- Surrogates Outside Limits (Table 4);
- MS/MSD Outside Limits (Table 5);
- LCS Outside Limits (Table 6); and
- Re-analysis Results (Table 7).

The inorganic data was originally reviewed Dean Momohara, Manchester Environmental Laboratory (MEL) on March 4, 2009. The laboratory provided analytical summaries for samples, including QC samples. No raw data was provided by the laboratory.

Metals by ICPMS	
Description	**Notes and Qualifiers**
Any compounds present in method and field blanks as noted on Table 2?	Yes – Copper was detected in the Field Blank.
For samples, if results are <3 times the blank then "U" flag data.	Samples results below the PQL are reported at the PQL and flagged U. Sample results greater than PQL are not changed and flagged U.
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
MS/MSD percent recovery values within QC criteria (see Table 4) of 75-125%? QC limits are not applicable to sample results greater than 4 times spike amount.	Yes
Sample and duplicate relative percent difference values within QC criteria (see Table 4) of <20%? Apply criteria only when both results are >PQL.	Yes
LCS percent recovery values within QC criteria (see Table 5) of 85-115%? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Is there one serial dilution per 20 samples? Are percent difference values within laboratory QC criteria?	Information not provided by the laboratory.
Spot check ICS recoveries 80-120%. Contact lab.	Information not provided by the laboratory.
Correlation Coefficient > 0.995.	Yes
ICV and CCV recovery between 90-110%. Contact lab.	Yes
Internal Standard recovery values for samples and MS/MSD within laboratory QC limits?	Yes.

Summary of Potential Impacts on Data Usability
Major Concerns
None
Minor Concerns
None

Table 3 - List of Positive Results for Blank Samples

Method	Sample ID	Samp Type	Analyte	Result	Qual	Anal Type	Units	PQL	MDL
EPA 200.8	0902008-11	FBLK	Copper	0.71		A	µg/L	0.10	0.02

Table 3A - List of Samples Qualified for Method Blank Contamination

None

Table 4 - List of Samples with Surrogates outside Control Limits

None

Table 5 - List MS/MSD Percent Recovery Values and RPDs outside Control Limits
None

Table 6 - List LCS Percent Recovery Values outside Control Limits
None

Table 7 –Samples that were Reanalyzed
None

Key:
A = Analyte
NC = Not Calculated
ND = Not Detected
PQL = Practical Quantitation Limit
RPD = Relative Percent Difference

Data Validation Qualifiers:

Code	Description
B	Analyte detected in sample and method blank. Reported result is sample concentration without blank correction or associated quantitation limit.
JG	Analyte was positively identified. Value may be greater than the reported estimate.
JK	Analyte was positively identified. Reported result is an estimate with unknown bias.
JL	Analyte was positively identified. Value may be less than the reported estimate.
JT	Analyte was positively identified. Reported result is an estimate below the associated quantitation limit but above the MDL.
JTG	Analyte was positively identified. Value may be greater than the reported result, which is an estimate below the associated quantitation limit but above the MDL.
JTK	Analyte was positively identified. Reported result is an estimate with unknown bias, below the associated quantitation limit but above the MDL.
JTL	Analyte was positively identified. Value may be less than the reported result which is an estimate below associated quantitation limit but above MDL.
NJ	There is evidence that the analyte is present in the sample. Reported result for the tentatively identified analyte is an estimate.
NJT	There is evidence the analyte is present in the sample. Reported result for the tentatively identified analyte is an estimate below the associated quantitation limit but above the MDL.
NU	There is evidence the analyte is present in the sample. Tentatively identified analyte was not detected at or above the reported result.
NUJ	There is evidence the analyte is present in the sample. Tentatively identified analyte was not detected at or above the reported estimate.
REJ	Data are unusable for all purposes. Sample results rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
U	Analyte was not detected at or above the reported result.
UJG	Analyte was not detected at or above the reported estimate with likely low bias.
UJK	Analyte was not detected at or above the reported estimate with unknown bias.
UJL	Analyte was not detected at or above the reported estimate with likely high bias.

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Copper

Project Name: Phase 3: Priority Pollutant Scans of Ten
Work Order: 0902008
Project Officer: Maroncelli, Jim

Analyte: Copper
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
0902008-01	Sumner	**13.2**		0.10	0.02	02/12/09	03/02/09	B09B136
0902008-02	Gig Harbor	**9.28**		0.10	0.02	02/10/09	03/02/09	B09B136
0902008-03	Shelton	**7.31**		0.10	0.02	02/10/09	03/02/09	B09B136
0902008-04	Everett	**11.8**		0.10	0.02	02/12/09	03/02/09	B09B136
0902008-05	Burlington	**2.56**		0.10	0.02	02/10/09	03/02/09	B09B136
0902008-06	Bremerton	**3.52**		0.10	0.02	02/10/09	03/02/09	B09B136
0902008-07	Tacoma	**9.65**		0.10	0.02	02/19/09	03/02/09	B09B136
0902008-08	Chambers Creek	**11.9**		0.10	0.02	02/19/09	03/02/09	B09B136
0902008-09	Metro West Point	**11.7**		0.10	0.02	02/10/09	03/02/09	B09B136
0902008-10	Bellingham	**6.21**		0.10	0.02	02/12/09	03/02/09	B09B136
0902008-11	Field Blank	**0.71**		0.10	0.02	02/12/09	03/02/09	B09B136

QC Results for Batch ID: B09B136

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B09B136-BLK1	Blank	0.10	U	0.10	03/02/09

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B09B136-BS1	LCS	20.8	20			104	85-115		
B09B136-DUP1	Duplicate	11.6		0902008-09	11.7			0.4	20
B09B136-MS1	Matrix Spike	28.8	20	0902008-02	9.28	98	75-125		
B09B136-MSD1	Matrix Spike Dup	28.8	20	0902008-02	9.28	97	75-125	0.07	20

10 Mar 2009

Authorized by: DM Release Date: 3/4/09

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Lead

Project Name: Phase 3: Priority Pollutant Scans of Ten
Work Order: 0902008
Project Officer: Maroncelli, Jim

Analyte: Lead
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
0902008-01	**Sumner**	**0.18**		0.10	0.007	02/12/09	03/02/09	B09B136
0902008-02	**Gig Harbor**	**0.68**		0.10	0.007	02/10/09	03/02/09	B09B136
0902008-03	**Shelton**	**0.40**		0.10	0.007	02/10/09	03/02/09	B09B136
0902008-04	**Everett**	**1.17**		0.10	0.007	02/12/09	03/02/09	B09B136
0902008-05	**Burlington**	**0.31**		0.10	0.007	02/10/09	03/02/09	B09B136
0902008-06	**Bremerton**	**0.28**		0.10	0.007	02/10/09	03/02/09	B09B136
0902008-07	**Tacoma**	**0.72**		0.10	0.007	02/19/09	03/02/09	B09B136
0902008-08	**Chambers Creek**	**0.29**		0.10	0.007	02/19/09	03/02/09	B09B136
0902008-09	**Metro West Point**	**0.38**		0.10	0.007	02/10/09	03/02/09	B09B136
0902008-10	**Bellingham**	**0.44**		0.10	0.007	02/12/09	03/02/09	B09B136
0902008-11	Field Blank	0.10	U	0.10	0.007	02/12/09	03/02/09	B09B136

QC Results for Batch ID: B09B136

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B09B136-BLK1	Blank	0.10	U	0.10	03/02/09

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B09B136-BS1	LCS	20.9	20			105	85-115		
B09B136-DUP1	Duplicate	0.376		0902008-09	0.38			2	20
B09B136-MS1	Matrix Spike	20.3	20	0902008-02	0.680	98	75-125		
B09B136-MSD1	Matrix Spike Dup	20.3	20	0902008-02	0.680	98	75-125	0.1	20

1 10 April 2009

Authorized by: DM

Release Date: 3/4/9

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for:
Zinc

Project Name: Phase 3: Priority Pollutant Scans of Ten	Analyte: Zinc
Work Order: 0902008	Method: EPA200.8
Project Officer: Maroncelli, Jim	Matrix: Water
	Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
0902008-01	Sumner	49.9		5.0	0.5	02/12/09	03/02/09	B09B136
0902008-02	Gig Harbor	76.2		5.0	0.5	02/10/09	03/02/09	B09B136
0902008-03	Shelton	44.5		5.0	0.5	02/10/09	03/02/09	B09B136
0902008-04	Everett	29.6		5.0	0.5	02/12/09	03/02/09	B09B136
0902008-05	Burlington	41.1		5.0	0.5	02/10/09	03/02/09	B09B136
0902008-06	Bremerton	21.7		5.0	0.5	02/10/09	03/02/09	B09B136
0902008-07	Tacoma	44.5		5.0	0.5	02/19/09	03/02/09	B09B136
0902008-08	Chambers Creek	34.5		5.0	0.5	02/19/09	03/02/09	B09B136
0902008-09	Metro West Point	33.0		5.0	0.5	02/10/09	03/02/09	B09B136
0902008-10	Bellingham	39.7		5.0	0.5	02/12/09	03/02/09	B09B136
0902008-11	Field Blank	5.0	U	5.0	0.5	02/12/09	03/02/09	B09B136

QC Results for Batch ID: B09B136

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B09B136-BLK1	Blank	5.0	U	5.0	03/02/09

10 April 2009

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B09B136-BS1	LCS	21.9	20			109	85-115		
B09B136-DUP1	Duplicate	33.0		0902008-09	33.0			0.06	20
B09B136-MS1	Matrix Spike	95.1	20	0902008-02	76.2	94	75-125		
B09B136-MSD1	Matrix Spike Dup	95.4	20	0902008-02	76.2	96	75-125	0.3	20

Authorized by: DM

Release Date: 3/4/9

Quality Assurance Review Level 1 Report	Project: Ecology – POTW Pollution Scans
Date Completed: September 15, 2009	Completed by: Mark Woodke

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1, PTI, 1989). Specific criteria for QC limits were obtained from the project QAPP. Compliance with the project QA program is indicated on the in the checklist and tables. Any major or minor concern affecting data usability is summarized below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Reference:

Table 1 Sample Summary Tables from Electronic Data Deliverable

Work Order	Sample ID	Lab ID	Sample Date	Lab QC	ID Corrections
0907021	Gig Harbor	0907021-01	07/14/2009		
0907021	Bremerton	0907021-02	07/14/2009	MS/MSD	
0907021	Shelton	0907021-03	07/14/2009		
0907021	West Point	0907021-04	07/14/2009		
0907021	Burlington	0907021-05	07/16/2009		
0907021	Tacoma	0907021-06	07/16/2009		
0907021	Chambers Creek	0907021-07	07/16/2009		
0907021	Sumner	0907021-08	07/17/2009		
0907021	Bellingham	0907021-09	07/16/2009		
0907021	Everett	0907021-10	07/16/2009		
0907021	Rinsate	0907021-11	07/14/2009		

Table 2 Work Orders, Tests and Number of Samples included in this DUSR

Work Order	Matrix	Test Method	Method Name	Number of Samples
0907021	Water	EPA 200.8	Inductively Coupled Plasma – Mass Spectrometry	11

General Sample Information	
Do Samples and Analyses on COC check against Lab Sample Tracking Form?	Yes, implied in the data review memorandum by Dean Momohara.
Did coolers arrive at lab between 0^oC and 6^oC and in good condition as indicated on COC and Cooler Receipt Form?	Yes, implied in the data review memorandum by Dean Momohara.
Frequency of Field QC Samples Correct? Field Duplicate – Not required. Field Blank – Not required. MS/MSD samples – 1/20 samples.	Yes.
Case narrative present and complete?	Yes.
Any holding time violations?	No.

The following tables are presented at the end of this QA1 Review Memorandum and provide summaries of results outside QC criteria.

- Method Blank Results (Table 3);
- MS/MSD Outside Limits (Table 4);
- LCS Outside Limits (Table 5); and
- Re-analysis Results (Table 6).

The inorganic data was originally reviewed by Dean Momohara, Manchester Environmental Laboratory (MEL) on August 3, 2009. The laboratory provided analytical summaries for samples, including QC samples. No raw data was provided by the laboratory.

Metals by GC/ECD	
Description	**Notes and Qualifiers**
Any compounds present in method and field blanks as noted on Table 3?	No.
For samples, if results are <3 times the blank then "U" flag data.	Not applicable.
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes.
MS/MSD percent recovery values within QC criteria (see Table 4) of 75 – 125%? QC limits are not applicable to sample results greater than 4 times spike amount.	Yes.
Sample and duplicate relative percent difference values within QC criteria (see Table 4) of < 20%? Apply criteria only when both results are >PQL.	Yes.
LCS percent recovery values within QC criteria (see Table 5) of 85-115%? If the value is high with no positive values in the associated data, then no qualification is required.	Yes.
Is there one serial dilution per 20 samples? Are percent difference values within laboratory QC criteria?	Information not provided by the laboratory.
Spot check ICS recoveries 80-120. Contact lab.	Information not provided by the laboratory.
Correlation coefficient > 0.995?	Yes.
ICV and CCV recovery between 90-110%. Contact lab.	Yes.
Internal standard recovery values for samples and MS/MSD within laboratory QC limits?	Yes.

Summary of Potential Impacts on Data Usability
Major Concerns
None
Minor Concerns
None

Table 3 – List of Positive Results for Blank Samples
None

Table 3A - List of Samples Qualified for Method Blank Contamination
None

Table 4 – List of MS/MSD Percent Recovery Values and RPDs outside Control Limits
None

Table 5 – List of LCS Percent Recovery Values Outside Control Limits
None.

Table 6 - Samples that were Reanalyzed
None.

Key:
A = Analyte
NC = Not Calculated
ND = Not Detected
PQL = Practical Quantitation Limit
RPD = Relative Percent Difference

Data Validation Qualifiers:

Code	Description
B	Analyte detected in sample and method blank. Reported result is sample concentration without blank correction or associated quantitation limit.
JG	Analyte was positively identified. Value may be greater than the reported estimate.
JK	Analyte was positively identified. Reported result is an estimate with an unknown bias.
JL	Analyte was positively identified. Value may be less than the reported estimate.
JT	Analyte was positively identified. Reported result is an estimate below the associated quantitation limit but above the MDL.
JTG	Analyte was positively identified. Value may be greater than the reported result, which is an estimate below the associated quantitation limit but above the MDL.
JTK	Analyte was positively identified. Reported result is an estimate with unknown bias, below the associated quantitation limit but above the MDL.
JTL	Analyte was positively identified. Value may be less than the reported result which is an estimate below associated quantitation limit but above the MDL.
NJ	There is evidence that the analyte is present in the sample. Reported result for the tentatively identified analyte is an estimate.
NJT	There is evidence that the analyte is present in the sample. Reported result for the tentatively identified analyte is an estimate below the associated quantitation limit but above the MDL.
NU	There is evidence that the analyte is present in the sample. Tentatively identified analyte was not detected at or above the reported result.
NUJ	There is evidence that the analyte is present in the sample. Tentatively identified analyte was not detected at or above the reported estimate.
REJ	Data are unusable for all purposes. Sample results rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
U	Analyte was not detected at or above the reported result.
UJG	Analyte was not detected at or above the reported estimate with likely low bias.
UJK	Analyte was not detected at or above the reported estimate with unknown bias.
UJL	Analyte was not detected at or above the reported estimate with likely high bias.

Appendix C.

Summary of Analytical Results

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Bellingham STP				Bremerton STP				Burlington WWTP				City of Tacoma (Central No. 1)				Everett STP (Outfall 100)			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (PAHs)																							
Low Molecular Weight PAHs (LPAHs)																							
Acenaphthene		83-32-9	ug/L	6.10E-03	U	5.70E-03	UJG	6.50E-03	U	8.20E-02	JG	6.00E-03	U	6.30E-03	UJG	1.10E-02		5.80E-03	UJG	6.60E-03	U	6.00E-03	UJG
Acenaphthylene		208-96-8	ug/L	6.10E-03	U	5.70E-03	UJG	6.50E-03	U	5.20E-02		6.00E-03	U	6.30E-03	UJG	5.80E-03	JT	5.80E-03	UJG	6.60E-03	U	6.00E-03	UJG
Anthracene		120-12-7	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	8.20E-03		6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	6.00E-03	U
Fluorene		86-73-7	ug/L	1.10E-02		5.70E-03	U	6.90E-03		1.70E-01		1.10E-02		6.30E-03	UJG	2.20E-02		5.80E-03	U	6.60E-03	U	6.00E-03	U
Naphthalene		91-20-3	ug/L	3.70E-02	UFB	5.70E-03	UJG	4.00E-02	UFB	3.40E-01	JG	2.70E-02	UFB	6.30E-03	JTG	3.60E-02	UFB	1.20E-02	UJG	1.80E-02	UFB	1.20E-02	UJG
Phenanthrene		85-01-8	ug/L	1.10E-02		3.90E-03	JT	5.40E-03	JT	6.60E-02		6.00E-03	U	6.30E-03	UJG	8.00E-03		5.80E-03	U	6.60E-03	U	6.00E-03	U
Number of Detects =				2		1		2		6		1		1		4		0		0		0	
Sum of Detects =			ug/L	2.20E-02		3.90E-03	J	1.23E-02	J	7.18E-01	J	1.10E-02		6.30E-03	J	4.68E-02	J	1.20E-02	U	1.80E-02	U	1.20E-02	U
High Molecular Weight PAHs (HPAHs)																							
Benzo(a)anthracene		56-55-3	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	6.20E-03	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	5.50E-03	JT
Benzo(a)pyrene		50-32-8	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	1.20E-02	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	1.20E-02	U
Benzo(b)fluoranthene		205-99-2	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	6.20E-03	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	2.10E-02	JL
Benzo(g,h,i)perylene		191-24-2	ug/L	6.10E-03	U	5.70E-03	UJG	6.50E-03	U	1.20E-02	UJG	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	UJG	5.90E-03	JT	1.20E-02	UJG
Benzo(k)fluoranthene		207-08-9	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	6.20E-03	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	6.00E-03	U
Chrysene		218-01-9	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	6.20E-03	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	8.20E-03	
Dibenzo(a,h)anthracene		53-70-3	ug/L	6.10E-03	U	5.70E-03	UJG	6.50E-03	U	1.20E-02	UJG	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	UJG	6.60E-03	U	1.20E-02	UJG
Fluoranthene		206-44-0	ug/L	8.40E-03		4.00E-03	JT	3.70E-03	JT	4.80E-03	JT	3.70E-03	JT	2.00E-03	JTG	1.50E-02		5.80E-03	U	8.70E-03		9.80E-03	
Indeno(1,2,3-cd)pyrene		193-39-5	ug/L	6.10E-03	U	5.70E-03	UJG	6.50E-03	U	1.20E-02	UJG	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	UJG	1.60E-02		1.20E-02	UJG
Pyrene		129-00-0	ug/L	7.80E-03		6.60E-03		6.00E-03	JT	5.60E-03	JT	4.50E-03	JT	5.00E-03	JTG	1.80E-02		5.20E-03	JT	1.60E-02		3.10E-02	
Number of Detects =				2		2		2		2		2		2		2		1		4		5	
Sum of Detects =			ug/L	1.62E-02		1.06E-02	J	9.70E-03	J	1.04E-02	J	8.20E-03	J	7.00E-03	J	3.30E-02		5.20E-03	J	4.66E-02	J	7.55E-02	J
Carcinogenic PAHs (cPAHs)																							
Benzo(a)anthracene		56-55-3	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	6.20E-03	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	5.50E-03	JT
Benzo(a)pyrene		50-32-8	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	1.20E-02	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	1.20E-02	U
Benzo(b)fluoranthene		205-99-2	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	6.20E-03	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	2.10E-02	JL
Benzo(k)fluoranthene		207-08-9	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	6.20E-03	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	6.00E-03	U
Chrysene		218-01-9	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	6.20E-03	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	8.20E-03	
Dibenzo(a,h)anthracene		53-70-3	ug/L	6.10E-03	U	5.70E-03	UJG	6.50E-03	U	1.20E-02	UJG	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	UJG	6.60E-03	U	1.20E-02	UJG
Indeno(1,2,3-cd)pyrene		193-39-5	ug/L	6.10E-03	U	5.70E-03	UJG	6.50E-03	U	1.20E-02	UJG	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	UJG	1.60E-02		1.20E-02	UJG
Number of Detects =				0		0		0		0		0		0		0		0		1		3	
Sum of Detects =			ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	1.20E-02	U	6.00E-03	U	6.30E-03	U	7.40E-03	U	5.80E-03	U	1.60E-02		3.47E-02	J
Total PAHs (LPAHs+HPAHs)																							
Number of Detects =				4		3		4		8		3		3		6		1		4		5	
Sum of Detects =			ug/L	3.82E-02		1.45E-02	J	2.20E-02	J	7.28E-01	J	1.92E-02	J	1.33E-02	J	7.98E-02	J	5.20E-03	J	4.66E-02	J	7.55E-02	J
Phthalates																							
bis(2-Ethylhexyl) phthalate		117-81-7	ug/L	5.90E-01	UJL	4.70E-01		2.40E+00		4.30E-01		5.30E-01		8.40E-01		2.80E+00		2.30E+00		3.40E+00		5.30E+00	
Butylbenzyl phthalate		85-68-7	ug/L	6.00E-01	U	6.00E-01	U	1.00E-01	JT	5.90E-01	U	4.60E-01		6.40E-01	U	1.90E-01	JT	5.90E-01	U	6.50E-01	UJK	6.00E-01	U
Di-N-butyl phthalate		84-74-2	ug/L	4.90E-01		2.60E-01	UJL	3.60E-01	UJL	1.90E-01	UJL	2.40E-01	UJL	3.90E-01	UJL	2.80E-01	UJG	2.40E-01	UJL	1.60E-01	U	2.50E-01	UJL
Di-N-octyl phthalate		117-84-0	ug/L	3.00E-01	UJG	3.00E-01	U	2.90E-01	U	3.00E-01	U	2.80E-01	U	3.20E-01	U	3.60E-01	U	2.90E-01	U	3.20E-01	UJG	3.00E-01	U
Diethyl phthalate		84-66-2	ug/L	3.00E-01	U	2.70E-01	UFB	2.90E-01	U	3.00E-01	U	3.40E-01		3.20E-01	U	1.40E-01	JT	2.90E-01	U	3.20E-01	UJK	3.00E-01	U
Dimethyl phthalate		131-11-3	ug/L	3.00E-01	UFB	3.00E-01	U	2.90E-01	U	3.00E-01	U	2.80E-01	U	3.20E-01	U	3.60E-01	U	2.90E-01	U	3.20E-01	UJK	3.00E-01	U
Number of Detects =				1		1		2		1		3		1		3		1		1		1	
Sum of Detects =			ug/L	4.90E-01		4.70E-01		2.50E+00		4.30E-01		1.33E+00		8.40E-01		3.13E+00	J	2.30E+00		3.40E+00		5.30E+00	

Chemical of Concern	Alternate Name	CAS Number	Units	Gig Harbor STP				King County West Point				Pierce County Chambers Creek STP				Shelton STP				Sumner STP			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (PAHs)																							
Low Molecular Weight PAHs (LPAHs)																							
Acenaphthene		83-32-9	ug/L	6.70E-03	U	8.90E-02	JG	1.20E-02		6.00E-03	UJG	1.40E-02		6.10E-03	UJG	6.30E-03	U	6.20E-03	UJG	5.50E-03	JT	1.50E-02	JG
Acenaphthylene		208-96-8	ug/L	6.70E-03	U	5.50E-02	JG	5.10E-03	JT	6.00E-03	UJK	6.50E-03	U	6.10E-03	UJG	6.30E-03	U	6.20E-03	UJG	3.20E-03	JT	2.30E-02	JG
Anthracene		120-12-7	ug/L	6.70E-03	U	8.40E-03	JG	3.90E-03	JT	6.00E-03	UJK	6.50E-03	U	6.61E-02	U	6.30E-03	U	6.20E-03	U	6.20E-03	U	7.00E-03	
Fluorene		86-73-7	ug/L	6.70E-03	U	2.00E-01	JG	2.50E-02		6.00E-03	UJK	1.80E-02		1.10E-02		5.70E-03	JT	6.20E-03	U	9.00E-03		1.20E-01	
Naphthalene		91-20-3	ug/L	1.30E-01		3.70E-01	JG	4.40E-02	UFB	6.00E-03	UJG	6.30E-02		1.20E-02	UJG	2.50E-02	UFB	1.20E-02	UJG	3.00E-02	UFB	2.20E-02	JG
Phenanthrene		85-01-8	ug/L	6.10E-03	JT	7.10E-02	JG	1.60E-02		4.50E-03	JTK	1.60E-02		1.40E-02		5.10E-03	JT	6.20E-03	U	6.00E-03	JT	5.40E-02	
Number of Detects =				2		6		5		1		4		2		2		0		4		6	
Sum of Detects =			ug/L	1.36E-01		7.93E-01	J	6.20E-02	J	4.50E-03	J	1.11E-01		2.50E-02		1.08E-02	J	1.20E-02	U	2.37E-02	J	2.41E-01	J
High Molecular Weight PAHs (HPAHs)																							
Benzo(a)anthracene		56-55-3	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	U	6.50E-03	U	6.61E-02	U	6.30E-03	U	6.20E-03	U	6.20E-03	U	6.20E-03	U
Benzo(a)pyrene		50-32-8	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	U	6.50E-03	U	1.20E-02	U	6.30E-03	U	1.20E-02	U	6.20E-03	U	1.20E-02	U
Benzo(b)fluoranthene		205-99-2	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	U	6.50E-03	U	6.10E-03	U	6.30E-03	U	6.20E-03	U	6.20E-03	U	6.20E-03	U
Benzo(g,h,i)perylene		191-24-2	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	UJG	6.50E-03	U	1.20E-02	UJG	6.30E-03	U	1.20E-02	UJG	6.20E-03	U	1.20E-02	UJG
Benzo(k)fluoranthene		207-08-9	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	U	6.50E-03	U	6.10E-03	U	6.30E-03	U	6.20E-03	U	6.20E-03	U	6.20E-03	U
Chrysene		218-01-9	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	U	6.50E-03	U	6.10E-03	U	6.30E-03	U	6.20E-03	U	6.20E-03	U	6.20E-03	U
Dibenzo(a,h)anthracene		53-70-3	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	UJG	6.50E-03	U	1.20E-02	UJG	6.30E-03	U	1.20E-02	UJG	6.20E-03	U	1.20E-02	UJG
Fluoranthene		206-44-0	ug/L	6.70E-03	U	4.70E-03	JTG	7.50E-03		4.40E-03	JT	8.50E-03		9.50E-03		6.30E-03	U	6.20E-03	U	4.90E-03	JT	4.80E-03	JT
Indeno(1,2,3-cd)pyrene		193-39-5	ug/L	6.70E-03	U	1.30E-02	UJG	4.70E-03	JT	6.00E-03	UJG	6.50E-03	U	1.20E-02	UJG	6.30E-03	U	1.20E-02	UJG	6.20E-03	U	1.20E-02	UJG
Pyrene		129-00-0	ug/L	4.30E-03	JT	1.10E-02	JG	1.40E-02		7.70E-03		6.80E-03		6.30E-03		6.30E-03	U	6.20E-03	U	4.30E-03	JT	3.20E-03	JT
Number of Detects =				1		2		3		2		2		2		0		0		2		2	
Sum of Detects =			ug/L	4.30E-03	J	1.57E-02	J	2.62E-02	J	1.21E-02	J	1.53E-02		1.58E-02		6.30E-03	U	1.20E-02	U	9.20E-03	J	8.00E-03	J
Carcinogenic PAHs (cPAHs)																							
Benzo(a)anthracene		56-55-3	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	U	6.50E-03	U	6.61E-02	U	6.30E-03	U	6.20E-03	U	6.20E-03	U	6.20E-03	U
Benzo(a)pyrene		50-32-8	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	U	6.50E-03	U	1.20E-02	U	6.30E-03	U	1.20E-02	U	6.20E-03	U	1.20E-02	U
Benzo(b)fluoranthene		205-99-2	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	U	6.50E-03	U	6.10E-03	U	6.30E-03	U	6.20E-03	U	6.20E-03	U	6.20E-03	U
Benzo(k)fluoranthene		207-08-9	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	U	6.50E-03	U	6.10E-03	U	6.30E-03	U	6.20E-03	U	6.20E-03	U	6.20E-03	U
Chrysene		218-01-9	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	U	6.50E-03	U	6.10E-03	U	6.30E-03	U	6.20E-03	U	6.20E-03	U	6.20E-03	U
Dibenzo(a,h)anthracene		53-70-3	ug/L	6.70E-03	U	1.30E-02	UJG	5.90E-03	U	6.00E-03	UJG	6.50E-03	U	1.20E-02	UJG	6.30E-03	U	1.20E-02	UJG	6.20E-03	U	1.20E-02	UJG
Indeno(1,2,3-cd)pyrene		193-39-5	ug/L	6.70E-03	U	1.30E-02	UJG	4.70E-03	JT	6.00E-03	UJG	6.50E-03	U	1.20E-02	UJG	6.30E-03	U	1.20E-02	UJG	6.20E-03	U	1.20E-02	UJG
Number of Detects =				0		0		1		0		0		0		0		0		0		0	
Sum of Detects =			ug/L	6.70E-03	U	1.30E-02	U	4.70E-03	J	6.00E-03	U	6.50E-03	U	1.20E-02	U	6.30E-03	U	1.20E-02	U	6.20E-03	U	1.20E-02	U
Total PAHs (LPAHs+HPAHs)																							
Number of Detects =				3		8		8		3		6		4		2		0		6		8	
Sum of Detects =			ug/L	1.40E-01		8.09E-01	J	8.82E-02	J	1.66E-02	J	1.26E-01		4.08E-02		1.08E-02	J	1.20E-02	U	3.29E-02	J	2.49E-01	J
Phthalates																							
bis(2-Ethylhexyl) phthalate		117-81-7	ug/L	1.40E+00		1.80E+00		1.40E+00		8.70E-01		1.20E+00		4.10E-01		1.00E+00		2.40E-01	JT	1.10E+00	UJL	1.90E-01	JT
Butylbenzyl phthalate		85-68-7	ug/L	8.00E-02	JT	6.30E-01	U	1.90E-01	JT	5.70E-01	U	6.80E-01	U	5.90E-01	U	6.30E-01	U	5.90E-01	U	6.20E-01	UJK	6.00E-01	U
Di-N-butyl phthalate		84-74-2	ug/L	2.20E-01	UJL	3.20E-01	UJL	3.80E-01	UJL	2.10E-01	UJL	1.50E-01	JT	3.30E-01	UJL	4.30E-01	UJL	2.20E-01	UJL	1.50E-01	U	2.40E-01	UJL
Di-N-octyl phthalate		117-84-0	ug/L	3.20E-01	U	3.20E-01	U	2.90E-01	U	2.90E-01	U	3.40E-01	U	2.90E-01	U	3.20E-01	U	2.90E-01	U	3.10E-01	UJK	3.00E-01	U
Diethyl phthalate		84-66-2	ug/L	3.30E-01		5.40E-01	UFB	2.90E-01	U	2.90E-01	U	3.40E-01	U	2.90E-01	U	3.20E-01	U	2.90E-01	U	3.10E-01	JT	3.00E-01	U
Dimethyl phthalate		131-11-3	ug/L	3.20E-01	U	3.20E-01	U	2.90E-01	U	2.90E-01	U	3.40E-01	U	2.90E-01	U	3.20E-01	U	2.90E-01	U	3.10E-01	UJK	3.00E-01	U
Number of Detects =				3		1		2		1		2		1		1		1		1		1	
Sum of Detects =			ug/L	1.81E+00		1.80E+00		1.59E+00	J	8.70E-01		1.35E+00	J	4.10E-01		1.00E+00		2.40E-01	J	3.10E-01	J	1.90E-01	J

Chemical of Concern	Alternate Name	CAS Number	Units	Bellingham STP				Bremerton STP				Burlington WWTP				City of Tacoma (Central No. 1)				Everett STP (Outfall 100)			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Other Base/Neutral/Acid Extractables																							
1,2,4-Trichlorobenzene		120-82-1	ug/L	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.40E-01	U	1.60E-01	U	1.80E-01	U	1.50E-01	U	1.60E-01	U	1.50E-01	U
1,2-Dichlorobenzene		95-50-1	ug/L	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.40E-01	U	1.60E-01	U	1.80E-01	U	1.50E-01	U	1.60E-01	U	1.50E-01	U
1,3-Dichlorobenzene		541-73-1	ug/L	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.40E-01	U	1.60E-01	U	1.80E-01	U	1.50E-01	U	1.60E-01	U	1.50E-01	U
1,4-Dichlorobenzene		106-46-7	ug/L	2.40E-01		2.10E-01		1.60E-01		2.00E-01		8.60E-01		4.70E-01		5.10E-01		6.30E-01		9.00E-02	JT	1.50E-01	U
1-Methylnaphthalene		90-12-0	ug/L	9.90E-03	UJL	5.70E-03	UJG	1.20E-02	UJL	1.10E-01	JG	9.70E-03	UJL	6.30E-03	UJG	1.50E-02	UJL	1.20E-02	UJG	6.60E-03	U	1.20E-02	UJG
2,3,4,5-Tetrachlorophenol		4901-51-3	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
2,3,4,6-Tetrachlorophenol		58-90-2	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	UJL	6.40E-02	U	6.10E-02	UJL	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
2,4,5-Trichlorophenol		95-95-4	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
2,4,6-Trichlorophenol		88-06-2	ug/L	4.90E-02	JT	5.90E-02	JTG	3.30E-02	JT	1.50E-01	JG	2.90E-02	JT	9.80E-02	JG	1.20E-01		1.00E-01	JG	6.20E-02	U	6.60E-02	NJG
2,4-Dichlorophenol		120-83-2	ug/L	2.10E-01	JT	1.50E+00	U	2.50E-01	JT	1.50E+00	U	1.80E-01	JT	1.60E+00	U	2.90E-01	JT	1.50E+00	U	1.40E-01	JT	1.50E+00	U
2,4-Dimethylphenol		105-67-9	ug/L	1.50E+00	UJK	1.00E-01	JT		REJ	1.50E+00	U	2.20E-01	JTK	1.60E+00	U	1.80E+00	UJK	1.50E+00	U	1.60E+00	UJG	1.50E+00	U
2,4-Dinitrophenol		51-28-5	ug/L	1.50E+00	U	1.50E+00	U	1.50E+00	UJK	1.50E+00	U	2.20E-01	JTK	1.60E+00	U	1.80E+00	UJK	1.50E+00	UJG	1.60E+00	UJK	1.50E+00	UJG
2,4-Dinitrotoluene		121-14-2	ug/L	6.00E-01	U	6.00E-01	U	5.80E-01	U	5.90E-01	U	5.60E-01	U	6.40E-01	U	7.20E-01	U	5.90E-01	U	6.50E-01	UJK	6.00E-01	U
2,6-Dinitrotoluene		606-20-2	ug/L	6.00E-01	U	6.00E-01	U	5.80E-01	U	5.90E-01	U	5.60E-01	U	6.40E-01	U	7.20E-01	U	5.90E-01	U	6.50E-01	UJK	6.00E-01	U
2-Chloroethanol phosphate (3:1)		115-96-8	ug/L	na		7.00E-02	JT	na		2.70E-01		na		1.50E-01	JT	na		3.10E-01		na		4.30E-01	
2-Chloronaphthalene		91-58-7	ug/L	8.60E-03		5.70E-03	UJG	6.50E-03	U	6.20E-03	UJG	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	UJG	6.60E-03	U	6.00E-03	UJG
2-Chlorophenol		95-57-8	ug/L	6.00E-01	U	6.00E-01	U	5.80E-01	U	5.90E-01	U	5.60E-01	U	6.40E-01	U	7.20E-01	U	5.90E-01	U	6.50E-01	U	6.00E-01	U
2-Methylnaphthalene		91-57-6	ug/L	1.00E-02	UJL	5.70E-03	UJG	1.10E-02	UJL	1.70E-01	JG	8.20E-03	UJL	6.30E-03	UJG	8.20E-03	UJL	1.20E-02	UJG	6.60E-03	U	1.20E-02	UJG
2-Methylphenol	o-Cresol	95-48-7	ug/L	1.50E+00	U	1.50E+00	U	1.50E+00	U	1.50E+00	U	1.40E+00	U	1.20E-01	JT	1.80E+00	U	7.00E-02	JT	1.60E+00	U	1.50E+00	U
2-Nitroaniline	o-Nitroaniline	88-74-4	ug/L		REJ	3.00E+00	U	2.90E+00	UJK	3.00E+00	U	2.80E+00	UJK	3.20E+00	U		REJ	2.90E+00	U		REJ	3.00E+00	U
2-Nitrophenol		88-75-5	ug/L	3.00E-01	U	3.00E-01	U	1.70E-01	JT	3.00E-01	U	2.80E-01	U	3.20E-01	U	2.30E-01	JT	2.90E-01	U	3.20E-01	U	3.00E-01	U
3,3'-Dichlorobenzidine		91-94-1	ug/L		REJ	3.00E-01	UJK		REJ	3.00E-01	UJK		REJ	3.20E-01	UJK		REJ	2.90E-01	UJG		REJ	3.00E-01	UJG
3B-Coprostanol		360-68-9	ug/L	na		9.40E+00	JG	na		1.50E+00	UJG	na		1.50E+01	JG	na		1.40E+01	JG	na		1.50E+01	JG
3-Nitroaniline	m-Nitroaniline	99-09-2	ug/L		REJ	6.00E-01	U	5.80E-01	UJK	5.90E-01	U	5.60E-01	UJK	6.40E-01	U		REJ	5.90E-01	U		REJ	6.00E-01	U
4,6-Dinitro-2-methylphenol		534-52-1	ug/L	6.00E-01	U	6.00E-01	UJG	5.80E-01	U	5.90E-01	UJG	5.60E-01	U	6.40E-01	UJG	7.20E-01	U	5.90E-01	UJG	6.50E-01	U	6.00E-01	UJG
4-Bromophenylphenyl ether		101-55-3	ug/L	3.00E-01	U	3.00E-01	U	2.90E-01	U	3.00E-01	U	2.80E-01	U	3.20E-01	U	3.60E-01	U	2.90E-01	U	6.30E-01	U	3.00E-01	U
4-Chloro-3-methylphenol	p-Chloro-m-cresol	59-50-7	ug/L	1.50E+00	UJK	1.50E+00	U	1.50E+00	UJK	1.50E+00	U	1.40E+00	UJK	1.60E+00	U	1.80E+00	UJG	1.50E+00	U	1.60E+00	UJG	1.50E+00	U
4-Chloroaniline		106-47-8	ug/L		REJ		REJ		REJ		REJ		REJ		REJ		REJ		REJ		REJ		REJ
4-Chlorophenylphenyl ether		7005-72-3	ug/L	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.40E-01	U	1.60E-01	U	1.80E-01	U	1.50E-01	U	1.60E-01	UJK	1.50E-01	U
4-Methylphenol	p-Cresol	106-44-5	ug/L	4.90E-01	JTK	2.80E+00		2.60E-01	JTK	1.00E+00	JT	1.40E+00	UJK	1.60E+00	U	2.60E-01	JTG	1.50E+00	U	1.60E+00	UJG	1.50E+00	U
4-Nitroaniline	p-Nitroaniline	100-01-6	ug/L		REJ	6.00E-01	UJK		REJ	5.90E-01	UJK		REJ	6.40E-01	UJK		REJ	5.90E-01	U		REJ	6.00E-01	UJL
4-Nitrophenol		100-02-7	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	UJL	6.40E-02	U	6.10E-02	UJL	6.40E-02	U	6.20E-02	UJL	6.10E-02	U	6.20E-02	U	6.30E-02	U
4-Nonylphenol		104-40-5	ug/L	6.00E-01	UJG	6.00E-01	U		REJ	5.90E-01	U	5.60E-01	U	6.40E-01	U	1.00E+00	JG	5.90E-01	U	6.50E-01	UFB	6.00E-01	U
Benzoic acid		65-85-0	ug/L	na		1.80E+00	UFB	na		1.50E+00	UFB	na		1.60E+00	UJG	na		1.50E+00	UJG	na		1.50E+00	UJG
Benzyl alcohol		100-51-6	ug/L	na		1.40E+00	JG	na		1.50E+00	UJG	na		1.60E+00	UJG	na		1.50E+00	UJG	na		1.50E+00	UJG
bis(2-Chloroethoxy) methane		111-91-1	ug/L		REJ	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.40E-01	U	1.60E-01	U		REJ	1.50E-01	U		REJ	1.50E-01	U
bis(2-Chloroethyl) ether		111-44-4	ug/L	3.00E-01	U	3.00E-01	U	2.90E-01	U	3.00E-01	U	2.80E-01	U	3.20E-01	U	3.60E-01	U	2.90E-01	U	3.20E-01	U	3.00E-01	U
Bisphenol A		80-05-7	ug/L		REJ	6.70E-01	JK	5.80E-01	UJK	8.40E-01		2.00E-01	JT	6.40E-01	U		REJ	1.20E+00	JK		REJ	6.00E-01	U
Caffeine		58-08-2	ug/L		REJ	3.00E-01	U	2.80E+00		1.00E-01	JT	1.20E+01		3.20E-01	U	5.30E-01	JTG	2.90E-01	U		REJ	3.00E-01	U
Carbazole		86-74-8	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	6.20E-03	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	6.00E-03	U
Cholesterol		57-88-5	ug/L	na		1.30E+01	JG	na		8.40E+00	JG	na		1.70E+01	JG	na		2.30E+01	JG	na		1.70E+01	JG
Dibenzofuran		132-64-9	ug/L	1.10E-02		5.70E-03	UJG	6.20E-03	JT	1.90E-01		6.10E-03		6.30E-03	UJG	1.90E-02		5.80E-03	UJG	6.60E-03	U	6.90E-03	JG
Hexachlorobutadiene		87-68-3	ug/L	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.40E-01	UJG	1.60E-01	U	1.80E-01	UJG	1.50E-01	U	1.60E-01	U	1.50E-01	U
Hexachlorocyclopentadiene		77-47-4	ug/L	6.00E-01	U	6.00E-01	UJG	5.80E-01	UJG	5.90E-01	UJG	5.60E-01	U	6.40E-01	UJG	7.20E-01	U	5.90E-01	UJG	6.50E-01	UJK	6.00E-01	UJG
Hexachloroethane		67-72-1	ug/L	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.40E-01	U	1.60E-01	U	1.80E-01	UJG	1.50E-01	U	1.60E-01	U	1.50E-01	U
Isophorone		78-59-1	ug/L	3.00E-01	U	6.00E-02	JT	2.90E-01	U	3.00E-01	U	2.80E-01	U	3.20E-01	U	3.60E-01	U	1.40E-01	JT	3.20E-01	U	3.00E-01	U
Nitrobenzene		98-95-3	ug/L	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.50E-01	U	1.40E-01	U	1.60E-01	U	1.80E-01	U	1.50E-01	U	1.60E-01	U	1.50E-01	U
N-Nitrosodimethylamine		62-75-9	ug/L	6.00E-01	U	na		5.80E-01	U	na		5.60E-01	U	na		6.50E-01	JTG	na		6.50E-01	U	na	
N-Nitrosodi-n-propylamine		621-64-7	ug/L	1.80E-01	U	1.80E-01	U	1.70E-01	U	1.80E-01	U	1.70E-01	U	1.90E-01	U	2.20E-01	U	1.80E-01	U	1.90E-01	U	1.80E-01	U
N-Nitrosodiphenylamine		86-30-6	ug/L	3.00E-01	UJG	3.00E-01	U	2.90E-01	UJK	3.00E-01	U	2.80E-01	UJK	3.20E-01	U	3.60E-01	UJK	2.90E-01	U	3.20E-01	UJG	3.00E-01	U

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Gig Harbor STP				King County West Point				Pierce County Chambers Creek STP				Shelton STP				Sumner STP			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Other Base/Neutral/Acid Extractables																							
1,2,4-Trichlorobenzene		120-82-1	ug/L	1.60E-01	U	1.60E-01	U	1.50E-01	U	1.40E-01	U	1.70E-01	U	1.50E-01	U	1.60E-01	U	1.50E-01	U	1.50E-01	U	1.50E-01	U
1,2-Dichlorobenzene		95-50-1	ug/L	1.60E-01	UFB	1.60E-01	U	1.50E-01	U	1.40E-01	U	1.70E-01	U	7.00E-02	JTG	1.60E-01	UFB	1.50E-01	U	1.50E-01	UFB	1.50E-01	U
1,3-Dichlorobenzene		541-73-1	ug/L	1.60E-01	UFB	1.60E-01	U	1.50E-01	U	1.40E-01	U	1.70E-01	U	1.50E-01	U	1.60E-01	UFB	1.50E-01	U	1.50E-01	U	1.50E-01	U
1,4-Dichlorobenzene		106-46-7	ug/L	2.90E-01		1.10E-01	JTG	2.20E+00		7.60E-01		2.20E-01		2.80E-01		7.00E-02	JT	7.00E-02	JT	1.40E-01	JT	1.90E-01	
1-Methylnaphthalene		90-12-0	ug/L	1.20E-02	UJL	1.20E-01	JG	2.00E-02		6.00E-03	UJG	2.50E-02		1.20E-02	UJG	8.40E-03	UJL	1.20E-02	UJK	1.20E-02	UJL	8.00E-03	JG
2,3,4,5-Tetrachlorophenol		4901-51-3	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
2,3,4,6-Tetrachlorophenol		58-90-2	ug/L	6.30E-02	UJL	6.40E-02	U	6.20E-02	UJL	6.60E-02	U	6.40E-02	U	6.30E-02	U	1.50E-01	JL	6.20E-02	U	6.20E-02	U	6.40E-02	U
2,4,5-Trichlorophenol		95-95-4	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
2,4,6-Trichlorophenol		88-06-2	ug/L	1.60E-01		1.70E-01	JG	4.60E-02	JT	2.30E-01	JG	9.20E-02		1.20E-01	JG	3.00E-01		2.70E-01	JG	5.70E-02	JT	2.20E-02	JTG
2,4-Dichlorophenol		120-83-2	ug/L	2.70E-01	JT	1.60E+00	U	2.10E-01	JT	1.40E+00	U	2.70E-01	JT	1.50E+00	U	1.60E+00	U	1.50E+00	U	1.50E-01	JTK	1.50E+00	U
2,4-Dimethylphenol		105-67-9	ug/L	3.40E-01	JTK	5.00E-02	JT	2.40E-01	JTK	1.40E+00	U	3.10E-01	JTK	3.50E-01	JT		REJ	1.50E+00	U	1.50E+00	U	1.50E+00	U
2,4-Dinitrophenol		51-28-5	ug/L	3.40E-01	JTK	1.60E+00	UJG	2.40E-01	JTK	1.40E+00	U	1.70E+00	UJK	1.50E+00	U	1.60E+00	UJK	1.50E+00	UJG	1.20E-01	JT	1.50E+00	U
2,4-Dinitrotoluene		121-14-2	ug/L	6.30E-01	U	6.30E-01	U	5.90E-01	U	5.70E-01	U	6.80E-01	U	5.90E-01	U	6.30E-01	UJK	5.90E-01	U	6.20E-01	UJK	6.00E-01	U
2,6-Dinitrotoluene		606-20-2	ug/L	6.30E-01	U	6.30E-01	U	5.90E-01	U	5.70E-01	U	6.80E-01	U	5.90E-01	U	6.30E-01	U	5.90E-01	U	6.20E-01	UJK	6.00E-01	U
2-Chloroethanol phosphate (3:1)		115-96-8	ug/L	na		9.00E-02	JT	na		2.90E-01		na		4.10E-01		na		1.90E-01		na		1.90E-01	
2-Chloronaphthalene		91-58-7	ug/L	6.70E-03	U	6.60E-03	UJG	5.90E-03	U	6.00E-03	UJG	6.50E-03	U	6.10E-03	UJG	4.70E-03	JT	6.20E-03	UJG	6.20E-03	U	6.20E-03	UJG
2-Chlorophenol		95-57-8	ug/L	6.30E-01	U	6.30E-01	U	5.90E-01	U	5.70E-01	U	6.80E-01	U	5.90E-01	U	6.30E-01	U	5.90E-01	U	6.20E-01	U	6.00E-01	U
2-Methylnaphthalene		91-57-6	ug/L	9.40E-03	UJL	1.80E-01	JG	2.20E-02		6.00E-03	UJG	1.40E-02	UJL	1.20E-02	UJG	9.00E-03	UJL	1.20E-02	UJK	9.00E-03	UJL	1.30E-02	JG
2-Methylphenol	o-Cresol	95-48-7	ug/L	2.00E-01	JT	1.60E+00	U	1.90E-01	JT	1.40E+00	U	1.70E+00	U	1.50E+00	U	1.50E-01	JT	1.50E+00	U	1.90E-01	JT	1.50E+00	U
2-Nitroaniline	o-Nitroaniline	88-74-4	ug/L	3.20E+00	UJK	3.20E+00	U	2.90E+00	UJK	2.90E+00	U		REJ	2.90E+00	U	3.20E+00	UJK	2.90E+00	U		REJ	3.00E+00	U
2-Nitrophenol		88-75-5	ug/L	1.50E-01	JT	3.20E-01	U	2.90E-01	U	2.90E-01	U	3.40E-01	U	2.90E-01	U	3.20E-01	U	2.90E-01	U	3.10E-01	U	3.00E-01	U
3,3'-Dichlorobenzidine		91-94-1	ug/L		REJ	3.20E-01	UJG		REJ		REJ		REJ	2.90E-01	UJK		REJ	2.90E-01	UJG		REJ	3.00E-01	UJK
3B-Coprostanol		360-68-9	ug/L	na		2.00E+01	JG	na		8.70E+00	JG	na		7.70E+00	JG	na		6.10E+00	JG	na		4.30E+00	JG
3-Nitroaniline	m-Nitroaniline	99-09-2	ug/L	6.30E-01	UJK	6.30E-01	U	5.90E-01	UJK	5.70E-01	U		REJ	5.90E-01	U	6.30E-01	UJK	5.90E-01	U		REJ	6.00E-01	U
4,6-Dinitro-2-methylphenol		534-52-1	ug/L	6.30E-01	U	6.30E-01	UJG	5.90E-01	U	5.70E-01	UJG	6.80E-01	U	5.90E-01	UJG	6.30E-01	U	5.90E-01	UJG	6.20E-01	U	6.00E-01	UJG
4-Bromophenylphenyl ether		101-55-3	ug/L	3.20E-01	U	3.20E-01	U	2.90E-01	U	2.90E-01	U	3.40E-01	U	2.90E-01	U	3.20E-01	U	2.90E-01	U	3.10E-01	UJK	3.00E-01	U
4-Chloro-3-methylphenol	p-Chloro-m-cresol	59-50-7	ug/L	1.60E+00	UJK	1.60E+00	U	1.50E+00	UJK	1.40E+00	U	1.70E+00	UJK	1.50E+00	U	1.60E+00	UJK	1.50E+00	U	1.50E+00	UJK	1.50E+00	U
4-Chloroaniline		106-47-8	ug/L		REJ		REJ		REJ		REJ		REJ		REJ		REJ		REJ		REJ		REJ
4-Chlorophenylphenyl ether		7005-72-3	ug/L	1.60E-01	U	1.60E-01	U	1.50E-01	U	1.40E-01	U	1.70E-01	U	1.50E-01	U	1.60E-01	U	1.50E-01	U	1.50E-01	UJK	1.50E-01	U
4-Methylphenol	p-Cresol	106-44-5	ug/L	1.70E+00	UJK	8.10E+00		4.60E-01	JTK	4.80E-01	JT	2.30E-01	JTK	1.10E-01	JT	2.10E-01	JTK	1.20E-01	JT	2.10E-01	JT	1.50E+00	U
4-Nitroaniline	p-Nitroaniline	100-01-6	ug/L		REJ	6.30E-01	UJK		REJ	5.70E-01	UJG		REJ	5.90E-01	UJK		REJ	5.90E-01	U		REJ	6.00E-01	UJK
4-Nitrophenol		100-02-7	ug/L	6.30E-02	UJL	6.40E-02	U	6.20E-02	UJL	6.60E-02	UJG	6.40E-02	U	6.30E-02	U	6.30E-02	UJL	6.20E-02	U	6.20E-02	U	6.40E-02	U
4-Nonylphenol		104-40-5	ug/L		REJ	6.30E-01	U		REJ	5.70E-01	U	6.80E-01	UFB	5.90E-01	U		REJ	5.90E-01	U	8.40E-01	UFB	6.00E-01	U
Benzoic acid		65-85-0	ug/L	na		1.70E+00	UFB	na		1.40E+00	UFB	na		1.50E+00	UFB	na		1.50E+00	UJG	na		1.50E+00	UJG
Benzyl alcohol		100-51-6	ug/L	na		1.50E-01	JG	na		1.40E+00	UJG	na		9.00E-02	JG	na		1.50E+00	UJG	na		1.50E+00	UJG
bis(2-Chloroethoxy) methane		111-91-1	ug/L	1.60E-01	U	1.60E-01	U	1.50E-01	U	5.00E-02	JT		REJ	1.50E-01	U	1.60E-01	U	1.50E-01	U		REJ	1.50E-01	U
bis(2-Chloroethyl) ether		111-44-4	ug/L	3.20E-01	U	3.20E-01	U	2.90E-01	U	2.90E-01	U	3.40E-01	U	2.90E-01	U	3.20E-01	U	2.90E-01	U	3.10E-01	U	3.00E-01	U
Bisphenol A		80-05-7	ug/L	2.60E-01	JTK	6.30E-01	U	5.90E-01	UJK	1.10E+00	JL		REJ	1.60E+00	JK	2.80E-01	JTK	5.90E-01	U		REJ	6.00E-01	U
Caffeine		58-08-2	ug/L	4.20E+01		4.00E-01		7.00E-01		2.90E-01	U	5.90E-01	JTG	8.60E-01		8.00E-02	JT	2.90E-01	U		REJ	3.00E-01	U
Carbazole		86-74-8	ug/L	6.70E-03	U	3.60E-02	UJG	5.90E-03	U	6.00E-03	U	6.50E-03	U	6.10E-03	U	6.30E-03	U	6.20E-03	U	6.20E-03	U	6.20E-03	U
Cholesterol		57-88-5	ug/L	na		3.20E+01	JG	na		1.20E+01	JG	na		7.90E+00	JG	na		8.50E+00	JG	na		4.90E+00	JG
Dibenzofuran		132-64-9	ug/L	6.70E-03	U	1.90E-01	JG	2.10E-02		6.00E-03	UJK	1.60E-02		6.10E-03	UJG	5.60E-03	JT	6.20E-03	UJG	8.10E-03		9.50E-02	JG
Hexachlorobutadiene		87-68-3	ug/L	1.60E-01	U	1.60E-01	U	1.50E-01	U	1.40E-01	U	1.70E-01	U	1.50E-01	U	1.60E-01	U	1.50E-01	U	1.50E-01	U	1.50E-01	U
Hexachlorocyclopentadiene		77-47-4	ug/L	6.30E-01	UJG	6.30E-01	UJG	5.90E-01	UJG	5.70E-01	UJG	6.80E-01	U	5.90E-01	UJG	6.30E-01	UJG	5.90E-01	UJG	6.20E-01	UJK	6.00E-01	UJG
Hexachloroethane		67-72-1	ug/L	1.60E-01	U	1.60E-01	U	1.50E-01	U	1.40E-01	UJG	1.70E-01	U	1.50E-01	U	1.60E-01	U	1.50E-01	U	1.50E-01	U	1.50E-01	U
Isophorone		78-59-1	ug/L	3.20E-01	U	3.20E-01	U	2.90E-01	U	4.00E-02	JT	3.40E-01	U	2.90E-01	U	3.20E-01	U	2.00E-02	JT	3.10E-01	U	3.00E-01	U
Nitrobenzene		98-95-3	ug/L	1.60E-01	U	1.60E-01	U	1.50E-01	U	1.40E-01	U	1.70E-01	U	1.50E-01	U	1.60E-01	U	1.50E-01	U	1.50E-01	U	1.50E-01	U
N-Nitrosodimethylamine		62-75-9	ug/L	6.30E-01	U	na		5.90E-01	U	na		6.80E-01	U	na		6.30E-01	U	na		6.20E-01	U	na	
N-Nitrosodi-n-propylamine		621-64-7	ug/L	1.90E-01	U	1.90E-01	U	1.80E-01	U	1.70E-01	U	2.10E-01	U	1.80E-01	U	1.90E-01	U	1.80E-01	U	1.90E-01	U	1.80E-01	U
N-Nitrosodiphenylamine		86-30-6	ug/L	3.20E-01	UJK	3.20E-01	U	2.90E-01	UJK	2.90E-01	U	3.40E-01	UJK	2.90E-01	U	3.20E-01	UJK	2.90E-01	U	1.20E-01	JTG	3.00E-01	U

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Bellingham STP				Bremerton STP				Burlington WWTP				City of Tacoma (Central No. 1)				Everett STP (Outfall 100)			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Pentachlorophenol		87-86-5	ug/L	7.60E-02	NJT	5.60E-02	JT	4.40E-02	NJT	6.40E-02	U	3.70E-02	NJT	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
Phenol		108-95-2	ug/L	9.60E-01	JT	1.10E+00		8.60E-01	JG	1.40E+00		5.60E-01	UFB	1.10E-01	UFB	7.20E-01	UFB	5.90E-01	UFB	7.80E-01		6.00E-01	UFB
Retene		483-65-8	ug/L	6.10E-03	U	5.70E-03	U	6.50E-03	U	6.20E-03	U	6.00E-03	U	6.30E-03	UJG	7.40E-03	U	5.80E-03	U	6.60E-03	U	6.00E-03	U
Triclosan		3380-34-5	ug/L	2.90E-01		7.30E-01		5.50E-01		5.30E-01		1.80E-01	NJG	5.70E-01		8.80E-01	JG	1.30E+00		1.60E-01	UJG	8.50E-01	
Triethyl citrate		77-93-0	ug/L	5.10E-01	JT	1.40E+00		9.10E-01		7.10E-01		8.30E-01		3.50E+00		1.10E+00		1.20E+00		9.00E-02	JK	5.80E-01	JT
Number of Detects =				10		14		11		13		11		8		11		10		4		7	
Sum of Detects =			ug/L	2.84E+00	J	3.11E+01	J	6.04E+00	J	1.41E+01	J	1.48E+01		3.69E+01	J	5.59E+00	J	4.20E+01	J	1.10E+00	J	3.39E+01	J
Pesticides																							
2,4'-DDD		53-19-0	ug/L	na		2.60E-03	U	na		2.80E-03	U	na		2.60E-03	U	na		2.50E-03	U	na		2.60E-03	UJG
2,4'-DDE		3424-82-6	ug/L	na		2.60E-03	U	na		2.80E-03	U	na		2.60E-03	U	na		2.50E-03	U	na		2.60E-03	UJG
2,4'-DDT		789-02-6	ug/L	na		2.60E-03	U	na		2.80E-03	U	na		2.60E-03	U	na		2.50E-03	U	na		2.60E-03	UJG
4,4'-DDD		72-54-8	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
4,4'-DDE		72-55-9	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
4,4'-DDT		50-29-3	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Aldrin		309-00-2	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
alpha-BHC		319-84-6	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
beta-BHC		319-85-7	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.60E-03	UJK	2.50E-03	UJG	2.60E-03	UJG
delta-BHC		319-86-8	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	3.00E-03	UJK	2.50E-03	UJG	2.60E-03	UJG
gamma-BHC	Lindane	58-89-9	ug/L	4.00E-03	UJK	5.30E-03	UJL	3.70E-03	UJL	3.60E-03	UJL	4.90E-03	UJL	6.60E-03	UJL	3.90E-03	UJK	3.20E-03	UJL	2.50E-03	UJG	5.10E-03	UJK
cis-Chlordane		5103-71-9	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
trans-Chlordane		5103-74-2	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Chlordane, technical		12789-03-6	ug/L	na		2.60E-02	U	na		2.80E-02	U	na		2.60E-02	U	na		2.50E-02	U	na		2.60E-02	UJG
Chlorpyriphos		2921-88-2	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	1.20E-02	JG
Dacthal	DCPA	1861-32-1	ug/L	6.20E-02	U	2.60E-03	U	6.30E-02	U	2.80E-03	U	6.10E-02	U	2.60E-03	U	6.20E-02	U	2.50E-03	U	6.20E-02	U	2.60E-03	UJG
DDMU		1022-22-6	ug/L	na		2.60E-03	U	na		4.80E-03	UJK	na		2.60E-03	U	na		2.50E-03	U	na		2.60E-03	UJG
Dieldrin		60-57-1	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	6.80E-03	UJK	2.50E-03	UJG	2.60E-03	UJG
Endosulfan I		959-98-8	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.60E-03		2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Endosulfan II		33213-65-9	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Endosulfan sulfate		1031-07-8	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Endrin		72-20-8	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Endrin aldehyde		7421-93-4	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Endrin ketone		53494-70-5	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Heptachlor		76-44-8	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Heptachlor epoxide		1024-57-3	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Hexachlorobenzene		118-74-1	ug/L	2.50E-03	UJG	2.60E-03	U	3.10E-03	JK	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Methoxychlor		72-43-5	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Mirex		2385-85-5	ug/L	na		2.60E-03	U	na		2.80E-03	U	na		2.60E-03	U	na		2.50E-03	U	na		2.60E-03	UJG
cis-Nonachlor		5103-73-1	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
trans-Nonachlor		39765-80-5	ug/L	2.50E-03	UJG	2.60E-03	U	2.40E-03	U	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Oxychlordane		27304-13-8	ug/L	2.50E-03	UJG	2.60E-03	U	2.50E-03	UJK	2.80E-03	U	2.50E-03	U	2.60E-03	U	2.50E-03	UJG	2.50E-03	U	2.50E-03	UJG	2.60E-03	UJG
Pentachloroanisole		1825-21-4	ug/L	na		2.60E-03	U	na		2.80E-03	U	na		4.30E-03		na		2.50E-03	U	na		2.50E-03	JGT
Toxaphene		8001-35-2	ug/L	2.50E-02	UJG	1.00E-01	UJK	2.40E-02	U	1.50E-01	UJK	2.50E-02	U	1.10E-01	UJK	2.50E-02	UJG	1.60E-01	JK	2.50E-02	UJG	1.00E-01	UJG
Number of Detects =				0		0		1		0		1		1		0		1		0		2	
Sum of Detects =			ug/L	6.20E-02	U	1.00E-01	U	3.10E-03	J	1.50E-01	U	2.60E-03		4.30E-03		6.20E-02	U	1.60E-01	J	6.20E-02	U	1.45E-02	J

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Gig Harbor STP				King County West Point				Pierce County Chambers Creek STP				Shelton STP				Sumner STP			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Pentachlorophenol		87-86-5	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
Phenol		108-95-2	ug/L	1.00E+00	JT	1.10E+00		9.40E-01		2.80E+00	JG	6.80E-01	UFB	6.90E-01		6.30E-01	UFB	1.50E+00		6.20E-01	UFB	6.00E-01	UFB
Retene		483-65-8	ug/L	6.70E-03	U	6.60E-03	UJG	5.90E-03	U	6.00E-03	UJK	6.50E-03	U	6.10E-03	U	6.30E-03	U	1.60E-03	JT	6.20E-03	U	6.20E-03	U
Triclosan		3380-34-5	ug/L	5.50E-01	JG	9.30E-01		4.60E-01	JG	8.60E-01		4.70E-01	JG	1.00E+00		1.80E-01		3.60E-01		8.40E-01	UJG	3.00E-01	
Triethyl citrate		77-93-0	ug/L	1.10E+00		1.00E+00		6.00E-01		8.20E-01		1.10E+00		1.20E+00		3.70E-01	JT	1.90E-01	JT	1.30E-01	JK	4.60E-01	JT
Number of Detects =				12		15		14		12		10		14		11		11		9		10	
Sum of Detects =			ug/L	4.67E+01		6.46E+01	J	6.35E+00	J	2.81E+01	J	3.32E+00	J	2.24E+01	J	1.80E+00	J	1.73E+01	J	1.13E+00	J	1.05E+01	J
Pesticides																							
2,4'-DDD		53-19-0	ug/L	na		2.50E-03	UJG	na		2.70E-03	UJG	na		3.40E-03	UJK	na		2.50E-03	U	na		4.50E-03	UJK
2,4'-DDE		3424-82-6	ug/L	na		2.50E-03	UJG	na		2.70E-03	UJG	na		2.50E-03	U	na		2.50E-03	U	na		2.50E-03	U
2,4'-DDT		789-02-6	ug/L	na		2.50E-03	UJG	na		2.70E-03	UJG	na		2.50E-03	U	na		2.50E-03	U	na		2.50E-03	U
4,4'-DDD		72-54-8	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
4,4'-DDE		72-55-9	ug/L	2.50E-03	U	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
4,4'-DDT		50-29-3	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Aldrin		309-00-2	ug/L	2.50E-03	U	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
alpha-BHC		319-84-6	ug/L	3.50E-03	JG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
beta-BHC		319-85-7	ug/L	2.50E-03	UJG	4.20E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	3.60E-03	UJK	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
delta-BHC		319-86-8	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.60E-03	UJK	2.50E-03	U	2.50E-03	U
gamma-BHC	Lindane	58-89-9	ug/L	4.90E-03	UJK	1.00E-02	UJK	2.90E-03	UJK	4.70E-03	UJK	4.80E-03	UJK	2.50E-03	U	4.30E-03	UJL	2.70E-03	UJL	4.50E-03	UJL	2.70E-03	UJL
cis-Chlordane		5103-71-9	ug/L	2.50E-03	U	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
trans-Chlordane		5103-74-2	ug/L	5.10E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	4.00E-03	UJK	2.50E-03	U	2.50E-03	U	2.50E-03	U
Chlordane, technical		12789-03-6	ug/L	na		5.10E-02	UJG	na		5.30E-02	UJG	na		2.50E-02	U	na		2.50E-02	U	na		2.50E-02	U
Chlorpyriphos		2921-88-2	ug/L	2.50E-03	UJG	7.20E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	3.30E-03	UJK	2.50E-03	U	3.50E-03	UJK	2.50E-03	U	2.50E-03	U
Dacthal	DCPA	1861-32-1	ug/L	6.30E-02	U	2.50E-03	UJG	6.20E-02	U	2.70E-03	UJG	6.40E-02	U	2.50E-03	U	6.30E-02	U	2.50E-03	U	6.20E-02	U	2.50E-03	U
DDMU		1022-22-6	ug/L	na		8.20E-03	UJG	na		2.70E-03	UJG	na		2.50E-03	U	na		2.50E-03	U	na		2.50E-03	U
Dieldrin		60-57-1	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	5.30E-03	UJK	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Endosulfan I		959-98-8	ug/L	7.70E-03	JG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	1.20E-02		2.50E-03	U	5.30E-03		2.50E-03	U
Endosulfan II		33213-65-9	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Endosulfan sulfate		1031-07-8	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Endrin		72-20-8	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Endrin aldehyde		7421-93-4	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Endrin ketone		53494-70-5	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Heptachlor		76-44-8	ug/L	2.50E-03	U	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Heptachlor epoxide		1024-57-3	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Hexachlorobenzene		118-74-1	ug/L	2.50E-03	U	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	3.70E-03	JK	2.50E-03	U	2.50E-03	U
Methoxychlor		72-43-5	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Mirex		2385-85-5	ug/L	na		2.50E-03	UJG	na		2.70E-03	UJG	na		2.50E-03	U	na		2.50E-03	U	na		2.50E-03	U
cis-Nonachlor		5103-73-1	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
trans-Nonachlor		39765-80-5	ug/L	2.50E-03	U	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Oxychlordane		27304-13-8	ug/L	2.50E-03	UJG	2.50E-03	UJG	2.50E-03	UJG	2.70E-03	UJG	2.50E-03	UJG	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U	2.50E-03	U
Pentachloroanisole		1825-21-4	ug/L	na		2.50E-03	UJG	na		2.70E-03	UJG	na		2.50E-03	U	na		2.50E-03	U	na		3.00E-03	
Toxaphene		8001-35-2	ug/L	2.50E-02	UJG	1.00E-01	JG	2.50E-02	UJG	1.50E-01	UJG	2.50E-02	UJG	5.10E-02	UJK	2.50E-02	U	5.10E-02	UJK	2.50E-02	U	1.00E-01	UJK
Number of Detects =				2		1		0		0		0		0		1		1		1		1	
Sum of Detects =			ug/L	1.12E-02	J	1.00E-01	J	6.20E-02	U	1.50E-01	U	6.40E-02	U	5.10E-02	U	1.20E-02		3.70E-03	J	5.30E-03		3.00E-03	

Chemical of Concern	Alternate Name	CAS Number	Units	Bellingham STP				Bremerton STP				Burlington WWTP				City of Tacoma (Central No. 1)				Everett STP (Outfall 100)			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Herbicides																							
2,4,5-T		93-76-5	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
2,4,5-TP	Silvex	93-72-1	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
2,4-D		94-75-7	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	1.80E-01		6.10E-02	U	6.70E-02	NJK	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
2,4-DB	2,4-D butyric acid	94-82-6	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U		REJ	6.10E-02	U	6.20E-02	U	6.30E-02	U
3,5-Dichlorobenzoic acid		51-36-5	ug/L	6.20E-02	U	6.40E-02	UJK	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	UJK	6.20E-02	U	6.30E-02	UJK
Acifluorfen	Blazer	62476-59-9	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U		REJ	6.10E-02	U	6.20E-02	U	6.30E-02	U
Bentazon		25057-89-0	ug/L	6.10E-03	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
Bromoxynil		1689-84-5	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
Clopyralid		1702-17-6	ug/L	6.20E-02	UJG	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	UJG	6.10E-02	U	6.20E-02	UJG	6.30E-02	U
Dicamba I		1918-00-9	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	2.90E-02	NJTK	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
Dichlorprop		120-36-5	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
Diclofop-Methyl		51338-27-3	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
Dinoseb		88-85-7	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U		REJ	6.10E-02	U	6.20E-02	U	6.30E-02	U
Ioxynil		1689-83-4	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
MCPA		94-74-6	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
MCPP	Mecoprop	93-65-2	ug/L	6.20E-02	U	5.90E-02	NJTK	6.30E-02	U	7.10E-02	NJK	6.10E-02	U	6.40E-02	U	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
Picloram		1918-02-01	ug/L	6.20E-02	UJG	6.40E-02	UJG	6.30E-02	UJG	6.40E-02	U	6.10E-02	UJG	6.40E-02	U		REJ	6.10E-02	UJG	6.20E-02	UJG	6.30E-02	UJG
Triclopyr		55335-06-3	ug/L	6.20E-02	U	6.40E-02	U	6.30E-02	U	6.40E-02	U	6.10E-02	U	6.30E-02	NJTK	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
Number of Detects =				0		1		0		3		0		2		0		0		0		0	
Sum of Detects =			ug/L	6.20E-02	U	5.90E-02	NJ	6.30E-02	U	2.80E-01	NJ	6.10E-02	U	1.30E-01	NJ	6.20E-02	U	6.10E-02	U	6.20E-02	U	6.30E-02	U
Polybrominated Diphenyl Ethers (Congeners)																							
2,4-DiBDE	BDE-007		pg/L	5.00E+00	U	5.00E+00	UJK	6.80E+00	JT	1.13E+01	JT	9.70E+00	JT	5.00E+00	UJK	5.00E+00	U	5.00E+00	UJK	1.45E+01	JT	2.30E+01	JT
2,6-DiBDE	BDE-010		pg/L	5.00E+00	U	5.00E+00	UJK	5.00E+00	U	2.50E+01	UJK	5.00E+00	U	5.00E+00	UJK	5.00E+00	U	5.00E+00	UJK	5.00E+00	U	5.00E+00	UJK
4,4'-DiBDE	BDE-015	2050-47-7	pg/L	6.70E+00	JT	9.40E+00	JT	8.20E+00	JT	2.50E+01	UJK	4.33E+01		5.64E+01		1.62E+01	JT	1.26E+01	JT	1.30E+02		4.53E+02	
2,2',4-TrBDE	BDE-017	147217-75-2	pg/L	3.63E+01		2.66E+01		4.70E+01		2.50E+01	UJK	1.59E+02		4.96E+02		7.76E+01		7.87E+01		3.13E+02		4.59E+02	
2,4,4'-TrBDE	BDE-028	41318-75-6	pg/L	9.58E+01		7.51E+01		9.67E+01		5.13E+01	JT	4.18E+02		1.19E+03		2.29E+02		2.14E+02		5.86E+02		1.06E+03	
2,4,6-TrBDE	BDE-030		pg/L	1.24E+01	JT	5.00E+00	UJK	1.08E+01	NJK	2.50E+01	UJK	5.00E+00	U	5.00E+00	UJK	3.12E+01	NJK	5.00E+00	UJK	2.84E+01	NJK	1.26E+01	JT
2,2',4,4'-TeBDE	BDE-047	5436-43-1	pg/L	5.26E+03		3.91E+03		5.35E+03		5.38E+03		2.97E+03		7.11E+03		1.41E+04		1.53E+04		3.19E+04		4.10E+04	
2,2',4,5'-TeBDE	BDE-049	243982-82-3	pg/L	co-elute		1.79E+01	JT	co-elute		5.00E+01	UJK	co-elute		1.00E+01	UJK	co-elute		3.52E+02		co-elute		1.26E+03	
2,2',4,5'/2,3',4',6-TeBDE	BDE-049/071		pg/L	1.93E+02		co-elute		1.88E+02		co-elute		3.95E+02		co-elute		5.15E+02		co-elute		1.38E+03		co-elute	
2,3',4,4'-TeBDE	BDE-066	189084-61-5	pg/L	1.00E+01	U	1.55E+02		1.00E+01	U	4.77E+02		2.00E+02		5.00E+01	NJK	5.45E+02		1.00E+01	UJK	9.87E+02		2.53E+03	
2,3',4',6-TeBDE	BDE-071	189084-62-6	pg/L	co-elute		1.00E+01	UJK	co-elute		7.97E+01	JT	co-elute		5.37E+02		co-elute		5.14E+01		co-elute		1.55E+02	
3,3',4,4'-TeBDE	BDE-077	93703-48-1	pg/L	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK
2,2',3,4,4'-PeBDE	BDE-085	182346-21-0	pg/L	1.47E+02		1.13E+02		1.88E+02		3.80E+02		1.00E+01	U	2.02E+02		3.74E+02		2.68E+02		1.23E+03		1.31E+03	
2,2',4,4',5-PeBDE	BDE-099	60348-60-9	pg/L	4.54E+03		2.99E+03		5.05E+03		4.58E+03		2.25E+03		6.30E+03		1.37E+04		1.48E+04		3.24E+04		3.77E+04	
2,2',4,4',6-PeBDE	BDE-100	189084-64-8	pg/L	9.52E+02		6.09E+02		1.09E+03		1.07E+03		5.52E+02		1.41E+03		2.88E+03		2.78E+03		6.65E+03		6.91E+03	
2,3',4,4',6-PeBDE	BDE-119	189084-66-0	pg/L	7.27E+01		1.00E+01	UJK	1.00E+01	U	5.00E+01	UJK	5.83E+01		7.89E+01		1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK
3,3',4,4',5-PeBDE	BDE-126	366791-32-4	pg/L	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK
2,2',3,4,4',5'-HxBDE	BDE-138	182677-30-1	pg/L	1.00E+01	U	4.56E+01	JT	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.74E+02		2.91E+02		5.18E+02	
2,2',3,4,4',6-HxBDE	BDE-139		pg/L	1.00E+01	U	2.99E+01	JG	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	7.96E+01		2.27E+02	JG	2.93E+02		3.86E+02	
2,2',3,4,4',6'-HxBDE	BDE-140	243982-83-4	pg/L	1.00E+01	U	2.37E+01	JT	1.00E+01	U	4.42E+01	JT	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	8.65E+01		9.08E+01		1.74E+02	
2,2',4,4',5,5'-HxBDE	BDE-153	68631-49-2	pg/L	3.62E+02		2.97E+02		4.45E+02		8.26E+02		2.08E+02		5.13E+02		1.32E+03		1.23E+03		3.27E+03		4.79E+03	
2,2',4,4',5,6'-HxBDE	BDE-154	207122-15-4	pg/L	2.92E+02		1.55E+02		4.02E+02		3.77E+02		1.44E+02		4.06E+02		9.48E+02		8.23E+02		2.32E+03		2.31E+03	
2,3,3',4,4',5/3,3',4,4',5,5'-HxBDE	BDE-156/169		pg/L	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	7.46E+01	JT
2,2',3,3',4,4',6-HpBDE	BDE-171		pg/L	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	5.54E+01	JT
2,2',3,4,4',5,5'-HpBDE	BDE-180		pg/L	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	9.26E+01	JT
2,2',3,4,4',5',6-HpBDE	BDE-183	207122-16-5	pg/L	4.41E+01	JT	1.20E+01	NJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	1.37E+02		1.31E+02		4.91E+02		5.98E+02	
2,2',3,4,4',6,6'-HpBDE	BDE-184		pg/L	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	6.22E+01	JT
2,3,3',4,4',5',6-HpBDE	BDE-191		pg/L	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.81E+01	JT

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Gig Harbor STP				King County West Point				Pierce County Chambers Creek STP				Shelton STP				Sumner STP			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Herbicides																							
2,4,5-T		93-76-5	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	UJG	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
2,4,5-TP	Silvex	93-72-1	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
2,4-D		94-75-7	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	1.30E-01	JG	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
2,4-DB	2,4-D butyric acid	94-82-6	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
3,5-Dichlorobenzoic acid		51-36-5	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	U	6.30E-02	UJK	6.30E-02	U	6.20E-02	UJK	6.20E-02	U	6.40E-02	UJK
Acifluorfen	Blazer	62476-59-9	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
Bentazon		25057-89-0	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	UJG	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
Bromoxynil		1689-84-5	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
Clopyralid		1702-17-6	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	UJG	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	UJG	6.40E-02	U
Dicamba I		1918-00-9	ug/L	6.30E-02	U	6.40E-02	U	3.10E-02	NJT	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	2.90E-02	JT
Dichlorprop		120-36-5	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
Diclofop-Methyl		51338-27-3	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
Dinoseb		88-85-7	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	UJG	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
Ioxynil		1689-83-4	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	6.20E-02	U	6.40E-02	U
MCPA		94-74-6	ug/L	6.30E-02	U	6.40E-02	U	1.60E-01	NJT	6.60E-02	U	6.40E-02	U	6.30E-02	U	6.30E-02	U	6.20E-02	U	1.10E-01	NJT	7.80E-02	NJK
MCPP	Mecoprop	93-65-2	ug/L	6.30E-02	U	6.40E-02	U	6.20E-02	U	6.60E-02	U	2.30E-01		2.50E-01		6.30E-02	U	6.20E-02	U	6.20E-02	U	3.10E-02	JT
Picloram		1918-02-01	ug/L	6.30E-02	UJG	6.40E-02	U	6.20E-02	UJG		REJ	6.40E-02	U	6.30E-02	UJG	6.30E-02	UJG	6.20E-02	UJG	6.20E-02	UJG	6.40E-02	UJG
Triclopyr		55335-06-3	ug/L	6.30E-02	U	6.40E-02	U	5.10E-02	NJT	6.60E-02	U	6.40E-02	U	6.30E-02	U	5.40E-02	NJT	1.10E-01		6.20E-02	U	3.00E-02	JT
Number of Detects =				0		0		3		1		1		1		1		1		1		4	
Sum of Detects =			ug/L	6.30E-02	U	6.40E-02	U	2.42E-01	NJ	1.30E-01	J	2.30E-01		2.50E-01		5.40E-02	NJ	1.10E-01		1.10E-01	NJ	1.68E-01	J
Polybrominated Diphenyl Ethers (Congeners)																							
2,4-DiBDE	BDE-007		pg/L	5.00E+00	U	4.88E+01	JT	5.00E+00	U	2.50E+01	UJK	1.11E+01	JT	2.13E+01	JT	5.00E+00	U	5.00E+00	UJK	5.00E+00	U	1.84E+01	JT
2,6-DiBDE	BDE-010		pg/L	5.00E+00	U	2.50E+01	UJK	5.00E+00	U	2.50E+01	UJK	5.00E+00	U	5.00E+00	UJK	5.00E+00	U	5.00E+00	UJK	5.00E+00	U	5.00E+00	UJK
4,4'-DiBDE	BDE-015	2050-47-7	pg/L	6.30E+00	NJK	1.08E+01	JT	1.18E+01	JT	9.00E+00	JT	6.46E+01		8.20E+01		5.00E+00	U	5.00E+00	UJK	3.26E+01		1.65E+01	JT
2,2',4-TrBDE	BDE-017	147217-75-2	pg/L	3.65E+01		1.09E+02		4.70E+01		3.70E+01	JT	2.91E+02		3.71E+02		7.64E+01		9.18E+01		1.54E+02		2.71E+02	
2,4,4'-TrBDE	BDE-028	41318-75-6	pg/L	9.01E+01		1.43E+02		1.12E+02		8.94E+01		8.04E+02		7.55E+02		1.75E+02		1.26E+02		2.85E+02		2.22E+02	
2,4,6-TrBDE	BDE-030		pg/L	5.00E+00	U	2.50E+01	UJK	7.30E+00	NJK	2.50E+01	UJK	5.00E+00	U	5.00E+00	UJK	2.30E+01	NJK	5.00E+00	UJK	5.00E+00	U	5.00E+00	UJK
2,2',4,4'-TeBDE	BDE-047	5436-43-1	pg/L	4.80E+03		9.38E+03		6.03E+03		6.90E+03		7.62E+03		6.44E+03		1.45E+04		6.31E+03		3.34E+03		6.63E+03	
2,2',4,5'-TeBDE	BDE-049	243982-82-3	pg/L	co-elute		2.07E+02		co-elute		1.75E+02		co-elute		5.55E+02		co-elute		2.27E+02		co-elute		2.38E+02	
2,2',4,5'/2,3',4',6-TeBDE	BDE-049/071		pg/L	1.60E+02		co-elute		2.34E+02		co-elute		8.06E+02		co-elute		5.72E+02		co-elute		2.97E+02		co-elute	
2,3',4,4'-TeBDE	BDE-066	189084-61-5	pg/L	1.00E+01	U	3.52E+02		1.36E+02		1.08E+02	JT	3.81E+02		1.00E+01	UJK	1.00E+01	U	1.68E+02		1.49E+02		5.15E+02	
2,3',4',6-TeBDE	BDE-071	189084-62-6	pg/L	co-elute		4.06E+01	JT	co-elute		2.40E+01	JT	co-elute		2.07E+02		co-elute		3.57E+01	JT	co-elute		3.98E+01	JT
3,3',4,4'-TeBDE	BDE-077	93703-48-1	pg/L	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK
2,2',3,4,4'-PeBDE	BDE-085	182346-21-0	pg/L	1.80E+02		7.16E+02		2.14E+02		3.04E+02		2.64E+02		2.48E+02		6.82E+02		2.18E+02		1.00E+01	U	8.96E+02	
2,2',4,4',5-PeBDE	BDE-099	60348-60-9	pg/L	3.96E+03		8.55E+03		5.72E+03		6.30E+03		6.76E+03		4.79E+03		1.85E+04		6.62E+03		2.20E+03		1.50E+04	
2,2',4,4',6-PeBDE	BDE-100	189084-64-8	pg/L	8.58E+02		1.61E+03		1.16E+03		1.22E+03		1.49E+03		1.02E+03		3.95E+03		1.34E+03		5.32E+02		2.42E+03	
2,3',4,4',6-PeBDE	BDE-119	189084-66-0	pg/L	1.85E+01		5.00E+01	UJK	1.00E+01	U	5.00E+01	UJK	1.09E+02		1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK
3,3',4,4',5-PeBDE	BDE-126	366791-32-4	pg/L	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK
2,2',3,4,4',5'-HxBDE	BDE-138	182677-30-1	pg/L	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	4.39E+01	JT	1.00E+01	U	1.94E+02	
2,2',3,4,4',6-HxBDE	BDE-139		pg/L	1.00E+01	U	5.00E+01	UJK	3.26E+01	JT	5.70E+01	JG	5.53E+01		1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	3.44E+02	JG
2,2',3,4,4',6'-HxBDE	BDE-140	243982-83-4	pg/L	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	3.00E+01	NJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	9.64E+01	
2,2',4,4',5,5'-HxBDE	BDE-153	68631-49-2	pg/L	3.43E+02		1.54E+03		4.82E+02		5.22E+02		5.64E+02		2.77E+02		1.73E+03		8.00E+02		1.78E+02		2.30E+03	
2,2',4,4',5,6'-HxBDE	BDE-154	207122-15-4	pg/L	2.44E+02		5.52E+02		3.62E+02		3.78E+02		4.68E+02		3.19E+02		1.37E+03		4.90E+02		1.48E+02		1.12E+03	
2,3,3',4,4',5/3,3',4,4',5,5'-HxBDE	BDE-156/169		pg/L	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	5.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK	1.00E+01	U	1.00E+01	UJK
2,2',3,3',4,4',6-HpBDE	BDE-171		pg/L	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK
2,2',3,4,4',5,5'-HpBDE	BDE-180		pg/L	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK
2,2',3,4,4',5',6-HpBDE	BDE-183	207122-16-5	pg/L	2.00E+01	U	1.00E+02	UJK	4.67E+01	JT	1.00E+02	UJK	7.10E+01	JT	2.00E+01	UJK	1.39E+02		7.05E+01	JT	2.00E+01	U	1.02E+02	
2,2',3,4,4',6,6'-HpBDE	BDE-184		pg/L	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.06E+01	JT	2.00E+01	U	2.00E+01	UJK
2,3,3',4,4',5',6-HpBDE	BDE-191		pg/L	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Bellingham STP				Bremerton STP				Burlington WWTP				City of Tacoma (Central No. 1)				Everett STP (Outfall 100)			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
2,2',3,3',4,4',5,6'-OcBDE	BDE-196		pg/L	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	7.17E+01	JT	5.14E+01	JT	3.81E+02		5.86E+02	
2,2',3,3',4,4',6,6'/ 2,2',3,4,4',5,6,6'-OcBDE	BDE-197/204		pg/L	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	8.32E+01	JT	8.27E+01	JT	3.12E+02		3.87E+02	
2,2',3,3',4,5',6,6'-OcBDE	BDE-201		pg/L	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	3.19E+01	JT	2.00E+01	UJK	1.98E+02		4.34E+02	
2,2',3,4,4',5,5',6-OcBDE	BDE-203	337513-72-1	pg/L	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	4.33E+01	JT	3.30E+01	NJK	3.40E+02		6.48E+02	
2,3,3',4,4',5,5',6-OcBDE	BDE-205	446255-56-7	pg/L	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK
2,2',3,3',4,4',5,5',6-NoBDE	BDE-206	63387-28-0	pg/L	1.57E+02	JT	5.00E+01	UJK	3.00E+02		2.50E+02	UJK	1.56E+02	JT	5.00E+01	UJK	6.45E+02		6.84E+02		2.59E+03		2.31E+03	
2,2',3,3',4,4',5,6,6'-NoBDE	BDE-207	437701-79-6	pg/L	1.25E+02	JT	1.38E+02	JT	1.91E+02	JT	2.50E+02	UJK	2.30E+02	JT	5.00E+01	UJK	5.54E+02		3.44E+02		2.23E+03		2.91E+03	
2,2',3,3',4,5,5',6,6'-NoBDE	BDE-208		pg/L	9.96E+01	JT	5.00E+01	UJK	1.15E+02	JT	2.50E+02	UJK	1.21E+02	JT	5.00E+01	UJK	3.11E+02		4.77E+02		1.49E+03		3.50E+03	
2,2',3,3',4,4',5,5',6,6'-DeBDE	BDE-209	1163-19-5	pg/L	2.00E+03		1.39E+03	UFB	3.34E+03		7.50E+02	UJK	3.06E+03		4.46E+03		6.83E+03		8.87E+03		3.55E+04		2.20E+04	
Number of Detects =				17		16		16		11		16		13		22		22		25		31	
Sum of Detects =			pg/L	1.44E+04		8.61E+03		1.68E+04		1.33E+04		1.10E+04		2.28E+04		4.35E+04		4.71E+04		1.25E+05		1.35E+05	
Polybrominated Diphenyl Ethers (Homologs)																							
Decabromodiphenyl ether			pg/L	2.00E+03		1.39E+03	U	3.34E+03		7.50E+02	UJ	3.06E+03		4.46E+03		6.83E+03		8.87E+03		3.55E+04		2.20E+04	
Dibromodiphenyl ethers			pg/L	6.70E+00	J	9.40E+00	J	1.50E+01	J	1.13E+01	J	5.30E+01	J	5.64E+01		1.62E+01	J	1.26E+01	J	1.45E+02		4.76E+02	
Heptabromodiphenyl ethers			pg/L	4.41E+01	J	1.20E+01	NJ	2.00E+01	U	1.00E+02	UJ	2.00E+01	U	2.00E+01	UJ	1.37E+02		1.31E+02		4.91E+02		8.36E+02	J
Hexabromodiphenyl ethers			pg/L	6.54E+02		5.51E+02	J	8.47E+02		1.25E+03		3.52E+02		9.19E+02		2.35E+03		2.54E+03		6.26E+03		8.18E+03	
Nonabromodiphenyl ethers			pg/L	3.82E+02	J	1.38E+02	J	6.06E+02	J	2.50E+02	UJ	5.07E+02	J	5.00E+01	UJ	1.51E+03		1.51E+03		6.31E+03		8.72E+03	
Octabromodiphenyl ethers			pg/L	2.00E+01	U	2.00E+01	UJ	2.00E+01	U	1.00E+02	UJ	2.00E+01	U	2.00E+01	UJ	2.30E+02	J	1.67E+02	J	1.23E+03		2.06E+03	
Pentabromodiphenyl ethers			pg/L	5.71E+03		3.71E+03		6.33E+03		6.03E+03		2.86E+03		7.99E+03		1.70E+04		1.78E+04		4.03E+04		4.59E+04	
Tetrabromodiphenyl ethers			pg/L	5.45E+03		4.08E+03		5.54E+03		5.94E+03		3.57E+03		7.70E+03		1.52E+04		1.57E+04		3.43E+04		4.49E+04	
Tribromodiphenyl ethers			pg/L	1.45E+02		1.02E+02		1.55E+02		5.13E+01	J	5.77E+02		1.69E+03		3.38E+02		2.93E+02		9.27E+02		1.53E+03	
Number of Detects =				8		7		7		5		7		6		9		9		9		9	
Perfluorinated Compounds																							
Perfluorobutane sulfonate	PFBS	45187-15-3	ng/L	2.00E+00	U	1.98E+00	U	1.94E+00	U	1.77E+01		1.98E+00	U	1.97E+00	U	1.96E+00	U	1.98E+00	U	2.08E+00	U	2.00E+00	U
Perfluorobutanoate	PFBA	375-22-4	ng/L	1.86E+00		1.46E+00	U	1.40E+00		1.83E+00		9.91E-01	U	1.27E+00	U	1.38E+00		1.53E+00	U	1.04E+00	U	3.24E+00	
Perfluorodecanoate	PFDA	335-76-2	ng/L	1.37E+00		2.82E+00		1.74E+00		2.77E+00		4.27E+00		3.57E+00		2.62E+00		1.54E+00		1.91E+00		2.55E+00	
Perfluorododecanoate	PFDoA	307-55-1	ng/L	1.00E+00	U	9.91E-01	U	9.68E-01	U	1.00E+00	U	9.91E-01	U	9.84E-01	U	9.82E-01	U	9.88E-01	U	1.04E+00	U	1.00E+00	U
Perfluoroheptanoate	PFHpA	375-85-9	ng/L	3.53E+00		5.10E+00		2.08E+00		3.44E+00		4.06E+00		4.73E+00		5.64E+00		9.69E+00		1.03E+01		7.83E+00	
Perfluorohexane sulfonate	PFHxS	108427-53-8	ng/L	3.31E+00		2.41E+00		1.94E+00	U	7.79E+00		3.17E+00		2.34E+00		4.42E+00		7.01E+00		2.57E+00		3.36E+00	
Perfluorohexanoate	PFHxA	307-24-4	ng/L	1.54E+01		1.72E+01		1.08E+01		1.43E+01		2.49E+01		9.62E+00		1.09E+01		2.28E+01		1.19E+01		1.61E+01	
Perfluorononanoate	PFNA	375-95-1	ng/L	3.52E+00		2.20E+01		2.36E+00		1.08E+01		1.31E+01		4.11E+00		4.47E+00		7.02E+00		1.34E+02		2.87E+01	
Perfluorooctane sulfonamide	PFOSA	754-91-6	ng/L	1.00E+00	U	2.48E+00	U	9.68E-01	U	2.51E+00	U	1.95E+00		2.46E+00	U	9.82E-01	U	2.47E+00	U	1.04E+00	U	2.50E+00	U
Perfluorooctane sulfonate	PFOS	45298-90-6	ng/L	6.02E+00		1.98E+00	U	4.50E+00		5.50E+01		5.89E+00		3.51E+00		9.71E+00		4.23E+00		7.57E+00		1.00E+01	
Perfluorooctanoate	PFOA	335-67-1	ng/L	1.16E+01		1.74E+01		1.13E+01		1.11E+01		3.05E+01		1.65E+01		2.70E+01		3.02E+01		2.43E+01		1.68E+01	
Perfluoropentanoate	PFPeA	2706-90-3	ng/L	1.90E+00		2.05E+00		1.16E+00		1.00E+00	U	5.80E+00		1.94E+00		3.77E+00		6.79E+00		1.50E+00	U	3.18E+00	
Perfluoroundecanoate	PFUnA	2058-94-8	ng/L	1.00E+00	U	9.91E-01	U	9.68E-01	U	1.00E+00	U	9.91E-01	U	9.84E-01	U	9.82E-01	U	9.88E-01	U	1.18E+00		1.00E+00	U
Number of Detects =				9		7		8		9		9		8		9		8		8		9	
Sum of Detects =			ng/L	4.85E+01		6.90E+01		3.53E+01		1.25E+02		9.36E+01		4.63E+01		6.99E+01		8.93E+01		1.94E+02		9.18E+01	
Polychlorinated Biphenyls (Congeners)																							
2-MoCB	PCB-001	2051-60-7	pg/L	na		na		1.00E+01	U	na		na		na		4.14E+01		na		5.08E+01		na	
3-MoCB	PCB-002	2051-61-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
4-MoCB	PCB-003	2051-62-9	pg/L	na		na		1.00E+01	U	na		na		na		2.91E+01		na		1.00E+01	U	na	
2,2'-DiCB	PCB-004	13029-08-8	pg/L	na		na		1.00E+01	U	na		na		na		8.48E+01		na		1.04E+03		na	
2,3/2,4'-DiCB	PCB-005/008		pg/L	na		na		1.21E+01	UJL	na		na		na		1.30E+02		na		7.70E+01	UJL	na	
2,3'-DiCB	PCB-006	25569-80-6	pg/L	na		na		1.00E+01	U	na		na		na		2.23E+01		na		3.06E+01		na	
2,4-DiCB	PCB-007	33284-50-3	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.39E+01		na	
2,5-DiCB	PCB-009	34883-39-1	pg/L	na		na		1.00E+01	U	na		na		na		1.11E+01		na		1.00E+01	U	na	

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Gig Harbor STP				King County West Point				Pierce County Chambers Creek STP				Shelton STP				Sumner STP			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
2,2',3,3',4,4',5,6'-OcBDE	BDE-196		pg/L	2.00E+01	U	1.00E+02	UJK	2.36E+01	JT	1.00E+02	UJK	4.44E+01	JT	2.00E+01	UJK	2.00E+01	U	9.78E+01	JT	2.00E+01	U	2.00E+01	UJK
2,2',3,3',4,4',6,6'/ 2,2',3,4,4',5,6,6'-OcBDE	BDE-197/204		pg/L	2.00E+01	U	1.00E+02	UJK	3.23E+01	JT	1.00E+02	UJK	7.15E+01	JT	2.00E+01	UJK	6.84E+01	JT	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK
2,2',3,3',4,5',6,6'-OcBDE	BDE-201		pg/L	2.00E+01	U	1.00E+02	UJK	2.54E+01	JT	1.00E+02	UJK	5.63E+01	JT	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK
2,2',3,4,4',5,5',6-OcBDE	BDE-203	337513-72-1	pg/L	2.00E+01	U	1.00E+02	UJK	3.11E+01	JT	1.00E+02	UJK	1.23E+02		2.00E+01	UJK	2.00E+01	U	1.38E+02		2.00E+01	U	2.00E+01	UJK
2,3,3',4,4',5,5',6-OcBDE	BDE-205	446255-56-7	pg/L	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	1.00E+02	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK	2.00E+01	U	2.00E+01	UJK
2,2',3,3',4,4',5,5',6-NoBDE	BDE-206	63387-28-0	pg/L	3.34E+02		1.13E+03		2.46E+02	JT	2.50E+02	UJK	2.84E+02		5.00E+01	UJK	8.84E+02		6.10E+02		5.00E+01	U	5.00E+01	UJK
2,2',3,3',4,4',5,6,6'-NoBDE	BDE-207	437701-79-6	pg/L	3.02E+02		1.39E+03		2.75E+02		2.50E+02	UJK	3.77E+02		5.00E+01	UJK	7.14E+02		6.78E+02		5.00E+01	U	5.00E+01	UJK
2,2',3,3',4,5,5',6,6'-NoBDE	BDE-208		pg/L	2.40E+02	JT	1.22E+03		1.25E+02	JT	2.50E+02	UJK	2.53E+02		5.00E+01	UJK	4.09E+02		7.83E+02		5.00E+01	U	5.00E+01	UJK
2,2',3,3',4,4',5,5',6,6'-DeBDE	BDE-209	1163-19-5	pg/L	1.07E+04		1.88E+04		2.54E+03		2.15E+03		2.87E+03		2.50E+02	U	1.06E+04		5.61E+03		1.78E+03		2.50E+02	UJK
Number of Detects =				15		17		22		14		23		13		16		20		11		17	
Sum of Detects =			pg/L	2.23E+04		4.58E+04		1.79E+04		1.83E+04		2.38E+04		1.51E+04		5.44E+04		2.45E+04	J	9.10E+03		3.04E+04	
Polybrominated Diphenyl Ethers (Homologs)																							
Decabromodiphenyl ether			pg/L	1.07E+04		1.88E+04		2.54E+03		2.15E+03		2.87E+03		2.50E+02	U	1.06E+04		5.61E+03		1.78E+03		2.50E+02	UJ
Dibromodiphenyl ethers			pg/L	6.30E+00	NJ	5.96E+01	J	1.18E+01	J	9.00E+00	J	7.57E+01	J	1.03E+02	J	5.00E+00	U	5.00E+00	U	3.26E+01		3.49E+01	J
Heptabromodiphenyl ethers			pg/L	2.00E+01	U	1.00E+02	UJ	4.67E+01	J	1.00E+02	UJ	7.10E+01	J	2.00E+01	UJ	1.39E+02		9.11E+01	J	2.00E+01	U	1.02E+02	
Hexabromodiphenyl ethers			pg/L	5.87E+02		2.09E+03		8.77E+02		9.57E+02		1.09E+03		6.26E+02		3.10E+03		1.33E+03		3.26E+02		4.05E+03	
Nonabromodiphenyl ethers			pg/L	8.76E+02	J	3.74E+03		6.46E+02	J	2.50E+02	UJ	9.14E+02		5.00E+01	UJ	2.01E+03		2.07E+03		5.00E+01	U	5.00E+01	UJ
Octabromodiphenyl ethers			pg/L	2.00E+01	U	1.00E+02	UJ	1.12E+02	J	1.00E+02	UJ	2.95E+02	J	2.00E+01	UJ	6.84E+01	J	2.36E+02	J	2.00E+01	U	2.00E+01	UJ
Pentabromodiphenyl ethers			pg/L	5.02E+03		1.09E+04		7.09E+03		7.82E+03		8.62E+03		6.06E+03		2.31E+04		8.18E+03		2.73E+03		1.83E+04	
Tetrabromodiphenyl ethers			pg/L	4.96E+03		9.98E+03		6.40E+03		7.21E+03		8.81E+03		7.20E+03		1.51E+04		6.74E+03		3.79E+03		7.42E+03	
Tribromodiphenyl ethers			pg/L	1.27E+02		2.52E+02		1.66E+02		1.26E+02	J	1.10E+03		1.13E+03		2.74E+02		2.18E+02		4.39E+02		4.93E+02	
Number of Detects =				7		7		9		6		9		5		8		8		6		6	
Perfluorinated Compounds																							
Perfluorobutane sulfonate	PFBS	45187-15-3	ng/L	1.98E+00	U	2.03E+00	U	1.99E+00	U	1.38E+01		1.97E+00	U	1.47E+01		1.98E+00	U	2.04E+00	U	1.96E+00	U	1.97E+00	U
Perfluorobutanoate	PFBA	375-22-4	ng/L	9.91E-01	U	1.38E+00		1.31E+00		2.47E+00		3.60E+00		4.87E+00		9.91E-01	U	2.99E+00		2.95E+00		9.85E-01	U
Perfluorodecanoate	PFDA	335-76-2	ng/L	5.66E+00		7.31E+00		2.82E+00		4.28E+00		5.54E+00		3.66E+00		5.78E+00		6.30E+00		7.85E+00		1.04E+01	
Perfluorododecanoate	PFDoA	307-55-1	ng/L	9.91E-01	U	1.02E+00	U	9.97E-01	U	9.87E-01	U	9.83E-01	U	9.93E-01	U	9.91E-01	U	1.02E+00	U	9.81E-01	U	9.85E-01	U
Perfluoroheptanoate	PFHpA	375-85-9	ng/L	4.65E+00		5.27E+00		2.75E+00		6.00E+00		3.98E+00		6.49E+00		2.80E+00		3.74E+00		4.29E+00		6.96E+00	
Perfluorohexane sulfonate	PFHxS	108427-53-8	ng/L	1.98E+00	U	2.03E+00	U	3.12E+00		2.65E+00		6.87E+00		8.27E+00		1.98E+00	U	2.04E+00	U	1.96E+00	U	1.97E+00	U
Perfluorohexanoate	PFHxA	307-24-4	ng/L	3.41E+01		4.13E+01		1.32E+01		1.61E+01		1.21E+01		1.85E+01		2.55E+01		4.43E+01		5.21E+01		3.09E+01	
Perfluorononanoate	PFNA	375-95-1	ng/L	1.23E+01		2.32E+01		3.73E+00		5.83E+00		2.76E+00		5.76E+00		1.39E+00		3.29E+00		6.27E+00		9.16E+00	
Perfluorooctane sulfonamide	PFOSA	754-91-6	ng/L	9.91E-01	U	2.54E+00	U	9.97E-01	U	2.47E+00	U	9.83E-01	U	2.48E+00	U	9.91E-01	U	2.56E+00	U	1.08E+00		2.46E+00	U
Perfluorooctane sulfonate	PFOS	45298-90-6	ng/L	5.60E+00		2.24E+00		1.95E+01		2.12E+01		6.56E+00		8.78E+00		1.98E+00	U	4.37E+00		2.57E+00		1.07E+01	
Perfluorooctanoate	PFOA	335-67-1	ng/L	4.86E+01		5.25E+01		1.25E+01		2.26E+01		1.09E+01		1.32E+01		3.31E+01		3.89E+01		6.98E+01		4.65E+01	
Perfluoropentanoate	PFPeA	2706-90-3	ng/L	1.59E+01		1.26E+01		1.84E+00		1.38E+00	U	2.02E+00		1.98E+00		8.47E+00		1.65E+01		1.33E+01		1.82E+01	
Perfluoroundecanoate	PFUnA	2058-94-8	ng/L	9.91E-01	U	1.02E+00	U	9.97E-01	U	9.87E-01	U	9.83E-01	U	9.93E-01	U	9.91E-01	U	1.02E+00	U	9.81E-01	U	9.85E-01	U
Number of Detects =				7		8		9		9		9		10		6		8		9		7	
Sum of Detects =			ng/L	1.27E+02		1.46E+02		6.08E+01		9.49E+01		5.43E+01		8.62E+01		7.70E+01		1.20E+02		1.60E+02		1.33E+02	
Polychlorinated Biphenyls (Congeners)																							
2-MoCB	PCB-001	2051-60-7	pg/L	na		na		1.91E+01		na		1.01E+01		na		1.00E+01	U	na		na		na	
3-MoCB	PCB-002	2051-61-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
4-MoCB	PCB-003	2051-62-9	pg/L	na		na		1.35E+01		na		1.30E+01		na		1.00E+01	U	na		na		na	
2,2'-DiCB	PCB-004	13029-08-8	pg/L	na		na		4.69E+01		na		2.90E+01		na		1.00E+01	U	na		na		na	
2,3/2,4'-DiCB	PCB-005/008		pg/L	na		na		6.49E+01	UJL	na		3.75E+01	UJL	na		1.00E+01	U	na		na		na	
2,3'-DiCB	PCB-006	25569-80-6	pg/L	na		na		1.46E+01		na		1.68E+01		na		1.00E+01	U	na		na		na	
2,4-DiCB	PCB-007	33284-50-3	pg/L	na		na		1.23E+01		na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,5-DiCB	PCB-009	34883-39-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	

Chemical of Concern	Alternate Name	CAS Number	Units	Bellingham STP				Bremerton STP				Burlington WWTP				City of Tacoma (Central No. 1)				Everett STP (Outfall 100)			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
2,6-DiCB	PCB-010	33146-45-1	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
3,3'-DiCB	PCB-011	2050-67-1	pg/L	na		na		4.29E+01	UJL	na		na		na		9.51E+01	UJL	na		2.83E+02	UJL	na	
3,4/3,4'-DiCB	PCB-012/013		pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		2.42E+01		na	
3,5-DiCB	PCB-014	34883-41-5	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
4,4'-DiCB	PCB-015	2050-68-2	pg/L	na		na		1.00E+01	UFB	na		na		na		3.62E+01		na		1.29E+02		na	
2,2',3-TrCB	PCB-016	38444-78-9	pg/L	na		na		1.43E+01		na		na		na		4.86E+01		na		8.82E+01		na	
2,2',4-TrCB	PCB-017	37680-66-3	pg/L	na		na		1.00E+01	U	na		na		na		4.75E+01		na		1.66E+02		na	
2,2',5-TrCB	PCB-018	37680-65-2	pg/L	na		na		1.59E+01	UFB	na		na		na		1.36E+02		na		2.65E+02		na	
2,2',6-TrCB	PCB-019	38444-73-4	pg/L	na		na		1.00E+01	U	na		na		na		1.84E+01		na		1.65E+02		na	
2,3,3'/2,3',4'-TriCB	PCB-020/033		pg/L	na		na		1.37E+01		na		na		na		9.46E+01		na		9.66E+01		na	
2,3,4-TrCB	PCB-021	55702-46-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,4'-TrCB	PCB-022	38444-85-8	pg/L	na		na		1.00E+01	U	na		na		na		5.42E+01		na		1.26E+02		na	
2,3,5-TrCB	PCB-023	55720-44-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,6-TrCB	PCB-024	55702-45-9	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3',4-TrCB	PCB-025	55712-37-3	pg/L	na		na		1.00E+01	U	na		na		na		1.07E+01		na		3.21E+01		na	
2,3',5-TrCB	PCB-026	38444-81-4	pg/L	na		na		1.00E+01	U	na		na		na		2.13E+01		na		5.46E+01		na	
2,3',6-TrCB	PCB-027	38444-76-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		3.84E+01		na	
2,4,4'-TrCB	PCB-028	7012-37-5	pg/L	na		na		1.46E+01		na		na		na		1.16E+02		na		2.84E+02		na	
2,4,5-TrCB	PCB-029	15862-07-4	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,4,6-TrCB	PCB-030	35693-92-6	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,4',5-TrCB	PCB-031	16606-02-3	pg/L	na		na		1.63E+01		na		na		na		1.23E+02		na		2.89E+02		na	
2,4',6-TrCB	PCB-032	38444-77-8	pg/L	na		na		1.00E+01	U	na		na		na		4.07E+01		na		1.33E+02		na	
2,3',5'-TrCB	PCB-034	37680-68-5	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
3,3',4-TrCB	PCB-035	37680-69-6	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		2.47E+01		na	
3,3',5-TrCB	PCB-036	38444-87-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		2.16E+01		na	
3,4,4'-TrCB	PCB-037	38444-90-5	pg/L	na		na		1.00E+01	U	na		na		na		3.58E+01		na		1.11E+02		na	
3,4,5-TrCB	PCB-038	53555-66-1	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
3,4',5-TrCB	PCB-039	38444-88-1	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3'-TeCB	PCB-040	38444-93-8	pg/L	na		na		1.00E+01	U	na		na		na		2.35E+01		na		4.38E+01		na	
2,3,4',6-TeCB	PCB-041	52663-59-9	pg/L	na		na		1.00E+01	U	na		na		na		1.14E+01		na		2.40E+01		na	
2,2',3,4'-TeCB	PCB-042	36559-22-5	pg/L	na		na		1.00E+01	U	na		na		na		2.91E+01		na		7.51E+01		na	
2,2',3,5/2,2',4,5'-TeCB	PCB-043/049		pg/L	na		na		1.00E+01	U	na		na		na		9.47E+01		na		2.45E+02		na	
2,2',3,5'-TeCB	PCB-044	41464-39-5	pg/L	na		na		1.39E+01	UFB	na		na		na		1.27E+02		na		3.35E+02		na	
2,2',3,6-TeCB	PCB-045	70362-45-7	pg/L	na		na		1.00E+01	U	na		na		na		1.65E+01		na		3.44E+01		na	
2,2',3,6'-TeCB	PCB-046	41464-47-5	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.96E+01		na	
2,2',4,4'/2,2',4,5-TeCB	PCB-047/048		pg/L	na		na		1.00E+01	U	na		na		na		2.84E+01		na		8.16E+01		na	
2,2',4,6-TeCB	PCB-050	62796-65-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',4,6'-TeCB	PCB-051	68194-04-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		3.93E+01		na	
2,2',5,5'/2,3',4,6-TeCB	PCB-052/069		pg/L	na		na		1.98E+01	UJL	na		na		na		1.50E+02		na		4.69E+02		na	
2,2',5,6'-TeCB	PCB-053	41464-41-9	pg/L	na		na		1.00E+01	U	na		na		na		1.62E+01		na		6.07E+01	N	na	
2,2',6,6'-TeCB	PCB-054	15968-05-5	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4-TeCB	PCB-055	74338-24-2	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4'-TeCB	PCB-056	41464-43-1	pg/L	na		na		1.00E+01	U	na		na		na		5.03E+01		na		1.15E+02		na	
2,3,3',5-TeCB	PCB-057	70424-67-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',5'-TeCB	PCB-058	41464-49-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',6-TeCB	PCB-059	74472-33-6	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,4,4'-TeCB	PCB-060	33025-41-1	pg/L	na		na		1.00E+01	U	na		na		na		1.73E+01		na		5.83E+01		na	
2,3,4,5-TeCB	PCB-061	33284-53-6	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,4,6-TeCB	PCB-062	54230-22-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,4',5-TeCB	PCB-063	74472-34-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,4',6/2,3',5,5'-TeCB	PCB-064/072		pg/L	na		na		1.00E+01	U	na		na		na		5.48E+01		na		1.23E+02		na	
2,3,5,6/2,4,4',6-TeCB	PCB-065/075		pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	

Chemical of Concern	Alternate Name	CAS Number	Units	Gig Harbor STP				King County West Point				Pierce County Chambers Creek STP				Shelton STP				Sumner STP			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
2,6-DiCB	PCB-010	33146-45-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,3'-DiCB	PCB-011	2050-67-1	pg/L	na		na		6.85E+01	UJL	na		9.40E+01	UJL	na		2.85E+01	UJL	na		na		na	
3,4/3,4'-DiCB	PCB-012/013		pg/L	na		na		1.00E+01	U	na		2.66E+01		na		1.00E+01	U	na		na		na	
3,5-DiCB	PCB-014	34883-41-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
4,4'-DiCB	PCB-015	2050-68-2	pg/L	na		na		2.03E+01	UFB	na		2.35E+01	UFB	na		1.00E+01	UFB	na		na		na	
2,2',3-TrCB	PCB-016	38444-78-9	pg/L	na		na		3.58E+01		na		1.78E+01		na		1.00E+01	U	na		na		na	
2,2',4-TrCB	PCB-017	37680-66-3	pg/L	na		na		2.15E+01		na		1.33E+01		na		1.00E+01	U	na		na		na	
2,2',5-TrCB	PCB-018	37680-65-2	pg/L	na		na		7.06E+01		na		4.01E+01		na		1.85E+01	UFB	na		na		na	
2,2',6-TrCB	PCB-019	38444-73-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3'/2,3',4'-TriCB	PCB-020/033		pg/L	na		na		3.33E+01		na		1.76E+01		na		1.00E+01	U	na		na		na	
2,3,4-TrCB	PCB-021	55702-46-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,4'-TrCB	PCB-022	38444-85-8	pg/L	na		na		2.00E+01		na		1.25E+01		na		1.00E+01	U	na		na		na	
2,3,5-TrCB	PCB-023	55720-44-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,6-TrCB	PCB-024	55702-45-9	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',4-TrCB	PCB-025	55712-37-3	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',5-TrCB	PCB-026	38444-81-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',6-TrCB	PCB-027	38444-76-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,4,4'-TrCB	PCB-028	7012-37-5	pg/L	na		na		4.18E+01		na		2.17E+01		na		1.56E+01		na		na		na	
2,4,5-TrCB	PCB-029	15862-07-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,4,6-TrCB	PCB-030	35693-92-6	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,4',5-TrCB	PCB-031	16606-02-3	pg/L	na		na		4.93E+01		na		3.03E+01		na		1.53E+01		na		na		na	
2,4',6-TrCB	PCB-032	38444-77-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',5'-TrCB	PCB-034	37680-68-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,3',4-TrCB	PCB-035	37680-69-6	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,3',5-TrCB	PCB-036	38444-87-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,4,4'-TrCB	PCB-037	38444-90-5	pg/L	na		na		1.51E+01		na		2.11E+01		na		1.00E+01	U	na		na		na	
3,4,5-TrCB	PCB-038	53555-66-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,4',5-TrCB	PCB-039	38444-88-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3'-TeCB	PCB-040	38444-93-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,4',6-TeCB	PCB-041	52663-59-9	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4'-TeCB	PCB-042	36559-22-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,5/2,2',4,5'-TeCB	PCB-043/049		pg/L	na		na		3.65E+01		na		2.08E+01		na		1.43E+01		na		na		na	
2,2',3,5'-TeCB	PCB-044	41464-39-5	pg/L	na		na		6.02E+01	UFB	na		3.19E+01	UFB	na		2.01E+01	UFB	na		na		na	
2,2',3,6-TeCB	PCB-045	70362-45-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,6'-TeCB	PCB-046	41464-47-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',4,4'/2,2',4,5-TeCB	PCB-047/048		pg/L	na		na		1.08E+01		na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',4,6-TeCB	PCB-050	62796-65-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',4,6'-TeCB	PCB-051	68194-04-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',5,5'/2,3',4,6-TeCB	PCB-052/069		pg/L	na		na		8.99E+01		na		4.36E+01		na		2.77E+01	UJL	na		na		na	
2,2',5,6'-TeCB	PCB-053	41464-41-9	pg/L	na		na		1.20E+01		na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',6,6'-TeCB	PCB-054	15968-05-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4-TeCB	PCB-055	74338-24-2	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4'-TeCB	PCB-056	41464-43-1	pg/L	na		na		2.09E+01		na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',5-TeCB	PCB-057	70424-67-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',5'-TeCB	PCB-058	41464-49-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',6-TeCB	PCB-059	74472-33-6	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,4,4'-TeCB	PCB-060	33025-41-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,4,5-TeCB	PCB-061	33284-53-6	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,4,6-TeCB	PCB-062	54230-22-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,4',5-TeCB	PCB-063	74472-34-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,4',6/2,3',5,5'-TeCB	PCB-064/072		pg/L	na		na		1.76E+01		na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,5,6/2,4,4',6-TeCB	PCB-065/075		pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Bellingham STP				Bremerton STP				Burlington WWTP				City of Tacoma (Central No. 1)				Everett STP (Outfall 100)			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
2,3',4,4'-TeCB	PCB-066	32598-10-0	pg/L	na		na		1.05E+01		na		na		na		9.22E+01		na		2.45E+02		na	
2,3',4,5-TeCB	PCB-067	73575-53-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.06E+01		na	
2,2',3,4-TeCB	PCB-068	73575-52-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3',4',5-TeCB	PCB-070	32598-11-1	pg/L	na		na		1.52E+01	UFB	na		na		na		1.34E+02		na		4.37E+02		na	
2,3',4',6-TeCB	PCB-071	41464-46-4	pg/L	na		na		1.00E+01	U	na		na		na		2.94E+01		na		6.86E+01		na	
2,2',5,5'-TeCB	PCB-073	74338-23-1	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,4,4',5-TeCB	PCB-074	32690-93-0	pg/L	na		na		1.00E+01	U	na		na		na		5.62E+01		na		1.54E+02		na	
2,3',4',5'-TeCB	PCB-076	70362-48-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
3,3',4,4'-TeCB	PCB-077	32598-13-3	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		3.91E+01		na	
3,3',4,5-TeCB	PCB-078	70362-49-1	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
3,3',4,5'-TeCB	PCB-079	41464-48-6	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
3,3',5,5'-TeCB	PCB-080	33284-52-5	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
3,4,4',5-TeCB	PCB-081	70362-50-4	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4-PeCB	PCB-082	52663-62-4	pg/L	na		na		1.00E+01	U	na		na		na		1.66E+01	N	na		9.24E+01		na	
2,2',3,3',5-PeCB	PCB-083	60145-20-2	pg/L	na		na		1.00E+01	U	na		na		na		1.22E+01		na		2.57E+01		na	
2,2',3,3',6-PeCB	PCB-084	52663-60-2	pg/L	na		na		1.00E+01	U	na		na		na		3.20E+01		na		1.22E+02		na	
2,2',3,4,4'-PeCB	PCB-085	65510-45-4	pg/L	na		na		1.00E+01	U	na		na		na		2.67E+01		na		1.21E+02		na	
2,2',3,4,5/2,2',3,4',5'/ 2,3,4',5,6-PeCB	PCB-086/097/117		pg/L	na		na		1.00E+01	U	na		na		na		5.17E+01		na		2.32E+02		na	
2,2',3,4,5'/2,3,4,4',6-PeCB	PCB-087/115		pg/L	na		na		1.11E+01	UFB	na		na		na		7.05E+01		na		3.09E+02		na	
2,2',3,4,6-PeCB	PCB-088	55215-17-3	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4,6'-PeCB	PCB-089	73575-57-2	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4',5-PeCB	PCB-090	68194-07-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4',6-PeCB	PCB-091	68194-05-8	pg/L	na		na		1.00E+01	U	na		na		na		2.40E+01		na		7.28E+01		na	
2,2',3,5,5'-PeCB	PCB-092	52663-61-3	pg/L	na		na		1.00E+01	U	na		na		na		4.51E+01		na		1.82E+02		na	
2,2',3,5,6/2,2',3,5',6/2,2',3,4',6'/ 2,2',4,5,6'-PeCB	PCB-093/095/098/102		pg/L	na		na		2.00E+01	UFB	na		na		na		1.60E+02		na		6.01E+02		na	
2,2',3,5,6'-PeCB	PCB-094	73575-55-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,6,6'-PeCB	PCB-096	73575-54-9	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',4,4',5-PeCB	PCB-099	38380-01-7	pg/L	na		na		1.00E+01	U	na		na		na		7.65E+01		na		2.97E+02		na	
2,2',4,4',6-PeCB	PCB-100	39485-83-1	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',4,5,5'-PeCB	PCB-101	37680-73-2	pg/L	na		na		2.28E+01	UFB	na		na		na		2.06E+02		na		7.77E+02		na	
2,2',4,5',6-PeCB	PCB-103	60145-21-3	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',4,6,6'-PeCB	PCB-104	56558-16-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4,4'-PeCB	PCB-105	32598-14-4	pg/L	na		na		1.00E+01	U	na		na		na		5.65E+01		na		2.69E+02		na	
2,3,3',4,5-PeCB	PCB-106	70424-69-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4',5/2,3,3',4,5'-PeCB	PCB-107/108		pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		4.89E+01		na	
2,3,3',4,6-PeCB	PCB-109	74472-35-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4',6-PeCB	PCB-110	38380-03-9	pg/L	na		na		2.48E+01	UFB	na		na		na		1.95E+02		na		7.56E+02		na	
2,3,3',5,5'-PeCB	PCB-111	39635-32-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',5,6/2,3',4,4',6-PeCB	PCB-112/119		pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',5',6-PeCB	PCB-113	68194-10-5	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,4,4',5-PeCB	PCB-114	74472-37-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		2.44E+01		na	
2,3,4,5,6/2,3',4',5',6-PeCB	PCB-116/125		pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3',4,4',5-PeCB	PCB-118	31508-00-6	pg/L	na		na		1.96E+01	UFB	na		na		na		1.35E+02		na		6.48E+02		na	
2,3',4,5,5'-PeCB	PCB-120	68194-12-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3',4,5',6-PeCB	PCB-121	56558-18-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4',5'-PeCB	PCB-122	76842-07-4	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3',4,4',5'-PeCB	PCB-123	65510-44-3	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.92E+01	N	na	
2,3',4',5,5'-PeCB	PCB-124	70424-70-3	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		2.68E+01		na	
3,3',4,4',5-PeCB	PCB-126	57465-28-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.33E+01		na	

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Gig Harbor STP				King County West Point				Pierce County Chambers Creek STP				Shelton STP				Sumner STP			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
2,3',4,4'-TeCB	PCB-066	32598-10-0	pg/L	na		na		3.02E+01		na		1.00E+01	U	na		1.14E+01		na		na		na	
2,3',4,5-TeCB	PCB-067	73575-53-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4-TeCB	PCB-068	73575-52-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',4',5-TeCB	PCB-070	32598-11-1	pg/L	na		na		5.65E+01	UFB	na		3.59E+01	UFB	na		2.19E+01	UFB	na		na		na	
2,3',4',6-TeCB	PCB-071	41464-46-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',5,5'-TeCB	PCB-073	74338-23-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,4,4',5-TeCB	PCB-074	32690-93-0	pg/L	na		na		1.96E+01		na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',4',5'-TeCB	PCB-076	70362-48-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,3',4,4'-TeCB	PCB-077	32598-13-3	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,3',4,5-TeCB	PCB-078	70362-49-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,3',4,5'-TeCB	PCB-079	41464-48-6	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,3',5,5'-TeCB	PCB-080	33284-52-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,4,4',5-TeCB	PCB-081	70362-50-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4-PeCB	PCB-082	52663-62-4	pg/L	na		na		1.07E+01	N	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',5-PeCB	PCB-083	60145-20-2	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',6-PeCB	PCB-084	52663-60-2	pg/L	na		na		1.61E+01		na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,4'-PeCB	PCB-085	65510-45-4	pg/L	na		na		1.13E+01	N	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,5/2,2',3,4',5'/ 2,3,4',5,6-PeCB	PCB-086/097/117		pg/L	na		na		3.08E+01	UFB	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,5'/2,3,4,4',6-PeCB	PCB-087/115		pg/L	na		na		4.11E+01	UFB	na		1.85E+01	UFB	na		1.66E+01	UFB	na		na		na	
2,2',3,4,6-PeCB	PCB-088	55215-17-3	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,6'-PeCB	PCB-089	73575-57-2	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4',5-PeCB	PCB-090	68194-07-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4',6-PeCB	PCB-091	68194-05-8	pg/L	na		na		1.19E+01		na		1.12E+01	N	na		1.00E+01	U	na		na		na	
2,2',3,5,5'-PeCB	PCB-092	52663-61-3	pg/L	na		na		2.60E+01		na		1.49E+01	N	na		1.08E+01		na		na		na	
2,2',3,5,6/2,2',3,5',6/2,2',3,4',6'/ 2,2',4,5,6'-PeCB	PCB-093/095/098/102		pg/L	na		na		9.50E+01	UFB	na		4.34E+01	UFB	na		3.10E+01	UFB	na		na		na	
2,2',3,5,6'-PeCB	PCB-094	73575-55-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,6,6'-PeCB	PCB-096	73575-54-9	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',4,4',5-PeCB	PCB-099	38380-01-7	pg/L	na		na		3.83E+01		na		2.08E+01	UFB	na		1.90E+01	UFB	na		na		na	
2,2',4,4',6-PeCB	PCB-100	39485-83-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',4,5,5'-PeCB	PCB-101	37680-73-2	pg/L	na		na		1.09E+02	UFB	na		5.25E+01	UFB	na		3.87E+01	UFB	na		na		na	
2,2',4,5',6-PeCB	PCB-103	60145-21-3	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',4,6,6'-PeCB	PCB-104	56558-16-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,4'-PeCB	PCB-105	32598-14-4	pg/L	na		na		2.97E+01		na		1.00E+01	U	na		1.33E+01		na		na		na	
2,3,3',4,5-PeCB	PCB-106	70424-69-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4',5/2,3,3',4,5'-PeCB	PCB-107/108		pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,6-PeCB	PCB-109	74472-35-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4',6-PeCB	PCB-110	38380-03-9	pg/L	na		na		9.69E+01	UFB	na		4.64E+01	UFB	na		4.10E+01	UFB	na		na		na	
2,3,3',5,5'-PeCB	PCB-111	39635-32-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',5,6/2,3',4,4',6-PeCB	PCB-112/119		pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',5',6-PeCB	PCB-113	68194-10-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,4,4',5-PeCB	PCB-114	74472-37-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,4,5,6/2,3',4',5',6-PeCB	PCB-116/125		pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',4,4',5-PeCB	PCB-118	31508-00-6	pg/L	na		na		7.19E+01		na		3.17E+01	UFB	na		3.16E+01	UFB	na		na		na	
2,3',4,5,5'-PeCB	PCB-120	68194-12-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',4,5',6-PeCB	PCB-121	56558-18-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4',5'-PeCB	PCB-122	76842-07-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',4,4',5'-PeCB	PCB-123	65510-44-3	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',4',5,5'-PeCB	PCB-124	70424-70-3	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,3',4,4',5-PeCB	PCB-126	57465-28-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Bellingham STP				Bremerton STP				Burlington WWTP				City of Tacoma (Central No. 1)				Everett STP (Outfall 100)			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
3,3',4,5,5'-PeCB	PCB-127	39635-33-1	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4,4'-HxCB	PCB-128	38380-07-3	pg/L	na		na		1.00E+01	U	na		na		na		3.50E+01		na		1.62E+02		na	
2,2',3,3',4,5-HxCB	PCB-129	55215-18-4	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		2.96E+01		na	
2,2',3,3',4,5'-HxCB	PCB-130	52663-66-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		4.42E+01		na	
2,2',3,3',4,6-HxCB	PCB-131	61798-70-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4,6'-HxCB	PCB-132	38380-05-1	pg/L	na		na		1.21E+01	UFB	na		na		na		7.93E+01		na		2.91E+02		na	
2,2',3,3',5,5'-HxCB	PCB-133	35694-04-3	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.08E+01		na	
2,2',3,3',5,6-HxCB	PCB-134	52704-70-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		3.77E+01		na	
2,2',3,3',5,6'-HxCB	PCB-135	52744-13-5	pg/L	na		na		1.00E+01	U	na		na		na		2.43E+01		na		7.70E+01		na	
2,2',3,3',6,6'-HxCB	PCB-136	38411-22-2	pg/L	na		na		1.00E+01	U	na		na		na		3.79E+01		na		9.15E+01		na	
2,2',3,4,4',5-HxCB	PCB-137	35694-06-5	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		3.08E+01		na	
2,2',3,4,4',5'-HxCB	PCB-138	35065-28-2	pg/L	na		na		1.64E+01	UFB	na		na		na		1.68E+02		na		7.15E+02		na	
2,2',3,4,4',6/2,2',3,4',5',6-HxCB	PCB-139/149		pg/L	na		na		1.84E+01	UFB	na		na		na		1.78E+02		na		5.77E+02		na	
2,2',3,4,4',6'-HxCB	PCB-140	59291-64-4	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4,5,5'-HxCB	PCB-141	52712-04-6	pg/L	na		na		1.00E+01	U	na		na		na		3.34E+01		na		9.08E+01		na	
2,2',3,4,5,6-HxCB	PCB-142	41411-61-4	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4,5,6'-HxCB	PCB-143	68194-15-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4,5',6-HxCB	PCB-144	68194-14-9	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.95E+01		na	
2,2',3,4,6,6'-HxCB	PCB-145	74472-40-5	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4',5,5'-HxCB	PCB-146	51908-16-8	pg/L	na		na		1.00E+01	U	na		na		na		3.60E+01		na		9.96E+01		na	
2,2',3,4',5,6-HxCB	PCB-147	68194-13-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4',5,6'-HxCB	PCB-148	74472-41-6	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4',6,6'-HxCB	PCB-150	68194-08-1	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,5,5',6-HxCB	PCB-151	52663-63-5	pg/L	na		na		1.00E+01	U	na		na		na		5.46E+01		na		1.43E+02		na	
2,2',3,5,6,6'-HxCB	PCB-152	68194-09-2	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',4,4',5,5'-HxCB	PCB-153	35065-27-1	pg/L	na		na		2.13E+01	UFB	na		na		na		1.92E+02		na		6.66E+02		na	
2,2',4,4',5,6'-HxCB	PCB-154	60145-22-4	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',4,4',6,6'-HxCB	PCB-155	33979-03-2	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4,4',5-HxCB	PCB-156	38380-08-4	pg/L	na		na		1.00E+01	U	na		na		na		2.02E+01		na		8.69E+01		na	
2,3,3',4,4',5'-HxCB	PCB-157	69782-90-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.75E+01		na	
2,3,3',4,4',6-HxCB	PCB-158	74472-42-7	pg/L	na		na		1.00E+01	U	na		na		na		1.84E+01		na		8.23E+01		na	
2,3,3',4,5,5'-HxCB	PCB-159	39635-35-3	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4,5,6-HxCB	PCB-160	41411-62-5	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4,5',6-HxCB	PCB-161	74472-43-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4',5,5'-HxCB	PCB-162	39635-34-2	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4',5,6/2,3,3',4',5',6-HxCB	PCB-163/164		pg/L	na		na		1.00E+01	U	na		na		na		6.18E+01		na		2.06E+02		na	
2,3,3',5,5',6-HxCB	PCB-165	74472-46-1	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,4,4',5,6-HxCB	PCB-166	41411-63-6	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3',4,4',5,5'-HxCB	PCB-167	52663-72-6	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		3.28E+01		na	
2,3',4,4',5',6-HxCB	PCB-168	59291-65-5	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
3,3',4,4',5,5'-HxCB	PCB-169	32774-16-6	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4,4',5-HpCB	PCB-170	35065-30-6	pg/L	na		na		1.00E+01	U	na		na		na		4.23E+01		na		8.58E+01		na	
2,2',3,3',4,4',6-HpCB	PCB-171	52663-71-5	pg/L	na		na		1.00E+01	U	na		na		na		1.73E+01		na		3.00E+01		na	
2,2',3,3',4,5,5'-HpCB	PCB-172	52663-74-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		2.23E+01	NJ	na	
2,2',3,3',4,5,6-HpCB	PCB-173	68194-16-1	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4,5,6'-HpCB	PCB-174	38411-25-5	pg/L	na		na		1.00E+01	U	na		na		na		6.61E+01		na		1.30E+02		na	
2,2',3,3',4,5',6-HpCB	PCB-175	40186-70-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4,6,6'-HpCB	PCB-176	52663-65-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.64E+01		na	
2,2',3,3',4,5',6'-HpCB	PCB-177	52663-70-4	pg/L	na		na		1.00E+01	U	na		na		na		2.85E+01		na		7.63E+01		na	
2,2',3,3',5,5',6-HpCB	PCB-178	52663-67-9	pg/L	na		na		1.00E+01	U	na		na		na		1.24E+01		na		2.89E+01		na	
2,2',3,3',5,6,6'-HpCB	PCB-179	52663-64-6	pg/L	na		na		1.00E+01	U	na		na		na		2.91E+01		na		5.54E+01		na	
2,2',3,4,4',5,5'-HpCB	PCB-180	35065-29-3	pg/L	na		na		1.00E+01	U	na		na		na		1.42E+02		na		2.67E+02		na	

Chemical of Concern	Alternate Name	CAS Number	Units	Gig Harbor STP				King County West Point				Pierce County Chambers Creek STP				Shelton STP				Sumner STP			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
3,3',4,5,5'-PeCB	PCB-127	39635-33-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,4'-HxCB	PCB-128	38380-07-3	pg/L	na		na		1.38E+01		na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,5-HxCB	PCB-129	55215-18-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,5'-HxCB	PCB-130	52663-66-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,6-HxCB	PCB-131	61798-70-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,6'-HxCB	PCB-132	38380-05-1	pg/L	na		na		3.88E+01	UFB	na		1.78E+01	UFB	na		1.88E+01	UFB	na		na		na	
2,2',3,3',5,5'-HxCB	PCB-133	35694-04-3	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',5,6-HxCB	PCB-134	52704-70-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',5,6'-HxCB	PCB-135	52744-13-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',6,6'-HxCB	PCB-136	38411-22-2	pg/L	na		na		1.45E+01		na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,4',5-HxCB	PCB-137	35694-06-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,4',5'-HxCB	PCB-138	35065-28-2	pg/L	na		na		6.83E+01		na		3.16E+01	UFB	na		4.60E+01	UFB	na		na		na	
2,2',3,4,4',6/2,2',3,4',5',6-HxCB	PCB-139/149		pg/L	na		na		6.63E+01	UFB	na		3.09E+01	UFB	na		4.09E+01	UFB	na		na		na	
2,2',3,4,4',6'-HxCB	PCB-140	59291-64-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,5,5'-HxCB	PCB-141	52712-04-6	pg/L	na		na		1.15E+01		na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,5,6-HxCB	PCB-142	41411-61-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,5,6'-HxCB	PCB-143	68194-15-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,5',6-HxCB	PCB-144	68194-14-9	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,6,6'-HxCB	PCB-145	74472-40-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4',5,5'-HxCB	PCB-146	51908-16-8	pg/L	na		na		1.00E+01		na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4',5,6-HxCB	PCB-147	68194-13-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4',5,6'-HxCB	PCB-148	74472-41-6	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4',6,6'-HxCB	PCB-150	68194-08-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,5,5',6-HxCB	PCB-151	52663-63-5	pg/L	na		na		2.01E+01		na		1.00E+01	U	na		1.38E+01		na		na		na	
2,2',3,5,6,6'-HxCB	PCB-152	68194-09-2	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',4,4',5,5'-HxCB	PCB-153	35065-27-1	pg/L	na		na		7.08E+01	UFB	na		2.98E+01	UFB	na		5.27E+01	UFB	na		na		na	
2,2',4,4',5,6'-HxCB	PCB-154	60145-22-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',4,4',6,6'-HxCB	PCB-155	33979-03-2	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,4',5-HxCB	PCB-156	38380-08-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,4',5'-HxCB	PCB-157	69782-90-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,4',6-HxCB	PCB-158	74472-42-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,5,5'-HxCB	PCB-159	39635-35-3	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,5,6-HxCB	PCB-160	41411-62-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,5',6-HxCB	PCB-161	74472-43-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4',5,5'-HxCB	PCB-162	39635-34-2	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4',5,6/2,3,3',4',5',6-HxCB	PCB-163/164		pg/L	na		na		2.16E+01		na		1.12E+01		na		1.15E+01	N	na		na		na	
2,3,3',5,5',6-HxCB	PCB-165	74472-46-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,4,4',5,6-HxCB	PCB-166	41411-63-6	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',4,4',5,5'-HxCB	PCB-167	52663-72-6	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3',4,4',5',6-HxCB	PCB-168	59291-65-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
3,3',4,4',5,5'-HxCB	PCB-169	32774-16-6	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,4',5-HpCB	PCB-170	35065-30-6	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,4',6-HpCB	PCB-171	52663-71-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,5,5'-HpCB	PCB-172	52663-74-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,5,6-HpCB	PCB-173	68194-16-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,5,6'-HpCB	PCB-174	38411-25-5	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.55E+01	N	na		na		na	
2,2',3,3',4,5',6-HpCB	PCB-175	40186-70-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,6,6'-HpCB	PCB-176	52663-65-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,5',6'-HpCB	PCB-177	52663-70-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',5,5',6-HpCB	PCB-178	52663-67-9	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',5,6,6'-HpCB	PCB-179	52663-64-6	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,4',5,5'-HpCB	PCB-180	35065-29-3	pg/L	na		na		3.53E+01		na		1.59E+01		na		3.39E+01		na		na		na	

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Bellingham STP				Bremerton STP				Burlington WWTP				City of Tacoma (Central No. 1)				Everett STP (Outfall 100)			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
2,2',3,4,4',5,6-HpCB	PCB-181	74472-47-2	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4,4',5,6'/ 2,2',3,4',5,5',6-HpCB	PCB-182/187		pg/L	na		na		1.00E+01	U	na		na		na		7.48E+01		na		1.85E+02		na	
2,2',3,4,4',5',6-HpCB	PCB-183	52663-69-1	pg/L	na		na		1.00E+01	U	na		na		na		3.39E+01		na		8.68E+01		na	
2,2',3,4,4',6,6'-HpCB	PCB-184	74472-48-3	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4,5,5',6-HpCB	PCB-185	52712-05-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.58E+01		na	
2,2',3,4,5,6,6'-HpCB	PCB-186	74472-49-4	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,4',5,6,6'-HpCB	PCB-188	74487-85-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4,4',5,5'-HpCB	PCB-189	39635-31-9	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.01E+01	NJ	na	
2,3,3',4,4',5,6-HpCB	PCB-190	41411-64-7	pg/L	na		na		1.00E+01	U	na		na		na		1.11E+01		na		2.30E+01		na	
2,3,3',4,4',5',6-HpCB	PCB-191	74472-50-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4,5,5',6-HpCB	PCB-192	74472-51-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4',5,5',6-HpCB	PCB-193	69782-91-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4,4',5,5'-OcCB	PCB-194	35694-08-7	pg/L	na		na		1.00E+01	U	na		na		na		2.13E+01		na		5.09E+01	NJ	na	
2,2',3,3',4,4',5,6-OcCB	PCB-195	52663-78-2	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		2.07E+01		na	
2,2',3,3',4,4',5,6'-OcCB	PCB-196	42740-50-1	pg/L	na		na		1.00E+01	U	na		na		na		1.57E+01		na		3.28E+01		na	
2,2',3,3',4,4',6,6'-OcCB	PCB-197	33091-17-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4,5,5',6-OcCB	PCB-198	68194-17-2	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4,5,5',6'-OcCB	PCB-199	52663-75-9	pg/L	na		na		1.00E+01	U	na		na		na		3.88E+01		na		8.81E+01		na	
2,2',3,3',4,5,6,6'-OcCB	PCB-200	52663-73-7	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4,5',6,6'-OcCB	PCB-201	40186-71-8	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.29E+01	NJ	na	
2,2',3,3',5,5',6,6'-OcCB	PCB-202	2136-99-4	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.84E+01		na	
2,2',3,4,4',5,5',6-OcCB	PCB-203	52663-76-0	pg/L	na		na		1.00E+01	U	na		na		na		2.28E+01		na		5.63E+01		na	
2,2',3,4,4',5,6,6'-OcCB	PCB-204	74472-52-9	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,3,3',4,4',5,5',6-OcCB	PCB-205	74472-53-0	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4,4',5,5',6-NoCB	PCB-206	40186-72-9	pg/L	na		na		1.00E+01	U	na		na		na		1.47E+01		na		5.06E+01		na	
2,2',3,3',4,4',5,6,6'-NoCB	PCB-207	52663-79-3	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.00E+01	U	na	
2,2',3,3',4,5,5',6,6'-NoCB	PCB-208	52663-77-1	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		1.76E+01		na	
2,2',3,3',4,4',5,5',6,6'-DeCB	PCB-209	2051-24-3	pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		2.31E+01	UFB	na	
Number of Detects =				nc		nc		5		nc		nc		nc		77		nc		105		nc	
Sum of Detects =			pg/L	nc		nc		6.94E+01		nc		nc		nc		4.65E+03		nc		1.54E+04		nc	
Polychlorinated Biphenyls (Homologs)																							
Decachlorobiphenyl			pg/L	na		na		1.00E+01	U	na		na		na		1.00E+01	U	na		2.31E+01		na	
Dichlorobiphenyls			pg/L	na		na		5.50E+01	UFB	na		na		na		3.80E+02		na		1.60E+03	JL	na	
Heptachlorobiphenyls			pg/L	na		na		1.00E+01	U	na		na		na		4.58E+02		na		1.00E+03		na	
Hexachlorobiphenyls			pg/L	na		na		5.61E+01	UFB	na		na		na		9.39E+02		na		3.51E+03		na	
Monochlorobiphenyls			pg/L	na		na		1.00E+01	U	na		na		na		7.05E+01		na		5.08E+01		na	
Nonachlorobiphenyls			pg/L	na		na		1.00E+01	U	na		na		na		1.47E+01		na		6.82E+01		na	
Octachlorobiphenyls			pg/L	na		na		1.00E+01	U	na		na		na		9.86E+01		na		2.16E+02		na	
Pentachlorobiphenyls			pg/L	na		na		8.72E+01	UFB	na		na		na		1.09E+03		na		4.62E+03		na	
Tetrachlorobiphenyls			pg/L	na		na		5.94E+01	UFB	na		na		na		9.31E+02		na		2.62E+03		na	
Trichlorobiphenyls			pg/L	na		na		7.48E+01		na		na		na		7.47E+02		na		1.90E+03		na	
Number of Detects =				nc		nc		1		nc		nc		nc		9		nc		10		nc	

Chemical of Concern	Alternate Name	CAS Number	Units	Gig Harbor STP				King County West Point				Pierce County Chambers Creek STP				Shelton STP				Sumner STP			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
2,2',3,4,4',5,6-HpCB	PCB-181	74472-47-2	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,4',5,6'/ 2,2',3,4',5,5',6-HpCB	PCB-182/187		pg/L	na		na		1.68E+01		na		1.11E+01	N	na		2.59E+01		na		na		na	
2,2',3,4,4',5',6-HpCB	PCB-183	52663-69-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,4',6,6'-HpCB	PCB-184	74472-48-3	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,5,5',6-HpCB	PCB-185	52712-05-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,5,6,6'-HpCB	PCB-186	74472-49-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4',5,6,6'-HpCB	PCB-188	74487-85-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,4',5,5'-HpCB	PCB-189	39635-31-9	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,4',5,6-HpCB	PCB-190	41411-64-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,4',5',6-HpCB	PCB-191	74472-50-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,5,5',6-HpCB	PCB-192	74472-51-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4',5,5',6-HpCB	PCB-193	69782-91-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,4',5,5'-OcCB	PCB-194	35694-08-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,4',5,6-OcCB	PCB-195	52663-78-2	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,4',5,6'-OcCB	PCB-196	42740-50-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.03E+01	N	na		na		na	
2,2',3,3',4,4',6,6'-OcCB	PCB-197	33091-17-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,5,5',6-OcCB	PCB-198	68194-17-2	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,5,5',6'-OcCB	PCB-199	52663-75-9	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.27E+01		na		na		na	
2,2',3,3',4,5,6,6'-OcCB	PCB-200	52663-73-7	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,5',6,6'-OcCB	PCB-201	40186-71-8	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',5,5',6,6'-OcCB	PCB-202	2136-99-4	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,4,4',5,5',6-OcCB	PCB-203	52663-76-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.09E+01	N	na		na		na	
2,2',3,4,4',5,6,6'-OcCB	PCB-204	74472-52-9	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,3,3',4,4',5,5',6-OcCB	PCB-205	74472-53-0	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,4',5,5',6-NoCB	PCB-206	40186-72-9	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.10E+01	N	na		na		na	
2,2',3,3',4,4',5,6,6'-NoCB	PCB-207	52663-79-3	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,5,5',6,6'-NoCB	PCB-208	52663-77-1	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
2,2',3,3',4,4',5,5',6,6'-DeCB	PCB-209	2051-24-3	pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
Number of Detects =				nc		nc		38		nc		20		nc		15		nc		nc		nc	
Sum of Detects =			pg/L	nc		nc		1.06E+03		nc		3.99E+02		nc		2.26E+02	NJ	nc		nc		nc	
Polychlorinated Biphenyls (Homologs)																							
Decachlorobiphenyl			pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
Dichlorobiphenyls			pg/L	na		na		2.28E+02	JL	na		2.27E+02	JL	na		2.85E+01	UFB	na		na		na	
Heptachlorobiphenyls			pg/L	na		na		5.21E+01		na		1.59E+01		na		5.98E+01		na		na		na	
Hexachlorobiphenyls			pg/L	na		na		3.36E+02		na		1.21E+02	UFB	na		1.72E+02	UFB	na		na		na	
Monochlorobiphenyls			pg/L	na		na		3.26E+01		na		2.31E+01		na		1.00E+01	U	na		na		na	
Nonachlorobiphenyls			pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.00E+01	U	na		na		na	
Octachlorobiphenyls			pg/L	na		na		1.00E+01	U	na		1.00E+01	U	na		1.27E+01		na		na		na	
Pentachlorobiphenyls			pg/L	na		na		5.67E+02		na		2.13E+02	UFB	na		1.83E+02	UFB	na		na		na	
Tetrachlorobiphenyls			pg/L	na		na		3.54E+02	JL	na		1.32E+02		na		7.53E+01		na		na		na	
Trichlorobiphenyls			pg/L	na		na		2.87E+02		na		1.74E+02		na		4.94E+01		na		na		na	
Number of Detects =				nc		nc		7		nc		5		nc		4		nc		nc		nc	

Appendix C. Summary of Analytical Results

Chemical of Concern	Alternate Name	CAS Number	Units	Bellingham STP				Bremerton STP				Burlington WWTP				City of Tacoma (Central No. 1)				Everett STP (Outfall 100)			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Metals																							
Copper		7440-50-8	ug/L	6.21E+00		2.69E+00		3.52E+00		3.96E+00		2.56E+00		5.27E+00		9.65E+00		9.16E+00		1.18E+01		5.34E+00	
Lead		7439-92-1	ug/L	4.40E-01		4.60E-01		2.80E-01		1.90E-01		3.10E-01		4.50E-01		7.20E-01		6.00E-01		1.17E+00		5.20E-01	
Zinc		7440-66-6	ug/L	3.97E+01		4.47E+01		2.17E+01		1.32E+01		4.11E+01		6.37E+01		4.45E+01		3.75E+01		2.96E+01		1.79E+01	

Key:

See User Study ID **ToxLPh3F** in the Ecology Environmental Information Management (EIM) System for more details.

The precision of the data in this table is only two significant figures.

Winter = A 24-hour composite from February 2009.
Summer = A 24-hour composite from July 2009.
co-elute = BDE049 and BDE071 coeluted in the analyses of the winter samples.
nc = Not calculated.
na = Not analyzed.
ng/L = Nanograms per liter.
pg/L = Picograms per liter.
ug/L = Micrograms per liter.

Data Qualifiers:

G = Value is likely greater than the reported result. Reported result may be biased low.
J = Analyte was positively identified. Value is the approximate concentration.
K = Bias could not be determined.
L = Value is likely less than the reported result. Reported result may be biased high.
NJ = Analyte was "tentatively identified." Value is its approximate concentration.
REJ = Datum is unusable for all purposes due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence of absence of the analyte cannot be verified.
T = The positive result is less than the quantitation limit.
U = Analyte was not detected at or above the reported result.
UFB = Result was less than three times the respective result in the field blank. In the EIM System, this qualifier was substituted with a "U" plus a note in the Result Value Comment field.
UJ = Analyte was not detected above the reported quantitation limit, which is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Chemical of Concern	Alternate Name	CAS Number	Units	Gig Harbor STP				King County West Point				Pierce County Chambers Creek STP				Shelton STP				Sumner STP			
				Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Metals																							
Copper		7440-50-8	ug/L	9.28E+00		1.14E+01		1.17E+01		1.39E+01		1.19E+01		1.11E+01		7.31E+00		8.29E+00		1.32E+01		1.72E+01	
Lead		7439-92-1	ug/L	6.80E-01		6.00E-01		3.80E-01		3.90E-01		2.90E-01		3.00E-01		4.00E-01		3.50E-01		1.80E-01		1.50E-01	
Zinc		7440-66-6	ug/L	7.62E+01		9.51E+01		3.30E+01		3.86E+01		3.45E+01		3.55E+01		4.45E+01		5.31E+01		4.99E+01		5.29E+01	

Key:

See User Study ID **ToxLPh3F** in the Ecology Environmental Information Management (EIM) System for more details.

The precision of the data in this table is only two significant figures.

Winter = A 24-hour composite from February 2009.

Summer = A 24-hour composite from July 2009.

co-elute = BDE049 and BDE071 coeluted in the analyses of the winter samples.

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ng/L = Nanograms per liter.

pg/L = Picograms per liter.

ug/L = Micrograms per liter.

Data Qualifiers:

G = Value is likely greater than the reported result. Reported result may be biased low.

J = Analyte was positively identified. Value is the approximate concentration.

K = Bias could not be determined.

L = Value is likely less than the reported result. Reported result may be biased high.

NJ = Analyte was "tentatively identified." Value is its approximate concentration.

REJ = Datum is unusable for all purposes due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence of absence of the analyte cannot be verified.

T = The positive result is less than the quantitation limit.

U = Analyte was not detected at or above the reported result.

UFB = Result was less than three times the respective result in the field blank. In the EIM System, this qualifier was substituted with a "U" plus a note in the Result Value Comment field.

UJ = Analyte was not detected above the reported quantitation limit, which is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Appendix D.

Percent Detection for Individual Chemicals

Appendix D. Percent Detection for Individual Chemicals

Chemical of Concern	Alternate Name	Number of Valid Results	Number of Laboratory Non-Detects (a)	Number of Field/Rinseate Non-Detects (b)	Percent Detection (c)
Polycyclic Aromatic Hydrocarbons (PAHs)					
Low Molecular Weight PAHs (LPAHs)					
Phenanthrene		20	6	0	**70.0**
Fluorene		20	8	0	**60.0**
Acenaphthene		20	13	0	**35.0**
Acenaphthylene		20	14	0	**30.0**
Naphthalene		20	6	8	**30.0**
Anthracene		20	16	0	**20.0**
High Molecular Weight PAHs (HPAHs)					
Pyrene		20	2	0	**90.0**
Fluoranthene		20	4	0	**80.0**
Indeno(1,2,3-cd)pyrene		20	18	0	**10.0**
Benzo(a)anthracene		20	19	0	**5.0**
Benzo(b)fluoranthene		20	19	0	**5.0**
Benzo(g,h,i)perylene		20	19	0	**5.0**
Chrysene		20	19	0	**5.0**
Benzo(a)pyrene		20	20	0	**0.0**
Benzo(k)fluoranthene		20	20	0	**0.0**
Dibenzo(a,h)anthracene		20	20	0	**0.0**
Carcinogenic PAHs (cPAHs)					
Indeno(1,2,3-cd)pyrene		20	18	0	**10.0**
Benzo(a)anthracene		20	19	0	**5.0**
Benzo(b)fluoranthene		20	19	0	**5.0**
Chrysene		20	19	0	**5.0**
Benzo(a)pyrene		20	20	0	**0.0**
Benzo(k)fluoranthene		20	20	0	**0.0**
Dibenzo(a,h)anthracene		20	20	0	**0.0**
Total PAHs (LPAHs+HPAHs)		20	1	0	**95.0**
Phthalates					
bis(2-Ethylhexyl) phthalate		20	2	0	**90.0**
Butylbenzyl phthalate		20	15	0	**25.0**
Diethyl phthalate		20	14	2	**20.0**
Di-N-butyl phthalate		20	18	0	**10.0**
Di-N-octyl phthalate		20	20	0	**0.0**
Dimethyl phthalate		20	19	1	**0.0**
Other Base/Neutral/Acid Extractables					
2-Chloroethanol phosphate (3:1)		10	0	0	**100.0**
Cholesterol		10	0	0	**100.0**
Triethyl citrate		20	0	0	**100.0**
1,4-Dichlorobenzene		20	1	0	**95.0**
2,4,6-Trichlorophenol		20	1	0	**95.0**
3B-Coprostanol		10	1	0	**90.0**
Triclosan		20	2	0	**90.0**
4-Methylphenol	p-Cresol	20	7	0	**65.0**
Dibenzofuran		20	8	0	**60.0**
Caffeine		17	7	0	**58.8**
Phenol		20	0	9	**55.0**
Bisphenol A		15	7	0	**53.3**
2,4-Dichlorophenol		20	11	0	**45.0**
2,4-Dimethylphenol		18	11	0	**38.9**
2-Methylphenol	o-Cresol	20	14	0	**30.0**
Benzyl alcohol		10	7	0	**30.0**
1-Methylnaphthalene		20	15	0	**25.0**
2,4-Dinitrophenol		20	16	0	**20.0**
2-Methylnaphthalene		20	16	0	**20.0**
Isophorone		20	16	0	**20.0**
Pentachlorophenol		20	16	0	**20.0**
2-Nitrophenol		20	17	0	**15.0**
2-Chloronaphthalene		20	18	0	**10.0**
N-Nitrosodimethylamine		10	9	0	**10.0**
bis(2-Chloroethoxy) methane		15	14	0	**6.7**
4-Nonylphenol		16	12	3	**6.3**
1,2-Dichlorobenzene		20	16	3	**5.0**
2,3,4,6-Tetrachlorophenol		20	19	0	**5.0**
N-Nitrosodiphenylamine		20	19	0	**5.0**

Appendix D. Percent Detection for Individual Chemicals

Chemical of Concern	Alternate Name	Number of Valid Results	Number of Laboratory Non-Detects (a)	Number of Field/Rinseate Non-Detects (b)	Percent Detection (c)
Retene		20	19	0	**5.0**
1,2,4-Trichlorobenzene		20	20	0	**0.0**
1,3-Dichlorobenzene		20	18	2	**0.0**
2,3,4,5-Tetrachlorophenol		20	20	0	**0.0**
2,4,5-Trichlorophenol		20	20	0	**0.0**
2,4-Dinitrotoluene		20	20	0	**0.0**
2,6-Dinitrotoluene		20	20	0	**0.0**
2-Chlorophenol		20	20	0	**0.0**
2-Nitroaniline	o-Nitroaniline	15	15	0	**0.0**
3,3'-Dichlorobenzidine		9	9	0	**0.0**
3-Nitroaniline	m-Nitroaniline	15	15	0	**0.0**
4,6-Dinitro-2-methylphenol		20	20	0	**0.0**
4-Bromophenylphenyl ether		20	20	0	**0.0**
4-Chloro-3-methylphenol	p-Chloro-m-cresol	20	20	0	**0.0**
4-Chlorophenylphenyl ether		20	20	0	**0.0**
4-Nitroaniline	p-Nitroaniline	10	10	0	**0.0**
4-Nitrophenol		20	20	0	**0.0**
Benzoic acid		10	5	5	**0.0**
bis(2-Chloroethyl) ether		20	20	0	**0.0**
Carbazole		20	20	0	**0.0**
Hexachlorobutadiene		20	20	0	**0.0**
Hexachlorocyclopentadiene		20	20	0	**0.0**
Hexachloroethane		20	20	0	**0.0**
Nitrobenzene		20	20	0	**0.0**
N-Nitrosodi-n-propylamine		20	20	0	**0.0**
4-Chloroaniline		0	0	0	**no data**
Pesticides					
Pentachloroanisole		10	7	0	**30.0**
Endosulfan I		20	16	0	**20.0**
Hexachlorobenzene		20	18	0	**10.0**
Toxaphene		20	18	0	**10.0**
alpha-BHC		20	19	0	**5.0**
Chlorpyriphos		20	19	0	**5.0**
2,4'-DDD		10	10	0	**0.0**
2,4'-DDE		10	10	0	**0.0**
2,4'-DDT		10	10	0	**0.0**
4,4'-DDD		20	20	0	**0.0**
4,4'-DDE		20	20	0	**0.0**
4,4'-DDT		20	20	0	**0.0**
Aldrin		20	20	0	**0.0**
beta-BHC		20	20	0	**0.0**
delta-BHC		20	20	0	**0.0**
gamma-BHC	Lindane	20	20	0	**0.0**
cis-Chlordane		20	20	0	**0.0**
trans-Chlordane		20	20	0	**0.0**
Chlordane, technical		10	10	0	**0.0**
Dacthal	DCPA	20	20	0	**0.0**
DDMU		10	10	0	**0.0**
Dieldrin		20	20	0	**0.0**
Endosulfan II		20	20	0	**0.0**
Endosulfan sulfate		20	20	0	**0.0**
Endrin		20	20	0	**0.0**
Endrin aldehyde		20	20	0	**0.0**
Endrin ketone		20	20	0	**0.0**
Heptachlor		20	20	0	**0.0**
Heptachlor epoxide		20	20	0	**0.0**
Methoxychlor		20	20	0	**0.0**
Mirex		10	10	0	**0.0**
cis-Nonachlor		20	20	0	**0.0**
trans-Nonachlor		20	20	0	**0.0**
Oxychlordane		20	20	0	**0.0**
Herbicides					
MCPP	Mecoprop	20	15	0	**25.0**
Triclopyr		20	15	0	**25.0**
2,4-D		20	17	0	**15.0**
Dicamba I		20	17	0	**15.0**
MCPA		20	17	0	**15.0**
2,4,5-T		20	20	0	**0.0**

Appendix D. Percent Detection for Individual Chemicals

Chemical of Concern	Alternate Name	Number of Valid Results	Number of Laboratory Non-Detects (a)	Number of Field/Rinseate Non-Detects (b)	Percent Detection (c)
2,4,5-TP	Silvex	20	20	0	**0.0**
2,4-DB	2,4-D butyric acid	19	19	0	**0.0**
3,5-Dichlorobenzoic acid		20	20	0	**0.0**
Acifluorfen	Blazer	19	19	0	**0.0**
Bentazon		20	20	0	**0.0**
Bromoxynil		20	20	0	**0.0**
Clopyralid		20	20	0	**0.0**
Dichlorprop		20	20	0	**0.0**
Diclofop-Methyl		20	20	0	**0.0**
Dinoseb		19	19	0	**0.0**
Ioxynil		20	20	0	**0.0**
Picloram		18	18	0	**0.0**
Polybrominated Diphenyl Ethers (Congeners)					
2,4,4'-TrBDE	BDE-028	20	0	0	**100.0**
2,2',4,4'-TeBDE	BDE-047	20	0	0	**100.0**
2,2',4,5'/2,3',4',6-TeBDE	BDE-049/071	10	0	0	**100.0**
2,2',4,4',5-PeBDE	BDE-099	20	0	0	**100.0**
2,2',4,4',6-PeBDE	BDE-100	20	0	0	**100.0**
2,2',4,4',5,5'-HxBDE	BDE-153	20	0	0	**100.0**
2,2',4,4',5,6'-HxBDE	BDE-154	20	0	0	**100.0**
2,2',4-TrBDE	BDE-017	20	1	0	**95.0**
2,3',4',6-TeBDE	BDE-071	10	1	0	**90.0**
2,2',3,4,4'-PeBDE	BDE-085	20	2	0	**90.0**
4,4'-DiBDE	BDE-015	20	3	0	**85.0**
2,2',4,5'-TeBDE	BDE-049	10	2	0	**80.0**
2,2',3,3',4,4',5,5',6,6'-DeBDE	BDE-209	20	3	1	**80.0**
2,3',4,4'-TeBDE	BDE-066	20	6	0	**70.0**
2,2',3,3',4,4',5,6,6'-NoBDE	BDE-207	20	6	0	**70.0**
2,2',3,3',4,4',5,5',6-NoBDE	BDE-206	20	7	0	**65.0**
2,2',3,3',4,5,5',6,6'-NoBDE	BDE-208	20	7	0	**65.0**
2,2',3,4,4',5',6-HpBDE	BDE-183	20	9	0	**55.0**
2,4-DiBDE	BDE-007	20	11	0	**45.0**
2,2',3,4,4',6-HxBDE	BDE-139	20	11	0	**45.0**
2,4,6-TrBDE	BDE-030	20	13	0	**35.0**
2,2',3,4,4',6'-HxBDE	BDE-140	20	13	0	**35.0**
2,2',3,3',4,4',5,6'-OcBDE	BDE-196	20	13	0	**35.0**
2,2',3,3',4,4',6,6'/ 2,2',3,4,4',5,6,6'-OcBDE	BDE-197/204	20	13	0	**35.0**
2,2',3,4,4',5,5',6-OcBDE	BDE-203	20	13	0	**35.0**
2,2',3,4,4',5'-HxBDE	BDE-138	20	14	0	**30.0**
2,3',4,4',6-PeBDE	BDE-119	20	15	0	**25.0**
2,2',3,3',4,5',6,6'-OcBDE	BDE-201	20	15	0	**25.0**
2,2',3,4,4',6,6'-HpBDE	BDE-184	20	18	0	**10.0**
2,3,3',4,4',5/3,3',4,4',5,5'-HxBDE	BDE-156/169	20	19	0	**5.0**
2,2',3,3',4,4',6-HpBDE	BDE-171	20	19	0	**5.0**
2,2',3,4,4',5,5'-HpBDE	BDE-180	20	19	0	**5.0**
2,3,3',4,4',5',6-HpBDE	BDE-191	20	19	0	**5.0**
2,6-DiBDE	BDE-010	20	20	0	**0.0**
3,3',4,4'-TeBDE	BDE-077	20	20	0	**0.0**
3,3',4,4',5-PeBDE	BDE-126	20	20	0	**0.0**
2,3,3',4,4',5,5',6-OcBDE	BDE-205	20	20	0	**0.0**
Polybrominated Diphenyl Ethers (Homologs)					
Hexabromodiphenyl ethers		20	0	0	**100.0**
Pentabromodiphenyl ethers		20	0	0	**100.0**
Tetrabromodiphenyl ethers		20	0	0	**100.0**
Tribromodiphenyl ethers		20	0	0	**100.0**
Dibromodiphenyl ethers		20	2	0	**90.0**
Decabromodiphenyl ether		20	4	0	**80.0**
Nonabromodiphenyl ethers		20	6	0	**70.0**
Heptabromodiphenyl ethers		20	9	0	**55.0**
Octabromodiphenyl ethers		20	12	0	**40.0**

Appendix D. Percent Detection for Individual Chemicals

Chemical of Concern	Alternate Name	Number of Valid Results	Number of Laboratory Non-Detects (a)	Number of Field/Rinseate Non-Detects (b)	Percent Detection (c)
Perfluorinated Compounds					
Perfluorodecanoate	PFDA	20	0	0	**100.0**
Perfluoroheptanoate	PFHpA	20	0	0	**100.0**
Perfluorohexanoate	PFHxA	20	0	0	**100.0**
Perfluorononanoate	PFNA	20	0	0	**100.0**
Perfluorooctanoate	PFOA	20	0	0	**100.0**
Perfluorooctane sulfonate	PFOS	20	2	0	**90.0**
Perfluoropentanoate	PFPeA	20	3	0	**85.0**
Perfluorohexane sulfonate	PFHxS	20	7	0	**65.0**
Perfluorobutanoate	PFBA	20	8	0	**60.0**
Perfluorobutane sulfonate	PFBS	20	17	0	**15.0**
Perfluorooctane sulfonamide	PFOSA	20	18	0	**10.0**
Perfluoroundecanoate	PFUnA	20	19	0	**5.0**
Perfluorododecanoate	PFDoA	20	20	0	**0.0**
Polychlorinated Biphenyls (Congeners)					
2,4,4'-TrCB	PCB-028	6	0	0	**100.0**
2,4',5-TrCB	PCB-031	6	0	0	**100.0**
2,2',3-TrCB	PCB-016	6	1	0	**83.3**
2,3,3'/2,3',4'-TriCB	PCB-020/033	6	1	0	**83.3**
2,2',3,5/2,2',4,5'-TeCB	PCB-043/049	6	1	0	**83.3**
2,3',4,4'-TeCB	PCB-066	6	1	0	**83.3**
2,2',3,5,5'-PeCB	PCB-092	6	1	0	**83.3**
2,3,3',4',5,6/2,3,3',4',5',6-HxCB	PCB-163/164	6	1	0	**83.3**
2,2',3,4,4',5,5'-HpCB	PCB-180	6	1	0	**83.3**
2,2',3,4,4',5,6'/ 2,2',3,4',5,5',6-HpCB	PCB-182/187	6	1	0	**83.3**
2-MoCB	PCB-001	6	2	0	**66.7**
2,2'-DiCB	PCB-004	6	2	0	**66.7**
2,3'-DiCB	PCB-006	6	2	0	**66.7**
2,2',4-TrCB	PCB-017	6	2	0	**66.7**
2,2',5-TrCB	PCB-018	6	0	2	**66.7**
2,3,4'-TrCB	PCB-022	6	2	0	**66.7**
3,4,4'-TrCB	PCB-037	6	2	0	**66.7**
2,2',5,5'/2,3',4,6-TeCB	PCB-052/069	6	2	0	**66.7**
2,2',3,4',6-PeCB	PCB-091	6	2	0	**66.7**
2,3,3',4,4'-PeCB	PCB-105	6	2	0	**66.7**
2,2',3,5,5',6-HxCB	PCB-151	6	2	0	**66.7**
4-MoCB	PCB-003	6	3	0	**50.0**
2,2',4,4'/2,2',4,5-TeCB	PCB-047/048	6	3	0	**50.0**
2,2',5,6'-TeCB	PCB-053	6	3	0	**50.0**
2,3,3',4'-TeCB	PCB-056	6	3	0	**50.0**
2,3,4',6/2,3',5,5'-TeCB	PCB-064/072	6	3	0	**50.0**
2,4,4',5-TeCB	PCB-074	6	3	0	**50.0**
2,2',3,3',4-PeCB	PCB-082	6	3	0	**50.0**
2,2',3,3',6-PeCB	PCB-084	6	3	0	**50.0**
2,2',3,4,4'-PeCB	PCB-085	6	3	0	**50.0**
2,2',4,4',5-PeCB	PCB-099	6	1	2	**50.0**
2,3',4,4',5-PeCB	PCB-118	6	0	3	**50.0**
2,2',3,3',4,4'-HxCB	PCB-128	6	3	0	**50.0**
2,2',3,3',6,6'-HxCB	PCB-136	6	3	0	**50.0**
2,2',3,4,4',5'-HxCB	PCB-138	6	0	3	**50.0**
2,2',3,4,5,5'-HxCB	PCB-141	6	3	0	**50.0**
2,2',3,4',5,5'-HxCB	PCB-146	6	3	0	**50.0**
2,2',3,3',4,5,6'-HpCB	PCB-174	6	3	0	**50.0**
2,2',3,3',4,4',5,6'-OcCB	PCB-196	6	3	0	**50.0**
2,2',3,3',4,5,5',6'-OcCB	PCB-199	6	3	0	**50.0**
2,2',3,4,4',5,5',6-OcCB	PCB-203	6	3	0	**50.0**
2,2',3,3',4,4',5,5',6-NoCB	PCB-206	6	3	0	**50.0**
2,4-DiCB	PCB-007	6	4	0	**33.3**
3,4/3,4'-DiCB	PCB-012/013	6	4	0	**33.3**
4,4'-DiCB	PCB-015	6	0	4	**33.3**
2,2',6-TrCB	PCB-019	6	4	0	**33.3**
2,3',4-TrCB	PCB-025	6	4	0	**33.3**
2,3',5-TrCB	PCB-026	6	4	0	**33.3**
2,4',6-TrCB	PCB-032	6	4	0	**33.3**

Appendix D. Percent Detection for Individual Chemicals

Chemical of Concern	Alternate Name	Number of Valid Results	Number of Laboratory Non-Detects (a)	Number of Field/Rinseate Non-Detects (b)	Percent Detection (c)
2,2',3,3'-TeCB	PCB-040	6	4	0	**33.3**
2,3,4',6-TeCB	PCB-041	6	4	0	**33.3**
2,2',3,4'-TeCB	PCB-042	6	4	0	**33.3**
2,2',3,5'-TeCB	PCB-044	6	0	4	**33.3**
2,2',3,6-TeCB	PCB-045	6	4	0	**33.3**
2,3,4,4'-TeCB	PCB-060	6	4	0	**33.3**
2,3',4',5-TeCB	PCB-070	6	0	4	**33.3**
2,3',4',6-TeCB	PCB-071	6	4	0	**33.3**
2,2',3,3',5-PeCB	PCB-083	6	4	0	**33.3**
2,2',3,4,5/2,2',3,4',5'/ 2,3,4',5,6-PeCB	PCB-086/097/117	6	3	1	**33.3**
2,2',3,4,5'/2,3,4,4',6-PeCB	PCB-087/115	6	0	4	**33.3**
2,2',3,5,6/2,2',3,5',6/2,2',3,4',6'/ 2,2',4,5,6'-PeCB	PCB-093/095/098/102	6	0	4	**33.3**
2,2',4,5,5'-PeCB	PCB-101	6	0	4	**33.3**
2,3,3',4',6-PeCB	PCB-110	6	0	4	**33.3**
2,2',3,3',4,6'-HxCB	PCB-132	6	0	4	**33.3**
2,2',3,3',5,6'-HxCB	PCB-135	6	4	0	**33.3**
2,2',3,4,4',6/2,2',3,4',5',6-HxCB	PCB-139/149	6	0	4	**33.3**
2,2',4,4',5,5'-HxCB	PCB-153	6	0	4	**33.3**
2,3,3',4,4',5-HxCB	PCB-156	6	4	0	**33.3**
2,3,3',4,4',6-HxCB	PCB-158	6	4	0	**33.3**
2,2',3,3',4,4',5-HpCB	PCB-170	6	4	0	**33.3**
2,2',3,3',4,4',6-HpCB	PCB-171	6	4	0	**33.3**
2,2',3,3',4,5',6'-HpCB	PCB-177	6	4	0	**33.3**
2,2',3,3',5,5',6-HpCB	PCB-178	6	4	0	**33.3**
2,2',3,3',5,6,6'-HpCB	PCB-179	6	4	0	**33.3**
2,2',3,4,4',5',6-HpCB	PCB-183	6	4	0	**33.3**
2,3,3',4,4',5,6-HpCB	PCB-190	6	4	0	**33.3**
2,2',3,3',4,4',5,5'-OcCB	PCB-194	6	4	0	**33.3**
2,3/2,4'-DiCB	PCB-005/008	6	5	0	**16.7**
2,5-DiCB	PCB-009	6	5	0	**16.7**
2,3',6-TrCB	PCB-027	6	5	0	**16.7**
3,3',4-TrCB	PCB-035	6	5	0	**16.7**
3,3',5-TrCB	PCB-036	6	5	0	**16.7**
2,2',3,6'-TeCB	PCB-046	6	5	0	**16.7**
2,2',4,6'-TeCB	PCB-051	6	5	0	**16.7**
2,3',4,5-TeCB	PCB-067	6	5	0	**16.7**
3,3',4,4'-TeCB	PCB-077	6	5	0	**16.7**
2,3,3',4',5/2,3,3',4,5'-PeCB	PCB-107/108	6	5	0	**16.7**
2,3,4,4',5-PeCB	PCB-114	6	5	0	**16.7**
2,3',4,4',5'-PeCB	PCB-123	6	5	0	**16.7**
2,3',4',5,5'-PeCB	PCB-124	6	5	0	**16.7**
3,3',4,4',5-PeCB	PCB-126	6	5	0	**16.7**
2,2',3,3',4,5-HxCB	PCB-129	6	5	0	**16.7**
2,2',3,3',4,5'-HxCB	PCB-130	6	5	0	**16.7**
2,2',3,3',5,5'-HxCB	PCB-133	6	5	0	**16.7**
2,2',3,3',5,6-HxCB	PCB-134	6	5	0	**16.7**
2,2',3,4,4',5-HxCB	PCB-137	6	5	0	**16.7**
2,2',3,4,5',6-HxCB	PCB-144	6	5	0	**16.7**
2,3,3',4,4',5'-HxCB	PCB-157	6	5	0	**16.7**
2,3',4,4',5,5'-HxCB	PCB-167	6	5	0	**16.7**
2,2',3,3',4,5,5'-HpCB	PCB-172	6	5	0	**16.7**
2,2',3,3',4,6,6'-HpCB	PCB-176	6	5	0	**16.7**
2,2',3,4,5,5',6-HpCB	PCB-185	6	5	0	**16.7**
2,3,3',4,4',5,5'-HpCB	PCB-189	6	5	0	**16.7**
2,2',3,3',4,4',5,6-OcCB	PCB-195	6	5	0	**16.7**
2,2',3,3',4,5',6,6'-OcCB	PCB-201	6	5	0	**16.7**
2,2',3,3',5,5',6,6'-OcCB	PCB-202	6	5	0	**16.7**
2,2',3,3',4,5,5',6,6'-NoCB	PCB-208	6	5	0	**16.7**
3-MoCB	PCB-002	6	6	0	**0.0**
2,6-DiCB	PCB-010	6	6	0	**0.0**
3,3'-DiCB	PCB-011	6	6	0	**0.0**
3,5-DiCB	PCB-014	6	6	0	**0.0**
2,3,4-TrCB	PCB-021	6	6	0	**0.0**

Appendix D. Percent Detection for Individual Chemicals

Chemical of Concern	Alternate Name	Number of Valid Results	Number of Laboratory Non-Detects (a)	Number of Field/Rinseate Non-Detects (b)	Percent Detection (c)
2,3,5-TrCB	PCB-023	6	6	0	**0.0**
2,3,6-TrCB	PCB-024	6	6	0	**0.0**
2,4,5-TrCB	PCB-029	6	6	0	**0.0**
2,4,6-TrCB	PCB-030	6	6	0	**0.0**
2,3',5'-TrCB	PCB-034	6	6	0	**0.0**
3,4,5-TrCB	PCB-038	6	6	0	**0.0**
3,4',5-TrCB	PCB-039	6	6	0	**0.0**
2,2',4,6-TeCB	PCB-050	6	6	0	**0.0**
2,2',6,6'-TeCB	PCB-054	6	6	0	**0.0**
2,3,3',4-TeCB	PCB-055	6	6	0	**0.0**
2,3,3',5-TeCB	PCB-057	6	6	0	**0.0**
2,3,3',5'-TeCB	PCB-058	6	6	0	**0.0**
2,3,3',6-TeCB	PCB-059	6	6	0	**0.0**
2,3,4,5-TeCB	PCB-061	6	6	0	**0.0**
2,3,4,6-TeCB	PCB-062	6	6	0	**0.0**
2,3,4',5-TeCB	PCB-063	6	6	0	**0.0**
2,3,5,6/2,4,4',6-TeCB	PCB-065/075	6	6	0	**0.0**
2,2',3,4-TeCB	PCB-068	6	6	0	**0.0**
2,2',5,5'-TeCB	PCB-073	6	6	0	**0.0**
2,3',4',5'-TeCB	PCB-076	6	6	0	**0.0**
3,3',4,5-TeCB	PCB-078	6	6	0	**0.0**
3,3',4,5'-TeCB	PCB-079	6	6	0	**0.0**
3,3',5,5'-TeCB	PCB-080	6	6	0	**0.0**
3,4,4',5-TeCB	PCB-081	6	6	0	**0.0**
2,2',3,4,6-PeCB	PCB-088	6	6	0	**0.0**
2,2',3,4,6'-PeCB	PCB-089	6	6	0	**0.0**
2,2',3,4',5-PeCB	PCB-090	6	6	0	**0.0**
2,2',3,5,6'-PeCB	PCB-094	6	6	0	**0.0**
2,2',3,6,6'-PeCB	PCB-096	6	6	0	**0.0**
2,2',4,4',6-PeCB	PCB-100	6	6	0	**0.0**
2,2',4,5',6-PeCB	PCB-103	6	6	0	**0.0**
2,2',4,6,6'-PeCB	PCB-104	6	6	0	**0.0**
2,3,3',4,5-PeCB	PCB-106	6	6	0	**0.0**
2,3,3',4,6-PeCB	PCB-109	6	6	0	**0.0**
2,3,3',5,5'-PeCB	PCB-111	6	6	0	**0.0**
2,3,3',5,6/2,3',4,4',6-PeCB	PCB-112/119	6	6	0	**0.0**
2,3,3',5',6-PeCB	PCB-113	6	6	0	**0.0**
2,3,4,5,6/2,3',4',5',6-PeCB	PCB-116/125	6	6	0	**0.0**
2,3',4,5,5'-PeCB	PCB-120	6	6	0	**0.0**
2,3',4,5',6-PeCB	PCB-121	6	6	0	**0.0**
2,3,3',4',5'-PeCB	PCB-122	6	6	0	**0.0**
3,3',4,5,5'-PeCB	PCB-127	6	6	0	**0.0**
2,2',3,3',4,6-HxCB	PCB-131	6	6	0	**0.0**
2,2',3,4,4',6'-HxCB	PCB-140	6	6	0	**0.0**
2,2',3,4,5,6-HxCB	PCB-142	6	6	0	**0.0**
2,2',3,4,5,6'-HxCB	PCB-143	6	6	0	**0.0**
2,2',3,4,6,6'-HxCB	PCB-145	6	6	0	**0.0**
2,2',3,4',5,6-HxCB	PCB-147	6	6	0	**0.0**
2,2',3,4',5,6'-HxCB	PCB-148	6	6	0	**0.0**
2,2',3,4',6,6'-HxCB	PCB-150	6	6	0	**0.0**
2,2',3,5,6,6'-HxCB	PCB-152	6	6	0	**0.0**
2,2',4,4',5,6'-HxCB	PCB-154	6	6	0	**0.0**
2,2',4,4',6,6'-HxCB	PCB-155	6	6	0	**0.0**
2,3,3',4,5,5'-HxCB	PCB-159	6	6	0	**0.0**
2,3,3',4,5,6-HxCB	PCB-160	6	6	0	**0.0**
2,3,3',4,5',6-HxCB	PCB-161	6	6	0	**0.0**
2,3,3',4',5,5'-HxCB	PCB-162	6	6	0	**0.0**
2,3,3',5,5',6-HxCB	PCB-165	6	6	0	**0.0**
2,3,4,4',5,6-HxCB	PCB-166	6	6	0	**0.0**
2,3',4,4',5',6-HxCB	PCB-168	6	6	0	**0.0**
3,3',4,4',5,5'-HxCB	PCB-169	6	6	0	**0.0**
2,2',3,3',4,5,6-HpCB	PCB-173	6	6	0	**0.0**
2,2',3,3',4,5',6-HpCB	PCB-175	6	6	0	**0.0**
2,2',3,4,4',5,6-HpCB	PCB-181	6	6	0	**0.0**
2,2',3,4,4',6,6'-HpCB	PCB-184	6	6	0	**0.0**

Appendix D. Percent Detection for Individual Chemicals

Chemical of Concern	Alternate Name	Number of Valid Results	Number of Laboratory Non-Detects (a)	Number of Field/Rinseate Non-Detects (b)	Percent Detection (c)
2,2',3,4,5,6,6'-HpCB	PCB-186	6	6	0	**0.0**
2,2',3,4',5,6,6'-HpCB	PCB-188	6	6	0	**0.0**
2,3,3',4,4',5',6-HpCB	PCB-191	6	6	0	**0.0**
2,3,3',4,5,5',6-HpCB	PCB-192	6	6	0	**0.0**
2,3,3',4',5,5',6-HpCB	PCB-193	6	6	0	**0.0**
2,2',3,3',4,4',6,6'-OcCB	PCB-197	6	6	0	**0.0**
2,2',3,3',4,5,5',6-OcCB	PCB-198	6	6	0	**0.0**
2,2',3,3',4,5,6,6'-OcCB	PCB-200	6	6	0	**0.0**
2,2',3,4,4',5,6,6'-OcCB	PCB-204	6	6	0	**0.0**
2,3,3',4,4',5,5',6-OcCB	PCB-205	6	6	0	**0.0**
2,2',3,3',4,4',5,6,6'-NoCB	PCB-207	6	6	0	**0.0**
2,2',3,3',4,4',5,5',6,6'-DeCB	PCB-209	6	5	1	**0.0**
Polychlorinated Biphenyls (Homologs)					
Trichlorobiphenyls		6	0	0	**100.0**
Heptachlorobiphenyls		6	1	0	**83.3**
Tetrachlorobiphenyls		6	0	1	**83.3**
Dichlorobiphenyls		6	0	2	**66.7**
Monochlorobiphenyls		6	2	0	**66.7**
Hexachlorobiphenyls		6	0	3	**50.0**
Octachlorobiphenyls		6	3	0	**50.0**
Pentachlorobiphenyls		6	0	3	**50.0**
Nonachlorobiphenyls		6	4	0	**33.3**
Decachlorobiphenyl		6	5	0	**16.7**
Metals					
Copper		20	0	0	**100.0**
Lead		20	0	0	**100.0**
Zinc		20	0	0	**100.0**

Key:

The number of valid results varies for each chemical because some results were rejected for quality assurance reasons, and not all chemicals were sampled and analyzed the same number of times for each event.

(a) = Results qualified with a "U" because the analyte was not detected at or above the reported quantitation limit.

(b) = Results qualified with a "UFB" because the result was not at least 3 times the concentration in the respective field or rinseate blank.

(c) = ((Valid Results - Laboratory Non-Detects - Field/Rinseate Non-Detects) / Valid Results) x 100%

Appendix E.

Summary Statistics

Appendix E. Summary Statistics

Chemical of Concern	Alternate Name	Units	Sample Size	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile
Polycyclic Aromatic Hydrocarbons (PAHs)								
Low Molecular Weight PAHs (LPAHs)								
Fluorene		ug/L	20	8.04E-04	1.43E-03	7.95E-03	1.90E-02	1.72E-01
Phenanthrene		ug/L	20	3.85E-03	4.89E-03	5.70E-03	1.45E-02	6.63E-02
Entire Chemical Class:		ug/L	20	3.84E-03	6.97E-03	1.72E-02	7.43E-02	7.22E-01
High Molecular Weight PAHs (HPAHs)								
Fluoranthene		ug/L	20	3.62E-03	4.23E-03	4.75E-03	8.43E-03	1.01E-02
Pyrene		ug/L	20	4.25E-03	4.68E-03	6.15E-03	8.60E-03	1.87E-02
Entire Chemical Class:		ug/L	20	4.29E-03	7.90E-03	1.05E-02	1.59E-02	4.80E-02
Total PAHs (LPAHs+HPAHs)		ug/L	20	5.19E-03	1.61E-02	3.95E-02	9.77E-02	7.32E-01
Phthalates								
bis(2-Ethylhexyl) phthalate		ug/L	20	2.38E-01	4.60E-01	9.35E-01	1.93E+00	3.50E+00
Entire Chemical Class:		ug/L	20	2.38E-01	4.60E-01	1.17E+00	1.93E+00	3.50E+00
Other Base/Neutral/Acid Extractables								
1,4-Dichlorobenzene		ug/L	20	7.00E-02	1.33E-01	2.15E-01	4.80E-01	9.27E-01
2,4,6-Trichlorophenol		ug/L	20	2.87E-02	4.83E-02	9.50E-02	1.53E-01	2.72E-01
2-Chloroethanol phosphate (3:1)		ug/L	10	7.90E-02	1.60E-01	2.30E-01	3.05E-01	4.21E-01
3B-Coprostanol		ug/L	10	3.58E+00	6.50E+00	9.05E+00	1.48E+01	1.78E+01
4-Methylphenol	p-Cresol	ug/L	20	1.20E-01	2.10E-01	3.27E-01	4.97E-01	3.07E+00
Bisphenol A		ug/L	15	2.00E-01	2.65E-01	2.80E-01	7.55E-01	1.32E+00
Caffeine		ug/L	17	1.88E-02	6.17E-02	1.51E-01	7.00E-01	1.80E+01
Cholesterol		ug/L	10	6.25E+00	8.43E+00	1.25E+01	1.70E+01	2.80E+01
Dibenzofuran		ug/L	20	1.82E-03	2.53E-03	6.15E-03	1.68E-02	1.90E-01
Phenol		ug/L	20	4.09E-01	4.13E-01	7.35E-01	1.03E+00	1.57E+00
Triclosan		ug/L	20	1.78E-01	3.45E-01	5.40E-01	8.53E-01	1.02E+00
Triethyl citrate		ug/L	20	1.28E-01	4.98E-01	8.25E-01	1.10E+00	1.51E+00
Polybrominated Diphenyl Ethers (Congeners)								
4,4'-DiBDE	BDE-015	pg/L	20	1.96E+00	8.71E+00	1.22E+01	4.66E+01	1.46E+02
2,2',4-TrBDE	BDE-017	pg/L	20	2.58E+01	4.45E+01	8.53E+01	2.76E+02	4.61E+02
2,4,4'-TrBDE	BDE-028	pg/L	20	7.39E+01	9.65E+01	1.95E+02	4.60E+02	1.07E+03
2,2',4,4'-TeBDE	BDE-047	pg/L	20	3.32E+03	5.33E+03	6.54E+03	1.06E+04	3.24E+04
2,2',4,5'-TeBDE	BDE-049	pg/L	10	1.52E+01	6.28E+01	2.17E+02	3.24E+02	9.43E+02
2,2',4,5'/2,3',4',6-TeBDE	BDE-049/071	pg/L	10	1.73E+02	2.03E+02	3.46E+02	5.58E+02	1.12E+03
2,3',4,4'-TeBDE	BDE-066	pg/L	20	1.52E+01	4.62E+01	1.52E+02	4.05E+02	1.06E+03

Chemical of Concern	Alternate Name	Units	Sample Size	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile
2,3',4',6-TeBDE	BDE-071	pg/L	10	1.44E+01	3.67E+01	4.60E+01	1.36E+02	3.89E+02
2,2',3,4,4'-PeBDE	BDE-085	pg/L	20	6.98E+01	1.86E+02	2.56E+02	4.56E+02	1.23E+03
2,2',4,4',5-PeBDE	BDE-099	pg/L	20	2.25E+03	4.57E+03	6.30E+03	1.40E+04	3.27E+04
2,2',4,4',6-PeBDE	BDE-100	pg/L	20	5.51E+02	1.00E+03	1.28E+03	2.51E+03	6.66E+03
2,2',4,4',5,5'-HxBDE	BDE-153	pg/L	20	2.07E+02	3.57E+02	5.43E+02	1.38E+03	3.35E+03
2,2',4,4',5,6'-HxBDE	BDE-154	pg/L	20	1.48E+02	3.12E+02	4.04E+02	8.54E+02	2.31E+03
2,2',3,4,4',5',6-HpBDE	BDE-183	pg/L	20	6.82E+00	1.39E+01	4.39E+01	1.09E+02	4.96E+02
2,2',3,3',4,4',5,5',6-NoBDE	BDE-206	pg/L	20	3.84E+01	9.12E+01	2.65E+02	6.55E+02	2.32E+03
2,2',3,3',4,4',5,6,6'-NoBDE	BDE-207	pg/L	20	3.63E+01	1.11E+02	2.53E+02	5.85E+02	2.26E+03
2,2',3,3',4,5,5',6,6'-NoBDE	BDE-208	pg/L	20	1.68E+01	4.59E+01	1.23E+02	4.26E+02	1.59E+03
2,2',3,3',4,4',5,5',6,6'-DeBDE	BDE-209	pg/L	20	6.61E+02	1.95E+03	3.20E+03	9.30E+03	2.27E+04
Entire Chemical Class:		pg/L	20	9.07E+03	1.49E+04	2.25E+04	4.41E+04	1.26E+05
<u>Polybrominated Diphenyl Ethers (Homologs)</u>								
Decabromodiphenyl ether		pg/L	20	6.61E+02	1.95E+03	3.20E+03	9.30E+03	2.27E+04
Dibromodiphenyl ethers		pg/L	20	2.13E+00	9.30E+00	1.56E+01	5.72E+01	1.62E+02
Heptabromodiphenyl ethers		pg/L	20	6.42E+00	1.36E+01	4.43E+01	1.09E+02	5.08E+02
Hexabromodiphenyl ethers		pg/L	20	3.51E+02	6.47E+02	1.02E+03	2.40E+03	6.36E+03
Nonabromodiphenyl ethers		pg/L	20	6.22E+01	1.41E+02	6.26E+02	1.64E+03	6.43E+03
Pentabromodiphenyl ethers		pg/L	20	2.85E+03	5.95E+03	7.91E+03	1.72E+04	4.06E+04
Tetrabromodiphenyl ethers		pg/L	20	3.78E+03	5.52E+03	7.21E+03	1.13E+04	3.48E+04
Tribromodiphenyl ethers		pg/L	20	9.95E+01	1.53E+02	2.84E+02	6.65E+02	1.54E+03
<u>Perfluorinated Compounds</u>								
Perfluorobutanoate	PFBA	ng/L	20	7.33E-01	8.80E-01	1.38E+00	2.59E+00	3.66E+00
Perfluorodecanoate	PFDA	ng/L	20	1.53E+00	2.60E+00	3.62E+00	5.69E+00	7.98E+00
Perfluoroheptanoate	PFHpA	ng/L	20	2.72E+00	3.69E+00	4.69E+00	6.12E+00	9.72E+00
Perfluorohexane sulfonate	PFHxS	ng/L	20	1.26E+00	1.27E+00	2.61E+00	3.63E+00	7.81E+00
Perfluorohexanoate	PFHxA	ng/L	20	1.07E+01	1.29E+01	1.67E+01	2.69E+01	4.47E+01
Perfluorononanoate	PFNA	ng/L	20	2.31E+00	3.68E+00	6.05E+00	1.25E+01	3.40E+01
Perfluorooctane sulfonate	PFOS	ng/L	20	1.35E+00	4.05E+00	5.96E+00	9.78E+00	2.29E+01
Perfluorooctanoate	PFOA	ng/L	20	1.11E+01	1.30E+01	2.35E+01	3.46E+01	5.34E+01
Perfluoropentanoate	PFPeA	ng/L	20	7.00E-01	1.89E+00	2.62E+00	9.50E+00	1.66E+01
Entire Chemical Class:		pg/L	20	4.58E+01	6.69E+01	9.05E+01	1.25E+02	1.62E+02
<u>Polychlorinated Biphenyls (Congeners)</u>								
2-MoCB	PCB-001	pg/L	6	5.00E+00	6.28E+00	1.46E+01	3.58E+01	4.85E+01
2,2'-DiCB	PCB-004	pg/L	6	5.00E+00	1.10E+01	3.80E+01	7.53E+01	8.01E+02
2,3'-DiCB	PCB-006	pg/L	6	5.00E+00	7.40E+00	1.57E+01	2.09E+01	2.85E+01

Appendix E. Summary Statistics

Chemical of Concern	Alternate Name	Units	Sample Size	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile
2,2',3-TrCB	PCB-016	pg/L	6	7.33E+00	1.52E+01	2.68E+01	4.54E+01	7.83E+01
2,2',4-TrCB	PCB-017	pg/L	6	5.00E+00	7.08E+00	1.74E+01	4.10E+01	1.36E+02
2,2',5-TrCB	PCB-018	pg/L	6	8.28E+00	1.70E+01	5.54E+01	1.20E+02	2.33E+02
2,3,3'/2,3',4'-TriCB	PCB-020/033	pg/L	6	7.18E+00	1.47E+01	2.55E+01	7.93E+01	9.61E+01
2,3,4'-TrCB	PCB-022	pg/L	6	5.00E+00	6.88E+00	1.63E+01	4.57E+01	1.08E+02
2,4,4'-TrCB	PCB-028	pg/L	6	1.49E+01	1.71E+01	3.18E+01	9.75E+01	2.42E+02
2,4',5-TrCB	PCB-031	pg/L	6	1.56E+01	1.98E+01	3.98E+01	1.05E+02	2.48E+02
3,4,4'-TrCB	PCB-037	pg/L	6	5.00E+00	7.53E+00	1.81E+01	3.21E+01	9.22E+01
2,2',3,5/2,2',4,5'-TeCB	PCB-043/049	pg/L	6	7.33E+00	1.59E+01	2.87E+01	8.02E+01	2.07E+02
2,2',5,5'/2,3',4,6-TeCB	PCB-052/069	pg/L	6	1.09E+01	2.13E+01	6.68E+01	1.35E+02	3.89E+02
2,3',4,4'-TeCB	PCB-066	pg/L	6	6.38E+00	1.07E+01	2.08E+01	7.67E+01	2.07E+02
2,2',3,4',6-PeCB	PCB-091	pg/L	6	5.00E+00	6.55E+00	1.15E+01	2.10E+01	6.06E+01
2,2',3,5,5'-PeCB	PCB-092	pg/L	6	6.45E+00	1.18E+01	2.04E+01	4.03E+01	1.48E+02
2,3,3',4,4'-PeCB	PCB-105	pg/L	6	5.00E+00	7.08E+00	2.15E+01	4.98E+01	2.16E+02
2,2',3,5,5',6-HxCB	PCB-151	pg/L	6	5.00E+00	7.20E+00	1.70E+01	4.60E+01	1.21E+02
2,3,3',4',5,6/2,3,3',4',5',6-HxCB	PCB-163/164	pg/L	6	6.55E+00	1.13E+01	1.65E+01	5.18E+01	1.70E+02
2,2',3,4,4',5,5'-HpCB	PCB-180	pg/L	6	7.73E+00	2.04E+01	3.46E+01	1.15E+02	2.36E+02
2,2',3,4,4',5,6'/2,2',3,4',5,5',6-HpCB	PCB-182/187	pg/L	6	6.52E+00	1.25E+01	2.14E+01	6.26E+01	1.57E+02
Entire Chemical Class:		pg/L	6	1.09E+02	2.69E+02	7.30E+02	3.73E+03	1.26E+04
<u>Polychlorinated Biphenyls (Homologs)</u>								
Dichlorobiphenyls		pg/L	6	1.76E+01	7.75E+01	2.27E+02	3.42E+02	1.29E+03
Heptachlorobiphenyls		pg/L	6	7.73E+00	2.50E+01	5.60E+01	3.58E+02	8.65E+02
Monochlorobiphenyls		pg/L	6	5.00E+00	9.53E+00	2.79E+01	4.63E+01	6.56E+01
Tetrachlorobiphenyls		pg/L	6	4.11E+01	8.95E+01	2.43E+02	7.87E+02	2.20E+03
Trichlorobiphenyls		pg/L	6	5.58E+01	9.97E+01	2.31E+02	6.32E+02	1.61E+03
<u>Metals</u>								
Copper		ug/L	20	2.68E+00	5.32E+00	9.22E+00	1.17E+01	1.41E+01
Lead		ug/L	20	1.79E-01	2.98E-01	3.95E-01	5.40E-01	7.43E-01
Zinc		ug/L	20	1.77E+01	3.41E+01	4.04E+01	5.07E+01	7.71E+01

Key:

The precision of the data in this table is only two significant figures.

Appendix F.

Comparision of Two Methods for Handling Non-Detect Values

Appendix F. Comparison of Two Methods for Handling Non-Detect Values (Regression on Order Statistics versus Substitution)

Chemical of Concern	Alternate Name	Relative Percent Differences Substitute Non-Detect Values with:		
		Zero	Half the Reporting Limit	Reporting Limit
Polycyclic Aromatic Hydrocarbons				
Low Molecular Weight PAHs (LPAHs)				
Fluorene		0.0%	0.0%	0.0%
Phenanthrene		0.0%	0.0%	**9.2%**
Entire Chemical Class =		0.0%	0.0%	**15.3%**
High Molecular Weight PAHs (HPAHs)				
Fluoranthene		0.0%	0.0%	**23.3%**
Pyrene		0.0%	0.0%	**2.4%**
Entire Chemical Class =		0.0%	0.0%	**7.3%**
Total PAHs (LPAHs+HPAHs)		0.0%	0.0%	0.0%
Phthalates				
bis(2-Ethylhexyl) phthalate		0.0%	0.0%	**11.6%**
Entire Chemical Class =		0.0%	0.0%	0.0%
Other Base/Neutral/Acid Extractables				
1,4-Dichlorobenzene		0.0%	0.0%	0.0%
2,4,6-Trichlorophenol		0.0%	0.0%	0.0%
3B-Coprostanol		0.0%	0.0%	0.0%
4-Methylphenol	p-Cresol	**43.5%**	**58.2%**	**78.0%**
Bisphenol A		**33.3%**	**6.9%**	**72.7%**
Caffeine		**40.9%**	**5.5%**	**71.5%**
Dibenzofuran		0.0%	0.0%	**7.8%**
Phenol		0.0%	0.0%	**2.0%**
Triclosan		0.0%	0.0%	**1.8%**
Polybrominated Diphenyl Ethers (Congeners)				
4,4'-DiBDE	BDE-015	0.0%	**2.8%**	**16.5%**
2,2',4-TrBDE	BDE-017	0.0%	0.0%	0.0%
2,2',4,5'-TeBDE	BDE-049	0.0%	0.0%	0.0%
2,3',4,4'-TeBDE	BDE-066	0.0%	0.0%	0.0%
2,3',4',6-TeBDE	BDE-071	0.0%	0.0%	0.0%
2,2',3,4,4'-PeBDE	BDE-085	0.0%	0.0%	0.0%
2,2',3,4,4',5',6-HpBDE	BDE-183	**44.1%**	**12.9%**	**46.8%**
2,2',3,3',4,4',5,5',6-NoBDE	BDE-206	0.0%	0.0%	**0.8%**
2,2',3,3',4,4',5,6,6'-NoBDE	BDE-207	0.0%	0.0%	**3.9%**
2,2',3,3',4,5,5',6,6'-NoBDE	BDE-208	0.0%	**1.6%**	**66.3%**
2,2',3,3',4,4',5,5',6,6'-DeBDE	BDE-209	0.0%	0.0%	0.0%
Entire Chemical Class =		0.0%	0.0%	0.0%

Appendix F. Comparison of Two Methods for Handling Non-Detect Values (Regression on Order Statistics versus Substitution)

Chemical of Concern	Alternate Name	Relative Percent Differences Substitute Non-Detect Values with: Zero	Half the Reporting Limit	Reporting Limit
Polybrominated Diphenyl Ethers (Homologs)				
Decabromodiphenyl ether		0.0%	0.0%	0.0%
Dibromodiphenyl ethers		0.0%	0.0%	0.0%
Heptabromodiphenyl ethers		**45.0%**	**12.0%**	**58.5%**
Nonabromodiphenyl ethers		0.0%	0.0%	0.0%
Perfluorinated Compounds				
Perfluorobutanoate	PFBA	0.0%	0.0%	**3.6%**
Perfluorohexane sulfonate	PFHxS	0.0%	0.0%	0.0%
Perfluorooctane sulfonate	PFOS	0.0%	0.0%	0.0%
Perfluoropentanoate	PFPeA	0.0%	0.0%	0.0%
	Entire Chemical Class =	0.0%	0.0%	0.0%
Polychlorinated Biphenyls (Congeners)				
2-MoCB	PCB-001	0.0%	0.0%	0.0%
2,2'-DiCB	PCB-004	0.0%	0.0%	0.0%
2,3'-DiCB	PCB-006	0.0%	0.0%	0.0%
2,2',3-TrCB	PCB-016	0.0%	0.0%	0.0%
2,2',4-TrCB	PCB-017	0.0%	0.0%	0.0%
2,2',5-TrCB	PCB-018	0.0%	0.0%	0.0%
2,3,3'/2,3',4'-TriCB	PCB-020/033	0.0%	0.0%	0.0%
2,3,4'-TrCB	PCB-022	0.0%	0.0%	0.0%
3,4,4'-TrCB	PCB-037	0.0%	0.0%	0.0%
2,2',3,5/2,2',4,5'-TeCB	PCB-043/049	0.0%	0.0%	0.0%
2,2',5,5'/2,3',4,6-TeCB	PCB-052/069	0.0%	0.0%	0.0%
2,3',4,4'-TeCB	PCB-066	0.0%	0.0%	0.0%
2,2',3,4',6-PeCB	PCB-091	0.0%	0.0%	0.0%
2,2',3,5,5'-PeCB	PCB-092	0.0%	0.0%	0.0%
2,3,3',4,4'-PeCB	PCB-105	0.0%	0.0%	0.0%
2,2',3,5,5',6-HxCB	PCB-151	0.0%	0.0%	0.0%
2,3,3',4',5,6/2,3,3',4',5',6-HxCB	PCB-163/164	0.0%	0.0%	0.0%
2,2',3,4,4',5,5'-HpCB	PCB-180	0.0%	0.0%	0.0%
2,2',3,4,4',5,6'/2,2',3,4',5,5',6-HpCB	PCB-182/187	0.0%	0.0%	0.0%
	Entire Chemical Class =	0.0%	0.0%	0.0%
Polychlorinated Biphenyls (Homologs)				
Dichlorobiphenyls		0.0%	0.0%	0.0%
Heptachlorobiphenyls		0.0%	0.0%	0.0%
Monochlorobiphenyls		0.0%	0.0%	0.0%
Tetrachlorobiphenyls		0.0%	0.0%	0.0%

Key: Percent differences determined by:

$$\frac{(\text{Substituted Value - ROS Value}))}{((\text{Substituted Value + ROS Value}) / 2)}$$

Regression on Order Statistics (ROS) Values were from Appendix E.

Appendix G.

Loading Rates from Each of the Ten POTWs

Appendix G. Loading Rates for Each of the Ten POTWs

Chemical of Concern	Alternate Name	Bellingham STP (kg/year)	Bremerton STP (kg/year)	Burlington WWTP (kg/year)	City of Tacoma (Central No. 1) (kg/year)	Everett STP (Outfall 100) (kg/year)	Gig Harbor STP (kg/year)	King County West Point (kg/year)	Pierce County Chambers Creek STP (kg/year)	Shelton STP (kg/year)	Sumner STP (kg/year)
Polycyclic Aromatic Hydrocarbons											
Low Molecular Weight PAHs (LPAHs)											
Acenaphthene		nd	2.53E-01	nd	1.91E-01	nd	5.16E-02	9.60E-01	2.11E-01	nd	2.85E-02
Acenaphthylene		nd	1.64E-01	nd	1.20E-01	nd	3.26E-02	5.18E-01	nd	nd	3.64E-02
Anthracene		nd	3.40E-02	nd	nd	nd	6.56E-03	4.41E-01	nd	nd	1.40E-02
Fluorene		1.18E-01	5.26E-01	1.60E-02	3.42E-01	nd	1.14E-01	1.79E+00	3.58E-01	1.21E-02	1.79E-01
Naphthalene		nd	1.07E+00	2.24E-02	nd	nd	2.79E-01	nd	8.53E-01	nd	5.14E-02
Phenanthrene		1.27E-01	2.12E-01	nd	1.50E-01	nd	4.30E-02	1.31E+00	3.71E-01	1.13E-02	8.34E-02
High Molecular Weight PAHs (HPAHs)											
Benzo(a)anthracene		nd	nd	nd	nd	6.45E-02	nd	nd	nd	nd	nd
Benzo(a)pyrene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene		nd	nd	nd	nd	1.78E-01	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene		nd	nd	nd	nd	8.72E-02	nd	nd	nd	nd	nd
Benzo(k)fluoranthene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene		nd	nd	nd	nd	8.42E-02	nd	nd	nd	nd	nd
Dibenzo(a,h)anthracene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene		1.05E-01	2.53E-02	6.46E-03	2.46E-01	1.36E-01	4.49E-03	7.61E-01	2.22E-01	nd	1.35E-02
Indeno(1,2,3-cd)pyrene		nd	nd	nd	nd	1.61E-01	nd	4.93E-01	nd	nd	nd
Pyrene		1.22E-01	3.45E-02	1.08E-02	3.19E-01	3.44E-01	8.54E-03	1.39E+00	1.62E-01	nd	1.04E-02
Carcinogenic PAHs (cPAHs)											
Benzo(a)anthracene		nd	nd	nd	nd	6.45E-02	nd	nd	nd	nd	nd
Benzo(a)pyrene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene		nd	nd	nd	nd	1.78E-01	nd	nd	nd	nd	nd
Benzo(k)fluoranthene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene		nd	nd	nd	nd	8.42E-02	nd	nd	nd	nd	nd
Dibenzo(a,h)anthracene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-cd)pyrene		nd	nd	nd	nd	1.61E-01	nd	4.93E-01	nd	nd	nd
Total PAHs (LPAHs+HPAHs)		4.72E-01	2.32E+00	5.57E-02	1.37E+00	1.05E+00	5.40E-01	7.66E+00	2.18E+00	2.34E-02	4.17E-01
Phthalates											
bis(2-Ethylhexyl) phthalate		6.50E+00	8.41E+00	1.55E+00	7.01E+01	6.37E+01	1.79E+00	1.45E+02	1.99E+01	1.70E+00	1.03E+00
Butylbenzyl phthalate		nd	1.17E+00	8.84E-01	6.66E+00	nd	2.21E-01	3.04E+01	nd	nd	nd
Di-N-butyl phthalate		5.27E+00	nd	nd	nd	nd	nd	nd	3.89E+00	nd	nd
Di-N-octyl phthalate		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Diethyl phthalate		nd	nd	5.67E-01	3.92E+00	nd	3.35E-01	nd	nd	nd	6.39E-01
Dimethyl phthalate		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Other Base/Neutral/Acid Extractables											
1,2,4-Trichlorobenzene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene		nd	nd	nd	nd	nd	nd	nd	1.92E+00	nd	nd
1,3-Dichlorobenzene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene		3.82E+00	1.07E+00	1.51E+00	1.57E+01	1.21E+00	2.23E-01	1.89E+02	6.18E+00	1.92E-01	4.58E-01
1-Methylnaphthalene		nd	3.45E-01	nd	nd	nd	7.04E-02	1.47E+00	3.83E-01	nd	1.94E-02
2,3,4,5-Tetrachlorophenol		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,3,4,6-Tetrachlorophenol		nd	nd	nd	nd	nd	nd	nd	nd	2.49E-01	nd

Appendix G. Loading Rates for Each of the Ten POTWs

Chemical of Concern	Alternate Name	Bellingham STP (kg/year)	Bremerton STP (kg/year)	Burlington WWTP (kg/year)	City of Tacoma (Central No. 1) (kg/year)	Everett STP (Outfall 100) (kg/year)	Gig Harbor STP (kg/year)	King County West Point (kg/year)	Pierce County Chambers Creek STP (kg/year)	Shelton STP (kg/year)	Sumner STP (kg/year)
2,4,5-Trichlorophenol		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4,6-Trichlorophenol		9.18E-01	5.44E-01	1.44E-01	3.02E+00	7.11E-01	1.84E-01	1.77E+01	2.62E+00	7.83E-01	1.10E-01
2,4-Dichlorophenol		8.16E+00	2.97E+00	1.11E+00	1.43E+01	6.52E+00	5.97E-01	5.82E+01	1.26E+01	nd	1.25E+00
2,4-Dimethylphenol		7.22E+00	nd	1.16E+00	nd	nd	2.18E-01	6.01E+01	8.16E+00	nd	nd
2,4-Dinitrophenol		nd	nd	1.16E+00	nd	nd	6.37E-01	6.01E+01	nd	nd	1.21E+00
2,4-Dinitrotoluene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,6-Dinitrotoluene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Chloroethanol phosphate (3:1)		1.19E+00	1.60E+00	3.40E-01	8.52E+00	6.30E+00	1.01E-01	3.71E+01	1.01E+01	5.22E-01	5.28E-01
2-Chloronaphthalene		9.73E-02	nd	nd	nd	nd	nd	nd	nd	1.07E-02	nd
2-Chlorophenol		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene		nd	5.22E-01	nd	nd	nd	1.03E-01	1.60E+00	nd	nd	2.43E-02
2-Methylphenol	o-Cresol	nd	nd	9.30E-01	1.33E+01	nd	5.58E-01	5.69E+01	nd	1.24E+00	1.31E+00
2-Nitroaniline	o-Nitroaniline	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Nitrophenol		nd	9.51E-01	nd	5.15E+00	nd	1.73E-01	nd	nd	nd	nd
3,3'-Dichlorobenzidine		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
3B-Coprostanol		1.60E+02	nd	3.40E+01	3.85E+02	2.20E+02	2.23E+01	1.11E+03	1.90E+02	1.68E+01	1.19E+01
3-Nitroaniline	m-Nitroaniline	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4,6-Dinitro-2-methylphenol		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-Bromophenylphenyl ether		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-Chloro-3-methylphenol	p-Chloro-m-cresol	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-Chloroaniline		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-Chlorophenylphenyl ether		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-Methylphenol	p-Cresol	2.80E+01	3.74E+00	nd	1.39E+01	nd	5.00E+00	6.01E+01	4.20E+00	4.53E-01	1.33E+00
4-Nitroaniline	p-Nitroaniline	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-Nitrophenol		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4-Nonylphenol		nd	nd	nd	1.78E+01	nd	nd	nd	nd	nd	nd
Benzoic acid		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzyl alcohol		2.38E+01	nd	nd	nd	nd	1.68E-01	nd	2.22E+00	nd	nd
bis(2-Chloroethoxy) methane		nd	nd	nd	nd	nd	nd	8.00E+00	nd	nd	nd
bis(2-Chloroethyl) ether		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bisphenol A		1.14E+01	3.36E+00	5.90E-01	3.30E+01	nd	3.21E-01	8.92E+01	3.95E+01	7.90E-01	nd
Caffeine		nd	8.62E+00	1.38E+01	9.28E+00	nd	2.37E+01	5.41E+01	1.79E+01	3.09E-01	nd
Carbazole		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cholesterol		2.21E+02	4.99E+01	3.85E+01	6.32E+02	2.49E+02	3.57E+01	1.54E+03	1.95E+02	2.34E+01	1.36E+01
Dibenzofuran		1.18E-01	5.83E-01	1.05E-02	3.01E-01	7.47E-02	1.08E-01	1.54E+00	2.35E-01	1.20E-02	1.43E-01
Hexachlorobutadiene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Hexachlorocyclopentadiene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Hexachloroethane		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Isophorone		1.78E+00	nd	nd	4.40E+00	nd	nd	1.18E+01	nd	2.47E-01	nd
Nitrobenzene		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
N-Nitrosodimethylamine		nd	nd	nd	1.79E+01	nd	nd	nd	nd	nd	nd
N-Nitrosodi-n-propylamine		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
N-Nitrosodiphenylamine		nd	nd	nd	nd	nd	nd	nd	nd	nd	3.75E-01
Pentachlorophenol		1.12E+00	2.26E-01	7.82E-02	nd	nd	nd	nd	nd	nd	nd
Phenol		1.75E+01	6.72E+00	nd	nd	7.91E+00	1.17E+00	2.39E+02	1.27E+01	2.49E+00	nd
Retene		nd	nd	nd	nd	nd	nd	nd	nd	6.53E-03	nd
Triclosan		8.67E+00	3.21E+00	8.50E-01	3.00E+01	6.81E+00	8.26E-01	8.44E+01	1.82E+01	7.42E-01	1.00E+00
Triethyl citrate		1.62E+01	4.81E+00	4.91E+00	3.16E+01	4.91E+00	1.17E+00	9.08E+01	2.84E+01	7.69E-01	8.20E-01

Appendix G. Loading Rates for Each of the Ten POTWs

Chemical of Concern	Alternate Name	Bellingham STP (kg/year)	Bremerton STP (kg/year)	Burlington WWTP (kg/year)	City of Tacoma (Central No. 1) (kg/year)	Everett STP (Outfall 100) (kg/year)	Gig Harbor STP (kg/year)	King County West Point (kg/year)	Pierce County Chambers Creek STP (kg/year)	Shelton STP (kg/year)	Sumner STP (kg/year)
Pesticides											
2,4'-DDD		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4'-DDE		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4'-DDT		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4,4'-DDD		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4,4'-DDE		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4,4'-DDT		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aldrin		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
alpha-BHC		nd	nd	nd	nd	nd	2.65E-03	nd	nd	nd	nd
beta-BHC		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
delta-BHC		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
gamma-BHC	Lindane	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
cis-Chlordane		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
trans-Chlordane		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chlordane, technical		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chlorpyriphos		nd	nd	nd	nd	9.71E-02	nd	nd	nd	nd	nd
Dacthal	DCPA	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
DDMU		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dieldrin		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Endosulfan I		nd	nd	4.42E-03	nd	nd	5.00E-03	nd	nd	1.82E-02	9.10E-03
Endosulfan II		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Endosulfan sulfate		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Endrin		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Endrin aldehyde		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Endrin ketone		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Heptachlor		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Heptachlor epoxide		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Hexachlorobenzene		nd	1.34E-02	nd	nd	nd	nd	nd	nd	6.80E-03	nd
Methoxychlor		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mirex		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
cis-Nonachlor		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
trans-Nonachlor		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Oxychlordane		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Pentachloroanisole		nd	nd	9.75E-03	nd	3.66E-02	nd	nd	nd	nd	8.34E-03
Toxaphene		nd	nd	nd	2.37E+00	nd	6.28E-02	nd	nd	nd	nd
Herbicides											
2,4,5-T		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4,5-TP	Silvex	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,4-D		nd	6.28E-01	1.11E-01	nd	nd	nd	1.03E+01	nd	nd	nd
2,4-DB	2,4-D butyric acid	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
3,5-Dichlorobenzoic acid		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acifluorfen	Blazer	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bentazon		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromoxynil		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Clopyralid		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dicamba I		nd	1.80E-01	nd	nd	nd	nd	4.09E+00	nd	nd	8.34E-02
Dichlorprop		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Diclofop-Methyl		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Appendix G. Loading Rates for Each of the Ten POTWs

Chemical of Concern	Alternate Name	Bellingham STP (kg/year)	Bremerton STP (kg/year)	Burlington WWTP (kg/year)	City of Tacoma (Central No. 1) (kg/year)	Everett STP (Outfall 100) (kg/year)	Gig Harbor STP (kg/year)	King County West Point (kg/year)	Pierce County Chambers Creek STP (kg/year)	Shelton STP (kg/year)	Sumner STP (kg/year)
Dinoseb		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ioxynil		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MCPA		nd	nd	nd	nd	nd	nd	1.23E+01	nd	nd	2.61E-01
MCPP	Mecoprop	7.65E-01	3.05E-01	nd	nd	nd	nd	nd	5.93E+00	nd	8.61E-02
Picloram		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Triclopyr		nd	nd	1.06E-01	nd	nd	nd	5.37E+00	nd	2.25E-01	8.47E-02
Polybrominated Diphenyl Ethers (Congeners)											
2,4-DiBDE	BDE-007	nd	5.38E-05	1.38E-05	nd	2.75E-04	2.86E-05	nd	4.00E-04	nd	2.90E-05
2,6-DiBDE	BDE-010	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
4,4'-DiBDE	BDE-015	1.37E-04	6.15E-05	1.13E-04	3.96E-04	4.27E-03	9.55E-06	1.33E-03	1.81E-03	nd	6.82E-05
2,2',4-TrBDE	BDE-017	5.35E-04	1.77E-04	7.43E-04	2.15E-03	5.65E-03	8.12E-05	5.37E-03	8.18E-03	2.31E-04	5.90E-04
2,4,4'-TrBDE	BDE-028	1.45E-03	4.40E-04	1.82E-03	6.09E-03	1.21E-02	1.30E-04	1.29E-02	1.93E-02	4.14E-04	7.04E-04
2,4,6-TrBDE	BDE-030	1.27E-04	6.92E-05	nd	4.63E-04	3.00E-04	nd	1.27E-03	nd	3.50E-05	nd
2,2',4,4'-TeBDE	BDE-047	7.79E-02	3.19E-02	1.14E-02	4.04E-01	5.34E-01	7.92E-03	8.27E-01	1.74E-01	2.86E-02	1.39E-02
2,2',4,5'-TeBDE	BDE-049	3.04E-06	nd	nd	9.67E-03	1.85E-02	2.31E-04	2.24E-02	1.37E-02	6.24E-04	6.61E-04
2,2',4,5'/2,3',4',6-TeBDE	BDE-049/071	3.28E-03	1.12E-03	8.96E-04	1.42E-02	2.02E-02	1.79E-04	2.99E-02	1.99E-02	1.57E-03	8.25E-04
2,3',4,4'-TeBDE	BDE-066	1.36E-03	1.43E-03	2.83E-04	7.56E-03	2.58E-02	1.99E-04	1.56E-02	4.77E-03	2.38E-04	9.22E-04
2,3',4',6-TeBDE	BDE-071	nd	4.74E-04	1.22E-03	1.41E-03	2.27E-03	4.53E-05	3.07E-03	5.12E-03	9.81E-05	1.11E-04
3,3',4,4'-TeBDE	BDE-077	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,2',3,4,4'-PeBDE	BDE-085	2.21E-03	1.69E-03	2.35E-04	8.82E-03	1.86E-02	5.00E-04	3.31E-02	6.33E-03	1.24E-03	1.25E-03
2,2',4,4',5-PeBDE	BDE-099	6.40E-02	2.86E-02	9.69E-03	3.92E-01	5.13E-01	6.98E-03	7.69E-01	1.43E-01	3.45E-02	2.39E-02
2,2',4,4',6-PeBDE	BDE-100	1.33E-02	6.42E-03	2.22E-03	7.78E-02	9.93E-02	1.38E-03	1.52E-01	3.10E-02	7.27E-03	4.10E-03
2,3',4,4',6-PeBDE	BDE-119	6.60E-04	nd	1.56E-04	nd	nd	2.43E-05	nd	1.41E-03	nd	nd
3,3',4,4',5-PeBDE	BDE-126	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,2',3,4,4',5'-HxBDE	BDE-138	4.30E-04	nd	nd	2.46E-03	5.93E-03	nd	nd	nd	6.72E-05	2.76E-04
2,2',3,4,4',6-HxBDE	BDE-139	2.97E-04	nd	nd	4.21E-03	4.97E-03	nd	5.73E-03	7.45E-04	nd	4.85E-04
2,2',3,4,4',6'-HxBDE	BDE-140	2.44E-04	1.46E-04	nd	1.26E-03	1.94E-03	nd	nd	4.33E-04	nd	1.41E-04
2,2',4,4',5,5'-HxBDE	BDE-153	5.60E-03	3.78E-03	8.17E-04	3.50E-02	5.90E-02	1.05E-03	6.42E-02	1.04E-02	3.48E-03	3.44E-03
2,2',4,4',5,6'-HxBDE	BDE-154	3.80E-03	2.31E-03	6.24E-04	2.43E-02	3.39E-02	4.44E-04	4.73E-02	9.73E-03	2.56E-03	1.76E-03
2,3,3',4,4',5/3,3',4,4',5,5'-HxBDE	BDE-156/169	nd	nd	nd	nd	5.83E-04	nd	nd	nd	nd	nd
2,2',3,3',4,4',6-HpBDE	BDE-171	nd	nd	nd	nd	4.79E-04	nd	nd	nd	nd	nd
2,2',3,4,4',5,5'-HpBDE	BDE-180	nd	nd	nd	nd	7.52E-04	nd	nd	nd	nd	nd
2,2',3,4,4',5',6-HpBDE	BDE-183	4.77E-04	nd	nd	3.68E-03	7.98E-03	nd	6.19E-03	1.00E-03	2.88E-04	1.56E-04
2,2',3,4,4',6,6'-HpBDE	BDE-184	nd	nd	nd	nd	5.29E-04	nd	nd	nd	4.20E-05	nd
2,3,3',4,4',5',6-HpBDE	BDE-191	nd	nd	nd	nd	2.79E-04	nd	nd	nd	nd	nd
2,2',3,3',4,4',5,6'-OcBDE	BDE-196	nd	nd	nd	1.69E-03	7.08E-03	nd	4.71E-03	6.72E-04	1.48E-04	nd
2,2',3,3',4,4',6,6'/ 2,2',3,4,4',5,6,6'-OcBDE	BDE-197/204	nd	nd	nd	2.28E-03	5.12E-03	nd	5.26E-03	1.01E-03	1.08E-04	nd
2,2',3,3',4,5',6,6'-OcBDE	BDE-201	nd	nd	nd	5.76E-04	4.63E-03	nd	4.82E-03	8.19E-04	nd	nd
2,2',3,4,4',5,5',6-OcBDE	BDE-203	nd	nd	nd	1.05E-03	7.24E-03	nd	5.19E-03	1.64E-03	2.03E-04	nd
2,3,3',4,4',5,5',6-OcBDE	BDE-205	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2,2',3,3',4,4',5,5',6-NoBDE	BDE-206	1.55E-03	1.26E-03	2.05E-04	1.83E-02	3.59E-02	8.17E-04	2.37E-02	3.82E-03	2.05E-03	nd
2,2',3,3',4,4',5,6,6'-NoBDE	BDE-207	2.24E-03	9.39E-04	2.89E-04	1.23E-02	3.76E-02	9.45E-04	2.56E-02	4.97E-03	1.91E-03	nd
2,2',3,3',4,5,5',6,6'-NoBDE	BDE-208	1.06E-03	7.13E-04	1.66E-04	1.08E-02	3.66E-02	8.15E-04	1.60E-02	3.44E-03	1.64E-03	nd
2,2',3,3',4,4',5,5',6,6'-DeBDE	BDE-209	2.29E-02	1.10E-02	8.53E-03	2.16E-01	4.21E-01	1.65E-02	3.00E-01	3.70E-02	2.23E-02	2.65E-03

Appendix G. Loading Rates for Each of the Ten POTWs

Chemical of Concern	Alternate Name	Bellingham STP (kg/year)	Bremerton STP (kg/year)	Burlington WWTP (kg/year)	City of Tacoma (Central No. 1) (kg/year)	Everett STP (Outfall 100) (kg/year)	Gig Harbor STP (kg/year)	King County West Point (kg/year)	Pierce County Chambers Creek STP (kg/year)	Shelton STP (kg/year)	Sumner STP (kg/year)
Polybrominated Diphenyl Ethers (Homologs)											
Decabromodiphenyl ether		2.29E-02	1.10E-02	6.79E-03	2.16E-01	4.21E-01	1.65E-02	3.00E-01	3.70E-02	2.23E-02	2.65E-03
Dibromodiphenyl ethers		1.37E-04	7.82E-05	9.40E-05	3.96E-04	4.55E-03	3.68E-05	1.33E-03	2.21E-03	nd	9.38E-05
Heptabromodiphenyl ethers		4.77E-04	nd	nd	3.68E-03	9.72E-03	nd	6.19E-03	1.00E-03	3.16E-04	1.56E-04
Hexabromodiphenyl ethers		1.02E-02	6.23E-03	1.44E-03	6.72E-02	1.06E-01	1.49E-03	1.17E-01	2.12E-02	6.09E-03	6.08E-03
Nonabromodiphenyl ethers		4.42E-03	2.17E-03	6.03E-04	4.15E-02	1.10E-01	2.58E-03	4.93E-02	1.16E-02	5.61E-03	nd
Octabromodiphenyl ethers		nd	nd	nd	5.46E-03	2.41E-02	nd	1.04E-02	3.77E-03	4.18E-04	nd
Pentabromodiphenyl ethers		8.01E-02	3.67E-02	1.23E-02	4.78E-01	6.31E-01	8.89E-03	9.54E-01	1.81E-01	4.30E-02	2.92E-02
Tetrabromodiphenyl ethers		8.10E-02	3.41E-02	1.28E-02	4.25E-01	5.80E-01	8.34E-03	8.71E-01	1.98E-01	3.00E-02	1.56E-02
Tribromodiphenyl ethers		2.10E-03	6.13E-04	2.57E-03	8.67E-03	1.80E-02	2.12E-04	1.87E-02	2.76E-02	6.76E-04	1.29E-03
Perfluorinated Compounds											
Perfluorobutane sulfonate	PFBS	nd	5.55E-02	nd	nd	nd	nd	9.46E-01	1.94E-01	nd	nd
Perfluorobutanoate	PFBA	2.20E-02	9.60E-03	nd	2.95E-02	2.75E-02	1.05E-03	2.42E-01	1.05E-01	4.79E-03	4.78E-03
Perfluorodecanoate	PFDA	3.56E-02	1.34E-02	8.89E-03	5.72E-02	3.27E-02	7.24E-03	4.54E-01	1.14E-01	1.66E-02	2.54E-02
Perfluorododecanoate	PFDoA	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Perfluoroheptanoate	PFHpA	7.33E-02	1.64E-02	9.97E-03	2.11E-01	1.33E-01	5.54E-03	5.60E-01	1.29E-01	8.99E-03	1.56E-02
Perfluorohexane sulfonate	PFHxS	4.86E-02	2.60E-02	6.25E-03	1.57E-01	4.34E-02	nd	3.69E-01	1.87E-01	nd	nd
Perfluorohexanoate	PFHxA	2.77E-01	7.46E-02	3.91E-02	4.63E-01	2.05E-01	4.21E-02	1.87E+00	3.78E-01	9.59E-02	1.15E-01
Perfluorononanoate	PFNA	2.17E-01	3.91E-02	1.95E-02	1.58E-01	1.19E+00	1.98E-02	6.12E-01	1.05E-01	6.43E-03	2.14E-02
Perfluorooctane sulfonamide	PFOSA	nd	nd	3.61E-03	nd	nd	nd	nd	nd	nd	3.21E-03
Perfluorooctane sulfonate	PFOS	5.96E-02	1.77E-01	1.07E-02	1.92E-01	1.29E-01	4.38E-03	2.60E+00	1.90E-01	7.37E-03	1.84E-02
Perfluorooctanoate	PFOA	2.46E-01	6.66E-02	5.33E-02	7.86E-01	3.01E-01	5.64E-02	2.25E+00	2.98E-01	9.89E-02	1.62E-01
Perfluoropentanoate	PFPeA	3.36E-02	4.93E-03	8.78E-03	1.45E-01	2.88E-02	1.59E-02	1.62E-01	4.94E-02	3.43E-02	4.38E-02
Perfluoroundecanoate	PFUnA	nd	nd	nd	nd	1.23E-02	nd	nd	nd	nd	nd
Polychlorinated Biphenyls (Congeners)											
2-MoCB	PCB-001	na	nd	na	1.14E-03	7.44E-04	na	2.44E-03	2.50E-04	nd	na
3-MoCB	PCB-002	na	nd	na	nd	nd	na	nd	nd	nd	na
4-MoCB	PCB-003	na	nd	na	8.00E-04	nd	na	1.73E-03	3.21E-04	nd	na
2,2'-DiCB	PCB-004	na	nd	na	2.33E-03	1.52E-02	na	6.00E-03	7.17E-04	nd	na
2,3/2,4'-DiCB	PCB-005/008	na	nd	na	3.57E-03	nd	na	nd	nd	nd	na
2,3'-DiCB	PCB-006	na	nd	na	6.13E-04	4.48E-04	na	1.87E-03	4.15E-04	nd	na
2,4-DiCB	PCB-007	na	nd	na	nd	2.04E-04	na	1.57E-03	nd	nd	na
2,5-DiCB	PCB-009	na	nd	na	3.05E-04	nd	na	nd	nd	nd	na
2,6-DiCB	PCB-010	na	nd	na	nd	nd	na	nd	nd	nd	na
3,3'-DiCB	PCB-011	na	nd	na	nd	nd	na	nd	nd	nd	na
3,4/3,4'-DiCB	PCB-012/013	na	nd	na	nd	3.55E-04	na	nd	6.58E-04	nd	na
3,5-DiCB	PCB-014	na	nd	na	nd	nd	na	nd	nd	nd	na
4,4'-DiCB	PCB-015	na	nd	na	9.95E-04	1.89E-03	na	nd	nd	nd	na
2,2',3-TrCB	PCB-016	na	8.50E-05	na	1.34E-03	1.29E-03	na	4.58E-03	4.40E-04	nd	na
2,2',4-TrCB	PCB-017	na	nd	na	1.31E-03	2.43E-03	na	2.75E-03	3.29E-04	nd	na
2,2',5-TrCB	PCB-018	na	nd	na	3.74E-03	3.88E-03	na	9.03E-03	9.91E-04	nd	na
2,2',6-TrCB	PCB-019	na	nd	na	5.06E-04	2.42E-03	na	nd	nd	nd	na
2,3,3'/2,3',4'-TriCB	PCB-020/033	na	8.14E-05	na	2.60E-03	1.42E-03	na	4.26E-03	4.35E-04	nd	na
2,3,4-TrCB	PCB-021	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,4'-TrCB	PCB-022	na	nd	na	1.49E-03	1.85E-03	na	2.56E-03	3.09E-04	nd	na
2,3,5-TrCB	PCB-023	na	nd	na	nd	nd	na	nd	nd	nd	na

Chemical of Concern	Alternate Name	Bellingham STP (kg/year)	Bremerton STP (kg/year)	Burlington WWTP (kg/year)	City of Tacoma (Central No. 1) (kg/year)	Everett STP (Outfall 100) (kg/year)	Gig Harbor STP (kg/year)	King County West Point (kg/year)	Pierce County Chambers Creek STP (kg/year)	Shelton STP (kg/year)	Sumner STP (kg/year)
2,3,6-TrCB	PCB-024	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3',4-TrCB	PCB-025	na	nd	na	2.94E-04	4.70E-04	na	nd	nd	nd	na
2,3',5-TrCB	PCB-026	na	nd	na	5.85E-04	8.00E-04	na	nd	nd	nd	na
2,3',6-TrCB	PCB-027	na	nd	na	nd	5.63E-04	na	nd	nd	nd	na
2,4,4'-TrCB	PCB-028	na	8.68E-05	na	3.19E-03	4.16E-03	na	5.35E-03	5.36E-04	4.29E-05	na
2,4,5-TrCB	PCB-029	na	nd	na	nd	nd	na	nd	nd	nd	na
2,4,6-TrCB	PCB-030	na	nd	na	nd	nd	na	nd	nd	nd	na
2,4',5-TrCB	PCB-031	na	9.69E-05	na	3.38E-03	4.23E-03	na	6.31E-03	7.49E-04	4.20E-05	na
2,4',6-TrCB	PCB-032	na	nd	na	1.12E-03	1.95E-03	na	nd	nd	nd	na
2,3',5'-TrCB	PCB-034	na	nd	na	nd	nd	na	nd	nd	nd	na
3,3',4-TrCB	PCB-035	na	nd	na	nd	3.62E-04	na	nd	nd	nd	na
3,3',5-TrCB	PCB-036	na	nd	na	nd	3.16E-04	na	nd	nd	nd	na
3,4,4'-TrCB	PCB-037	na	nd	na	9.84E-04	1.63E-03	na	1.93E-03	5.22E-04	nd	na
3,4,5-TrCB	PCB-038	na	nd	na	nd	nd	na	nd	nd	nd	na
3,4',5-TrCB	PCB-039	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3'-TeCB	PCB-040	na	nd	na	6.46E-04	6.42E-04	na	nd	nd	nd	na
2,3,4',6-TeCB	PCB-041	na	nd	na	3.13E-04	3.52E-04	na	nd	nd	nd	na
2,2',3,4'-TeCB	PCB-042	na	nd	na	8.00E-04	1.10E-03	na	nd	nd	nd	na
2,2',3,5/2,2',4,5'-TeCB	PCB-043/049	na	nd	na	2.60E-03	3.59E-03	na	4.67E-03	5.14E-04	3.93E-05	na
2,2',3,5'-TeCB	PCB-044	na	nd	na	3.49E-03	4.91E-03	na	nd	nd	nd	na
2,2',3,6-TeCB	PCB-045	na	nd	na	4.53E-04	5.04E-04	na	nd	nd	nd	na
2,2',3,6'-TeCB	PCB-046	na	nd	na	nd	2.87E-04	na	nd	nd	nd	na
2,2',4,4'/2,2',4,5-TeCB	PCB-047/048	na	nd	na	7.80E-04	1.20E-03	na	1.38E-03	nd	nd	na
2,2',4,6-TeCB	PCB-050	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',4,6'-TeCB	PCB-051	na	nd	na	nd	5.76E-04	na	nd	nd	nd	na
2,2',5,5'/2,3',4,6-TeCB	PCB-052/069	na	nd	na	4.12E-03	6.87E-03	na	1.15E-02	1.08E-03	nd	na
2,2',5,6'-TeCB	PCB-053	na	nd	na	4.45E-04	8.90E-04	na	1.54E-03	nd	nd	na
2,2',6,6'-TeCB	PCB-054	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4-TeCB	PCB-055	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4'-TeCB	PCB-056	na	nd	na	1.38E-03	1.68E-03	na	2.67E-03	nd	nd	na
2,3,3',5-TeCB	PCB-057	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',5'-TeCB	PCB-058	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',6-TeCB	PCB-059	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,4,4'-TeCB	PCB-060	na	nd	na	4.75E-04	8.54E-04	na	nd	nd	nd	na
2,3,4,5-TeCB	PCB-061	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,4,6-TeCB	PCB-062	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,4',5-TeCB	PCB-063	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,4',6/2,3',5,5'-TeCB	PCB-064/072	na	nd	na	1.51E-03	1.80E-03	na	2.25E-03	nd	nd	na
2,3,5,6/2,4,4',6-TeCB	PCB-065/075	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3',4,4'-TeCB	PCB-066	na	6.24E-05	na	2.53E-03	3.59E-03	na	3.86E-03	nd	3.13E-05	na
2,3',4,5-TeCB	PCB-067	na	nd	na	nd	1.55E-04	na	nd	nd	nd	na
2,2',3,4-TeCB	PCB-068	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3',4',5-TeCB	PCB-070	na	nd	na	3.68E-03	6.40E-03	na	nd	nd	nd	na
2,3',4',6-TeCB	PCB-071	na	nd	na	8.08E-04	1.00E-03	na	nd	nd	nd	na
2,2',5,5'-TeCB	PCB-073	na	nd	na	nd	nd	na	nd	nd	nd	na
2,4,4',5-TeCB	PCB-074	na	nd	na	1.54E-03	2.26E-03	na	2.51E-03	nd	nd	na
2,3',4',5'-TeCB	PCB-076	na	nd	na	nd	nd	na	nd	nd	nd	na
3,3',4,4'-TeCB	PCB-077	na	nd	na	nd	5.73E-04	na	nd	nd	nd	na
3,3',4,5-TeCB	PCB-078	na	nd	na	nd	nd	na	nd	nd	nd	na

Appendix G. Loading Rates for Each of the Ten POTWs

Chemical of Concern	Alternate Name	Bellingham STP (kg/year)	Bremerton STP (kg/year)	Burlington WWTP (kg/year)	City of Tacoma (Central No. 1) (kg/year)	Everett STP (Outfall 100) (kg/year)	Gig Harbor STP (kg/year)	King County West Point (kg/year)	Pierce County Chambers Creek STP (kg/year)	Shelton STP (kg/year)	Sumner STP (kg/year)
3,3',4,5'-TeCB	PCB-079	na	nd	na	nd	nd	na	nd	nd	nd	na
3,3',5,5'-TeCB	PCB-080	na	nd	na	nd	nd	na	nd	nd	nd	na
3,4,4',5-TeCB	PCB-081	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4-PeCB	PCB-082	na	nd	na	4.55E-04	1.35E-03	na	1.37E-03	nd	nd	na
2,2',3,3',5-PeCB	PCB-083	na	nd	na	3.35E-04	3.76E-04	na	nd	nd	nd	na
2,2',3,3',6-PeCB	PCB-084	na	nd	na	8.79E-04	1.79E-03	na	2.06E-03	nd	nd	na
2,2',3,4,4'-PeCB	PCB-085	na	nd	na	7.34E-04	1.77E-03	na	1.44E-03	nd	nd	na
2,2',3,4,5/2,2',3,4',5'/ 2,3,4',5,6-PeCB	PCB-086/097/117	na	nd	na	1.42E-03	3.40E-03	na	nd	nd	nd	na
2,2',3,4,5'/2,3,4,4',6-PeCB	PCB-087/115	na	nd	na	1.94E-03	4.53E-03	na	nd	nd	nd	na
2,2',3,4,6-PeCB	PCB-088	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,4,6'-PeCB	PCB-089	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,4',5-PeCB	PCB-090	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,4',6-PeCB	PCB-091	na	nd	na	6.60E-04	1.07E-03	na	1.52E-03	2.77E-04	nd	na
2,2',3,5,5'-PeCB	PCB-092	na	nd	na	1.24E-03	2.67E-03	na	3.33E-03	3.67E-04	2.97E-05	na
2,2',3,5,6/2,2',3,5',6/2,2',3,4',6'/ 2,2',4,5,6'-PeCB	PCB-093/095/098/102	na	nd	na	4.40E-03	8.80E-03	na	nd	nd	nd	na
2,2',3,5,6'-PeCB	PCB-094	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,6,6'-PeCB	PCB-096	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',4,4',5-PeCB	PCB-099	na	nd	na	2.10E-03	4.35E-03	na	4.90E-03	nd	nd	na
2,2',4,4',6-PeCB	PCB-100	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',4,5,5'-PeCB	PCB-101	na	nd	na	5.66E-03	1.14E-02	na	nd	nd	nd	na
2,2',4,5',6-PeCB	PCB-103	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',4,6,6'-PeCB	PCB-104	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4,4'-PeCB	PCB-105	na	nd	na	1.55E-03	3.94E-03	na	3.80E-03	nd	3.66E-05	na
2,3,3',4,5-PeCB	PCB-106	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4',5/2,3,3',4,5'-PeCB	PCB-107/108	na	nd	na	nd	7.16E-04	na	nd	nd	nd	na
2,3,3',4,6-PeCB	PCB-109	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4',6-PeCB	PCB-110	na	nd	na	5.36E-03	1.11E-02	na	nd	nd	nd	na
2,3,3',5,5'-PeCB	PCB-111	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',5,6/2,3',4,4',6-PeCB	PCB-112/119	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',5',6-PeCB	PCB-113	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,4,4',5-PeCB	PCB-114	na	nd	na	nd	3.57E-04	na	nd	nd	nd	na
2,3,4,5,6/2,3',4',5',6-PeCB	PCB-116/125	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3',4,4',5-PeCB	PCB-118	na	nd	na	3.71E-03	9.49E-03	na	9.20E-03	nd	nd	na
2,3',4,5,5'-PeCB	PCB-120	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3',4,5',6-PeCB	PCB-121	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4',5'-PeCB	PCB-122	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3',4,4',5'-PeCB	PCB-123	na	nd	na	nd	2.81E-04	na	nd	nd	nd	na
2,3',4',5,5'-PeCB	PCB-124	na	nd	na	nd	3.93E-04	na	nd	nd	nd	na
3,3',4,4',5-PeCB	PCB-126	na	nd	na	nd	1.95E-04	na	nd	nd	nd	na
3,3',4,5,5'-PeCB	PCB-127	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4,4'-HxCB	PCB-128	na	nd	na	9.62E-04	2.37E-03	na	1.77E-03	nd	nd	na
2,2',3,3',4,5-HxCB	PCB-129	na	nd	na	nd	4.34E-04	na	nd	nd	nd	na
2,2',3,3',4,5'-HxCB	PCB-130	na	nd	na	nd	6.48E-04	na	nd	nd	nd	na
2,2',3,3',4,6-HxCB	PCB-131	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4,6'-HxCB	PCB-132	na	nd	na	2.18E-03	4.26E-03	na	nd	nd	nd	na
2,2',3,3',5,5'-HxCB	PCB-133	na	nd	na	nd	1.58E-04	na	nd	nd	nd	na
2,2',3,3',5,6-HxCB	PCB-134	na	nd	na	nd	5.52E-04	na	nd	nd	nd	na

Appendix G. Loading Rates for Each of the Ten POTWs

Chemical of Concern	Alternate Name	Bellingham STP (kg/year)	Bremerton STP (kg/year)	Burlington WWTP (kg/year)	City of Tacoma (Central No. 1) (kg/year)	Everett STP (Outfall 100) (kg/year)	Gig Harbor STP (kg/year)	King County West Point (kg/year)	Pierce County Chambers Creek STP (kg/year)	Shelton STP (kg/year)	Sumner STP (kg/year)
2,2',3,3',5,6'-HxCB	PCB-135	na	nd	na	6.68E-04	1.13E-03	na	nd	nd	nd	na
2,2',3,3',6,6'-HxCB	PCB-136	na	nd	na	1.04E-03	1.34E-03	na	1.86E-03	nd	nd	na
2,2',3,4,4',5-HxCB	PCB-137	na	nd	na	nd	4.51E-04	na	nd	nd	nd	na
2,2',3,4,4',5'-HxCB	PCB-138	na	nd	na	4.62E-03	1.05E-02	na	8.74E-03	nd	nd	na
2,2',3,4,4',6/2,2',3,4',5',6-HxCB	PCB-139/149	na	nd	na	4.89E-03	8.45E-03	na	nd	nd	nd	na
2,2',3,4,4',6'-HxCB	PCB-140	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,4,5,5'-HxCB	PCB-141	na	nd	na	9.18E-04	1.33E-03	na	1.47E-03	nd	nd	na
2,2',3,4,5,6-HxCB	PCB-142	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,4,5,6'-HxCB	PCB-143	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,4,5',6-HxCB	PCB-144	na	nd	na	nd	2.86E-04	na	nd	nd	nd	na
2,2',3,4,6,6'-HxCB	PCB-145	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,4',5,5'-HxCB	PCB-146	na	nd	na	9.89E-04	1.46E-03	na	1.28E-03	nd	nd	na
2,2',3,4',5,6-HxCB	PCB-147	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,4',5,6'-HxCB	PCB-148	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,4',6,6'-HxCB	PCB-150	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,5,5',6-HxCB	PCB-151	na	nd	na	1.50E-03	2.09E-03	na	2.57E-03	nd	3.79E-05	na
2,2',3,5,6,6'-HxCB	PCB-152	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',4,4',5,5'-HxCB	PCB-153	na	nd	na	5.28E-03	9.76E-03	na	nd	nd	nd	na
2,2',4,4',5,6'-HxCB	PCB-154	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',4,4',6,6'-HxCB	PCB-155	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4,4',5-HxCB	PCB-156	na	nd	na	5.55E-04	1.27E-03	na	nd	nd	nd	na
2,3,3',4,4',5'-HxCB	PCB-157	na	nd	na	nd	2.56E-04	na	nd	nd	nd	na
2,3,3',4,4',6-HxCB	PCB-158	na	nd	na	5.06E-04	1.21E-03	na	nd	nd	nd	na
2,3,3',4,5,5'-HxCB	PCB-159	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4,5,6-HxCB	PCB-160	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4,5',6-HxCB	PCB-161	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4',5,5'-HxCB	PCB-162	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4',5,6/2,3,3',4',5',6-HxCB	PCB-163/164	na	nd	na	1.70E-03	3.02E-03	na	2.76E-03	2.77E-04	3.16E-05	na
2,3,3',5,5',6-HxCB	PCB-165	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,4,4',5,6-HxCB	PCB-166	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3',4,4',5,5'-HxCB	PCB-167	na	nd	na	nd	4.81E-04	na	nd	nd	nd	na
2,3',4,4',5',6-HxCB	PCB-168	na	nd	na	nd	nd	na	nd	nd	nd	na
3,3',4,4',5,5'-HxCB	PCB-169	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4,4',5-HpCB	PCB-170	na	nd	na	1.16E-03	1.26E-03	na	nd	nd	nd	na
2,2',3,3',4,4',6-HpCB	PCB-171	na	nd	na	4.75E-04	4.39E-04	na	nd	nd	nd	na
2,2',3,3',4,5,5'-HpCB	PCB-172	na	nd	na	nd	3.26E-04	na	nd	nd	nd	na
2,2',3,3',4,5,6-HpCB	PCB-173	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4,5,6'-HpCB	PCB-174	na	nd	na	1.82E-03	1.90E-03	na	nd	nd	4.27E-05	na
2,2',3,3',4,5',6-HpCB	PCB-175	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4,6,6'-HpCB	PCB-176	na	nd	na	nd	2.40E-04	na	nd	nd	nd	na
2,2',3,3',4,5',6'-HpCB	PCB-177	na	nd	na	7.83E-04	1.12E-03	na	nd	nd	nd	na
2,2',3,3',5,5',6-HpCB	PCB-178	na	nd	na	3.41E-04	4.23E-04	na	nd	nd	nd	na
2,2',3,3',5,6,6'-HpCB	PCB-179	na	nd	na	8.00E-04	8.12E-04	na	nd	nd	nd	na
2,2',3,4,4',5,5'-HpCB	PCB-180	na	nd	na	3.90E-03	3.91E-03	na	4.52E-03	3.93E-04	9.32E-05	na
2,2',3,4,4',5,6-HpCB	PCB-181	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,4,4',5,6'/ 2,2',3,4',5,5',6-HpCB	PCB-182/187	na	nd	na	2.06E-03	2.71E-03	na	2.15E-03	2.74E-04	7.12E-05	na
2,2',3,4,4',5',6-HpCB	PCB-183	na	nd	na	9.32E-04	1.27E-03	na	nd	nd	nd	na
2,2',3,4,4',6,6'-HpCB	PCB-184	na	nd	na	nd	nd	na	nd	nd	nd	na

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2,2',3,4,5,5',6-HpCB	PCB-185	na	nd	na	nd	2.31E-04	na	nd	nd	nd	na
2,2',3,4,5,6,6'-HpCB	PCB-186	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,4',5,6,6'-HpCB	PCB-188	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4,4',5,5'-HpCB	PCB-189	na	nd	na	nd	1.47E-04	na	nd	nd	nd	na
2,3,3',4,4',5,6-HpCB	PCB-190	na	nd	na	3.05E-04	3.37E-04	na	nd	nd	nd	na
2,3,3',4,4',5',6-HpCB	PCB-191	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4,5,5',6-HpCB	PCB-192	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4',5,5',6-HpCB	PCB-193	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4,4',5,5'-OcCB	PCB-194	na	nd	na	5.85E-04	7.45E-04	na	nd	nd	nd	na
2,2',3,3',4,4',5,6-OcCB	PCB-195	na	nd	na	nd	3.03E-04	na	nd	nd	nd	na
2,2',3,3',4,4',5,6'-OcCB	PCB-196	na	nd	na	4.31E-04	4.81E-04	na	nd	nd	2.82E-05	na
2,2',3,3',4,4',6,6'-OcCB	PCB-197	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4,5,5',6-OcCB	PCB-198	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4,5,5',6'-OcCB	PCB-199	na	nd	na	1.07E-03	1.29E-03	na	nd	nd	3.49E-05	na
2,2',3,3',4,5,6,6'-OcCB	PCB-200	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4,5',6,6'-OcCB	PCB-201	na	nd	na	nd	1.89E-04	na	nd	nd	nd	na
2,2',3,3',5,5',6,6'-OcCB	PCB-202	na	nd	na	nd	2.70E-04	na	nd	nd	nd	na
2,2',3,4,4',5,5',6-OcCB	PCB-203	na	nd	na	6.27E-04	8.25E-04	na	nd	nd	3.00E-05	na
2,2',3,4,4',5,6,6'-OcCB	PCB-204	na	nd	na	nd	nd	na	nd	nd	nd	na
2,3,3',4,4',5,5',6-OcCB	PCB-205	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4,4',5,5',6-NoCB	PCB-206	na	nd	na	4.04E-04	7.41E-04	na	nd	nd	3.03E-05	na
2,2',3,3',4,4',5,6,6'-NoCB	PCB-207	na	nd	na	nd	nd	na	nd	nd	nd	na
2,2',3,3',4,5,5',6,6'-NoCB	PCB-208	na	nd	na	nd	2.58E-04	na	nd	nd	nd	na
2,2',3,3',4,4',5,5',6,6'-DeCB	PCB-209	na	nd	na	nd	nd	na	nd	nd	nd	na
Polychlorinated Biphenyls (Homologs)											
Decachlorobiphenyl		na	nd	na	nd	3.38E-04	na	nd	nd	nd	na
Dichlorobiphenyls		na	nd	na	1.04E-02	2.34E-02	na	2.91E-02	5.62E-03	nd	na
Heptachlorobiphenyls		na	nd	na	1.26E-02	1.47E-02	na	6.67E-03	3.93E-04	1.64E-04	na
Hexachlorobiphenyls		na	nd	na	2.58E-02	5.14E-02	na	4.30E-02	nd	nd	na
Monochlorobiphenyls		na	nd	na	1.94E-03	7.44E-04	na	4.17E-03	5.71E-04	nd	na
Nonachlorobiphenyls		na	nd	na	4.04E-04	9.99E-04	na	nd	nd	nd	na
Octachlorobiphenyls		na	nd	na	2.71E-03	3.17E-03	na	nd	nd	3.49E-05	na
Pentachlorobiphenyls		na	nd	na	3.00E-02	6.77E-02	na	7.25E-02	nd	nd	na
Tetrachlorobiphenyls		na	nd	na	2.56E-02	3.83E-02	na	4.53E-02	3.27E-03	2.07E-04	na
Trichlorobiphenyls		na	4.45E-04	na	2.05E-02	2.78E-02	na	3.68E-02	4.31E-03	1.36E-04	na
Metals											
Copper		7.56E+01	2.22E+01	8.88E+00	2.58E+02	1.26E+02	1.15E+01	1.64E+03	2.84E+02	2.14E+01	4.22E+01
Lead		7.65E+00	1.40E+00	8.62E-01	1.81E+01	1.24E+01	7.15E-01	4.93E+01	7.29E+00	1.03E+00	4.58E-01
Zinc		7.17E+02	1.04E+02	1.19E+02	1.13E+03	3.48E+02	9.56E+01	4.58E+03	8.65E+02	1.34E+02	1.43E+02

Key:

The precision of the data in this table is only two significant figures.

na = Chemical was not analyzed during either the winter or summer sampling event.

nd = Chemical was not detected during either the winter or summer sampling event.

kg/year = Kilograms per year.

Appendix H.

Estimated Loadings to Puget Sound

Appendix H. Estimated Loadings to Puget Sound

Chemical of Concern	Alternate Name	Admiralty Inlet			Commencement Bay			Hood Canal (North)			Hood Canal (South)			Main Basin		
		25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile
Polycyclic Aromatic Hydrocarbons (kg/year)																
Low Molecular Weight PAHs (LPAHs)																
Fluorene		1.80E-03	9.99E-03	2.39E-02	6.58E-02	3.66E-01	8.75E-01	3.97E-04	2.21E-03	5.28E-03	3.18E-05	1.77E-04	4.22E-04	3.92E-01	2.18E+00	5.22E+00
Phenanthrene		6.14E-03	7.16E-03	1.82E-02	2.25E-01	2.63E-01	6.68E-01	1.36E-03	1.58E-03	4.03E-03	1.09E-04	1.27E-04	3.22E-04	1.34E+00	1.57E+00	3.98E+00
Entire Chemical Class:		8.76E-03	2.16E-02	9.33E-02	3.21E-01	7.90E-01	3.42E+00	1.94E-03	4.77E-03	2.06E-02	1.55E-04	3.81E-04	1.65E-03	1.91E+00	4.71E+00	2.04E+01
High Molecular Weight PAHs (HPAHs)																
Fluoranthene		5.31E-03	5.97E-03	1.06E-02	1.95E-01	2.19E-01	3.88E-01	1.17E-03	1.32E-03	2.34E-03	9.39E-05	1.06E-04	1.87E-04	1.16E+00	1.30E+00	2.31E+00
Pyrene		5.88E-03	7.73E-03	1.08E-02	2.16E-01	2.83E-01	3.96E-01	1.30E-03	1.71E-03	2.39E-03	1.04E-04	1.37E-04	1.91E-04	1.28E+00	1.69E+00	2.36E+00
Entire Chemical Class:		9.93E-03	1.32E-02	2.00E-02	3.64E-01	4.84E-01	7.32E-01	2.20E-03	2.92E-03	4.42E-03	1.76E-04	2.33E-04	3.53E-04	2.17E+00	2.88E+00	4.37E+00
Total PAHs (LPAHs+HPAHs)		2.02E-02	4.96E-02	1.23E-01	7.40E-01	1.82E+00	4.50E+00	4.47E-03	1.10E-02	2.71E-02	3.57E-04	8.78E-04	2.17E-03	4.41E+00	1.08E+01	2.68E+01
Phthalates (kg/year)																
bis(2-Ethylhexyl) phthalate		5.78E-01	1.18E+00	2.42E+00	2.12E+01	4.31E+01	8.87E+01	1.28E-01	2.60E-01	5.35E-01	1.02E-02	2.08E-02	4.28E-02	1.26E+02	2.57E+02	5.29E+02
Entire Chemical Class:		5.78E-01	1.46E+00	2.43E+00	2.12E+01	5.37E+01	8.90E+01	1.28E-01	3.24E-01	5.37E-01	1.02E-02	2.59E-02	4.29E-02	1.26E+02	3.20E+02	5.31E+02
Other Base/Neutral/Acid Extractables (kg/year)																
1,4-Dichlorobenzene		1.67E-01	2.70E-01	6.03E-01	6.10E+00	9.90E+00	2.21E+01	3.68E-02	5.97E-02	1.33E-01	2.94E-03	4.78E-03	1.07E-02	3.64E+01	5.90E+01	1.32E+02
2,4,6-Trichlorophenol		6.06E-02	1.19E-01	1.92E-01	2.22E+00	4.38E+00	7.02E+00	1.34E-02	2.64E-02	4.24E-02	1.07E-03	2.11E-03	3.39E-03	1.32E+01	2.61E+01	4.19E+01
2-Chloroethanol phosphate (3:1)		2.01E-01	2.89E-01	3.83E-01	7.37E+00	1.06E+01	1.40E+01	4.45E-02	6.39E-02	8.47E-02	3.56E-03	5.11E-03	6.78E-03	4.39E+01	6.32E+01	8.38E+01
3B-Coprostanol		8.17E+00	1.14E+01	1.85E+01	2.99E+02	4.17E+02	6.79E+02	1.81E+00	2.51E+00	4.10E+00	1.44E-01	2.01E-01	3.28E-01	1.78E+03	2.49E+03	4.05E+03
4-Methylphenol	p-Cresol	2.64E-01	4.11E-01	6.25E-01	9.67E+00	1.51E+01	2.29E+01	5.83E-02	9.08E-02	1.38E-01	4.67E-03	7.26E-03	1.10E-02	5.77E+01	8.98E+01	1.36E+02
Bisphenol A		3.33E-01	3.52E-01	9.49E-01	1.22E+01	1.29E+01	3.48E+01	7.35E-02	7.78E-02	2.10E-01	5.88E-03	6.22E-03	1.68E-02	7.27E+01	7.69E+01	2.07E+02
Caffeine		7.75E-02	1.90E-01	8.80E-01	2.84E+00	6.97E+00	3.22E+01	1.71E-02	4.21E-02	1.94E-01	1.37E-03	3.36E-03	1.56E-02	1.69E+01	4.16E+01	1.92E+02
Cholesterol		1.06E+01	1.57E+01	2.14E+01	3.88E+02	5.76E+02	7.83E+02	2.34E+00	3.47E+00	4.72E+00	1.87E-01	2.78E-01	3.78E-01	2.31E+03	3.43E+03	4.67E+03
Dibenzofuran		3.18E-03	7.73E-03	2.11E-02	1.16E-01	2.83E-01	7.72E-01	7.02E-04	1.71E-03	4.65E-03	5.62E-05	1.37E-04	3.72E-04	6.94E-01	1.69E+00	4.60E+00
Phenol		5.19E-01	9.24E-01	1.29E+00	1.90E+01	3.39E+01	4.72E+01	1.15E-01	2.04E-01	2.85E-01	9.18E-03	1.63E-02	2.28E-02	1.13E+02	2.02E+02	2.81E+02
Triclosan		4.34E-01	6.79E-01	1.07E+00	1.59E+01	2.49E+01	3.93E+01	9.59E-02	1.50E-01	2.37E-01	7.67E-03	1.20E-02	1.89E-02	9.47E+01	1.48E+02	2.34E+02
Triethyl citrate		6.25E-01	1.04E+00	1.38E+00	2.29E+01	3.80E+01	5.07E+01	1.38E-01	2.29E-01	3.06E-01	1.11E-02	1.83E-02	2.44E-02	1.37E+02	2.27E+02	3.02E+02
Polybrominated Diphenyl Ethers (Congeners) (kg/year)																
4,4'-DiBDE	BDE-015	1.09E-05	1.53E-05	5.85E-05	4.01E-04	5.62E-04	2.15E-03	2.42E-06	3.39E-06	1.29E-05	1.94E-07	2.71E-07	1.03E-06	2.39E-03	3.35E-03	1.28E-02
2,2',4-TrBDE	BDE-017	5.59E-05	1.07E-04	3.47E-04	2.05E-03	3.93E-03	1.27E-02	1.24E-05	2.37E-05	7.67E-05	9.89E-07	1.89E-06	6.13E-06	1.22E-02	2.34E-02	7.58E-02
2,4,4'-TrBDE	BDE-028	1.21E-04	2.44E-04	5.78E-04	4.44E-03	8.96E-03	2.12E-02	2.68E-05	5.40E-05	1.28E-04	2.14E-06	4.32E-06	1.02E-05	2.65E-02	5.34E-02	1.26E-01
2,2',4,4'-TeBDE	BDE-047	6.70E-03	8.21E-03	1.33E-02	2.45E-01	3.01E-01	4.86E-01	1.48E-03	1.82E-03	2.93E-03	1.18E-04	1.45E-04	2.35E-04	1.46E+00	1.79E+00	2.90E+00
2,2',4,5'-TeBDE	BDE-049	7.90E-05	2.73E-04	4.07E-04	2.89E-03	1.00E-02	1.49E-02	1.75E-05	6.03E-05	8.99E-05	1.40E-06	4.82E-06	7.19E-06	1.73E-02	5.96E-02	8.88E-02
2,2',4,5'/2,3',4',6-TeBDE	BDE-049/071	2.55E-04	4.35E-04	7.01E-04	9.36E-03	1.59E-02	2.57E-02	5.65E-05	9.61E-05	1.55E-04	4.52E-06	7.69E-06	1.24E-05	5.58E-02	9.50E-02	1.53E-01
2,3',4,4'-TeBDE	BDE-066	5.80E-05	1.91E-04	5.09E-04	2.13E-03	7.00E-03	1.87E-02	1.28E-05	4.22E-05	1.13E-04	1.03E-06	3.38E-06	9.00E-06	1.27E-02	4.17E-02	1.11E-01

Appendix H. Estimated Loadings to Puget Sound

Chemical of Concern	Alternate Name	Port Gardner			San Juan Islands			Sinclair-Dyes Inlet			South Sound (East)			South Sound (West)		
		25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile
Polycyclic Aromatic Hydrocarbons (kg/year)																
Low Molecular Weight PAHs (LPAHs)																
Fluorene		6.35E-02	3.53E-01	8.44E-01	4.48E-03	2.49E-02	5.96E-02	1.96E-02	1.09E-01	2.61E-01	3.84E-02	2.14E-01	5.10E-01	2.56E-02	1.42E-01	3.40E-01
Phenanthrene		2.17E-01	2.53E-01	6.44E-01	1.53E-02	1.79E-02	4.54E-02	6.71E-02	7.82E-02	1.99E-01	1.31E-01	1.53E-01	3.90E-01	8.76E-02	1.02E-01	2.60E-01
Entire Chemical Class:		3.10E-01	7.62E-01	3.30E+00	2.18E-02	5.38E-02	2.33E-01	9.56E-02	2.35E-01	1.02E+00	1.87E-01	4.61E-01	1.99E+00	1.25E-01	3.07E-01	1.33E+00
High Molecular Weight PAHs (HPAHs)																
Fluoranthene		1.88E-01	2.11E-01	3.74E-01	1.32E-02	1.49E-02	2.64E-02	5.80E-02	6.52E-02	1.16E-01	1.14E-01	1.28E-01	2.26E-01	7.57E-02	8.51E-02	1.51E-01
Pyrene		2.08E-01	2.73E-01	3.82E-01	1.47E-02	1.93E-02	2.70E-02	6.42E-02	8.44E-02	1.18E-01	1.26E-01	1.65E-01	2.31E-01	8.38E-02	1.10E-01	1.54E-01
Entire Chemical Class:		3.51E-01	4.66E-01	7.06E-01	2.48E-02	3.29E-02	4.98E-02	1.08E-01	1.44E-01	2.18E-01	2.12E-01	2.82E-01	4.27E-01	1.42E-01	1.88E-01	2.85E-01
Total PAHs (LPAHs+HPAHs)		7.14E-01	1.75E+00	4.34E+00	5.04E-02	1.24E-01	3.06E-01	2.21E-01	5.42E-01	1.34E+00	4.32E-01	1.06E+00	2.62E+00	2.88E-01	7.07E-01	1.75E+00
Phthalates (kg/year)																
bis(2-Ethylhexyl) phthalate		2.04E+01	4.15E+01	8.55E+01	1.44E+00	2.93E+00	6.03E+00	6.31E+00	1.28E+01	2.64E+01	1.24E+01	2.51E+01	5.17E+01	8.24E+00	1.67E+01	3.45E+01
Entire Chemical Class:		2.04E+01	5.18E+01	8.59E+01	1.44E+00	3.65E+00	6.06E+00	6.31E+00	1.60E+01	2.65E+01	1.24E+01	3.13E+01	5.19E+01	8.24E+00	2.09E+01	3.46E+01
Other Base/Neutral/Acid Extractables (kg/year)																
1,4-Dichlorobenzene		5.89E+00	9.55E+00	2.13E+01	4.15E-01	6.74E-01	1.50E+00	1.82E+00	2.95E+00	6.58E+00	3.56E+00	5.78E+00	1.29E+01	2.37E+00	3.85E+00	8.60E+00
2,4,6-Trichlorophenol		2.14E+00	4.22E+00	6.77E+00	1.51E-01	2.98E-01	4.78E-01	6.62E-01	1.30E+00	2.09E+00	1.30E+00	2.55E+00	4.10E+00	8.64E-01	1.70E+00	2.73E+00
2-Chloroethanol phosphate (3:1)		7.11E+00	1.02E+01	1.35E+01	5.01E-01	7.21E-01	9.56E-01	2.19E+00	3.16E+00	4.18E+00	4.30E+00	6.18E+00	8.19E+00	2.87E+00	4.12E+00	5.46E+00
3B-Coprostanol		2.89E+02	4.02E+02	6.55E+02	2.04E+01	2.84E+01	4.62E+01	8.92E+01	1.24E+02	2.02E+02	1.75E+02	2.43E+02	3.96E+02	1.16E+02	1.62E+02	2.64E+02
4-Methylphenol	p-Cresol	9.33E+00	1.45E+01	2.21E+01	6.58E-01	1.02E+00	1.56E+00	2.88E+00	4.48E+00	6.82E+00	5.64E+00	8.78E+00	1.34E+01	3.76E+00	5.85E+00	8.90E+00
Bisphenol A		1.18E+01	1.24E+01	3.35E+01	8.29E-01	8.78E-01	2.37E+00	3.63E+00	3.84E+00	1.04E+01	7.11E+00	7.52E+00	2.03E+01	4.74E+00	5.01E+00	1.35E+01
Caffeine		2.74E+00	6.73E+00	3.11E+01	1.93E-01	4.74E-01	2.19E+00	8.46E-01	2.08E+00	9.60E+00	1.66E+00	4.07E+00	1.88E+01	1.10E+00	2.71E+00	1.25E+01
Cholesterol		3.74E+02	5.55E+02	7.55E+02	2.64E+01	3.92E+01	5.33E+01	1.16E+02	1.71E+02	2.33E+02	2.26E+02	3.36E+02	4.57E+02	1.51E+02	2.24E+02	3.04E+02
Dibenzofuran		1.12E-01	2.73E-01	7.44E-01	7.92E-03	1.93E-02	5.25E-02	3.47E-02	8.44E-02	2.30E-01	6.79E-02	1.65E-01	4.50E-01	4.53E-02	1.10E-01	3.00E-01
Phenol		1.83E+01	3.27E+01	4.55E+01	1.29E+00	2.30E+00	3.21E+00	5.67E+00	1.01E+01	1.41E+01	1.11E+01	1.97E+01	2.75E+01	7.40E+00	1.32E+01	1.84E+01
Triclosan		1.53E+01	2.40E+01	3.79E+01	1.08E+00	1.69E+00	2.67E+00	4.73E+00	7.41E+00	1.17E+01	9.27E+00	1.45E+01	2.29E+01	6.18E+00	9.67E+00	1.53E+01
Triethyl citrate		2.21E+01	3.67E+01	4.89E+01	1.56E+00	2.59E+00	3.45E+00	6.82E+00	1.13E+01	1.51E+01	1.34E+01	2.22E+01	2.96E+01	8.91E+00	1.48E+01	1.97E+01
Polybrominated Diphenyl Ethers (Congeners) (kg/year)																
4,4'-DiBDE	BDE-015	3.87E-04	5.42E-04	2.07E-03	2.73E-05	3.82E-05	1.46E-04	1.20E-04	1.67E-04	6.39E-04	2.34E-04	3.28E-04	1.25E-03	1.56E-04	2.18E-04	8.34E-04
2,2',4-TrBDE	BDE-017	1.98E-03	3.79E-03	1.23E-02	1.39E-04	2.67E-04	8.65E-04	6.10E-04	1.17E-03	3.79E-03	1.20E-03	2.29E-03	7.41E-03	7.97E-04	1.53E-03	4.94E-03
2,4,4'-TrBDE	BDE-028	4.29E-03	8.64E-03	2.04E-02	3.02E-04	6.10E-04	1.44E-03	1.32E-03	2.67E-03	6.31E-03	2.59E-03	5.23E-03	1.24E-02	1.73E-03	3.48E-03	8.24E-03
2,2',4,4'-TeBDE	BDE-047	2.37E-01	2.90E-01	4.69E-01	1.67E-02	2.05E-02	3.31E-02	7.31E-02	8.96E-02	1.45E-01	1.43E-01	1.76E-01	2.84E-01	9.54E-02	1.17E-01	1.89E-01
2,2',4,5'-TeBDE	BDE-049	2.79E-03	9.64E-03	1.44E-02	1.97E-04	6.80E-04	1.01E-03	8.62E-04	2.98E-03	4.44E-03	1.69E-03	5.83E-03	8.69E-03	1.13E-03	3.89E-03	5.79E-03
2,2',4,5'/2,3',4',6-TeBDE	BDE-049/071	9.03E-03	1.54E-02	2.48E-02	6.37E-04	1.08E-03	1.75E-03	2.79E-03	4.75E-03	7.65E-03	5.46E-03	9.30E-03	1.50E-02	3.64E-03	6.20E-03	9.99E-03
2,3',4,4'-TeBDE	BDE-066	2.05E-03	6.75E-03	1.80E-02	1.45E-04	4.76E-04	1.27E-03	6.34E-04	2.09E-03	5.56E-03	1.24E-03	4.08E-03	1.09E-02	8.27E-04	2.72E-03	7.25E-03

Appendix H. Estimated Loadings to Puget Sound

Chemical of Concern	Alternate Name	Strait of Georgia 25th Percentile	Strait of Georgia 50th Percentile	Strait of Georgia 75th Percentile	Strait of Juan de Fuca 25th Percentile	Strait of Juan de Fuca 50th Percentile	Strait of Juan de Fuca 75th Percentile	Whidbey Basin 25th Percentile	Whidbey Basin 50th Percentile	Whidbey Basin 75th Percentile	Total Puget Sound 25th Percentile	Total Puget Sound 50th Percentile	Total Puget Sound 75th Percentile
Polycyclic Aromatic Hydrocarbons (kg/year)													
Low Molecular Weight PAHs (LPAHs)													
Fluorene		3.28E-02	1.83E-01	4.36E-01	6.00E-03	3.34E-02	7.98E-02	2.07E-02	1.15E-01	2.75E-01	6.72E-01	3.74E+00	8.93E+00
Phenanthrene		1.12E-01	1.31E-01	3.33E-01	2.05E-02	2.40E-02	6.09E-02	7.08E-02	8.25E-02	2.10E-01	2.30E+00	2.68E+00	6.81E+00
Entire Chemical Class:		1.60E-01	3.94E-01	1.71E+00	2.93E-02	7.21E-02	3.12E-01	1.01E-01	2.48E-01	1.08E+00	3.27E+00	8.06E+00	3.49E+01
High Molecular Weight PAHs (HPAHs)													
Fluoranthene		9.71E-02	1.09E-01	1.94E-01	1.78E-02	2.00E-02	3.54E-02	6.12E-02	6.88E-02	1.22E-01	1.99E+00	2.23E+00	3.96E+00
Pyrene		1.07E-01	1.41E-01	1.98E-01	1.97E-02	2.58E-02	3.61E-02	6.77E-02	8.90E-02	1.25E-01	2.20E+00	2.89E+00	4.04E+00
Entire Chemical Class:		1.82E-01	2.41E-01	3.65E-01	3.32E-02	4.41E-02	6.68E-02	1.14E-01	1.52E-01	2.30E-01	3.71E+00	4.93E+00	7.47E+00
Total PAHs (LPAHs+HPAHs)		3.69E-01	9.07E-01	2.24E+00	6.75E-02	1.66E-01	4.10E-01	2.33E-01	5.72E-01	1.41E+00	7.55E+00	1.86E+01	4.59E+01
Phthalates (kg/year)													
bis(2-Ethylhexyl) phthalate		1.06E+01	2.15E+01	4.42E+01	1.93E+00	3.93E+00	8.09E+00	6.66E+00	1.35E+01	2.79E+01	2.16E+02	4.39E+02	9.05E+02
Entire Chemical Class:		1.06E+01	2.68E+01	4.44E+01	1.93E+00	4.90E+00	8.12E+00	6.66E+00	1.69E+01	2.80E+01	2.16E+02	5.47E+02	9.08E+02
Other Base/Neutral/Acid Extractables (kg/year)													
1,4-Dichlorobenzene		3.04E+00	4.94E+00	1.10E+01	5.57E-01	9.03E-01	2.02E+00	1.92E+00	3.11E+00	6.95E+00	6.23E+01	1.01E+02	2.26E+02
2,4,6-Trichlorophenol		1.11E+00	2.18E+00	3.50E+00	2.03E-01	3.99E-01	6.41E-01	6.99E-01	1.38E+00	2.21E+00	2.27E+01	4.46E+01	7.17E+01
2-Chloroethanol phosphate (3:1)		3.68E+00	5.28E+00	7.01E+00	6.72E-01	9.66E-01	1.28E+00	2.32E+00	3.33E+00	4.42E+00	7.52E+01	1.08E+02	1.43E+02
3B-Coprostanol		1.49E+02	2.08E+02	3.39E+02	2.73E+01	3.80E+01	6.20E+01	9.41E+01	1.31E+02	2.14E+02	3.05E+03	4.25E+03	6.93E+03
4-Methylphenol	p-Cresol	4.82E+00	7.51E+00	1.14E+01	8.82E-01	1.37E+00	2.09E+00	3.04E+00	4.73E+00	7.20E+00	9.87E+01	1.54E+02	2.34E+02
Bisphenol A		6.08E+00	6.43E+00	1.73E+01	1.11E+00	1.18E+00	3.17E+00	3.83E+00	4.05E+00	1.09E+01	1.24E+02	1.32E+02	3.55E+02
Caffeine		1.42E+00	3.48E+00	1.61E+01	2.59E-01	6.36E-01	2.94E+00	8.93E-01	2.19E+00	1.01E+01	2.90E+01	7.11E+01	3.29E+02
Cholesterol		1.94E+02	2.87E+02	3.90E+02	3.54E+01	5.25E+01	7.14E+01	1.22E+02	1.81E+02	2.46E+02	3.96E+03	5.87E+03	7.99E+03
Dibenzofuran		5.81E-02	1.41E-01	3.85E-01	1.06E-02	2.58E-02	7.04E-02	3.66E-02	8.90E-02	2.43E-01	1.19E+00	2.89E+00	7.87E+00
Phenol		9.49E+00	1.69E+01	2.35E+01	1.74E+00	3.09E+00	4.31E+00	5.98E+00	1.06E+01	1.48E+01	1.94E+02	3.45E+02	4.82E+02
Triclosan		7.92E+00	1.24E+01	1.96E+01	1.45E+00	2.27E+00	3.58E+00	5.00E+00	7.82E+00	1.23E+01	1.62E+02	2.54E+02	4.01E+02
Triethyl citrate		1.14E+01	1.90E+01	2.53E+01	2.09E+00	3.47E+00	4.62E+00	7.20E+00	1.19E+01	1.59E+01	2.34E+02	3.88E+02	5.17E+02
Polybrominated Diphenyl Ethers (Congeners) (kg/year)													
4,4'-DiBDE	BDE-015	2.00E-04	2.80E-04	1.07E-03	3.66E-05	5.13E-05	1.96E-04	1.26E-04	1.77E-04	6.74E-04	4.09E-03	5.73E-03	2.19E-02
2,2',4-TrBDE	BDE-017	1.02E-03	1.96E-03	6.34E-03	1.87E-04	3.58E-04	1.16E-03	6.44E-04	1.23E-03	4.00E-03	2.09E-02	4.01E-02	1.30E-01
2,4,4'-TrBDE	BDE-028	2.22E-03	4.47E-03	1.06E-02	4.05E-04	8.17E-04	1.93E-03	1.40E-03	2.82E-03	6.66E-03	4.53E-02	9.14E-02	2.16E-01
2,2',4,4'-TeBDE	BDE-047	1.22E-01	1.50E-01	2.43E-01	2.24E-02	2.75E-02	4.44E-02	7.71E-02	9.46E-02	1.53E-01	2.50E+00	3.07E+00	4.96E+00
2,2',4,5'-TeBDE	BDE-049	1.44E-03	4.98E-03	7.43E-03	2.64E-04	9.12E-04	1.36E-03	9.10E-04	3.14E-03	4.68E-03	2.95E-02	1.02E-01	1.52E-01
2,2',4,5'/2,3',4',6-TeBDE	BDE-049/071	4.67E-03	7.95E-03	1.28E-02	8.54E-04	1.45E-03	2.34E-03	2.94E-03	5.01E-03	8.08E-03	9.55E-02	1.63E-01	2.62E-01
2,3',4,4'-TeBDE	BDE-066	1.06E-03	3.49E-03	9.30E-03	1.94E-04	6.39E-04	1.70E-03	6.69E-04	2.20E-03	5.86E-03	2.17E-02	7.14E-02	1.90E-01

Appendix H. Estimated Loadings to Puget Sound

Chemical of Concern	Alternate Name	Admiralty Inlet			Commencement Bay			Hood Canal (North)			Hood Canal (South)			Main Basin		
		25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile
2,3',4',6-TeBDE	BDE-071	4.62E-05	5.78E-05	1.71E-04	1.69E-03	2.12E-03	6.27E-03	1.02E-05	1.28E-05	3.78E-05	8.16E-07	1.02E-06	3.03E-06	1.01E-02	1.26E-02	3.74E-02
2,2',3,4,4'-PeBDE	BDE-085	2.34E-04	3.22E-04	5.72E-04	8.57E-03	1.18E-02	2.10E-02	5.17E-05	7.11E-05	1.27E-04	4.13E-06	5.69E-06	1.01E-05	5.11E-02	7.03E-02	1.25E-01
2,2',4,4',5-PeBDE	BDE-099	5.74E-03	7.92E-03	1.76E-02	2.11E-01	2.90E-01	6.44E-01	1.27E-03	1.75E-03	3.88E-03	1.02E-04	1.40E-04	3.11E-04	1.25E+00	1.73E+00	3.84E+00
2,2',4,4',6-PeBDE	BDE-100	1.26E-03	1.61E-03	3.15E-03	4.62E-02	5.90E-02	1.16E-01	2.79E-04	3.56E-04	6.97E-04	2.23E-05	2.84E-05	5.58E-05	2.75E-01	3.51E-01	6.89E-01
2,2',4,4',5,5'-HxBDE	BDE-153	4.49E-04	6.82E-04	1.73E-03	1.65E-02	2.50E-02	6.33E-02	9.93E-05	1.51E-04	3.82E-04	7.94E-06	1.21E-05	3.06E-05	9.81E-02	1.49E-01	3.78E-01
2,2',4,4',5,6'-HxBDE	BDE-154	3.92E-04	5.08E-04	1.07E-03	1.44E-02	1.86E-02	3.94E-02	8.68E-05	1.12E-04	2.37E-04	6.94E-06	8.98E-06	1.90E-05	8.57E-02	1.11E-01	2.35E-01
2,2',3,4,4',5',6-HpBDE	BDE-183	1.74E-05	5.52E-05	1.37E-04	6.39E-04	2.02E-03	5.03E-03	3.85E-06	1.22E-05	3.04E-05	3.08E-07	9.76E-07	2.43E-06	3.81E-03	1.21E-02	3.00E-02
2,2',3,3',4,4',5,5',6-NoBDE	BDE-206	1.15E-04	3.33E-04	8.23E-04	4.20E-03	1.22E-02	3.02E-02	2.53E-05	7.36E-05	1.82E-04	2.03E-06	5.89E-06	1.45E-05	2.50E-02	7.28E-02	1.80E-01
2,2',3,3',4,4',5,6,6'-NoBDE	BDE-207	1.40E-04	3.17E-04	7.35E-04	5.13E-03	1.16E-02	2.69E-02	3.09E-05	7.02E-05	1.63E-04	2.47E-06	5.61E-06	1.30E-05	3.06E-02	6.93E-02	1.61E-01
2,2',3,3',4,5,5',6,6'-NoBDE	BDE-208	5.76E-05	1.55E-04	5.35E-04	2.11E-03	5.67E-03	1.96E-02	1.27E-05	3.42E-05	1.18E-04	1.02E-06	2.73E-06	9.47E-06	1.26E-02	3.38E-02	1.17E-01
2,2',3,3',4,4',5,5',6,6'-DeBDE	BDE-209	2.44E-03	4.02E-03	1.17E-02	8.96E-02	1.47E-01	4.29E-01	5.40E-04	8.89E-04	2.58E-03	4.32E-05	7.11E-05	2.07E-04	5.34E-01	8.79E-01	2.55E+00
Entire Chemical Class:		1.88E-02	2.83E-02	5.54E-02	6.88E-01	1.04E+00	2.03E+00	4.15E-03	6.26E-03	1.23E-02	3.32E-04	5.01E-04	9.80E-04	4.10E+00	6.19E+00	1.21E+01
Polybrominated Diphenyl Ethers (Homologs) (kg/year)																
Decabromodiphenyl ether		2.44E-03	4.02E-03	1.17E-02	8.96E-02	1.47E-01	4.29E-01	5.40E-04	8.89E-04	2.58E-03	4.32E-05	7.11E-05	2.07E-04	5.34E-01	8.79E-01	2.55E+00
Dibromodiphenyl ethers		1.17E-05	1.96E-05	7.19E-05	4.28E-04	7.19E-04	2.63E-03	2.58E-06	4.33E-06	1.59E-05	2.07E-07	3.47E-07	1.27E-06	2.55E-03	4.28E-03	1.57E-02
Heptabromodiphenyl ethers		1.71E-05	5.57E-05	1.37E-04	6.25E-04	2.04E-03	5.03E-03	3.77E-06	1.23E-05	3.04E-05	3.02E-07	9.85E-07	2.43E-06	3.73E-03	1.22E-02	3.00E-02
Hexabromodiphenyl ethers		8.13E-04	1.29E-03	3.01E-03	2.98E-02	4.71E-02	1.10E-01	1.80E-04	2.84E-04	6.66E-04	1.44E-05	2.27E-05	5.33E-05	1.78E-01	2.81E-01	6.58E-01
Nonabromodiphenyl ethers		1.78E-04	7.87E-04	2.05E-03	6.52E-03	2.88E-02	7.53E-02	3.93E-05	1.74E-04	4.54E-04	3.14E-06	1.39E-05	3.63E-05	3.88E-02	1.72E-01	4.49E-01
Pentabromodiphenyl ethers		7.48E-03	9.93E-03	2.16E-02	2.74E-01	3.64E-01	7.92E-01	1.65E-03	2.20E-03	4.78E-03	1.32E-04	1.76E-04	3.82E-04	1.63E+00	2.17E+00	4.72E+00
Tetrabromodiphenyl ethers		6.93E-03	9.05E-03	1.42E-02	2.54E-01	3.32E-01	5.19E-01	1.53E-03	2.00E-03	3.13E-03	1.23E-04	1.60E-04	2.50E-04	1.52E+00	1.98E+00	3.09E+00
Tribromodiphenyl ethers		1.92E-04	3.56E-04	8.35E-04	7.02E-03	1.31E-02	3.06E-02	4.24E-05	7.88E-05	1.85E-04	3.39E-06	6.30E-06	1.48E-05	4.19E-02	7.79E-02	1.82E-01
Perfluorinated Compounds (kg/year)																
Perfluorobutanoate	PFBA	1.11E-03	1.73E-03	3.25E-03	4.05E-02	6.36E-02	1.19E-01	2.45E-04	3.83E-04	7.20E-04	1.96E-05	3.07E-05	5.76E-05	2.42E-01	3.79E-01	7.11E-01
Perfluorodecanoate	PFDA	3.27E-03	4.54E-03	7.15E-03	1.20E-01	1.67E-01	2.62E-01	7.23E-04	1.00E-03	1.58E-03	5.78E-05	8.03E-05	1.26E-04	7.15E-01	9.93E-01	1.56E+00
Perfluoroheptanoate	PFHpA	4.63E-03	5.89E-03	7.69E-03	1.70E-01	2.16E-01	2.82E-01	1.02E-03	1.30E-03	1.70E-03	8.19E-05	1.04E-04	1.36E-04	1.01E+00	1.29E+00	1.68E+00
Perfluorohexane sulfonate	PFHxS	1.60E-03	3.28E-03	4.56E-03	5.87E-02	1.20E-01	1.67E-01	3.54E-04	7.25E-04	1.01E-03	2.83E-05	5.80E-05	8.05E-05	3.50E-01	7.17E-01	9.95E-01
Perfluorohexanoate	PFHxA	1.62E-02	2.09E-02	3.37E-02	5.95E-01	7.67E-01	1.24E+00	3.59E-03	4.63E-03	7.46E-03	2.87E-04	3.70E-04	5.97E-04	3.55E+00	4.57E+00	7.37E+00
Perfluorononanoate	PFNA	4.62E-03	7.60E-03	1.57E-02	1.69E-01	2.79E-01	5.76E-01	1.02E-03	1.68E-03	3.47E-03	8.17E-05	1.34E-04	2.78E-04	1.01E+00	1.66E+00	3.43E+00
Perfluorooctane sulfonate	PFOS	5.09E-03	7.48E-03	1.23E-02	1.87E-01	2.74E-01	4.51E-01	1.13E-03	1.65E-03	2.72E-03	9.00E-05	1.32E-04	2.17E-04	1.11E+00	1.64E+00	2.69E+00
Perfluorooctanoate	PFOA	1.64E-02	2.95E-02	4.34E-02	6.00E-01	1.08E+00	1.59E+00	3.62E-03	6.52E-03	9.60E-03	2.89E-04	5.21E-04	7.68E-04	3.58E+00	6.44E+00	9.49E+00
Perfluoropentanoate	PFPeA	2.37E-03	3.29E-03	1.19E-02	8.68E-02	1.20E-01	4.38E-01	5.24E-04	7.27E-04	2.64E-03	4.19E-05	5.81E-05	2.11E-04	5.18E-01	7.18E-01	2.61E+00
Entire Chemical Class:		8.41E-02	1.14E-01	1.57E-01	3.08E+00	4.17E+00	5.77E+00	1.86E-02	2.52E-02	3.48E-02	1.49E-03	2.01E-03	2.78E-03	1.84E+01	2.49E+01	3.44E+01
Polychlorinated Biphenyls (Congeners) (kg/year)																
2-MoCB	PCB-001	7.89E-06	1.83E-05	4.50E-05	2.89E-04	6.73E-04	1.65E-03	1.74E-06	4.06E-06	9.95E-06	1.39E-07	3.24E-07	7.96E-07	1.72E-03	4.01E-03	9.84E-03
2,2'-DiCB	PCB-004	1.38E-05	4.77E-05	9.47E-05	5.07E-04	1.75E-03	3.47E-03	3.06E-06	1.05E-05	2.09E-05	2.44E-07	8.43E-07	1.67E-06	3.02E-03	1.04E-02	2.07E-02
2,3'-DiCB	PCB-006	9.30E-06	1.97E-05	2.63E-05	3.41E-04	7.23E-04	9.64E-04	2.06E-06	4.36E-06	5.81E-06	1.64E-07	3.49E-07	4.65E-07	2.03E-03	4.31E-03	5.75E-03
2,2',3-TrCB	PCB-016	1.91E-05	3.37E-05	5.71E-05	6.99E-04	1.23E-03	2.09E-03	4.22E-06	7.45E-06	1.26E-05	3.37E-07	5.96E-07	1.01E-06	4.17E-03	7.36E-03	1.25E-02

Appendix H. Estimated Loadings to Puget Sound

Chemical of Concern	Alternate Name	Port Gardner			San Juan Islands			Sinclair-Dyes Inlet			South Sound (East)			South Sound (West)		
		25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile
2,3',4',6-TeBDE	BDE-071	1.63E-03	2.04E-03	6.05E-03	1.15E-04	1.44E-04	4.27E-04	5.04E-04	6.31E-04	1.87E-03	9.87E-04	1.24E-03	3.66E-03	6.58E-04	8.24E-04	2.44E-03
2,2',3,4,4'-PeBDE	BDE-085	8.26E-03	1.14E-02	2.02E-02	5.83E-04	8.02E-04	1.43E-03	2.55E-03	3.51E-03	6.25E-03	5.00E-03	6.88E-03	1.22E-02	3.33E-03	4.58E-03	8.16E-03
2,2',4,4',5-PeBDE	BDE-099	2.03E-01	2.80E-01	6.21E-01	1.43E-02	1.97E-02	4.38E-02	6.27E-02	8.64E-02	1.92E-01	1.23E-01	1.69E-01	3.75E-01	8.18E-02	1.13E-01	2.50E-01
2,2',4,4',6-PeBDE	BDE-100	4.46E-02	5.69E-02	1.12E-01	3.14E-03	4.01E-03	7.87E-03	1.38E-02	1.76E-02	3.44E-02	2.69E-02	3.44E-02	6.74E-02	1.80E-02	2.29E-02	4.50E-02
2,2',4,4',5,5'-HxBDE	BDE-153	1.59E-02	2.41E-02	6.11E-02	1.12E-03	1.70E-03	4.31E-03	4.90E-03	7.45E-03	1.89E-02	9.60E-03	1.46E-02	3.69E-02	6.40E-03	9.72E-03	2.46E-02
2,2',4,4',5,6'-HxBDE	BDE-154	1.39E-02	1.79E-02	3.80E-02	9.79E-04	1.27E-03	2.68E-03	4.28E-03	5.54E-03	1.17E-02	8.39E-03	1.09E-02	2.29E-02	5.59E-03	7.24E-03	1.53E-02
2,2',3,4,4',5',6-HpBDE	BDE-183	6.16E-04	1.95E-03	4.85E-03	4.35E-05	1.38E-04	3.42E-04	1.90E-04	6.03E-04	1.50E-03	3.73E-04	1.18E-03	2.93E-03	2.48E-04	7.87E-04	1.96E-03
2,2',3,3',4,4',5,5',6-NoBDE	BDE-206	4.05E-03	1.18E-02	2.91E-02	2.86E-04	8.31E-04	2.05E-03	1.25E-03	3.64E-03	8.98E-03	2.45E-03	7.12E-03	1.76E-02	1.63E-03	4.75E-03	1.17E-02
2,2',3,3',4,4',5,6,6'-NoBDE	BDE-207	4.95E-03	1.12E-02	2.60E-02	3.49E-04	7.91E-04	1.83E-03	1.53E-03	3.46E-03	8.03E-03	2.99E-03	6.78E-03	1.57E-02	1.99E-03	4.52E-03	1.05E-02
2,2',3,3',4,5,5',6,6'-NoBDE	BDE-208	2.04E-03	5.46E-03	1.89E-02	1.44E-04	3.86E-04	1.34E-03	6.29E-04	1.69E-03	5.84E-03	1.23E-03	3.30E-03	1.14E-02	8.21E-04	2.20E-03	7.63E-03
2,2',3,3',4,4',5,5',6,6'-DeBDE	BDE-209	8.64E-02	1.42E-01	4.13E-01	6.10E-03	1.00E-02	2.92E-02	2.67E-02	4.39E-02	1.28E-01	5.23E-02	8.60E-02	2.50E-01	3.48E-02	5.73E-02	1.67E-01
Entire Chemical Class:		6.64E-01	1.00E+00	1.96E+00	4.68E-02	7.07E-02	1.38E-01	2.05E-01	3.09E-01	6.05E-01	4.01E-01	6.06E-01	1.18E+00	2.67E-01	4.04E-01	7.90E-01
Polybrominated Diphenyl Ethers (Homologs) (kg/year)																
Decabromodiphenyl ether		8.64E-02	1.42E-01	4.13E-01	6.10E-03	1.00E-02	2.92E-02	2.67E-02	4.39E-02	1.28E-01	5.23E-02	8.60E-02	2.50E-01	3.48E-02	5.73E-02	1.67E-01
Dibromodiphenyl ethers		4.13E-04	6.93E-04	2.54E-03	2.91E-05	4.89E-05	1.79E-04	1.28E-04	2.14E-04	7.85E-04	2.50E-04	4.19E-04	1.54E-03	1.67E-04	2.79E-04	1.02E-03
Heptabromodiphenyl ethers		6.03E-04	1.97E-03	4.85E-03	4.25E-05	1.39E-04	3.42E-04	1.86E-04	6.08E-04	1.50E-03	3.65E-04	1.19E-03	2.93E-03	2.43E-04	7.94E-04	1.96E-03
Hexabromodiphenyl ethers		2.87E-02	4.55E-02	1.07E-01	2.03E-03	3.21E-03	7.51E-03	8.88E-03	1.40E-02	3.29E-02	1.74E-02	2.75E-02	6.44E-02	1.16E-02	1.83E-02	4.29E-02
Nonabromodiphenyl ethers		6.28E-03	2.78E-02	7.26E-02	4.43E-04	1.96E-03	5.12E-03	1.94E-03	8.59E-03	2.24E-02	3.80E-03	1.68E-02	4.39E-02	2.53E-03	1.12E-02	2.93E-02
Pentabromodiphenyl ethers		2.64E-01	3.51E-01	7.64E-01	1.86E-02	2.48E-02	5.39E-02	8.16E-02	1.08E-01	2.36E-01	1.60E-01	2.12E-01	4.62E-01	1.07E-01	1.42E-01	3.08E-01
Tetrabromodiphenyl ethers		2.45E-01	3.20E-01	5.00E-01	1.73E-02	2.26E-02	3.53E-02	7.57E-02	9.88E-02	1.54E-01	1.48E-01	1.94E-01	3.02E-01	9.88E-02	1.29E-01	2.02E-01
Tribromodiphenyl ethers		6.77E-03	1.26E-02	2.95E-02	4.78E-04	8.89E-04	2.08E-03	2.09E-03	3.89E-03	9.12E-03	4.10E-03	7.62E-03	1.79E-02	2.73E-03	5.08E-03	1.19E-02
Perfluorinated Compounds (kg/year)																
Perfluorobutanoate	PFBA	3.91E-02	6.13E-02	1.15E-01	2.76E-03	4.33E-03	8.12E-03	1.21E-02	1.89E-02	3.55E-02	2.36E-02	3.71E-02	6.96E-02	1.58E-02	2.47E-02	4.64E-02
Perfluorodecanoate	PFDA	1.16E-01	1.61E-01	2.53E-01	8.16E-03	1.13E-02	1.78E-02	3.57E-02	4.96E-02	7.81E-02	6.99E-02	9.71E-02	1.53E-01	4.66E-02	6.47E-02	1.02E-01
Perfluoroheptanoate	PFHpA	1.64E-01	2.08E-01	2.72E-01	1.16E-02	1.47E-02	1.92E-02	5.06E-02	6.43E-02	8.40E-02	9.91E-02	1.26E-01	1.64E-01	6.60E-02	8.40E-02	1.10E-01
Perfluorohexane sulfonate	PFHxS	5.66E-02	1.16E-01	1.61E-01	3.99E-03	8.18E-03	1.14E-02	1.75E-02	3.58E-02	4.97E-02	3.42E-02	7.01E-02	9.74E-02	2.28E-02	4.67E-02	6.49E-02
Perfluorohexanoate	PFHxA	5.74E-01	7.40E-01	1.19E+00	4.05E-02	5.22E-02	8.42E-02	1.77E-01	2.28E-01	3.68E-01	3.47E-01	4.47E-01	7.21E-01	2.31E-01	2.98E-01	4.81E-01
Perfluorononanoate	PFNA	1.63E-01	2.69E-01	5.55E-01	1.15E-02	1.90E-02	3.92E-02	5.04E-02	8.30E-02	1.71E-01	9.88E-02	1.63E-01	3.36E-01	6.59E-02	1.08E-01	2.24E-01
Perfluorooctane sulfonate	PFOS	1.80E-01	2.65E-01	4.35E-01	1.27E-02	1.87E-02	3.07E-02	5.56E-02	8.17E-02	1.34E-01	1.09E-01	1.60E-01	2.63E-01	7.25E-02	1.07E-01	1.75E-01
Perfluorooctanoate	PFOA	5.79E-01	1.04E+00	1.53E+00	4.08E-02	7.35E-02	1.08E-01	1.79E-01	3.22E-01	4.74E-01	3.50E-01	6.30E-01	9.28E-01	2.33E-01	4.20E-01	6.19E-01
Perfluoropentanoate	PFPeA	8.37E-02	1.16E-01	4.22E-01	5.91E-03	8.20E-03	2.98E-02	2.59E-02	3.59E-02	1.30E-01	5.06E-02	7.03E-02	2.55E-01	3.38E-02	4.68E-02	1.70E-01
Entire Chemical Class:		2.97E+00	4.02E+00	5.56E+00	2.10E-01	2.84E-01	3.93E-01	9.18E-01	1.24E+00	1.72E+00	1.80E+00	2.43E+00	3.36E+00	1.20E+00	1.62E+00	2.24E+00
Polychlorinated Biphenyls (Congeners) (kg/year)																
2-MoCB	PCB-001	2.79E-04	6.49E-04	1.59E-03	1.97E-05	4.58E-05	1.12E-04	8.61E-05	2.00E-04	4.91E-04	1.69E-04	3.92E-04	9.62E-04	1.12E-04	2.61E-04	6.42E-04
2,2'-DiCB	PCB-004	4.89E-04	1.69E-03	3.35E-03	3.45E-05	1.19E-04	2.36E-04	1.51E-04	5.21E-04	1.03E-03	2.96E-04	1.02E-03	2.02E-03	1.97E-04	6.80E-04	1.35E-03
2,3'-DiCB	PCB-006	3.29E-04	6.97E-04	9.30E-04	2.32E-05	4.92E-05	6.56E-05	1.02E-04	2.15E-04	2.87E-04	1.99E-04	4.22E-04	5.62E-04	1.33E-04	2.81E-04	3.75E-04
2,2',3-TrCB	PCB-016	6.74E-04	1.19E-03	2.02E-03	4.76E-05	8.40E-05	1.42E-04	2.08E-04	3.68E-04	6.23E-04	4.08E-04	7.20E-04	1.22E-03	2.72E-04	4.80E-04	8.13E-04

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Appendix H. Estimated Loadings to Puget Sound

Chemical of Concern	Alternate Name	Strait of Georgia			Strait of Juan de Fuca			Whidbey Basin			Total Puget Sound		
		25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile
2,3',4',6-TeBDE	BDE-071	8.44E-04	1.06E-03	3.13E-03	1.54E-04	1.93E-04	5.72E-04	5.32E-04	6.66E-04	1.97E-03	1.73E-02	2.16E-02	6.40E-02
2,2',3,4,4'-PeBDE	BDE-085	4.27E-03	5.88E-03	1.05E-02	7.82E-04	1.08E-03	1.91E-03	2.69E-03	3.71E-03	6.60E-03	8.74E-02	1.20E-01	2.14E-01
2,2',4,4',5-PeBDE	BDE-099	1.05E-01	1.45E-01	3.21E-01	1.92E-02	2.65E-02	5.87E-02	6.62E-02	9.12E-02	2.02E-01	2.15E+00	2.96E+00	6.57E+00
2,2',4,4',6-PeBDE	BDE-100	2.30E-02	2.94E-02	5.77E-02	4.21E-03	5.38E-03	1.05E-02	1.45E-02	1.85E-02	3.63E-02	4.71E-01	6.02E-01	1.18E+00
2,2',4,4',5,5'-HxBDE	BDE-153	8.21E-03	1.25E-02	3.16E-02	1.50E-03	2.28E-03	5.78E-03	5.17E-03	7.86E-03	1.99E-02	1.68E-01	2.55E-01	6.46E-01
2,2',4,4',5,6'-HxBDE	BDE-154	7.17E-03	9.28E-03	1.96E-02	1.31E-03	1.70E-03	3.59E-03	4.52E-03	5.85E-03	1.24E-02	1.47E-01	1.90E-01	4.01E-01
2,2',3,4,4',5',6-HpBDE	BDE-183	3.19E-04	1.01E-03	2.51E-03	5.83E-05	1.85E-04	4.59E-04	2.01E-04	6.36E-04	1.58E-03	6.52E-03	2.06E-02	5.13E-02
2,2',3,3',4,4',5,5',6-NoBDE	BDE-206	2.09E-03	6.09E-03	1.50E-02	3.83E-04	1.11E-03	2.75E-03	1.32E-03	3.84E-03	9.48E-03	4.29E-02	1.25E-01	3.08E-01
2,2',3,3',4,4',5,6,6'-NoBDE	BDE-207	2.56E-03	5.80E-03	1.34E-02	4.68E-04	1.06E-03	2.46E-03	1.61E-03	3.66E-03	8.47E-03	5.23E-02	1.19E-01	2.75E-01
2,2',3,3',4,5,5',6,6'-NoBDE	BDE-208	1.05E-03	2.83E-03	9.79E-03	1.93E-04	5.17E-04	1.79E-03	6.64E-04	1.78E-03	6.17E-03	2.16E-02	5.78E-02	2.00E-01
2,2',3,3',4,4',5,5',6,6'-DeBDE	BDE-209	4.47E-02	7.35E-02	2.14E-01	8.17E-03	1.34E-02	3.91E-02	2.82E-02	4.63E-02	1.35E-01	9.14E-01	1.50E+00	4.37E+00
Entire Chemical Class:		3.43E-01	5.18E-01	1.01E+00	6.28E-02	9.47E-02	1.85E-01	2.16E-01	3.26E-01	6.38E-01	7.02E+00	1.06E+01	2.07E+01
Polybrominated Diphenyl Ethers (Homologs) (kg/year)													
Decabromodiphenyl ether		4.47E-02	7.35E-02	2.14E-01	8.17E-03	1.34E-02	3.91E-02	2.82E-02	4.63E-02	1.35E-01	9.14E-01	1.50E+00	4.37E+00
Dibromodiphenyl ethers		2.14E-04	3.58E-04	1.31E-03	3.91E-05	6.55E-05	2.40E-04	1.35E-04	2.26E-04	8.28E-04	4.37E-03	7.33E-03	2.69E-02
Heptabromodiphenyl ethers		3.12E-04	1.02E-03	2.51E-03	5.70E-05	1.86E-04	4.59E-04	1.97E-04	6.42E-04	1.58E-03	6.38E-03	2.08E-02	5.13E-02
Hexabromodiphenyl ethers		1.49E-02	2.35E-02	5.51E-02	2.72E-03	4.30E-03	1.01E-02	9.37E-03	1.48E-02	3.47E-02	3.04E-01	4.81E-01	1.13E+00
Nonabromodiphenyl ethers		3.25E-03	1.44E-02	3.76E-02	5.94E-04	2.63E-03	6.87E-03	2.05E-03	9.06E-03	2.37E-02	6.65E-02	2.94E-01	7.68E-01
Pentabromodiphenyl ethers		1.37E-01	1.82E-01	3.95E-01	2.50E-02	3.32E-02	7.23E-02	8.62E-02	1.14E-01	2.49E-01	2.80E+00	3.71E+00	8.08E+00
Tetrabromodiphenyl ethers		1.27E-01	1.65E-01	2.59E-01	2.32E-02	3.03E-02	4.73E-02	7.99E-02	1.04E-01	1.63E-01	2.59E+00	3.39E+00	5.29E+00
Tribromodiphenyl ethers		3.50E-03	6.51E-03	1.53E-02	6.41E-04	1.19E-03	2.79E-03	2.21E-03	4.10E-03	9.62E-03	7.17E-02	1.33E-01	3.12E-01
Perfluorinated Compounds (kg/year)													
Perfluorobutanoate	PFBA	2.02E-02	3.17E-02	5.95E-02	3.70E-03	5.80E-03	1.09E-02	1.27E-02	2.00E-02	3.75E-02	4.14E-01	6.49E-01	1.22E+00
Perfluorodecanoate	PFDA	5.98E-02	8.30E-02	1.31E-01	1.09E-02	1.52E-02	2.39E-02	3.77E-02	5.23E-02	8.24E-02	1.22E+00	1.70E+00	2.67E+00
Perfluoroheptanoate	PFHpA	8.47E-02	1.08E-01	1.41E-01	1.55E-02	1.97E-02	2.57E-02	5.34E-02	6.79E-02	8.86E-02	1.73E+00	2.20E+00	2.88E+00
Perfluorohexane sulfonate	PFHxS	2.93E-02	6.00E-02	8.33E-02	5.35E-03	1.10E-02	1.52E-02	1.84E-02	3.78E-02	5.25E-02	5.99E-01	1.23E+00	1.70E+00
Perfluorohexanoate	PFHxA	2.97E-01	3.82E-01	6.17E-01	5.43E-02	7.00E-02	1.13E-01	1.87E-01	2.41E-01	3.89E-01	6.07E+00	7.82E+00	1.26E+01
Perfluorononanoate	PFNA	8.45E-02	1.39E-01	2.87E-01	1.55E-02	2.54E-02	5.25E-02	5.32E-02	8.76E-02	1.81E-01	1.73E+00	2.84E+00	5.87E+00
Perfluorooctane sulfonate	PFOS	9.30E-02	1.37E-01	2.25E-01	1.70E-02	2.50E-02	4.11E-02	5.86E-02	8.62E-02	1.42E-01	1.90E+00	2.80E+00	4.60E+00
Perfluorooctanoate	PFOA	2.99E-01	5.39E-01	7.94E-01	5.47E-02	9.85E-02	1.45E-01	1.89E-01	3.40E-01	5.00E-01	6.12E+00	1.10E+01	1.62E+01
Perfluoropentanoate	PFPeA	4.33E-02	6.01E-02	2.18E-01	7.92E-03	1.10E-02	3.99E-02	2.73E-02	3.79E-02	1.38E-01	8.86E-01	1.23E+00	4.47E+00
Entire Chemical Class:		1.54E+00	2.08E+00	2.88E+00	2.81E-01	3.80E-01	5.26E-01	9.69E-01	1.31E+00	1.81E+00	3.15E+01	4.25E+01	5.89E+01
Polychlorinated Biphenyls (Congeners) (kg/year)													
2-MoCB	PCB-001	1.44E-04	3.35E-04	8.23E-04	2.64E-05	6.13E-05	1.51E-04	9.09E-05	2.11E-04	5.19E-04	2.95E-03	6.86E-03	1.68E-02
2,2'-DiCB	PCB-004	2.53E-04	8.72E-04	1.73E-03	4.62E-05	1.59E-04	3.17E-04	1.59E-04	5.49E-04	1.09E-03	5.17E-03	1.78E-02	3.54E-02
2,3'-DiCB	PCB-006	1.70E-04	3.61E-04	4.81E-04	3.11E-05	6.60E-05	8.79E-05	1.07E-04	2.27E-04	3.03E-04	3.48E-03	7.38E-03	9.83E-03
2,2',3-TrCB	PCB-016	3.49E-04	6.16E-04	1.04E-03	6.38E-05	1.13E-04	1.91E-04	2.20E-04	3.88E-04	6.57E-04	7.13E-03	1.26E-02	2.13E-02

Appendix H. Estimated Loadings to Puget Sound

Chemical of Concern	Alternate Name	Admiralty Inlet			Commencement Bay			Hood Canal (North)			Hood Canal (South)			Main Basin		
		25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile
2,2',4-TrCB	PCB-017	8.89E-06	2.19E-05	5.15E-05	3.26E-04	8.02E-04	1.89E-03	1.97E-06	4.83E-06	1.14E-05	1.57E-07	3.87E-07	9.11E-07	1.94E-03	4.78E-03	1.13E-02
2,2',5-TrCB	PCB-018	2.13E-05	6.96E-05	1.50E-04	7.81E-04	2.55E-03	5.51E-03	4.71E-06	1.54E-05	3.32E-05	3.77E-07	1.23E-06	2.66E-06	4.66E-03	1.52E-02	3.29E-02
2,3,3'/2,3',4'-TriCB	PCB-020/033	1.84E-05	3.20E-05	9.96E-05	6.76E-04	1.17E-03	3.65E-03	4.08E-06	7.07E-06	2.20E-05	3.26E-07	5.66E-07	1.76E-06	4.03E-03	6.99E-03	2.18E-02
2,3,4'-TrCB	PCB-022	8.64E-06	2.04E-05	5.74E-05	3.17E-04	7.49E-04	2.10E-03	1.91E-06	4.52E-06	1.27E-05	1.53E-07	3.61E-07	1.01E-06	1.89E-03	4.46E-03	1.25E-02
2,4,4'-TrCB	PCB-028	2.15E-05	3.99E-05	1.22E-04	7.89E-04	1.46E-03	4.49E-03	4.76E-06	8.82E-06	2.71E-05	3.81E-07	7.05E-07	2.17E-06	4.70E-03	8.72E-03	2.68E-02
2,4',5-TrCB	PCB-031	2.49E-05	5.00E-05	1.31E-04	9.12E-04	1.83E-03	4.82E-03	5.50E-06	1.11E-05	2.91E-05	4.40E-07	8.84E-07	2.32E-06	5.44E-03	1.09E-02	2.87E-02
3,4,4'-TrCB	PCB-037	9.46E-06	2.27E-05	4.04E-05	3.47E-04	8.34E-04	1.48E-03	2.09E-06	5.03E-06	8.93E-06	1.67E-07	4.02E-07	7.14E-07	2.07E-03	4.97E-03	8.82E-03
2,2',3,5/2,2',4,5'-TeCB	PCB-043/049	2.00E-05	3.60E-05	1.01E-04	7.34E-04	1.32E-03	3.69E-03	4.42E-06	7.96E-06	2.23E-05	3.54E-07	6.37E-07	1.78E-06	4.37E-03	7.87E-03	2.20E-02
2,2',5,5'/2,3',4,6-TeCB	PCB-052/069	2.68E-05	8.39E-05	1.70E-04	9.81E-04	3.07E-03	6.22E-03	5.91E-06	1.85E-05	3.75E-05	4.73E-07	1.48E-06	3.00E-06	5.85E-03	1.83E-02	3.71E-02
2,3',4,4'-TeCB	PCB-066	1.35E-05	2.61E-05	9.64E-05	4.94E-04	9.58E-04	3.53E-03	2.98E-06	5.78E-06	2.13E-05	2.38E-07	4.62E-07	1.70E-06	2.95E-03	5.71E-03	2.11E-02
2,2',3,4',6-PeCB	PCB-091	8.23E-06	1.45E-05	2.64E-05	3.02E-04	5.32E-04	9.66E-04	1.82E-06	3.21E-06	5.83E-06	1.45E-07	2.57E-07	4.66E-07	1.80E-03	3.17E-03	5.76E-03
2,2',3,5,5'-PeCB	PCB-092	1.48E-05	2.57E-05	5.07E-05	5.44E-04	9.41E-04	1.86E-03	3.28E-06	5.68E-06	1.12E-05	2.63E-07	4.54E-07	8.96E-07	3.24E-03	5.61E-03	1.11E-02
2,3,3',4,4'-PeCB	PCB-105	8.89E-06	2.70E-05	6.26E-05	3.26E-04	9.90E-04	2.29E-03	1.97E-06	5.97E-06	1.38E-05	1.57E-07	4.78E-07	1.11E-06	1.94E-03	5.90E-03	1.37E-02
2,2',3,5,5',6-HxCB	PCB-151	9.05E-06	2.13E-05	5.78E-05	3.32E-04	7.81E-04	2.12E-03	2.00E-06	4.71E-06	1.28E-05	1.60E-07	3.77E-07	1.02E-06	1.98E-03	4.65E-03	1.26E-02
2,3,3',4',5,6/2,3,3',4',5',6-HxCB	PCB-163/164	1.42E-05	2.08E-05	6.50E-05	5.19E-04	7.62E-04	2.38E-03	3.13E-06	4.60E-06	1.44E-05	2.50E-07	3.68E-07	1.15E-06	3.10E-03	4.54E-03	1.42E-02
2,2',3,4,4',5,5'-HpCB	PCB-180	2.56E-05	4.35E-05	1.45E-04	9.40E-04	1.59E-03	5.31E-03	5.67E-06	9.61E-06	3.20E-05	4.53E-07	7.69E-07	2.56E-06	5.60E-03	9.50E-03	3.17E-02
2,2',3,4,4',5,6'/2,2',3,4',5,5',6-HpCB	PCB-182/187	1.57E-05	2.68E-05	7.86E-05	5.76E-04	9.83E-04	2.88E-03	3.48E-06	5.93E-06	1.74E-05	2.78E-07	4.74E-07	1.39E-06	3.44E-03	5.86E-03	1.72E-02
Entire Chemical Class:		3.39E-04	9.17E-04	4.69E-03	1.24E-02	3.36E-02	1.72E-01	7.49E-05	2.03E-04	1.04E-03	5.99E-06	1.62E-05	8.29E-05	7.40E-02	2.00E-01	1.02E+00
Polychlorinated Biphenyls (Homologs) (kg/year)																
Dichlorobiphenyls		9.74E-05	2.86E-04	4.29E-04	3.57E-03	1.05E-02	1.57E-02	2.15E-05	6.32E-05	9.49E-05	1.72E-06	5.05E-06	7.59E-06	2.13E-02	6.25E-02	9.38E-02
Heptachlorobiphenyls		3.14E-05	7.03E-05	4.50E-04	1.15E-03	2.58E-03	1.65E-02	6.93E-06	1.55E-05	9.95E-05	5.54E-07	1.24E-06	7.96E-06	6.85E-03	1.54E-02	9.83E-02
Monochlorobiphenyls		1.20E-05	3.50E-05	5.81E-05	4.39E-04	1.28E-03	2.13E-03	2.65E-06	7.74E-06	1.29E-05	2.12E-07	6.19E-07	1.03E-06	2.62E-03	7.65E-03	1.27E-02
Tetrachlorobiphenyls		1.13E-04	3.06E-04	9.89E-04	4.12E-03	1.12E-02	3.62E-02	2.49E-05	6.76E-05	2.19E-04	1.99E-06	5.40E-06	1.75E-05	2.46E-02	6.68E-02	2.16E-01
Trichlorobiphenyls		1.25E-04	2.90E-04	7.94E-04	4.59E-03	1.06E-02	2.91E-02	2.77E-05	6.42E-05	1.76E-04	2.22E-06	5.13E-06	1.40E-05	2.74E-02	6.34E-02	1.74E-01
Metals (kg/year)																
Copper		6.69E+00	1.16E+01	1.47E+01	2.45E+02	4.25E+02	5.40E+02	1.48E+00	2.56E+00	3.26E+00	1.18E-01	2.05E-01	2.61E-01	1.46E+03	2.53E+03	3.22E+03
Lead		3.74E-01	4.96E-01	6.79E-01	1.37E+01	1.82E+01	2.49E+01	8.27E-02	1.10E-01	1.50E-01	6.61E-03	8.78E-03	1.20E-02	8.17E+01	1.08E+02	1.48E+02
Zinc		4.29E+01	5.08E+01	6.37E+01	1.57E+03	1.86E+03	2.33E+03	9.48E+00	1.12E+01	1.41E+01	7.58E-01	8.98E-01	1.13E+00	9.37E+03	1.11E+04	1.39E+04

Key:

The units of measure are kilograms per year (kg/year).

The precision of the data in this table is only two significant figures.

The loadings from POTWs to the Elliott Bay Study Area were zero because this area of Puget Sound had no POTWs discharging to it.

Appendix H. Estimated Loadings to Puget Sound

Chemical of Concern	Alternate Name	Port Gardner			San Juan Islands			Sinclair-Dyes Inlet			South Sound (East)			South Sound (West)		
		25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile
2,2',4-TrCB	PCB-017	3.14E-04	7.73E-04	1.82E-03	2.22E-05	5.45E-05	1.29E-04	9.71E-05	2.39E-04	5.62E-04	1.90E-04	4.67E-04	1.10E-03	1.27E-04	3.12E-04	7.34E-04
2,2',5-TrCB	PCB-018	7.54E-04	2.46E-03	5.32E-03	5.32E-05	1.73E-04	3.75E-04	2.33E-04	7.59E-04	1.64E-03	4.56E-04	1.49E-03	3.21E-03	3.04E-04	9.91E-04	2.14E-03
2,3,3'/2,3',4'-TriCB	PCB-020/033	6.52E-04	1.13E-03	3.52E-03	4.60E-05	7.98E-05	2.48E-04	2.01E-04	3.49E-04	1.09E-03	3.94E-04	6.84E-04	2.13E-03	2.63E-04	4.56E-04	1.42E-03
2,3,4'-TrCB	PCB-022	3.05E-04	7.22E-04	2.03E-03	2.15E-05	5.09E-05	1.43E-04	9.43E-05	2.23E-04	6.26E-04	1.85E-04	4.37E-04	1.23E-03	1.23E-04	2.91E-04	8.18E-04
2,4,4'-TrCB	PCB-028	7.61E-04	1.41E-03	4.33E-03	5.37E-05	9.95E-05	3.05E-04	2.35E-04	4.36E-04	1.34E-03	4.60E-04	8.53E-04	2.62E-03	3.07E-04	5.69E-04	1.75E-03
2,4',5-TrCB	PCB-031	8.80E-04	1.77E-03	4.65E-03	6.21E-05	1.25E-04	3.28E-04	2.72E-04	5.46E-04	1.43E-03	5.32E-04	1.07E-03	2.81E-03	3.55E-04	7.13E-04	1.87E-03
3,4,4'-TrCB	PCB-037	3.34E-04	8.04E-04	1.43E-03	2.36E-05	5.67E-05	1.01E-04	1.03E-04	2.48E-04	4.41E-04	2.02E-04	4.86E-04	8.63E-04	1.35E-04	3.24E-04	5.75E-04
2,2',3,5/2,2',4,5'-TeCB	PCB-043/049	7.07E-04	1.27E-03	3.56E-03	4.99E-05	8.98E-05	2.51E-04	2.18E-04	3.93E-04	1.10E-03	4.28E-04	7.70E-04	2.15E-03	2.85E-04	5.13E-04	1.44E-03
2,2',5,5'/2,3',4,6-TeCB	PCB-052/069	9.46E-04	2.97E-03	6.00E-03	6.67E-05	2.09E-04	4.23E-04	2.92E-04	9.16E-04	1.85E-03	5.72E-04	1.79E-03	3.63E-03	3.81E-04	1.20E-03	2.42E-03
2,3',4,4'-TeCB	PCB-066	4.76E-04	9.24E-04	3.41E-03	3.36E-05	6.52E-05	2.40E-04	1.47E-04	2.85E-04	1.05E-03	2.88E-04	5.59E-04	2.06E-03	1.92E-04	3.73E-04	1.37E-03
2,2',3,4',6-PeCB	PCB-091	2.91E-04	5.13E-04	9.32E-04	2.05E-05	3.62E-05	6.57E-05	8.98E-05	1.58E-04	2.88E-04	1.76E-04	3.10E-04	5.63E-04	1.17E-04	2.07E-04	3.76E-04
2,2',3,5,5'-PeCB	PCB-092	5.25E-04	9.08E-04	1.79E-03	3.70E-05	6.40E-05	1.26E-04	1.62E-04	2.80E-04	5.53E-04	3.17E-04	5.49E-04	1.08E-03	2.12E-04	3.66E-04	7.22E-04
2,3,3',4,4'-PeCB	PCB-105	3.14E-04	9.55E-04	2.21E-03	2.22E-05	6.74E-05	1.56E-04	9.71E-05	2.95E-04	6.83E-04	1.90E-04	5.78E-04	1.34E-03	1.27E-04	3.85E-04	8.92E-04
2,2',3,5,5',6-HxCB	PCB-151	3.20E-04	7.53E-04	2.04E-03	2.26E-05	5.31E-05	1.44E-04	9.88E-05	2.33E-04	6.31E-04	1.93E-04	4.55E-04	1.24E-03	1.29E-04	3.04E-04	8.23E-04
2,3,3',4',5,6/2,3,3',4',5',6-HxCB	PCB-163/164	5.01E-04	7.35E-04	2.30E-03	3.53E-05	5.19E-05	1.62E-04	1.55E-04	2.27E-04	7.10E-04	3.03E-04	4.44E-04	1.39E-03	2.02E-04	2.96E-04	9.27E-04
2,2',3,4,4',5,5'-HpCB	PCB-180	9.06E-04	1.54E-03	5.12E-03	6.39E-05	1.08E-04	3.61E-04	2.80E-04	4.75E-04	1.58E-03	5.48E-04	9.30E-04	3.10E-03	3.65E-04	6.20E-04	2.07E-03
2,2',3,4,4',5,6'/2,2',3,4',5,5',6-HpCB	PCB-182/187	5.56E-04	9.48E-04	2.78E-03	3.92E-05	6.69E-05	1.96E-04	1.72E-04	2.93E-04	8.58E-04	3.36E-04	5.74E-04	1.68E-03	2.24E-04	3.82E-04	1.12E-03
Entire Chemical Class:		1.20E-02	3.24E-02	1.66E-01	8.44E-04	2.29E-03	1.17E-02	3.70E-03	1.00E-02	5.12E-02	7.24E-03	1.96E-02	1.00E-01	4.82E-03	1.31E-02	6.68E-02
Polychlorinated Biphenyls (Homologs) (kg/year)																
Dichlorobiphenyls		3.44E-03	1.01E-02	1.52E-02	2.43E-04	7.13E-04	1.07E-03	1.06E-03	3.12E-03	4.68E-03	2.08E-03	6.11E-03	9.17E-03	1.39E-03	4.07E-03	6.12E-03
Heptachlorobiphenyls		1.11E-03	2.49E-03	1.59E-02	7.82E-05	1.75E-04	1.12E-03	3.42E-04	7.68E-04	4.91E-03	6.70E-04	1.50E-03	9.62E-03	4.47E-04	1.00E-03	6.41E-03
Monochlorobiphenyls		4.23E-04	1.24E-03	2.05E-03	2.99E-05	8.73E-05	1.45E-04	1.31E-04	3.82E-04	6.34E-04	2.56E-04	7.48E-04	1.24E-03	1.71E-04	4.99E-04	8.28E-04
Tetrachlorobiphenyls		3.98E-03	1.08E-02	3.50E-02	2.81E-04	7.62E-04	2.47E-03	1.23E-03	3.34E-03	1.08E-02	2.41E-03	6.53E-03	2.11E-02	1.60E-03	4.36E-03	1.41E-02
Trichlorobiphenyls		4.43E-03	1.03E-02	2.81E-02	3.12E-04	7.24E-04	1.98E-03	1.37E-03	3.17E-03	8.67E-03	2.68E-03	6.20E-03	1.70E-02	1.79E-03	4.14E-03	1.13E-02
Metals (kg/year)																
Copper		2.36E+02	4.10E+02	5.21E+02	1.67E+01	2.89E+01	3.67E+01	7.30E+01	1.26E+02	1.61E+02	1.43E+02	2.48E+02	3.15E+02	9.53E+01	1.65E+02	2.10E+02
Lead		1.32E+01	1.75E+01	2.40E+01	9.32E-01	1.24E+00	1.69E+00	4.08E+00	5.42E+00	7.41E+00	7.99E+00	1.06E+01	1.45E+01	5.33E+00	7.07E+00	9.67E+00
Zinc		1.52E+03	1.79E+03	2.25E+03	1.07E+02	1.27E+02	1.59E+02	4.68E+02	5.54E+02	6.95E+02	9.17E+02	1.09E+03	1.36E+03	6.11E+02	7.24E+02	9.07E+02

Key:
The units of measure are kilograms per year (kg/year).
The precision of the data in this table is only two significant figures.
The loadings from POTWs to the Elliott Bay Study Area were zero because this area of Puget Sound had no POTWs discharging to it.

Appendix H. Estimated Loadings to Puget Sound

Chemical of Concern	Alternate Name	Strait of Georgia			Strait of Juan de Fuca			Whidbey Basin			Total Puget Sound		
		25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile	25th Percentile	50th Percentile	75th Percentile
2,2',4-TrCB	PCB-017	1.63E-04	4.00E-04	9.42E-04	2.97E-05	7.31E-05	1.72E-04	1.02E-04	2.52E-04	5.94E-04	3.32E-03	8.18E-03	1.93E-02
2,2',5-TrCB	PCB-018	3.90E-04	1.27E-03	2.75E-03	7.13E-05	2.33E-04	5.03E-04	2.46E-04	8.01E-04	1.73E-03	7.97E-03	2.60E-02	5.62E-02
2,3,3'/2,3',4'-TriCB	PCB-020/033	3.37E-04	5.85E-04	1.82E-03	6.17E-05	1.07E-04	3.33E-04	2.12E-04	3.68E-04	1.15E-03	6.90E-03	1.20E-02	3.73E-02
2,3,4'-TrCB	PCB-022	1.58E-04	3.73E-04	1.05E-03	2.89E-05	6.83E-05	1.92E-04	9.95E-05	2.35E-04	6.61E-04	3.23E-03	7.64E-03	2.15E-02
2,4,4'-TrCB	PCB-028	3.93E-04	7.29E-04	2.24E-03	7.20E-05	1.33E-04	4.09E-04	2.48E-04	4.60E-04	1.41E-03	8.05E-03	1.49E-02	4.58E-02
2,4',5-TrCB	PCB-031	4.55E-04	9.14E-04	2.40E-03	8.32E-05	1.67E-04	4.39E-04	2.87E-04	5.76E-04	1.51E-03	9.30E-03	1.87E-02	4.91E-02
3,4,4'-TrCB	PCB-037	1.73E-04	4.16E-04	7.38E-04	3.16E-05	7.61E-05	1.35E-04	1.09E-04	2.62E-04	4.65E-04	3.54E-03	8.51E-03	1.51E-02
2,2',3,5/2,2',4,5'-TeCB	PCB-043/049	3.66E-04	6.58E-04	1.84E-03	6.69E-05	1.20E-04	3.37E-04	2.31E-04	4.15E-04	1.16E-03	7.48E-03	1.35E-02	3.77E-02
2,2',5,5'/2,3',4,6-TeCB	PCB-052/069	4.89E-04	1.53E-03	3.10E-03	8.94E-05	2.80E-04	5.67E-04	3.08E-04	9.66E-04	1.95E-03	1.00E-02	3.14E-02	6.34E-02
2,3',4,4'-TeCB	PCB-066	2.46E-04	4.78E-04	1.76E-03	4.51E-05	8.74E-05	3.22E-04	1.55E-04	3.01E-04	1.11E-03	5.04E-03	9.77E-03	3.60E-02
2,2',3,4',6-PeCB	PCB-091	1.50E-04	2.65E-04	4.82E-04	2.75E-05	4.85E-05	8.81E-05	9.48E-05	1.67E-04	3.04E-04	3.08E-03	5.43E-03	9.86E-03
2,2',3,5,5'-PeCB	PCB-092	2.71E-04	4.69E-04	9.26E-04	4.96E-05	8.58E-05	1.69E-04	1.71E-04	2.96E-04	5.84E-04	5.55E-03	9.60E-03	1.89E-02
2,3,3',4,4'-PeCB	PCB-105	1.63E-04	4.94E-04	1.14E-03	2.97E-05	9.03E-05	2.09E-04	1.02E-04	3.11E-04	7.21E-04	3.32E-03	1.01E-02	2.34E-02
2,2',3,5,5',6-HxCB	PCB-151	1.65E-04	3.89E-04	1.06E-03	3.03E-05	7.12E-05	1.93E-04	1.04E-04	2.45E-04	6.66E-04	3.38E-03	7.97E-03	2.16E-02
2,3,3',4',5,6/2,3,3',4',5',6-HxCB	PCB-163/164	2.59E-04	3.80E-04	1.19E-03	4.74E-05	6.95E-05	2.17E-04	1.63E-04	2.40E-04	7.49E-04	5.30E-03	7.77E-03	2.43E-02
2,2',3,4,4',5,5'-HpCB	PCB-180	4.69E-04	7.95E-04	2.65E-03	8.57E-05	1.45E-04	4.85E-04	2.95E-04	5.01E-04	1.67E-03	9.59E-03	1.63E-02	5.42E-02
2,2',3,4,4',5,6'/2,2',3,4',5,5',6-HpCB	PCB-182/187	2.87E-04	4.90E-04	1.44E-03	5.26E-05	8.97E-05	2.63E-04	1.81E-04	3.09E-04	9.06E-04	5.88E-03	1.00E-02	2.94E-02
Entire Chemical Class:		6.19E-03	1.68E-02	8.57E-02	1.13E-03	3.07E-03	1.57E-02	3.90E-03	1.06E-02	5.40E-02	1.27E-01	3.43E-01	1.75E+00
Polychlorinated Biphenyls (Homologs) (kg/year)													
Dichlorobiphenyls		1.78E-03	5.22E-03	7.84E-03	3.26E-04	9.56E-04	1.43E-03	1.12E-03	3.29E-03	4.94E-03	3.64E-02	1.07E-01	1.60E-01
Heptachlorobiphenyls		5.73E-04	1.29E-03	8.22E-03	1.05E-04	2.35E-04	1.50E-03	3.61E-04	8.10E-04	5.18E-03	1.17E-02	2.63E-02	1.68E-01
Monochlorobiphenyls		2.19E-04	6.40E-04	1.06E-03	4.00E-05	1.17E-04	1.94E-04	1.38E-04	4.03E-04	6.70E-04	4.48E-03	1.31E-02	2.17E-02
Tetrachlorobiphenyls		2.06E-03	5.59E-03	1.81E-02	3.76E-04	1.02E-03	3.31E-03	1.30E-03	3.52E-03	1.14E-02	4.21E-02	1.14E-01	3.70E-01
Trichlorobiphenyls		2.29E-03	5.30E-03	1.45E-02	4.19E-04	9.70E-04	2.66E-03	1.44E-03	3.34E-03	9.15E-03	4.69E-02	1.09E-01	2.97E-01
Metals (kg/year)													
Copper		1.22E+02	2.12E+02	2.69E+02	2.24E+01	3.87E+01	4.93E+01	7.71E+01	1.33E+02	1.70E+02	2.50E+03	4.33E+03	5.51E+03
Lead		6.83E+00	9.07E+00	1.24E+01	1.25E+00	1.66E+00	2.27E+00	4.31E+00	5.72E+00	7.82E+00	1.40E+02	1.86E+02	2.54E+02
Zinc		7.84E+02	9.28E+02	1.16E+03	1.43E+02	1.70E+02	2.13E+02	4.94E+02	5.85E+02	7.33E+02	1.60E+04	1.90E+04	2.38E+04

Key:

The units of measure are kilograms per year (kg/year).

The precision of the data in this table is only two significant figures.

The loadings from POTWs to the Elliott Bay Study Area were zero because this area of Puget Sound had no POTWs discharging to it.

Study_ID	Study_Specific_Location_ID	Field_Collection_Start_Date	Field_Collection_Reference_Point	Field_Collection_Upper_Depth	Field_Collection_Lower_Depth	Field_Collection_Depth_Units	Sample_ID	Result_Parameter_Name	Result_Value	Result_Value_Units	Result_Data_Qualifier
RCOO0010	Nooksack River	1/6/2010	Water surface	0	11.2	ft	0912035-01	PCB, Sum of Congeners	5.794	pg/L	J
RCOO0010	South Sound	1/11/2010	Water surface	90	90	m	1001013-14	PCB, Sum of Congeners	26.309	pg/L	J
RCOO0010	South Sound	1/11/2010	Water surface	10	10	m	1001013-13	PCB, Sum of Congeners	19.63	pg/L	J
RCOO0010	Main Basin	1/12/2010	Water surface	80	80	m	1001013-12	PCB, Sum of Congeners	38.98	pg/L	J
RCOO0010	Main Basin	1/12/2010	Water surface	20	20	m	1001013-11	PCB, Sum of Congeners	13.26	pg/L	J
RCOO0010	Hood Canal	1/13/2010	Water surface	100	100	m	1001013-02	PCB, Sum of Congeners	18.91	pg/L	J
RCOO0010	Hood Canal	1/13/2010	Water surface	25	25	m	1001013-01	PCB, Sum of Congeners	6.09	pg/L	J
RCOO0010	Whidbey Basin	1/26/2010	Water surface	95	95	m	1001013-10	PCB, Sum of Congeners	37.885	pg/L	J
RCOO0010	Whidbey Basin	1/26/2010	Water surface	15	15	m	1001013-09	PCB, Sum of Congeners	18.39	pg/L	J
RCOO0010	Whidbey Basin	1/26/2010	Water surface	20	20	m	1001013-17	PCB, Sum of Congeners	22.59	pg/L	J
RCOO0010	Haro Strait	2/1/2010	Water surface	95	95	m	1001013-08	PCB, Sum of Congeners	23.59	pg/L	J
RCOO0010	Haro Strait	2/1/2010	Water surface	15	15	m	1001013-07	PCB, Sum of Congeners	17.658	pg/L	J
RCOO0010	SJdF North	2/2/2010	Water surface	120	120	m	1001013-06	PCB, Sum of Congeners	26.408	pg/L	J
RCOO0010	SJdF North	2/2/2010	Water surface	15	15	m	1001013-05	PCB, Sum of Congeners	6.345	pg/L	J
RCOO0010	SJdF at Sill	2/2/2010	Water surface	120	120	m	1001013-04	PCB, Sum of Congeners	38.694	pg/L	J
RCOO0010	SJdF at Sill	2/2/2010	Water surface	15	15	m	1001013-03	PCB, Sum of Congeners	14.209	pg/L	J
RCOO0010	Hood Canal	7/7/2009	Water surface	40	40	m	0906045-02	PCB, Sum of Congeners	44.89	pg/L	J
RCOO0010	Hood Canal	7/7/2009	Water surface	5	5	m	0906045-01	PCB, Sum of Congeners	12.21	pg/L	J
RCOO0010	SJdF at Sill	7/7/2009	Water surface	45	45	m	0906045-04	PCB, Sum of Congeners	8.29	pg/L	J
RCOO0010	SJdF at Sill	7/7/2009	Water surface	10	10	m	0906045-03	PCB, Sum of Congeners	10.59	pg/L	J
RCOO0010	Haro Strait	7/8/2009	Water surface	115	115	m	0906045-08	PCB, Sum of Congeners	14.62	pg/L	
RCOO0010	Haro Strait	7/8/2009	Water surface	15	15	m	0906045-07	PCB, Sum of Congeners	13.485	pg/L	J
RCOO0010	SJdF North	7/8/2009	Water surface	110	110	m	0906045-06	PCB, Sum of Congeners	14.209	pg/L	J
RCOO0010	SJdF North	7/8/2009	Water surface	15	15	m	0906045-05	PCB, Sum of Congeners	15.409	pg/L	J
RCOO0010	Main Basin	7/9/2009	Water surface	95	95	m	0906045-12	PCB, Sum of Congeners	19.535	pg/L	J
RCOO0010	Main Basin	7/9/2009	Water surface	15	15	m	0906045-11	PCB, Sum of Congeners	24.49	pg/L	J
RCOO0010	South Sound	7/9/2009	Water surface	85	85	m	0906045-14	PCB, Sum of Congeners	43.48	pg/L	J
RCOO0010	South Sound	7/9/2009	Water surface	10	10	m	0906045-13	PCB, Sum of Congeners	26.55	pg/L	J
RCOO0010	Whidbey Basin	7/10/2009	Water surface	75	75	m	0906045-10	PCB, Sum of Congeners	43.92	pg/L	J
RCOO0010	Whidbey Basin	7/10/2009	Water surface	5	5	m	0906045-09	PCB, Sum of Congeners	8.73	pg/L	J
RCOO0010	Whidbey Basin	7/10/2009	Water surface	75	75	m	0906045-17	PCB, Sum of Congeners	31.12	pg/L	J
RCOO0010	Whidbey Basin	7/10/2009	Water surface	75	75	m	0906045-19	PCB, Sum of Congeners	30.31	pg/L	J
RCOO0010	Nooksack River	7/21/2009	Water surface	0	6.6	ft	0907026-01	PCB, Sum of Congeners	6.41	pg/L	J
RCOO0010	Skagit River	7/21/2009	Water surface	0	8.4	ft	0907026-02	PCB, Sum of Congeners	7.33	pg/L	J
RCOO0010	Stillaguamish River	7/22/2009	Water surface	0	11.7	ft	0907026-03	PCB, Sum of Congeners	19.27	pg/L	J
RCOO0010	Snohomish River	7/22/2009	Water surface	0	17.6	ft	0907026-04	PCB, Sum of Congeners	18.781	pg/L	J
RCOO0010	Puyallup River	7/23/2009	Water surface	0	7.5	ft	0907026-05	PCB, Sum of Congeners	2.61	pg/L	J
RCOO0010	Puyallup River	7/23/2009	Water surface	0	7.5	ft	0907026-06	PCB, Sum of Congeners	6.701	pg/L	J
RCOO0010	Whidbey Basin	9/28/2009	Water surface	45	45	m	0910041-10	PCB, Sum of Congeners	57.56	pg/L	J
RCOO0010	Whidbey Basin	9/28/2009	Water surface	5	5	m	0910041-09	PCB, Sum of Congeners	75.139	pg/L	J
RCOO0010	Main Basin	9/29/2009	Water surface	80	80	m	0910041-12	PCB, Sum of Congeners	52.23	pg/L	J
RCOO0010	Main Basin	9/29/2009	Water surface	20	20	m	0910041-11	PCB, Sum of Congeners	25.376	pg/L	J
RCOO0010	Hood Canal	9/30/2009	Water surface	80	80	m	0910041-02	PCB, Sum of Congeners	33.583	pg/L	J
RCOO0010	Hood Canal	9/30/2009	Water surface	80	80	m	0910041-17	PCB, Sum of Congeners	19.058	pg/L	J
RCOO0010	Hood Canal	9/30/2009	Water surface	2	2	m	0910041-01	PCB, Sum of Congeners	27.033	pg/L	J
RCOO0010	South Sound	10/1/2009	Water surface	80	80	m	0910041-14	PCB, Sum of Congeners	36.806	pg/L	J
RCOO0010	South Sound	10/1/2009	Water surface	10	10	m	0910041-13	PCB, Sum of Congeners	25.389	pg/L	J
RCOO0010	Haro Strait	10/7/2009	Water surface	95	95	m	0910041-08	PCB, Sum of Congeners	32.535	pg/L	J
RCOO0010	Haro Strait	10/7/2009	Water surface	15	15	m	0910041-07	PCB, Sum of Congeners	19.29	pg/L	J
RCOO0010	SJdF North	10/7/2009	Water surface	95	95	m	0910041-06	PCB, Sum of Congeners	35.418	pg/L	J
RCOO0010	SJdF North	10/7/2009	Water surface	15	15	m	0910041-05	PCB, Sum of Congeners	19.055	pg/L	J
RCOO0010	SJdF at Sill	10/7/2009	Water surface	95	95	m	0910041-04	PCB, Sum of Congeners	39.4	pg/L	J
RCOO0010	SJdF at Sill	10/7/2009	Water surface	15	15	m	0910041-03	PCB, Sum of Congeners	18.664	pg/L	J
RCOO0010	Nooksack River	10/12/2009	Water surface	0	5.4	ft	0910039-01	PCB, Sum of Congeners	17.18	pg/L	J
RCOO0010	Skagit River	10/13/2009	Water surface	0	6.3	ft	0910039-02	PCB, Sum of Congeners	9.961	pg/L	J
RCOO0010	Puyallup River	10/15/2009	Water surface	0	7	ft	0910039-05	PCB, Sum of Congeners	40.18	pg/L	J
RCOO0010	Puyallup River	10/15/2009	Water surface	0	7	ft	0910039-06	PCB, Sum of Congeners	33.35	pg/L	J
RCOO0010	Stillaguamish River	10/19/2009	Water surface	0	14.8	ft	0910039-03	PCB, Sum of Congeners	58.978	pg/L	J
RCOO0010	Snohomish River	10/20/2009	Water surface	0	26	ft	0910039-04	PCB, Sum of Congeners	4.93	pg/L	J
RCOO0010	Hood Canal sedtraps	10/22/2009	Water Surface	126	126	ft	1001017-01	PCB, Sum of Congeners	2966	ng/Kg	
RCOO0010	Stillaguamish River	12/8/2009	Water surface	0	13.2	ft	0912035-03	PCB, Sum of Congeners	4.991	pg/L	J
RCOO0010	Puyallup River	12/13/2009	Sediment surface	-2.8	-2.8	ft	1001014-05	PCB, Sum of Congeners	145.36	ng/Kg	
RCOO0010	Puyallup River	12/14/2009	Water surface	0	6.7	ft	0912035-05	PCB, Sum of Congeners	21.497	pg/L	J
RCOO0010	Puyallup River	12/14/2009	Water surface	0	6.5	ft	0912035-06	PCB, Sum of Congeners	23.509	pg/L	J
RCOO0010	Skagit River	12/17/2009	Water surface	0	9	ft	0912035-02	PCB, Sum of Congeners	16.981	pg/L	J
RCOO0010	Snohomish River	12/22/2009	Water surface	0	30.5	ft	0912035-04	PCB, Sum of Congeners	7.293	pg/L	J

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Presidential Documents

Title 3—

The President

Executive Order 13563 of January 18, 2011

Improving Regulation and Regulatory Review

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to improve regulation and regulatory review, it is hereby ordered as follows:

Section 1. *General Principles of Regulation.* (a) Our regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation. It must be based on the best available science. It must allow for public participation and an open exchange of ideas. It must promote predictability and reduce uncertainty. It must identify and use the best, most innovative, and least burdensome tools for achieving regulatory ends. It must take into account benefits and costs, both quantitative and qualitative. It must ensure that regulations are accessible, consistent, written in plain language, and easy to understand. It must measure, and seek to improve, the actual results of regulatory requirements.

(b) This order is supplemental to and reaffirms the principles, structures, and definitions governing contemporary regulatory review that were established in Executive Order 12866 of September 30, 1993. As stated in that Executive Order and to the extent permitted by law, each agency must, among other things: (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor its regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public.

(c) In applying these principles, each agency is directed to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. Where appropriate and permitted by law, each agency may consider (and discuss qualitatively) values that are difficult or impossible to quantify, including equity, human dignity, fairness, and distributive impacts.

Sec. 2. *Public Participation.* (a) Regulations shall be adopted through a process that involves public participation. To that end, regulations shall be based, to the extent feasible and consistent with law, on the open exchange of information and perspectives among State, local, and tribal officials, experts in relevant disciplines, affected stakeholders in the private sector, and the public as a whole.

(b) To promote that open exchange, each agency, consistent with Executive Order 12866 and other applicable legal requirements, shall endeavor to provide the public with an opportunity to participate in the regulatory process. To the extent feasible and permitted by law, each agency shall afford the public a meaningful opportunity to comment through the Internet on any proposed regulation, with a comment period that should generally be at least 60 days. To the extent feasible and permitted by law, each agency shall also provide, for both proposed and final rules, timely online access to the rulemaking docket on regulations.gov, including relevant scientific and technical findings, in an open format that can be easily searched and downloaded. For proposed rules, such access shall include, to the extent feasible and permitted by law, an opportunity for public comment on all pertinent parts of the rulemaking docket, including relevant scientific and technical findings.

(c) Before issuing a notice of proposed rulemaking, each agency, where feasible and appropriate, shall seek the views of those who are likely to be affected, including those who are likely to benefit from and those who are potentially subject to such rulemaking.

Sec. 3. *Integration and Innovation.* Some sectors and industries face a significant number of regulatory requirements, some of which may be redundant, inconsistent, or overlapping. Greater coordination across agencies could reduce these requirements, thus reducing costs and simplifying and harmonizing rules. In developing regulatory actions and identifying appropriate approaches, each agency shall attempt to promote such coordination, simplification, and harmonization. Each agency shall also seek to identify, as appropriate, means to achieve regulatory goals that are designed to promote innovation.

Sec. 4. *Flexible Approaches.* Where relevant, feasible, and consistent with regulatory objectives, and to the extent permitted by law, each agency shall identify and consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public. These approaches include warnings, appropriate default rules, and disclosure requirements as well as provision of information to the public in a form that is clear and intelligible.

Sec. 5. *Science.* Consistent with the President's Memorandum for the Heads of Executive Departments and Agencies, "Scientific Integrity" (March 9, 2009), and its implementing guidance, each agency shall ensure the objectivity of any scientific and technological information and processes used to support the agency's regulatory actions.

Sec. 6. *Retrospective Analyses of Existing Rules.* (a) To facilitate the periodic review of existing significant regulations, agencies shall consider how best to promote retrospective analysis of rules that may be outmoded, ineffective, insufficient, or excessively burdensome, and to modify, streamline, expand, or repeal them in accordance with what has been learned. Such retrospective analyses, including supporting data, should be released online whenever possible.

(b) Within 120 days of the date of this order, each agency shall develop and submit to the Office of Information and Regulatory Affairs a preliminary plan, consistent with law and its resources and regulatory priorities, under which the agency will periodically review its existing significant regulations to determine whether any such regulations should be modified, streamlined, expanded, or repealed so as to make the agency's regulatory program more effective or less burdensome in achieving the regulatory objectives.

Sec. 7. *General Provisions.* (a) For purposes of this order, "agency" shall have the meaning set forth in section 3(b) of Executive Order 12866.

(b) Nothing in this order shall be construed to impair or otherwise affect:

(i) authority granted by law to a department or agency, or the head thereof; or

(ii) functions of the Director of the Office of Management and Budget relating to budgetary, administrative, or legislative proposals.

(c) This order shall be implemented consistent with applicable law and subject to the availability of appropriations.

(d) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

THE WHITE HOUSE,
January 18, 2011.

[FR Doc. 2011–1385
Filed 1–20–11; 8:45 am]
Billing code 3195–W1–P

05990

Guidance on Considering Environmental Justice During the Development of Regulatory Actions

May 2015

05991

Message from the Administrator

Guidance on Considering Environmental Justice During the Development of Regulatory Actions

Making a visible difference in communities across America means that we should consider the impacts of our decisions on all populations. In particular, the U.S. Environmental Protection Agency has a responsibility under Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* to consider the impacts of our regulatory actions on populations documented as frequently bearing the greatest burdens imposed by environmental pollution. Recently, the EPA celebrated the 20th anniversary of the groundbreaking executive order, and we are privileged to continue working to advance environmental justice in every corner of our great nation.

The EPA's *Guidance on Considering Environmental Justice During the Development of Regulatory Actions* is the Agency's guide for determining when environmental justice should be considered during the Action Development Process when developing regulations. This guide outlines critical steps that rule-writers can take to consider the needs of minority populations, low-income populations and indigenous peoples—those most impacted by environmental and public-health concerns—and provide specific strategies for giving those populations a voice in shaping the EPA's rules and regulations. The companion *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) provides information on how to analytically consider environmental justice in rules. Together, these documents provide consistency and rigor in how the Agency considers environmental justice in regulatory actions.

Our work under *Plan EJ 2014* has paved the way to understanding and integrating environmental justice into the EPA's policies and programs. Through increased analysis, informed decision making and expanded community engagement, we can secure the EPA's place at the forefront in addressing the environmental justice issues that challenge the health and vitality of our most vulnerable citizens and their communities.

The EPA strives to set the standard for addressing the environmental challenges that burden so many of our communities. In doing so, we realize that the future of our efforts will be built on our federal and state agencies working together with academia and our community partners to foster communication, support innovation and promote tremendous growth and understanding of environmental justice issues. I call upon you, the EPA family, to reaffirm the spirit of Executive Order 12898 and to commit to strengthening our mission to protect our environment and every American's fundamental right to breathe clean air, drink clean water and live on clean land.

Gina McCarthy, Administrator

05992

EPA's Action Development Process:

Guidance on Considering Environmental Justice During the Development of Regulatory Actions

Foreword

The Environmental Protection Agency (EPA) is authorized by Congress to create and enforce regulations that put our nation's environmental laws into effect. Exercising this authority is one of the EPA's most important and powerful tools for protecting our environment and the health of our people. The EPA's regulations cover a range of environmental and public health issues, from setting standards for clean water to controlling air pollution from industry and other sources. When the EPA identifies the need to develop or revise a regulation, it forms a workgroup that is led by the EPA office that will be writing the regulation. The workgroup may work for months, even years, employing EPA expert scientists, economists, and other analysts, before an appropriate course of action is decided upon and a regulation is promulgated and implemented.

A number of laws, executive orders and policies direct the EPA to consider issues of concern to the President, Congress and the American public when developing regulations. To achieve the goals of Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, it is critical that EPA rule-writers consider environmental justice (EJ) when developing a regulation. EO 12898 and EPA policy identify population groups of concern, specifically minority populations, low-income populations and indigenous peoples. This Guide is designed to help EPA staff incorporate EJ into the process followed at the EPA for developing regulations, also known as the Action Development Process (ADP), by:

- Describing the legal and policy frameworks at the EPA for rule-writers to consider EJ;
- Identifying the information rule-writers should consider to determine whether there are EJ concerns involved in the regulation being developed;
- Highlighting the kinds of questions about EJ that rule-writers should ask and address in each step of developing a regulation; and
- Providing strategies and techniques for achieving meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples at key stages in the rule development process.

This Guide explicitly integrates EJ considerations into the fabric of the ADP—from the point when the Agency first starts considering a rule, then through its promulgation and implementation. The analyses needed to implement this Guide may include quantitative and/or qualitative elements. See a companion document, Draft Technical Guidance for Assessing Environmental Justice in Regulatory

Analysis (U.S. EPA 2013),[1] for recommendations on how to evaluate potential EJ concerns using quantitative and qualitative methods for regulatory actions.

This Guide empowers decision-makers responsible for developing rules to determine early in the process the level of focus and effort that is necessary and appropriate to achieve the EO 12898 goals. This approach can and should balance the need to make sure that strong, environmentally-protective rules are promulgated in a timely way while ensuring EJ is considered to the maximum extent practicable where it has potential to impact regulatory decisions. To achieve these goals, the Guide directs rule-writers and decision-makers to respond to three core EJ questions throughout the ADP:

1. How did the public participation process provide transparency and meaningful participation for minority populations, low-income populations, tribes, and indigenous peoples?[2]
2. How did the rule-writers identify and address existing and/or new disproportionate environmental and public health impacts on minority populations, low-income populations, and/or indigenous peoples?
3. How did actions taken under #1 and #2 impact the outcome or final decision?

Questions 1 and 2 use slightly different wording in referencing the subject entities (populations, peoples, tribes). Throughout this Guide, statements associated with engagement activities use the wording “minority populations, low-income populations, tribes, and indigenous peoples,” whereas statements associated with analysis, assessment and/or consideration of environmental and human health impacts use the wording “minority populations, low-income populations, and/or indigenous peoples.” When discussing public participation and meaningful involvement, Agency protocols specify inclusion of tribal organizations as well as indigenous peoples, and specifically define those terms. However, when discussing analysis, assessment and/or consideration of impacts, attention in the Guide is focused on impacts on populations rather than on governmental or other types of organizations.

This Guide helps rule-writers and decision-makers understand and identify potential EJ concerns, and advises on how to integrate the consideration of EJ into the rule development process and to meaningfully engage minority populations, low-income populations, tribes, and indigenous peoples during the rule development process. Further assistance is provided in references throughout the Guide linking rule-writers and decision-makers to the wealth of other information resources that they can turn to in seeking to consider EJ throughout all stages of the EPA’s ADP.

Disclaimer: This document identifies internal Agency policies and recommended procedures for EPA employees or decision-makers developing or reviewing regulatory actions in the ADP. This document is not a rule or regulation and it may not apply to a particular situation based upon the circumstances. This Guide does not change or substitute for any law, regulation, or any other legally binding requirement and is not legally enforceable. As indicated by the use of non-mandatory language such as “guidance,” “recommend,” “may,” “should,” and “can,” it identifies policies and provides recommendations and does not impose any legally-binding requirements.

[1] http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/ejtg.html

[2] It is important to solicit input from indigenous people and tribal governments that may be impacted by an action. Consultation with tribal governments should be offered as appropriate and in accordance with the Agency’s Tribal Consultation Policy.

Table of Contents

Appendices

Acronyms and Abbreviations

ABP	Analytic Blueprint
ADP	Action Development Process
CEQ	Council on Environmental Quality
DABP	Detailed Analytic Blueprint
EA	Economic Analysis
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
EPA	Environmental Protection Agency
FAR	Final Agency Review
FR	Federal Register
IT	Information Technology
MATS	Mercury Air Toxics Standards
NAAQS	National Ambient Air Quality Standards
NEJAC	National Environmental Justice Advisory Council
NEPA	National Environmental Policy Act
OAR	Office of Air and Radiation
OECA	Office of Enforcement and Compliance Assistance
OEJ	Office of Environmental Justice
OGC	Office of General Counsel
OMB	Office of Management and Budget
OP	Office of Policy
PABP	Preliminary Analytic Blueprint
PM	Particulate Matter
RegDaRRT	Regulatory Development and Retrospective Review Tracker
RRP	Renovation, Repair and Painting
RTR	Risk and Technology Review
UMCR	Unregulated Contaminant Monitoring Regulation
WPS	Worker Protection Standards

Overview and Background

A. What Is the Purpose of This Guide?

Achieving environmental justice is an EPA priority and should be factored into Agency regulatory decisions to ensure that all Americans, regardless of race, economic status or ethnicity, have access to clean water, clean air, and healthy communities.[3] The EPA is committed to using existing environmental statutes and regulations to consider and address potential environmental justice (EJ) concerns when possible. To aid in achieving this goal, it is vital that Agency rule-writers identify and address potentially disproportionate environmental and public health impacts experienced by minority populations, low-income populations, and/or indigenous peoples. This Guide will help Agency rule-writers consider EJ during the development of regulatory actions under the Agency's Action Development Process (ADP),[4] consistent with existing environmental and civil rights laws and their implementing regulations, as well as Executive Order (EO) 12898, *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629, Feb. 16, 1994), the EPA's EJ policies, Plan EJ 2014, and EJ strategies in the EPA's strategic plans.[5]

In addition to providing guidance on the importance of identifying potential EJ concerns during the development of regulatory actions (Part 1), this Guide identifies key steps throughout the ADP where EJ should be considered (Part 2). While this Guide applies specifically to the rule-making stages in the development of regulatory actions, rule-writers consider EJ in the development of risk assessments, analytical tools, guidance documents and other actions that support development of regulatory actions. Rule-making efforts are likely to be more effective and timely if EJ is considered in such "up-front" activities. For example, the development of some EPA regulations is prompted by the findings of risk assessments. If EJ was not considered in the development of those assessments, the rule-writers will not have the benefit of the information that might have been provided and may need to examine options for developing such information during specific stages of the ADP, as specified

[3] See EPA Strategic Plan Cross Cutting Strategies (http://www2.epa.gov/planandbudget/fy-2014-2018-strategic-plan), Plan EJ 2014 (http://www.epa.gov/environmentaljustice/plan-ej/index.html) and EPA's Themes – Meeting the Challenge Ahead (http://www.epa.gov/environmentaljustice/plan-ej/index.html).

[4] EPA's Action Development Process: Guidance for EPA Staff on Developing Quality Actions Process (http://yosemite.epa.gov/sab%5CSABPRODUCT.NSF/5088B3878A90053E8525788E005EC8D8/$File/adp03-00-11.pdf).

[5] Under Plan EJ 2014, EPA developed a set of basic guidances, policies and tools for integrating environmental justice into EPA programs and policies, available at http://www.epa.gov/environmentaljustice/plan-ej/index.html. EPA's historical EJ policies include: EPA's Environmental Justice Strategy (1995), Environmental Justice Implementation Plan (1996), Environmental Justice: Guidance Under the National Environmental Policy Act (1997), Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses (1998), Toolkit for Assessing Potential Allegations of Environmental Justice (2004), and Memo from Lisa P. Jackson: Next Steps: Environmental Justice and Civil Rights (2009).

in this Guide. As a supplement to this Guide, Agency staff may find it useful to refer to other EPA guidance documents related to risk assessment, public involvement and economic analysis, as referenced throughout this Guide and in Appendix E.

This Guide complements existing EPA requirements or recommendations for integrating children's health considerations into the ADP (see Text Box 1) and for consulting with federally-recognized tribes when Agency actions may impact their citizens or resources (see Text Box 2).[6] These issues are addressed in other Agency guides, which are available online at http://intranet.epa.gov/adplibrary.

Text Box 1: Children's Health

Refer to Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks and EPA's Guide to Considering Children's Health When Developing EPA Actions*. Note the important intersection between EJ concerns and children's health issues, since children in minority, low-income and indigenous population groups are more likely to be exposed to, and have increased health risks from, environmental pollution than the general population.

Text Box 2: Indigenous Peoples and Tribes

Refer to Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments and the Agency's Policy on Consultation and Coordination with Indian Tribes*. The Agency's responsibilities under EO 13175 and its own Consultation Policy are separate from the responsibilities under EO 12898 and stem from federally-recognized tribes' unique status as sovereign governments. To better understand how to integrate EJ principles in a consistent manner in the Agency's work with federally recognized tribes and indigenous peoples, refer to EPA's Policy on Environmental Justice for Working with Federally Recognized Tribes and Indigenous Peoples.

B. Who Is the Audience for This Guide?

This Guide is for EPA rule-writers and decision-makers:

- Rule-writers include: lead-program staff and managers charged with leading development of regulatory actions (who often also serve as leaders [chairs] of regulatory action development workgroups); members of regulatory action development workgroups; Agency staff and managers that perform the analyses that may be used to support Agency decision-making; and any other Agency staff and managers who assist in developing regulatory actions. Workgroup chairs have particular responsibilities under the ADP, including the responsibilities outlined in this Guide with respect to identifying and addressing potential EJ concerns. However, each regulatory action development workgroup member has the responsibility for being familiar with, and understanding, the various statutes and executive orders that impact the regulatory action they are developing. Other staff responsible for the development of regulatory actions, who may not be workgroup members, are also responsible for being familiar with these requirements.
- Decision-makers include: program managers, Office Directors, Assistant Administrators/National Program Managers, the Administrator, and other members of the Agency's decision-making team with respect to Agency regulatory actions. Decision-makers are responsible for helping to ensure that potential EJ concerns are appropriately identified and addressed in the development of regulatory actions under the ADP.

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[6] See EPA Policy on Environmental Justice for Working with Federally Recognized Tribes and Indigenous Peoples. (2014), http://www.epa.gov/environmentaljustice/resources/policy/indigenous/ej-indigenous-policy.pdf. For purposes of this cited policy, EPA defines the terms "federally recognized tribes" and "indigenous peoples." A "federally recognized tribe" is defined as an "Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to the Federally Recognized Indian Tribe List Act of 1944, 25 U.S.C.479a. The elected officials for the federally recognized tribe and the government structure they administer are referred to as the federally recognized tribal government." The term "indigenous peoples" includes "state-recognized tribes; indigenous and tribal community-based organizations; individual members of federally recognized tribes, including those living on a different reservation or living outside Indian country; individual members of state-recognized tribes; Native Hawaiians; Native Pacific Islanders; and individual Native Americans." When used in this document, the term "tribes" refers to federally recognized tribes unless otherwise specified.

C. How Is This Guide Organized?

This guidance document is organized into four parts:

- Part 1 presents the key concepts and policies that are critical for understanding EJ and determining whether regulatory actions involve potential EJ concerns.
- Part 2 provides a step-by-step walk-through of what rule-writers and decision-makers should do to consider EJ in each stage of the EPA's ADP.
- Part 3 provides strategies and techniques for achieving meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples at key stages in the rule development process.
- Appendices A through E provide more detailed information and guidance elaborating on information presented in the main body of this Guide.

In addition, a separate document, *Templates for Regulatory Preambles to Address EO 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, explains how to address EO 12898 in rule preambles covering various situations. It is available in the Office of Policy's (OP's) ADP library at http://intranet.epa.gov/adplibrary. It is important to note that the preamble discussion should also focus on how the EPA identified and addressed potential EJ concerns as well as how the regulatory action complies with EO 12898 and the Agency's EJ policies.

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Part 1: Key Concepts for Understanding Whether Regulatory Actions Involve an Environmental Justice Concern

A. What Is Environmental Justice?

Environmental justice is central to the Agency's mission and is the responsibility of everyone at the EPA. In particular, those who are involved in the development of regulatory actions need to understand the principles of EJ and how they relate to the development of an Agency regulatory action.

The EPA defines "environmental justice" as the ***fair treatment*** and ***meaningful involvement*** of all people regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.[7]

- *Fair Treatment* means that no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental and commercial operations or programs and policies.
- *Meaningful Involvement* means that: (1) potentially affected populations have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence the regulatory Agency's decision; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) the rule-writers and decision-makers seek out and facilitate the involvement of those potentially affected.

Throughout this Guide, as noted in the Foreword, statements associated with engagement activities use the wording "minority populations, low-income populations, tribes, and indigenous peoples," whereas statements associated with analysis, assessment and/or consideration of environmental and human health impacts use the wording "minority populations, low-income populations, and/or indigenous peoples." When discussing public participation and meaningful involvement, Agency protocols specify inclusion of tribal organizations as well as indigenous peoples, and specifically define those terms. However, when discussing analysis, assessment and/or consideration of impacts, attention in the Guide is focused on impacts on populations rather than on governmental or other types of organizations.

[7] EPA's definition of EJ can be found at http://www.epa.gov/compliance/environmentaljustice/basics/index.html. EPA's definition of EJ was informed by Executive Order 12898, which is discussed in full detail in Part 1, Section D of this Guide. Background information on EPA's EJ program can also be found on this website.

In implementing its EJ program, the EPA has expanded the concept of fair treatment to include not only consideration of how burdens are distributed across all populations, but the distribution of benefits as well. Thus, to the extent data are initially available or can be developed through timely data needs assessment and planning, rule-writers should not only evaluate the distribution of burdens by paying special attention to populations that have historically borne a disproportionate share of environmental harms and risks, but should also evaluate the distribution of the positive environmental and health consequences resulting from their regulatory actions.

B. Which Populations Groups Are the Focus of EO 12898 and the Agency's EJ Policies?

Executive Order 12898 and EPA policy identify the populations of concern for the EO and for the Agency; specifically: minority populations, low-income populations and indigenous peoples.[8,9] To help achieve the EPA's goals for EJ (i.e., the fair treatment and meaningful involvement of all people), the EPA places particular emphasis on the public health and environmental conditions affecting minority populations, low-income populations, and/or indigenous peoples. In recognizing that these populations frequently bear a disproportionate burden of environmental harms and risks (see Text Box 3 for an example), the EPA works to protect them from adverse public health and environmental effects of its programs. Thus, the focus in this Guide is on minority populations, low-income populations and indigenous peoples, who may be disproportionately impacted by environmental pollution.

Text Box 3: I-710 Freeway Los Angeles

The densely populated communities closest to the I-710 freeway in Los Angeles County are severely impacted by pollution from goods movement and industrial activity. The Ports of Long Beach and Los Angeles are the entry point of 40% of all imports to the U.S. and account for 20% of diesel particulate emissions in Southern California. Approximately 2,000 premature deaths annually are associated with diesel emissions from goods movement in the South Coast Air Basin. The I-710 freeway passes through 15 cities and unincorporated areas with a population of over 1 million residents—about 70% of which are minority and disproportionately low-income populations. The area is dense with truck traffic, industrial facilities, residences, schools, daycares and senior centers. The region exceeds national ambient air quality standards for particulate matter and has some of the worst ozone air pollution in the country. The South Coast Air Quality Management District, California Air Resources Board, and EPA are working vigorously to address the air quality issues in the region.

Source: http://www.epa.gov/region9/tri/report/09/TRI-2009-I710Corridor.pdf

8 Executive Order 12898 also mentions "populations with differential patterns of subsistence consumption of fish and wildlife" as populations of concern. This population category largely overlaps with those defined on the basis of income and race/ethnicity, as it identifies particular pathways of exposure. Accordingly, it is not separately identified as a population of concern in this Guide.

9 See *EPA Policy on Environmental Justice for Working with Federally Recognized Tribes and Indigenous Peoples*. (2014), http://www.epa.gov/environmentaljustice/resources/policy/indigenous/ej-indigenous-policy.pdf.

These population groups are briefly described below. See the *Guidelines for Preparing Economic Analyses* (U.S. EPA 2010) and *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) for detailed discussions of how these populations may be defined for analytic purposes.

Minority and Indigenous Peoples

The White House Office of Management and Budget (OMB) defines six distinct race and ethnic categories:

- American Indian or Alaska Native;
- Asian;
- Black or African American;
- Native Hawaiian or Other Pacific Islander;
- White; and
- Hispanic or Latino.

Statistical data collected by the federal government, such as the U.S. Census, use this classification system.[10]

Low-Income Populations

OMB has designated the Census Bureau's annual poverty measure as the official metric for program planning and analysis by all Executive branch federal agencies, though it does not preclude the use of other measures (OMB 1978).

However, unlike its treatment of poverty, the Census Bureau does not have an official or standard definition of what constitutes "low income." It is therefore appropriate to characterize low-income in a variety of ways. Rule-writers may examine several different low-income categories, such as families whose income falls above the poverty threshold but below the average household income for the United States, or below two times the poverty threshold. Additional socioeconomic characteristics such as educational attainment, baseline health status and health insurance coverage may also be useful for identifying, characterizing and developing strategies for assessing and engaging low-income populations in the context of specific regulatory actions.

C. What Are Disproportionate Impacts?

In accordance with EO 12898, each covered federal agency "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects…" of its policies. See the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) under development for a detailed discussion of the concept of disproportionate impacts.

It is important to note that the role of the analyst is to assess and present differences in anticipated impacts across population groups of concern to the decision-maker and the public. The determination of whether there is a potential disproportionate impact that may merit Agency action is ultimately a policy judgment informed by analysis, and is the responsibility of the decision-maker. These analyses will depend on the availability of the scientific and technical data. As noted in the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013), examples of the

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[10] See http://www.whitehouse.gov/omb/fedreg_1997standards/ for the specific OMB definitions.

type of information that may be useful to provide to decision-makers for considering whether or not effects are disproportionate include: the severity and nature of health consequences; the magnitude of the estimated differences in impacts between population groups; mean or median exposures or risks to relevant population groups; distributions of exposures or risk to relevant population groups; characterization of the uncertainty; and a discussion of factors that may make population groups more vulnerable.

Also note that the Agency's statutory and regulatory authorities provide a broader basis for protecting human health and the environment than EO 12898 and do not require a demonstration of disproportionate impacts in order to protect the health or environment of any population, including minority populations, low-income populations, and/or indigenous peoples. Consistent with its mission, the Agency may address adverse impacts in the context of developing an action without the need for showing that the impacts are disproportionate. Evidence of potential adverse impacts on populations of concern may be more likely to be addressed, however, if there is also evidence that the adverse impacts may fall disproportionately on populations of concern. Thus, this Guide recommends that analysts evaluate the potential for disproportionate impacts and present the relevant data to decision-makers, who will determine what actions to take.

D. What Is the Agency's Statutory and Policy Framework for Considering Environmental Justice?

For over a decade, the EPA has developed strategies, guidance documents and implementation plans to move the Agency closer to its goal of achieving environmental justice. These documents, along with Executive Order 12898 and existing environmental statutes and regulations, provide the framework for the rule-writers to consider EJ during the development of the regulatory action.

EO 12898 applies to agency "programs, policies and activities" and in general calls on each covered federal agency to make achieving EJ part of its mission. It directs agencies such as the EPA, "[t]o the greatest extent practicable and permitted by law" to "identify […] and address […], as appropriate, disproportionately high and adverse human health or environmental effects" of agency programs, policies and actions on minority populations and low-income populations.[11] Because minority populations, low-income populations, tribes, and indigenous peoples have historically been underrepresented in federal agency decision making, EO 12898 also aims to improve public participation of these populations in the decision-making process.

EO 12898 has informed the development and implementation of the EPA's EJ program and EJ policies. Consistent with the EO and the Presidential Memorandum accompanying it, the Agency's EJ policies promote human health and environmental protection by focusing attention and Agency efforts on addressing the types of environmental harms and risks that are prevalent among minority populations, low-income populations, and/or indigenous peoples. EO 12898 and the Agency's EJ policies do not mandate particular outcomes for regulatory actions, but they demand that decisions

[11] In addition, the Presidential Memorandum accompanying EO 12898 directs federal agencies to analyze environmental effects, including human health, economic and social effects, of federal actions when such analysis is required under the National Environmental Policy Act. See *Memorandum for the Heads of All Departments and Agencies: Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (1994). Similarly, the EPA promotes the consideration of economic or social effects in developing its actions to better inform and manage the process of implementing Agency actions and policies, where allowed by underlying statutory authority.

involving the action be informed by a consideration of EJ issues. Where feasible, regulatory actions should prevent or address and mitigate potential EJ concerns.

Consistent with the emphasis in the Presidential Memorandum accompanying EO 12898 on using existing environmental laws to help achieve the goal of EJ, the EPA uses existing environmental statutes and regulations to consider and address potential EJ concerns.[12] See Text Box 4 for some examples of statutory authorities used to help achieve EJ goals. These authorities encompass the breadth of the Agency's activities, including setting standards. Early in the rule writing process, rule-writers should become familiar with the specific authorities governing their rule's development and the opportunities they provide to address EJ concerns. Some of the EPA's legal authorities direct the Agency to consider specific populations when setting standards, whereas other authorities provide discretionary opportunities. Where discretionary authority exists, the decision to take a particular regulatory action to address potential EJ concerns is a policy call that may involve consideration of questions beyond the action's legal basis, such as data availability, time and resource constraints or the associated human health or environmental benefits.

> **Text Box 4: Examples of Statutory Authority**
>
> Under the Resource Conservation and Recovery Act sections 3002 through 3004, EPA is directed to establish requirements applicable to generation, transport, treatment, storage and disposal of hazardous waste "as may be necessary to protect human health and the environment." This provides EPA with broad discretion to consider impacts on minority populations, low-income populations, and/or indigenous populations when developing RCRA regulations.

As a starting point, rule-writers should consult the Agency's *EJ Legal Tools* document, which identifies discretionary legal authorities that are or may be available to the EPA to incorporate EJ into rules.[13] *EJ Legal Tools* notes that some authorities to promote EJ are clear, where others may involve interpretive issues that call for further analysis. Rule-writers may need to work closely with OGC and/or the appropriate regional or program office staff to understand how to use a specific authority to address potential EJ concerns in a particular set of circumstances. These conversations may influence the types of data collected and methods used to evaluate potential EJ concerns in a rule.

Existing statutory and regulatory authorities can be applied to prevent and mitigate adverse or disproportionate health and environmental impacts on all populations, including minority populations, low-income populations, and/or indigenous peoples. In applying these authorities to address potential EJ concerns, it is important to understand the appropriate role of demographic information when evaluating EJ. Demographic information can be used to identify existing or potential impacts on minority populations, low-income populations, and/or indigenous peoples and may be a factor in the design and implementation of regulatory actions. However, a decision to act (such as developing a more protective rule or standard) would be based on a human health or environmental factor, and not the racial composition or economic status of the impacted populations. Following this approach, demographic data will be used in conjunction with health or environmental information to identify

[12] The Presidential Memorandum also states that existing civil rights statutes provide opportunities to address environmental hazards in minority and low-income communities. It directs agencies as follows: "In accordance with Title VI of the Civil Rights Act of 1964, each Federal agency shall ensure that all programs or activities receiving Federal financial assistance that affect human health or the environment do not directly, or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin."

[13] The *EJ Legal Tools* document was developed under EPA's Plan EJ 2014 and can be accessed at http://www.epa.gov/environmentaljustice/plan-ej/law.html.

differences, and those health or environmental impacts (not demographics) are the rationale for the Agency's decision.

It is important, however, to recognize that the Agency's statutory and regulatory authorities provide a broad basis for protecting human health and the environment and do not require a demonstration of disproportionate impacts in order to protect the health or environment of any population, including minority populations, low-income populations, and/or indigenous peoples. Thus, consistent with its mission, the Agency may address adverse impacts in the context of developing regulatory actions without the need to show that the impacts are disproportionate. Unless prohibited by statutory or regulatory authority, the EPA can and should consider action to address adverse health and environmental impacts on populations of concern, consistent with this guidance. Rule-writers should focus attention on the health of and environmental conditions affecting minority populations, low-income populations, and/or indigenous peoples, both before and after implementation of a rule and/or for the regulatory options under consideration. This will allow decision-makers to make more informed choices between different regulatory options. An important consideration for regulatory options is the extent to which they improve the adverse health and environmental impacts in minority populations, low-income populations, and/or indigenous peoples.

E. What Is an "Environmental Justice Concern"?

Throughout this Guide, the phrase "potential environmental justice (EJ) concern" is used to indicate the actual or potential lack of fair treatment or meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples in the development, implementation and enforcement of environmental laws, regulations and policies. This section will provide general guidelines on how to identify regulatory actions that may involve potential EJ concerns. See the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) how to evaluate potential EJ concerns.

Decision-makers determine early in the rule-making process the appropriate level of analysis and engagement with stakeholders, including minority populations, low-income populations, tribes, and indigenous peoples, considering factors such as the legal framework governing the action, the availability of relevant data and analytical methodologies, stakeholder interest, and the impacts that potential EJ concerns are likely to have on the actual decisions involving the action (see Section G below). Based on the application of these criteria, some regulatory actions will be identified for enhanced efforts that may require the development of new data, application of more advanced analytical methodologies and more extensive and targeted engagement of stakeholders, including minority populations, low-income populations, tribes, and indigenous peoples. As detailed more thoroughly in Part 2, decision-makers should convey their determinations on the appropriate level of analysis and stakeholder engagement to the rule-writers. It is important to document decisions regarding the screening-level analysis described in Section G and any further analyses, including the information upon which these decisions are based.

1. A potential EJ concern refers to disproportionate and adverse impacts on minority populations, low-income populations, and/or indigenous peoples that may exist prior to or that may be created by the proposed regulatory action.

The regulatory action may involve a potential EJ concern if it could:

- Create new disproportionate impacts on minority populations, low-income populations, and/or indigenous peoples;
- Exacerbate existing disproportionate impacts on minority populations, low-income populations, and/or indigenous peoples; or
- Present opportunities to address existing disproportionate impacts on minority populations, low-income populations, and/or indigenous peoples through the action under development.

For some Agency regulatory actions, it may also be useful and appropriate to assess the distribution of the benefits of the rulemaking action under consideration. Data limitations may, however, constrain rule-writers' ability to gauge how the distribution of existing pollution control program benefits may be changed by the new regulatory action. Rule-writers are encouraged to consult the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) for information on potential considerations and methodologies and conduct timely assessment and planning for data needs during the rule-making process.

The assessment of whether the regulatory action involves potential disproportionate impacts may include qualitative and/or quantitative elements. To begin this assessment, rule-writers should first understand what an action is accomplishing and why it is necessary. As rule-writers gather this preliminary information and set the context for the action, they can begin to articulate the framework for analyzing whether there are potentially disproportionate impacts on minority populations, low-income populations, and/or indigenous peoples. The level of analysis appropriate for the regulatory action will depend on a variety of factors, including preliminary evidence of public health or environmental impacts on minority populations, low-income populations, and/or indigenous peoples, the legal framework governing the action, the availability of relevant data and analytical methodologies, a history of EJ issues in communities likely to be affected by the rule (e.g., history of significant non-compliance or recognized health effects due to polluting sources) or stakeholder interest, and the impacts that potential EJ concerns are likely to have on the actual decisions involving the action.

2. A potential EJ concern refers to lack of opportunities for minority populations, low-income populations, tribes, and indigenous peoples to meaningfully participate in the development of the regulatory action.

Regulatory actions may create a potential EJ concern if the Agency does not provide meaningful involvement opportunities to minority populations, low-income populations, tribes, and indigenous peoples during the development of the action. To provide meaningful involvement opportunities that are consistent with the Agency's definition of EJ, the rule-writers will likely need to go beyond the minimum requirements of standard notice and comment procedures and engage minority populations, low-income populations, tribes, and indigenous peoples early in the process. It is often unrealistic to expect meaningful involvement if the rule-writers have not targeted outreach efforts to these populations or tribes prior to proposing the action. Part 3 of this Guide describes the Agency's policies and resources related to meaningful involvement, and notes the difference between meaningful involvement of tribes and indigenous peoples as it is used in the EJ context versus formal consultation with tribes.

Rule-writers should think broadly about how regulatory actions may impact minority populations, low-income populations, and/or indigenous peoples. For regulatory actions that may impact these populations, the rule-writers should assess what steps will be taken to ensure there are sufficient opportunities for meaningful involvement during the development of the action. This includes regulatory actions that directly impact the health or environmental conditions of these populations as well as regulatory actions that involve the collection of information or data (information or data collection actions may impact these populations or tribes if the information or data are later used for inspection and enforcement or to assess potential health or environmental impacts).[14] Meaningful involvement is discussed in more detail in Part 3 of this document.

3. A potential EJ concern may arise when there is an actual or potential lack of fair treatment or meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples when implementing an agency regulatory action.

Rule-writers should assess how to consider EJ not only in the *development* of the action, but in the *implementation* of the action as well. The rule-writers should consider whether and how they can craft the action to influence its implementation in a manner that considers EJ. For example, listed below are common implementation issues that may be of particular concern to minority populations, low-income populations, tribes, and indigenous peoples.

What approaches should be included in the regulatory action to make sure it is effective with high compliance by the regulated community? Consider whether the regulatory action, when implemented, will itself promote compliance, to ensure that regulated facilities are complying. Rule-writers should try to make the rule self-implementing to drive compliance, using approaches such as enhanced monitoring, reporting and record-keeping requirements. These tools can help ensure compliance where needed to protect adversely affected populations, including minority populations, low-income populations, and/or indigenous peoples. Rule-writers should also draw on the expertise of the workgroup members, including representatives from OECA, in considering ways of ensuring effective program implementation and pursuing innovative ideas on how to achieve greater compliance and effectiveness of the action in reducing pollution and human and environmental risks. Information technologies in conjunction with public disclosure and accountability and other Next Generation Compliance concepts can be used to make rules more effective and enforceable.[15]

Does the regulatory action support compliance and enforcement? Non-compliance issues may impact the public health and environmental conditions affecting minority populations, low-income populations, and/or indigenous peoples, particularly when violations are occurring in areas already disproportionately impacted by environmental hazards. Structuring the action with compliance

[14] Agency actions involving monitoring requirements are often viewed as important data gathering opportunities that inform the development of future actions. Also, a test rule that requires the submission of certain data that may subsequently be used in an analysis about impacts presents an important opportunity. Rule-writers should offer affected minority populations, low-income populations, tribes, and indigenous peoples meaningful opportunities to influence the type of data and information collected through such actions, how the data or information may be made available to the public, and how the Agency plans to use that data or information in future actions. For example, while the Agency often makes data available for the public to consider by issuing a Notice of Data Availability or as part of an Advanced Notice of Proposed Rulemaking, Rule-writers may consider and solicit feedback on other mechanisms for making the data or information available to these populations.

[15] For further information on such concepts, rule-writers are encouraged to consult the Rule Implementation, Compliance and Effectiveness Screening Tool, available at http://intranet.epa.gov/gis/ejscreen/.

considerations built in will improve the Agency's ability to detect and respond to non-compliance and will help improve the action's effectiveness and efficiency in achieving its intended results. Ensuring that the action is written to be enforceable is critically important to address EJ concerns that may arise as a result of program implementation issues and non-compliance. For example, regulatory actions should define what constitutes a violation, clearly outline what industry should do to comply with the action and identify how compliance will be measured and by whom. The rule-writers should also consider available information regarding industry-specific non-compliance histories (and underlying causal factors) to determine whether the rule could be designed—or coordinated with other efforts—in ways that improve compliance rates and overall rule effectiveness. See Text Box 5.

Does the regulatory action promote transparency and meaningful involvement? Regulatory actions that promote transparency and meaningful involvement during implementation can make it easier to engage and inform minority populations, low-income populations, tribes, and indigenous peoples throughout the action lifecycle, including after regulations are promulgated and being implemented. These actions may in turn improve their ability to spot non-compliance issues or identify ways in which implementation may be improved. For example, rule-writers should seek to design actions to maximize appropriate public availability of post-promulgation compliance information readily available and accessible to the affected public. The rule-writers should also assess how the action impacts the ability of minority populations, low-income populations, tribes, and indigenous peoples to meaningfully participate in subsequent environmental decision-making processes, e.g., permits, NEPA assessments, State Implementation Plans and reassessments of Agency regulatory actions.

Text Box 5: Nitrogen Dioxide (NO_2) Ambient Air Quality Monitoring

In 2010, EPA strengthened the health-based NAAQS established new ambient air monitoring and reporting requirements for NO_2. To determine attainment of the new standard, EPA established new ambient air monitoring and reporting requirements for NO_2. Ambient NO_2 monitoring data are collected by state, local and tribal monitoring agencies in accordance with monitoring requirements contained in 40 CFR parts 50, 53 and 58. Under these monitoring requirements, EPA required Regional Administrators to work with states to site a minimum of 40 NO_2 monitors, above the minimum number required in the area-wide and near-road network design, focused primarily on collecting NO_2 air quality data in areas where susceptible or vulnerable populations may be exposed to ambient NO_2 concentrations that have the potential to approach or exceed the NAAQS. Additional information is available at http://www.epa.gov/ttn/amtic/svpop.html.

Does the regulatory action encourage or require state, local and tribal governments to consider EJ as they implement federal programs? State, local and tribal governments are the primary implementers of many programs that the Agency administers.[16] If rule-writers have identified potential EJ concerns that may arise during state, local or tribal implementation, they should then consider how the action should address those issues. See Text Box 5 for an example of how this has been done successfully in a prior EPA rulemaking.

Does the regulatory action provide sufficient background information for drafting subsequent individual permits? Permits are an important vehicle through which Agency regulatory actions are implemented within a specific location.[17] Permits implement generally applicable regulatory standards

[16] EPA reviews state, local, and tribal programs to determine if they meet applicable requirements for federal approval. If EPA finds that the program meets those requirements, it approves the state, local, or tribal government to implement the federal program. State and local governments which receive grants to implement federal programs are also subject to Title VI of the Civil Rights Act of 1964, as amended. Title VI prohibits recipients from discriminating on the basis of race, color, or national origin. A recipient's obligation under Title VI of the Civil Rights Act of 1964, is layered upon separate, but related, obligations under the federal or state environmental laws.

[17] For more information on considering EJ in permitting, see http://www.epa.gov/environmentaljustice/plan-ej/permitting.html.

by applying those standards to specific discharges and emissions of pollutants, which in some cases may take into account estimates of exposure experienced by minority populations, low-income populations, and/or indigenous peoples in that location. To facilitate the drafting of subsequent permits, it is important to consider, where feasible and appropriate, whether the data and assumptions that form the basis of the regulatory standard being developed account for exposure to multiple stressors,[18] impacts on vulnerable or susceptible populations, or other issues related to potential EJ concerns (see next section for discussion of factors that contribute to potential EJ concerns).[19,20]

F. What Are the Factors That Contribute to Potential Environmental Justice Concerns?

Identifying the presence of potential EJ concerns goes beyond simply characterizing potentially impacted populations. Several factors, summarized below, will help in assessing whether potential EJ concerns may be associated with regulatory actions (i.e., whether disproportionate impacts on, or distribution of benefits to, minority populations, low-income populations, and/or indigenous peoples exist prior to or are created by the proposed action). These factors may contribute to the higher health and environmental risks or lower environmental benefits in these populations. EJ concerns may result from a combination of several, if not all, of the subsequently listed factors. However, in some circumstances, the presence of one or two of these factors alone could be sufficient to result in a potential EJ concern (i.e., potentially disproportionate impact on minority populations, low-income populations, and/or indigenous peoples). The rule-writers should note that disproportionate impacts may also arise from factors not included here. See the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) for a more detailed discussion.

Proximity and Exposure to Emission Sources. Proximity to emission sources is the most studied indicator of high exposure in environmental justice literature. Disproportionate public health and environmental effects may be related to a population's differential proximity and associated exposure to environmental stressors, often stemming from evolving mixed land use patterns (i.e., encroachment of industrial/commercial facilities/infrastructure on residential communities or recreation areas, or expansion of residential areas into current or former industrial/commercial sites).

Unique Exposure Pathways. Unique exposure pathways are non-traditional pathways through which exposure to a given stressor occurs. Some populations sustain unique environmental exposures because of practices linked to their cultural background or socioeconomic status. For example, subsistence diets may expose these populations to toxic chemicals, such as exposures to mercury from a fish diet or exposures to other chemicals from a diet high in contaminated vegetation.[21] There are also non-dietary exposure pathways that may be unique to some indigenous peoples, such as the practice of basket weaving, where exposures to toxic chemicals may occur when contaminated materials are

18 This Guide uses the term "environmental stressor" or "stressor" to encompass the range of chemical, physical or biological agents, contaminants, or pollutants that may be subject to a rulemaking.

19 In some situations, it may be appropriate for EPA to seek information about specific exposure pathways associated with cultural or traditional practices before formulating assumptions or making a determination of whether the assumptions account for a population's vulnerability. See the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis*.

20 For a more detailed discussion of EJ and permitting, see EPA's Plan EJ 2014 webpage at http://www.epa.gov/environmentaljustice/plan-ej/permitting.html. The resources developed under the EJ in Permitting Initiative are housed on this website. The purpose of the EJ in Permitting Initiative is to enable overburdened communities to have full and meaningful access to the permitting process and to develop permits that address environmental justice issues to the greatest extent practicable under existing environmental laws.

21 In the case of subsistence fishing, these populations may be exercising legal rights, based on treaties, to do so.

placed in the mouth during the weaving process. Unique exposure pathways can also be identified based on other factors, such as behavioral and physiological stages of growth and development which may occur during a particular life stage.[22]

Physical Infrastructure. Physical infrastructure is a very important source of environmental stressors. The physical infrastructure, such as poor housing, poorly maintained public buildings (e.g., schools) or presence of legacy pollutants such as lead in paint and PCBs in building materials, may contribute to making certain populations more vulnerable to environmental hazards.

Multiple Stressors and Cumulative Impacts. Exposures to, and risks from, multiple stressors from one or more sources or pathways can be accumulated over time and result in one or multiple effects. In addition, such risks may be modified by other stressors affecting the exposed population, such as nutritional or health status, smoking, or other factors. However, the science supporting assessments of such cumulative impacts is evolving and the data and analytical tools needed to develop informative, scientifically sound analyses of these effects may not be available. Under these circumstances, estimated exposures or risks associated with environmental pollutants from a given source may not reflect the potential health risks to populations exposed to multiple environmental stressors, particularly if the emissions, exposures or risks being targeted by the action under consideration have significant interaction effects with these other stressors. Minority populations, low-income populations, and/or indigenous peoples are likely to suffer a wide range of environmental stressors, ranging from poor air quality to poor housing. Numerous empirical studies and anecdotal accounts describe minority populations, low-income populations, and/or indigenous peoples that are impacted by multiple environmental hazards, such as industrial facilities, landfills, transportation-related air pollution, poor housing, leaking underground tanks, pesticides and incompatible land uses. Analyzing cumulative impacts from multiple stressors allows a more complete evaluation of a population's risk from pollutants targeted by the action under consideration, particularly when there may be important interaction effects among these multiple stressors and adequate data and methods are available. The EPA's *Framework for Cumulative Risk Assessment*[23] can enhance an evaluation of the various aspects of cumulative risk experienced by these populations. See also the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) for a more detailed discussion.

Capacity to Participate in Decision Making. The ability, or inability, to participate in the environmental decision-making process may contribute to disproportionate impacts. Factors which contribute to the inability of minority populations, low-income populations, tribes, and indigenous peoples in particular to participate fully in the decision-making process include:

- Lack of trust;
- Availability or lack of information;
- Language barriers;
- Socio-cultural issues;
- Inability to access traditional communication channels; and
- Limited capacity to access technical and legal resources.

[22] EPA defines lifestages as the "time frame in an individual's life characterized by unique and relatively stable behavioral and/or physiological characteristics that are associated with development and growth." For more information on lifestages, please visit http://yosemite.epa.gov/ochp/ochpweb.nsf/content/lifestage.htm.

[23] See http://www.epa.gov/raf/publications/framework-cra.htm.

Higher Risk in Response to Exposure Among Minority Populations, Low-Income Populations, and/or Indigenous Peoples. At-risk populations are groups who have a greater likelihood of experiencing effects related to environmental exposures.[24] Certain factors may render different groups less able to resist or tolerate an environmental stressor. These risk factors may be intrinsic in nature, based on age, sex, genetics, race or ethnicity, or acquired (such as chronic medical conditions, or smoking status); as well as extrinsic, non-biological factors such as those related to socioeconomic status, reduced access to health-care, health-care, nutrition, fitness and/or exposures related factors.[25]

If the rule-writers conclude that one or more of the previously listed factors is relevant to the action, they should then consider whether the action involves potentially disproportionate impacts on minority populations, low-income populations, and/or indigenous peoples and thus raises a potential EJ concern. To characterize and better understand the populations affected by the proposed action, the rule-writers may want to look at demographic data and consult with program and/or regional office EJ coordinators.[26] The rule-writers should also consider reaching out to these populations and tribes directly to assess potential concerns and issues associated with the proposed action (see Part 3 below for guidance on meaningfully engaging minority populations, low-income populations, tribes, and indigenous peoples). Where a screening analysis indicates the need for further analysis and engagement, the previously listed factors can be considered to determine the extent to which adverse health or environmental risks may be higher or concentrated within minority populations, low-income populations, and/or indigenous peoples. See the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) for how to evaluate potential EJ concerns. Rule-writers may also want to draw on the expertise of representatives in their workgroup from the Office of Research and Development.[27]

G. How Do the Decision-Makers Determine What Degree of Assessment of Potential EJ Concerns Is Feasible and Appropriate?

In determining whether potential EJ concerns may be at issue in regulatory actions, some level of analysis is needed, be it qualitative, quantitative, or some combination of both. For many regulatory actions, including actions that strengthen environmental protection, it is not possible to rule out potential EJ concerns without some level of assessment. The extent to which an analysis of potential EJ concerns is feasible and appropriate also will be affected by data, budget and analytical constraints specific to the action and circumstance. See the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) for more information.

This Guide encourages offices to utilize a "screening–level" analysis when feasible and appropriate to help determine the extent to which regulatory actions may raise potential EJ concerns that need

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24 This Guide uses the term "environmental stressor" or "stressor" to encompass the range of chemical, physical or biological agents, contaminants, or pollutants that may be subject to a rulemaking.

25 For example, in the final PM2.5 National Ambient Air Quality Standards rule, based on information presented in the *Integrated Science Assessment for Particulate Matter* (U.S. EPA, 2009, sections 2.2.1 and 8.1.7), the EPA made a finding that persons with lower socioeconomic status are at increased risk for experiencing adverse health effects related to PM exposures (78 FR 3104). Persons with lower socioeconomic status (SES) have been generally found to have a higher prevalence of pre-existing diseases, limited access to medical treatment, and increased nutritional deficiencies, which can increase this population's risk of PM-related effects (77 FR 38911, June 29, 2012).

26 For a listing of media EJ Coordinators, please visit http://epa.gov/environmentaljustice/contact/ej-contacts-media.html. For a listing of Regional EJ Coordinators, please visit http://epa.gov/environmentaljustice/contact/ej-contacts-regional.html.

27 The recently-released *American Journal of Public Health* Supplement "Environmental Justice and Disparities in Health" may be useful in gaining a more complete understanding of how these factors influence health outcomes. See http://ajph.aphapublications.org/toc/ajph/101/S1.

to be evaluated further as rule-writers advance through the ADP.[28] Rule-writers are encouraged to check with the lead office's EJ Coordinator, Agency memoranda relating to prioritization of rules for EJ consideration/analysis and updates to the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) to assess whether specific guidance or screening tools are available to support decision-makers as they determine the appropriate methods and approaches for assessing potential EJ concerns in the context of the rule-making action.

Screening-level analyses can help offices focus their resources and efforts on regulatory actions where there are opportunities to identify and address potential EJ concerns. As is often the case in the development of many of EPA's regulations, screening-level analyses may need to be updated or reconsidered in the beginning stages of the ADP as more information becomes available. Rule-writers should also consult with OGC if there are questions about the opportunities for addressing potential EJ concerns that are provided by the statutes that govern the action.

Current EPA guidance does not prescribe or recommend a specific approach or methodology for conducting screening-level analysis. A screening-level analysis should provide information related to whether there may be potential EJ concerns associated with regulatory actions, and may include elements such as the following:

1. A description of the potential impacts on, and existing risks to, minority populations, low-income populations, and/or indigenous peoples. This may involve a description of:
   - The proximity of sources being regulated to these populations
   - The number of sources that may be impacting these populations
   - The nature and amount of pollutants that may be impacting these populations
   - Whether there are any unique exposure pathways involved
   - Combinations of the various EJ factors occurring in conjunction with one another
   - Expressed stakeholder concerns about the action, if any.
2. A description of potential impediments to meaningful involvement. This may involve understanding whether the action presents opportunities to improve public involvement requirements or limits opportunities in some way.

To assist decision-makers in their efforts to determine what degree of assessment of potential EJ concerns is feasible and appropriate, rule-writers should consider the data that would be needed to support a quantitative analysis and estimate the resources that would be needed to develop the data and carry out a quantitative analysis. Rule-writers should then provide this information to decision-makers to support their determinations regarding the analysis of EJ issues in the rulemaking effort. In some circumstances, decision-makers might determine that there are insufficient data available to do a quantitative evaluation or such analysis is otherwise infeasible or unnecessary. In such cases, it may nonetheless be possible to develop a meaningful qualitative analysis (see example in Text Box 6).

There may also be circumstances where decision-makers elect not to go beyond a screening level analysis to evaluate potential EJ concerns because it is impracticable to do so or initial screening or other information indicates that EJ concerns are unlikely to be manifest.

[28] In October 2012, the Deputy Administrator announced that EJSCREEN is EPA's official environmental justice screening tool for Agency work. EJSCREEN is available within EPA at http://ejscreen.epa.gov/mapper/.

Text Box 6: DSW Analysis

Although EPA's *Analysis for the Definition of Solid Waste* (DSW) relies on both quantitative and qualitative analyses, it demonstrates how a qualitative approach can be used. The DSW analysis showcases how EPA used data on vulnerabilities and impacts to support a proposed rule revision that would prevent and mitigate adverse impacts that disproportionately affect minority populations, low-income populations, and/or indigenous populations. This analysis made qualitative connections between the increased incidence of vulnerability factors (relating to increased proximity and increased susceptibility) and the likelihood that populations impacted by the rule, which included minority populations, low-income populations, and/or indigenous populations, would potentially face increased risk of negative health and environmental outcomes. The vulnerability factors considered in the DSW analysis are multiple and cumulative impacts; ability to participate in the decision-making process; physical infrastructure; susceptible populations; and unique exposure pathways. The analysis concluded that the underlying vulnerabilities traditionally associated with minority and low-income communities may exacerbate potential adverse impacts of the DSW rule (see http://www.regulations.gov/#!documentDetail;D=EPA-HQ-RCRA-2010-0742-0004).

It is important to document the decision-makers' determinations regarding the screening-level analysis and any further analyses, including the information upon which these decisions are based. This documentation should become part of the record for the action and will help the rule-writers and associated programs establish compliance with the directives of EO 12898 and EJ policies. Decision-makers may want to review this documentation and discuss whether further consideration of potential EJ concerns is appropriate.

H. Exploring Regulatory Responses to Potential EJ Concerns

A regulatory response to an identified potential EJ concern may require rule-writers to consider whether the regulatory action can and should set a stricter standard or go beyond the basic and ordinarily protective norms to require additional measures in a rule. The Agency's ability to do this, and the appropriateness of doing so, will depend on the Agency's legal authority and whether sufficient evidence of a potential EJ concern has been established, and whether circumstances or factors exist with respect to the particular emissions, exposures or risks addressed by the action that justify setting a stricter standard. An example of the latter might be the need to set a lower threshold of concern for exposure to a pollutant because the exposure-response for that pollutant is altered by disproportionately high exposure to other environmental stressors. These opportunities will become clearer as the Agency gains more experience in this area and as the data, tools and methods to evaluate potential EJ concerns evolve.

Examples of regulatory responses that could serve as starting points for rule-writer's consideration are discussed in Appendix E. The appendix includes examples in which responses to potential EJ concerns strengthened the defensibility of the rule, generated better data on differential exposure levels, increased benefits for all population groups, reduced disparities in risk, improved oversight of facilities, and improved compliance.

In some cases, rule-writers may identify a potential EJ concern for which the Agency's ability to explore a regulatory response is limited. It is important for rule-writers to alert their decision-makers to potential EJ concerns that cannot be addressed through the rule under development. This information allows decision-makers to look for other resources and tools to address potential EJ concerns as appropriate and as time, resources and data allow. In addition, rule-writers should pass along the information they have gathered about potential EJ concerns to other EPA offices as they consider EJ as they implement their own programs. See example in Text Box 7.

Text Box 7: National Emissions Standards for Hazardous Air Pollutants: Mineral Wool Production and Wool Fiberglass Manufacturing

Proposed Rule Development Example

As part of OAR's development of the Wool Fiberglass Manufacturing rulemaking proposal, EPA sent requests to 29 fiberglass manufacturing plants across the nation, asking them to provide emissions data. From this information, EPA learned that the CertainTeed plant in the Fairfax Industrial District of Kansas City, Kansas, was emitting chromium VI emissions that were higher than any other facility in the industry.

Region 7 proactively engaged the local community and identified the potential environmental concerns, opening lines of communication and launching several opportunities for the community to voice concerns, ask questions and receive additional information. At least ten face-to-face sessions were held, including stakeholders meetings, technical discussions, as well as a round table discussion with the Region 7 Regional Administrator.

Concurrently, Region 7 conducted air monitoring at John Garland Park, located between the facilities and nearby residential areas. The results of the air monitoring did not indicate that the plant emissions were a health concern for the community. The monitoring was conducted for approximately five months, however the furnace associated with the high chromium VI emissions was idled shortly after the monitoring began, and remains idled to this day.

Due to the high level of local interest regarding this rulemaking, a public hearing was also held in the Kansas City area giving the community an opportunity to submit verbal and written comments on the pending rulemaking. Much like the air monitoring events, holding a public hearing in the vicinity of an active community is not typically a direct result of the rulemaking process.

Rule-writers should also assess whether additional compliance drivers and tools for ensuring transparency (such as those discussed in section E.3) should be included in the regulations they are developing to ensure that the rules are as effective as possible in addressing the EJ Factors identified in Section F above. These tools can complement enforcement programs and enhance public involvement in rule implementation.

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Part 2: Considering Environmental Justice During the Development of Regulatory Actions Under the Action Development Process

This section of the Guide describes the key issues related to considering EJ during the development of regulatory actions under the ADP (see Text Box 8). It is designed to help the rule-writers identify opportunities in the ADP where they can:

1. Identify potential EJ concerns;
2. Plan to achieve meaningful involvement;
3. Plan to evaluate and address potential EJ concerns;
4. Discuss potential EJ concerns with decision-makers;
5. Compare how options under consideration would change the environmental and public health impacts on minority populations, low-income populations, and/or indigenous peoples; and
6. Document the rule-writers' efforts to achieve meaningful involvement and address potential EJ concerns.

Text Box 8: What Is the Action Development Process?

The ADP is a method for producing quality actions, such as regulations, policies, guidance, strategies and reports. It ensures that EPA uses the best available information to support its actions and that scientific, economic and policy issues are adequately coordinated across the Agency during the various stages of action development. Activities that implement EO 12898 should be undertaken within the framework of this process. For more information, see EPA's *Action Development Process: Guidance for EPA Staff on Developing Quality Actions* available on OP's intranet site at http://intranet.epa.gov/adplibrary.

A. Who Is Responsible for Considering EJ During the Development of Regulatory Actions Under the ADP?

Rule-writers and decision-makers (see definitions provided in subsection B of the Overview and Background section) should use this Guide in the development of regulatory actions. In addition, rule-writers and decision-makers may seek assistance from other EPA resources, such as EJ Coordinators. Based on the level of participation in the development of regulatory actions, they may have additional specific responsibilities. See EPA's *Action Development Process: Guidance for EPA Staff on Developing Quality Actions* for general information about the roles and responsibilities of the different participants in the development of regulatory actions. Following is guidance for key actors in the ADP:

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Text Box 9: Decision-Makers

Decision-makers establish policy priorities, communicate expectations to the workgroup and decide whether or not a potential EJ concern warrants further evaluation, the level of analysis and public involvement, and the resources available for those activities.

1. Decision-Makers. Relying on information provided by the rule-writers, EPA decision-makers determine what needs to be done to identify and address potential EJ concerns for Agency regulatory actions under development (see Text Box 9). They communicate expectations to the rule-writers, establish policy priorities, identify issues of significant concern and guide the process of developing the action. As a result, decision-makers play a key role in ensuring that the potential EJ implications of regulatory actions are considered during the development of those actions, and that populations affected by those actions have an opportunity to participate.

In particular, decision-makers determine early in the process the appropriate level of analysis and engagement of stakeholders, including minority populations, low-income populations, tribes, and indigenous peoples, considering factors such as the legal framework governing the regulatory action, the availability of relevant data and feasibility of analytical methodologies, stakeholder interest and the impacts that EJ concerns are likely to have on the actual decisions involving the action. Based on the application of these criteria, some regulatory actions will be identified for enhanced efforts that may require the development of new data, application of more advanced analytical methodologies and more extensive and targeted engagement of minority populations, low-income populations, tribes, and indigenous peoples. Decision-makers convey determinations on the appropriate level of analysis and stakeholder engagement to the workgroup.

Decision-makers are responsible for ensuring rule-writers address the following three core EJ questions at the appropriate points during the development of the regulatory action under the ADP (as described below in this section):

1. How will (or did) the public participation process provide transparency and meaningful participation for minority populations, low-income population, tribes, and indigenous peoples?
2. How do the rule-writers plan to (or how did the rule-writers) identify and address existing and new disproportionate environmental and public health impacts on minority populations, low-income populations, and/or indigenous peoples during the rulemaking process?
3. How did the actions taken under #1 and #2 impact the outcome or final decision?

Appendix B provides a quick reference for EPA decision-makers on when and how they can participate in the action's development to ensure that the rule-writers identify and evaluate potential EJ concerns.

2. The Workgroup Chair. The role of the workgroup chair is to facilitate and oversee the efforts of the rule-writers to achieve meaningful involvement and to consider EJ concerns during the development of the action. Appendix C provides a checklist to identify what the chair may need to know and/or do in order to integrate EJ into the development of the action.

3. The Rule-Writing Workgroup. The rule-writing workgroup is responsible for assuring meaningful involvement and consideration of EJ concerns during the development of the regulatory action under the ADP (see Text Box 10). Workgroup members influence the scope and content of analyses of EJ concerns that support regulatory actions. Workgroup members, as representatives of their program offices or regional offices, should keep decision-makers in their organizations informed of EJ concerns and workgroup actions in a timely manner so that they can formulate appropriate responses.

Text Box 10: What Is the Workgroup?

The workgroup consists of representatives from interested program offices and Regions. The workgroup develops the draft regulation, involving its members throughout the ADP. Workgroup members represent the position of their program office or Region. Tier 1 and Tier 2 actions call for formation of action development workgroups. Even though Tier 3 actions do not normally call for teams/workgroups, the lead program should consider the level of assistance needed from Regions and other offices to produce a quality regulatory action.

4. The Analysts. For the most part, the analysts—those doing the economic or scientific supporting analyses—are likely to be members of the workgroup. In some cases, however, the analysts may only be involved in the analytic work performed as part of the development of regulatory actions. In either case, the analyst plays a key role in identifying the analytical topics that will need to be addressed during the development of regulatory actions, as well as leading or actively participating in the analytical efforts, including considering whether one or more scientific or economic analyses are needed to support those actions.[29] It is also important to note that these analyses may be quantitative, qualitative, or both. See the *Guidelines for Preparing Economic Analyses* and the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) under development for more information on conducting an analysis of potential EJ concerns for regulatory actions.

B. When Should Potential EJ Concerns Be Considered During the Development of Regulatory Actions Under the ADP?

The following is a description of the opportunities for considering potential EJ concerns at the specific steps in developing regulatory actions under the ADP. If the workgroup is unable to follow the activities described below for a particular step of the ADP, those activities may be performed at later steps, as appropriate.

The procedural steps under the Agency's ADP may vary based on the specific tier designation. The procedural steps described in this Guide primarily apply to regulatory actions developed under Tier 1 and 2 of the ADP because Tier 3 regulatory actions, such as regional office regulatory actions, may not follow all the same procedural steps. For example, an Analytic Blueprint (preliminary or detailed) is optional for Tier 3 actions. Even though a particular ADP step may not apply to the action, rule-writers should consider potential EJ concerns regardless of the tier level assigned to the regulatory action. Note that some regional offices regulatory actions are developed under the ADP as Tier 3 actions while some are developed under a separate process from the ADP. This Guide can also help workgroups consider EJ concerns for those regional offices regulatory actions that are developed under a separate process from the ADP.

Appendix A includes a flowchart, entitled "Incorporating Environmental Justice into Tier 1 and Tier 2 Actions Under the ADP," which outlines the ADP procedural steps for Tier 1 and 2 actions to illustrate when EJ concerns might be integrated at various steps throughout the ADP (see blue text boxes). The discussion that follows in this Guide is linked to the numbered steps used in the Tier 1 and 2 process

[29] See EPA's *Action Development Process Guidelines for Preparing Analytic Blueprints*, p. 14, available electronically at http://intranet.epa.gov/adplibrary/documents/abp09-30-04.pdf.

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flowchart. This information is also provided on the EPA intranet in the form of tool at http://intranet.epa.gov/oswer/policy/ejr/index.html.

ADP Steps 1 and 2 – Action Initiation and Tiering

Once the Agency decides to initiate a regulatory action (Step 1), the next step of the ADP is tiering (Step 2). At this point, the lead EPA Program Office must fill out a tiering form in the ADP TRACKER that provides basic information about the action being initiated. Table 1 displays the EJ question currently in the ADP TRACKER. These questions can be used to help determine whether regulatory actions may involve a subject that is of particular interest to or may have particular impacts on these populations.

Table 1: EJ Question in ADP TRACKER

<table>
<tr><th colspan="3">Environmental Justice
Does this action involve a topic that is likely to be of particular interest to or have particular impact upon minority populations, low-income populations, or indigenous populations, or tribes?</th></tr>
<tr><td>☐ Yes</td><td>If the answer is Yes, please check a minimum of one of the following options:
☐ The action is likely to impact the health of these populations.
☐ The action is likely to impact the environmental conditions of these populations.
☐ The action is likely to present an opportunity to address an existing disproportionate impact on these populations.
☐ The action is likely to result in the collection of information or data that could be used to assess potential impacts on the health or environmental conditions of these populations or tribes.
☐ The action is likely to affect the availability of information to these populations or tribes.
☐ Other reasons. *Explain*:</td><td>Comments:</td></tr>
<tr><td>☐ No</td><td>Selecting No means that this action is not likely to be of any particular interest to these populations or tribes. *Explain*:</td><td>Comments:</td></tr>
<tr><td>☐ TBD</td><td>Selecting TBD means that, given the information available at this time, the Agency does not know if these populations or tribes will be particularly interested in this action.</td><td>Comments:</td></tr>
</table>

For some offices, the EJ question asked at tiering might also be the impetus for an initial screening analysis, as discussed in Part 1 of this document. For other offices, there may already be a screening process in place that can inform how rule-writers answer this question at tiering.

As the lead program office prepares to answer the EJ question displayed in Table 1, there are some important points to keep in mind.

- Rule-writers are expected to make an informed assessment about whether regulatory actions will have potential impacts on minority populations, low-income populations, and/or indigenous peoples based on readily accessible information and what the rule-writers already know about a regulatory action and its potential EJ implications, recognizing that at this early step in the ADP they may not have sufficient information to determine whether a potential EJ concern is associated with the action.
- The question also asks about actions that may be of *particular interest* to minority populations, low-income populations, tribes, and indigenous peoples. A regulatory action may be of particular interest if it concerns a topic that these populations or tribes have identified as important. For example, a rule that affects the availability of information may be of interest even though it

may not have particular impacts on these populations or tribes. If a regulatory action may be of particular interest to these populations or tribes, rule-writers may need to provide opportunities for meaningful involvement in the development of those actions.

- Answering yes to this question signals that potential EJ concerns are likely to be involved in the regulatory action. See the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) for guidance on analytic expectations. If rule-writers believe that the action may involve a potential EJ concern, they may request that an EJ coordinator be assigned to join the workgroup or otherwise support the action. This can be done by requesting OEJ assistance in assigning an EJ coordinator in the "Workgroup" section of the tiering form or by describing the potential concerns in the section labeled "Additional information or assistance needed."
- Answering TBD to this question signals that the rule-writers should consider whether there are potential EJ concerns associated with the regulatory action as they go through the ADP. Rule-writers are expected to conduct proper outreach and evaluation activities to make a determination of whether potential EJ concerns are involved and how those concerns can be addressed before they develop the final action. See the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) for guidance on analytic expectations.
- The lead program office's answer to this question (along with other information on the tiering form) will be part of the Agency's Regulatory Development and Retrospective Review Tracker (Reg DaRRT) Reg DaRRT offers the public a means of learning about and tracking rulemakings (see Text Box 11). One of the features allows rule-writers and the public to sort actions based on the responses to the EJ question displayed in Table 1. Reg DaRRT is updated regularly, so any updates rule-writers make to the action in the ADP TRACKER is reflected on Reg DaRRT throughout the life of the action. Rule-writers can access the Reg DaRRT website at http://yosemite.epa.gov/opei/RuleGate.nsf/.
- Program Offices will be asked to reconsider their answer for this question during the semi-annual update of the Agency's Regulatory Agenda. This provides rule-writers with an opportunity discuss whether the answer should be changed based on new information or the results of the evaluation.

Text Box 11: What Is Reg DaRRT?

The Regulatory Development and Retrospective Review Tracker (Reg DaRRT) provides information to the public on the status of EPA's priority rulemakings and retrospective reviews of existing regulations. Reg DaRRT includes rulemakings that have not yet been proposed, those that are open for public comment, those for which EPA is working on a final rule, and those that have been recently finalized.

ADP Step 3 – Preliminary Analytic Blueprint (PABP)

The PABP, which is required for all Tier 1 and 2 actions, provides an opportunity to review the rule-writers' screening decision and to identify what steps they will take to ensure that EJ concerns are considered in the development of regulatory actions. This opportunity to revisit EJ considerations is similar to the opportunity the PABP provides to revisit other assumptions or decisions made regarding other aspects of the regulation development effort. It is important to document the potential EJ concerns and how rule-writers will develop needed information and how they will use that existing and new information to explore and address them in the action.

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Careful consideration of EJ concerns in the PABP can improve regulatory actions by ensuring appropriate consideration in planning rule-writers' activities, including early attention to data gathering, facilitating cross-agency sharing of valuable information, expertise and perspectives and by fostering early agreement on the three core EJ questions through a structured, documented process. It is likely that information to describe baseline conditions for minority populations, low-income populations and indigenous peoples may be lacking, potentially limiting the ability to assess the impacts of the regulation on those populations. However, timely assessment and planning for these information needs will help rule-writers develop a well-supported and documented regulatory action and avoid last minute concerns over the type of information or analyses that should be available or might need to be developed (see Text Box 12). The rule-writers should also be aware of opportunities to coordinate data collection and analytical efforts with children's and other health impacts analyses conducted in developing the rule.[30]

Text Box 12: Consider a broad array of opportunities to integrate the meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples in the development and implementation of a regulatory action

When developing actions:

- Reach out to potentially affected populations and tribes early;
- Include them in data gathering;
- Engage them in developing options to address the issue(s); and
- Consider their role in future activities.

If the action establishes a framework or regulatory standards for subsequent actions, make sure to:

- Provide opportunities for public involvement in the subsequent actions; and
- Engage potentially affected populations and tribes in the subsequent actions.

When implementing the action:

- Continue to manage the ongoing program
- Build awareness;
- Provide information;
- Involve potentially affected populations and tribes in program activities;
- Seek feedback; and
- Be transparent.

To determine whether the regulatory action may have potential EJ concerns, and to ensure appropriate and timely information is provided to decision-makers, the PABP should (to the extent relevant and appropriate):

- Identify potentially affected populations and tribes, as well as others who might be interested in the action;
- Outline plans and resource needs for achieving meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples;
- Describe the plans and resource needs for evaluating impacts on of minority populations, low-income populations and indigenous peoples;

30 See EO 13045 Protection of Children from Environmental Health Risks and Safety Risks. Rule-makers should also be aware of the requirements in EPA's Guide to Considering Children's Health When Developing EPA Actions: Implementing Executive Order 13045 and EPA's Policy on Evaluating Health Risks to Children.

- Identify available EJ assessment tools, as well as related needs for data collection, expertise and resources; and
- Identify potential analytical issues that will need to be raised to decision-makers or addressed.

Please note that the PABP does not have to describe the details of the analyses that might be needed to evaluate EJ concerns.

It may be beneficial to develop a separate scoping document that becomes part of the PABP for purposes of increasing accountability and visibility of evaluating EJ concerns. For example, a scoping document may be a useful vehicle to provide an opportunity for meaningful involvement early in the regulatory action's development.

The framework for identifying and addressing EJ concerns is part of an iterative process. It is therefore important to revisit in later stages of the ADP as information and ideas continue to develop, similarly to revisiting assumptions or decisions made regarding other aspects of the regulation development effort, the scope of inquiry relating to evaluation of EJ concerns.

The PABP is an important vehicle for raising EJ concerns to decision-makers. Once developed, rule-writers should submit the PABP to senior management decision-makers as part of the request for Early Guidance.

ADP Step 4 – Early Guidance

At this step, decision-makers convey their expectation that rule-writers consider potential EJ concerns during regulatory action development. Early Guidance always comes from senior management decision-makers, although the level of management giving guidance differs for Tier 1 and Tier 2 actions. See Text Box 13 and EPA's *Action Development Process: Guidance for EPA Staff on Developing Quality Actions*, available on OP's intranet site http://intranet.epa.gov/adplibrary, for more information on Early Guidance.

> **Text Box 13: Early Guidance from Decision-Makers**
>
> Early guidance from decision-makers determines the appropriate level of analysis and engagement of stakeholders, based on:
>
> - Stakeholder interest;
> - The legal framework governing the action;
> - The availability of data;
> - The availability of resources and the timeline for developing the action; and
> - The impacts that EJ concerns are likely to have on the actual decisions involving the action.

In addition, at Early Guidance rule-writers should obtain input from decision-makers on the proposed approaches for considering potential EJ concerns and any potential complications or issues in doing so. Rule-writers should be prepared to respond to decision-makers' questions about whether the regulatory action may involve a potential EJ concern, and how this was or will be ascertained. This will ensure that decision-makers provide the direction that rule-writers need to respond to the three core EJ questions outlined in Part 2, Section A (and repeated in the guidance for Step 5). Rule-writers also should be prepared to explain what resources are required to identify and evaluate potential EJ concerns, including data needs.

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ADP Step 5 – Detailed Analytic Blueprint (DABP)

The DABP should incorporate the directions received through Early Guidance from senior management decision-makers. The preparation of the DABP provides rule-writers with another opportunity to plan key activities for determining whether and how potential EJ concerns will be identified and considered during the development of the regulatory action, including scientific and economic analysis, information gathering and defining alternative approaches to be considered. If there are potential EJ concerns, the rule-writers should also develop a detailed public involvement plan that provides transparency and meaningful participation for minority populations, low-income populations, tribes, and indigenous peoples (e.g., by considering their needs, capacities, cultural practices and languages).

The DABP may identify a preliminary plan to determine to what extent the regulatory action involves EJ concerns, estimate the magnitude of such concerns and guide the initial development of any options regarding those concerns. When preparing a quantitative or qualitative evaluation of potential EJ concerns, the DABP should describe the:

- Rule-writers with lead responsibility for the preliminary and detailed assessments of EJ concerns;
- Data needs and data sources for the EJ assessment;
- Scope and basic methodology of the EJ assessment;
- Outputs of the EJ assessment; and
- Schedule and resources required to prepare the EJ assessment.

In addition, the DABP should describe the rule-writers' planned activities to ensure that they can answer the first two of the three core EJ questions at key stages in the ADP:

1. **How did/will the public participation process provide transparency and meaningful participation for minority populations, low-income populations, tribes, and indigenous peoples?**

   This question asks rule-writers to document the proactive steps taken, beyond minimum notice and comment opportunities, to meaningfully engage these populations, tribes and peoples in the development of the regulatory action. This would include any outreach to state, tribal, and local governments and to national- and community-level non-governmental organizations, among others. Rule-writers should document planned public meetings, information sessions, workshops or other activities designed to identify and encourage the participation of these populations, tribes and peoples.

2. **How did the rule-writers identify and address existing and/or new disproportionate environmental and public health impacts on minority populations, low-income populations, and/or indigenous peoples?**

   This question asks rule-writers to document the proactive steps taken to identify and address potentially disproportionate impacts on the public health and environment of these populations. This could include any investigation and characterization the rule-writers performed of

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geographic areas or populations that are likely to be most affected by the action. As part of this evaluation, rule-writers are encouraged to look at the distribution of the positive environmental and health consequences from the EPA's activities. Rule-writers should ensure that they have identified and addressed issues that are of concern to minority populations, low-income populations, tribes and indigenous peoples.

Rule-writers should note that not all regulatory actions will raise potential EJ concerns. For regulatory actions that do not raise EJ concerns, rule-writers can answer the three core EJ questions by showing that the action either:

- Underwent a screening-level analysis designed to identify those regulatory actions that may raise potential EJ concerns and those that do not; or
- Has been shown—through thorough research and analysis—to support a determination that the action does not involve any potential EJ concerns.

ADP Step 6 – Management Approval of the DABP

The review and approval of the DABP provides another important opportunity for the rule-writers to check in with decision-makers to determine whether and how potential EJ concerns will be identified and considered during the development of the regulatory action. For example, during the formal cross-agency review of the draft DABP, the rule-writers and other reviewers of the draft DABP (e.g., OEJ or the lead office's EJ Coordinator) can assess whether the DABP outlines activities for identifying or considering potential EJ concerns. The decision-makers can also use this as an opportunity to consider how well the DABP addresses potential EJ concerns before approving the DABP (see Text Box 14).

Once the DABP is approved, decision-makers have determined the appropriate level of analysis and engagement for the regulatory action. In the absence of any compelling circumstances that would cause decision-makers to revisit this or other non-EJ determinations, rule-writers should follow the direction provided by decision-makers in the DABP for the remaining steps of the ADP.

Text Box 14: Management Approval of DABP

During the course of developing the PABP and DABP, an office may alter its determination that an action might be of particular interest to or have particular impacts upon minority populations, low-income populations, and/ or indigenous peoples. Should such a change occur, alter the answer provided to the EJ Question in the ADP TRACKER (illustrated in the section titled "ADP Steps 1 and 2"). The EJ Question in the TRACKER can be altered at any time. Changes to Tier 1 and Tier 2 actions are updated regularly so the public can access EPA's latest thinking about an action.

ADP Step 7 – Data Collection, Analysis and Consultation, and Development of Regulatory Options

In this step, rule-writers should implement the DABP and investigate the regulatory problem that the action is intended to address, gather relevant information, consult with stakeholders, including minority populations, low-income populations, tribes, and indigenous peoples, and develop options

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for resolving the problem.[31] Integrated into all of these activities should be the consideration of the extent to which there are potential EJ concerns, and how those concerns may be addressed. Rule-writers should use the Agency's available EJ assessment tools to determine the extent to which the action has potential EJ concerns, complete EJ-related consultation or public participation, as appropriate, and analyze any potential EJ concerns.

Although analyses to evaluate potential EJ concerns will vary across regulatory actions, they typically have the same starting point. Rule-writers should attempt to describe the regulatory baseline and the anticipated changes in emissions, exposures, and/or risks to be achieved by an action. It is important, where appropriate and when data permit, to characterize the potential changes in emissions, exposures and/or risks on minority populations, low-income populations, and/or indigenous peoples. The analysis should cover the appropriate range of options considered to address those impacts and should provide a sufficient level of detail to distinguish major environmental or public health impacts across the options for these population groups. Rule-writers should consider the data needed to support such analyses when developing their Preliminary and Detailed Analytical Blue Prints in order to maximize their opportunities to describe these baselines and the projected impacts of their regulatory actions. See the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013) for guidance on analytic expectations.

ADP Step 8 – Options Selection

Options selection is the last step in the ADP before rule-writers finish drafting the regulatory action. In this step, the rule-writers can identify the significant issues and several options to resolve each issue. Senior management decision-makers then selects those options that would best achieve the goals of the action. Selecting a regulatory action from among many options is a complex process. The extent to which potential EJ concerns factor into the process will vary considerably across regulatory actions, and will depend in large part on the operative requirements of the statute under which the action is being taken.

In presenting the options to senior management decision-makers for final decision-making, rule-writers have another opportunity to consider whether potential EJ concerns have been addressed. Decision-makers will also have an opportunity to confirm that the rule-writers have considered and addressed potential EJ concerns, including any necessary consultations to achieve meaningful involvement. The options selection presentation should describe the rule-writers' activities and efforts to assess potential EJ concerns and to involve affected populations, including minority populations, low-income populations, tribes, and indigenous peoples. The presentation should also describe what actions are recommended to ensure that potential EJ concerns are addressed by each of the options being presented (see Text Box 15). Rule-writers should be prepared to discuss the options under consideration in the regulatory action (such as pollution control options) in

> **Text Box 15: Does the DABP Address EJ?**
>
> The DABP presents the plan that implements the management decision regarding the level of analysis and engagement of stakeholders.

[31] See previous discussion about preparing the DABP, which should include a consultation plan that describes how the workgroup will achieve meaningful involvement, particularly for those stakeholders that may have historically not been able to participate. In addition, the workgroup should consult the Agency's Risk Characterization Handbook, which provides a single, centralized body of risk characterization implementation guidance for Agency risk assessors and risk managers to help make the risk characterization process transparent and the risk characterization products clear, consistent and reasonable, at http://www.epa.gov/osa/spc/pdfs/rchandbk.pdf.

light of their impacts on minority populations, low-income populations, and/or indigenous peoples, including reductions in exposure or risk.

In presenting the results of the analysis evaluating potential EJ concerns to decision-makers, rule-writers should be aware of the specific statutory and other important criteria they will use to select an option. Where EJ concerns represent the major consideration for selecting an option, it is vital that the nature and magnitude of impacts be clearly presented in some detail. For example, the following questions might be answered:

- Are there studies documenting impacts? How complete are the studies?
- Is there indication that certain populations are particularly sensitive?
- What are the qualitative and quantitative differences?

In addition, rule-writers should be prepared to discuss the first two of the three core EJ questions outlined above in Part 2, Section A. The rule-writers should also note that regulatory actions that impact the availability of information or the ability to participate meaningfully in the implementation of a program might have indirect impacts on these populations that should be considered. For example, a rule that modifies reporting requirements for regulated industries may make it easier or harder to effectively monitor facilities that are of concern to these populations and understand whether the rule is achieving the intended results. This type of impact should be considered.

ADP Step 9 – Preparation of the Action and Supporting Documents

In this step, rule-writers prepare the regulatory action, consistent with decision-maker direction. This step includes preparing the rule and preamble and the supporting documents. The evaluation of potential EJ concerns is part of this step.

At this stage, the rule-writers may document how they identified, assessed and addressed potential EJ concerns and how they achieved the meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples. Even if the rule-writers concluded there were no EJ concerns, the activities that led to that conclusion should be documented. It is important that pertinent documents relating to potential EJ concerns are understandable and readily accessible to the public in the docket for the regulatory action.

In general, the preamble for the regulatory action should clearly state how the action is supported by the results of the analyses to evaluate potential EJ concerns. If the data to characterize potential EJ concerns was insufficient or inadequate, the preamble should describe clearly the Agency's efforts to search for data to characterize risks and how the regulatory decision addressed the data gaps and any qualitative information available on potential EJ concerns. Suggested template language for addressing EO 12898 in preambles is available in the ADP library (http://intranet.epa.gov/adplibrary) and covers both proposed and final rules. However, the rule-writers' documentation is not limited to the inclusion of appropriate language in the preamble to address compliance with EO 12898.

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ADP Step 10 – Final Agency Review (FAR)

Once the regulatory action has been developed, a package is presented to the decision-makers for Final Agency Review (FAR). The FAR package consists of the final drafts of the action itself (e.g., the Federal Register [FR] document that represents the proposed rule), the supporting documents (e.g., the economic analysis and, if prepared separately, any assessment of potential EJ concerns), the Action Memorandum and any other relevant documents (e.g., the Information Collection Request, Communications Plan, etc.).

As part of the draft Action Memorandum, rule-writers should specifically address the three core EJ questions identified in Part 2, Section A (and repeated in ADP Step 5 above). These answers will accompany the action when it is presented to the Administrator or other Agency decision-maker for signature.

This is the final opportunity for rule-writers and decision-makers to consider whether potential EJ concerns have been considered and addressed, and to ensure that the rule-writers have properly documented those efforts.

ADP Steps 11 & 12 – Office of Management and Budget (OMB) Review (if "significant" under EO 12866)

If the regulatory action requires OMB review, rule-writers will have to prepare a package for submission to OMB. For more details, see the EPA's *Action Development Process: Guidance for EPA Staff on Developing Quality Actions* (http://intranet.epa.gov/adplibrary).

ADP Steps 13 & 14 – Signature and Publication

The lead program prepares the action for signature by the designated Agency official and subsequent publication in the Federal Register. For more details, see Text Box 16 and the EPA's *Action Development Process: Guidance for EPA Staff on Developing Quality Actions* (http://intranet.epa.gov/adplibrary).

Once signed by the appropriate official, the FR document is transmitted to the Office of the Federal Register for final publication. Rule-writers should ensure that all relevant documentation regarding the consideration of potential EJ concerns during the development of the action is included in the docket for the action.

> **Text Box 16: OMB Review**
>
> During OMB review, an office may alter its conclusion that an action might be of particular interest to or have particular impacts upon minority populations, low-income populations, and/or indigenous populations. Should such a change occur, alter the answer provided to the EJ Question in the ADP TRACKER (illustrated in the section titled "ADP Steps 1 and 2"). The EJ Question in the TRACKER can be altered at any time. Changes to Tier 1 and Tier 2 actions are regularly updated so the public can access EPA's latest thinking about an action.

ADP Step 15 – Soliciting and Accepting Public Comment

This step in the process provides another opportunity for the rule-writers to consider ways to ensure that the public comment process allows for meaningful involvement of minority populations, low-income population, tribes, and indigenous peoples, both in terms of providing a sufficient comment period and in terms of notification, communication or outreach to actively engage affected populations or tribes. This may include holding one or more public meetings or hearings in or near affected populations and tribes. If a public meeting and/or hearing is held, the rule-writers and lead program office should ensure there is sufficient notice about the meeting and/or hearing, and the meeting and/or hearing is scheduled at a time and place convenient to affected populations and tribes, with appropriate translation services, as appropriate. These activities may also be scheduled prior to the public comment period. See Part 3 of this Guide for ideas on how rule-writers can achieve meaningful involvement.

ADP Step 16 – Developing the Final Regulatory action

When preparing for the final stage of the regulatory action, the first step is to evaluate the public comments, which provides another opportunity for rule-writers to consider potential EJ concerns that were identified and discussed in the preamble, as well as an opportunity to consider potential EJ concerns raised in public comments.

In considering comments, rule-writers should evaluate whether the consideration of potential EJ concerns in the analyses performed for the proposed action needs to be refined or revised, and if so, how. If the EPA did not consider potential EJ concerns in their analyses, rule-writers should consider whether the public comments raise issues that may warrant reconsideration.

Rule-writers should then brief decision-makers on the scope of the EJ-related comments received and recommend how to respond to them. Decision-makers will consider the recommendations and will then provide guidance on how to proceed in developing the final action (e.g., this is equivalent to Early Guidance as discussed previously). Decision-maker guidance will also identify which process steps the rule-writers should follow in preparing the final action, which may vary based on the nature and extent of comments or other factors.

As with all significant public comments, rule-writers are expected to consider and respond to all significant public comments on EJ-related topics that are relevant to the proposal and submitted during the applicable comment period. For more details on responding to public comments, see the EPA's *Action Development Process: Guidance for EPA Staff on Developing Quality Actions* (http://intranet.epa.gov/adplibrary). It is also important to update responses to the EJ Question in the ADP TRACKER as needed and appropriate.

In general, rule-writers will be expected to follow the same basic process steps to finalize the action, thereby having additional opportunities to ensure that they satisfy the Agency's commitments to both identify and address potential EJ concerns, and to provide meaningful involvement in the ADP.

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Part 3: Achieving Meaningful Involvement

A. What Is Meaningful Involvement?

The EPA defines EJ as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Meaningful involvement means that: (1) potentially affected populations have an appropriate opportunity to participate in decisions about a proposed activity (i.e., rulemaking) that may affect their environment and/or health; (2) the populations' contributions can influence the EPA's rulemaking decisions; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) the EPA will seek out and facilitate the involvement of populations potentially affected by the EPA's rulemaking process.

Executive Order 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* and other policies[32] direct federal agencies to improve public participation among minority populations, low-income populations, tribes, and indigenous peoples. Consistent with the Agency's definition of EJ and EO 12898, Agency policy directs staff to take proactive steps to provide opportunities for potentially affected populations to participate in decisions that may affect their environment or health.

As EPA rule-writers identify opportunities for public involvement, they should also consider EO 13166 *Improving Access to Services for Persons with Limited English Proficiency*, which addresses the need to give voice to populations who historically may have been excluded from consideration during the decision-making process.

Public involvement works best when rule-writers consult with stakeholders, including minority populations, low-income populations, tribes, and indigenous peoples early and often and when their efforts follow a decision-making process that the potentially impacted populations understand and, to the extent feasible, have had a role in designing. Minority populations, low-income populations, tribes, and indigenous peoples have unique knowledge of their goals, needs and vulnerabilities. Through early public involvement, rule-writers can obtain information on issues affecting these populations and other entities and increase the understanding of such issues in the context of developing the action.

[32] For example, see *EPA Policy on Environmental Justice for Working with Federally Recognized Tribes and Indigenous Peoples*. (2014), http://www.epa.gov/environmentaljustice/resources/policy/indigenous/ej-indigenous-policy.pdf.

Rule-writers should develop a public involvement plan early in the rulemaking process, optimally as a part of the analytic blueprint stage so that the plan ensures that (1) opportunities for meaningful involvement have been appropriately addressed without delaying the rulemaking process, (2) input is considered early in the process so impacted populations may influence the Agency's decision-making process, where appropriate, and (3) the rule-writers get direction on the appropriate level of outreach and other activities given the nature of the rule, its potential impacts, and available resources.

B. Existing Guidance on Meaningful Public Involvement

The EPA is committed to engaging all stakeholders as it develops and implements Agency actions, but recognizes that special attention is often required in ensuring meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples. There are numerous resources that rule-writers can use to help determine what type and level of public involvement is appropriate for their regulatory actions.[33] See Text Box 17 for an overview of basic steps for effective public involvement. For some regulatory actions, it may be appropriate to reach out to affected populations, while for others it may be appropriate to go further and invite them to the table to develop alternatives for consideration.

Also, statutory and regulatory authorities set minimum standards for public involvement, so it is important to be familiar with the specific requirements for public notice and involvement that are associated with the development of the action. However, relying on the minimum notice and comment requirements is often not enough to achieve meaningful involvement for minority populations, low-income populations, tribes, and indigenous peoples.

Text Box 17: 7 Basic Steps for Effective Public Involvement

1. Plan and budget for public involvement activities;
2. Identify the interested and affected public;
3. Consider providing technical or financial assistance to the public to facilitate involvement;
4. Provide information and outreach to the public;
5. Conduct public consultation and involvement activities;
6. Review and use input and provide feedback to the public; and
7. Evaluate public involvement activities.

Promoting meaningful involvement often requires special efforts to connect with populations that have been historically underrepresented in decision-making and that have a wide range of educational levels, literacy, or proficiency in English. It will likely be necessary to tailor outreach materials to be concise, understandable and readily accessible to the populations that rule-writers are trying to reach.[34]

Involving these populations in a meaningful way presents challenges and opportunities that are different than those presented by a general public involvement effort, such as:

[33] For example, the International Association for Public Participation has developed materials that discuss the spectrum of public involvement ranging from informing the public to empowering the public. Their publications and public involvement training opportunities can be found at www.IAP2.org.

[34] For more information, see the "*Model Plan for Public Participation*" developed by the National Environmental Justice Advisory Council (http://www.epa.gov/environmentaljustice/resources/publications/nejac/model-public-part-plan.pdf).

- Conveying issues in ways that are tailored (for example, translation, timing, location) to each population;
- Bridging cultural and economic differences that affect participation;
- Using communication techniques that enable more effective interaction with other participants;
- Developing partnerships on a one-to-one or small group basis to ensure representation;
- Developing trust between government and potentially affected populations; and
- Developing stakeholder capacity to effectively participate in future decision-making processes.

In planning public involvement, rule-writers should identify different ways to engage minority populations, low-income populations, tribes, and indigenous peoples meaningfully and effectively. Rule-writers should consider using Web-based information technology (IT) tools, particularly those that are more user-centered, collaborative or interactive (see Text Box 18). However, some populations have only rudimentary access to the most modern communications tools. Remote towns and villages disseminate information using local radio stations, CB radio, local newspapers, placing posters at grocery stores, trading posts, or at village/community center/chapter meetings (see Text Box 2). In many instances, reaching parents of school-age children may be facilitated through schools.

It is important to note the difference between the meaningful involvement of tribes and indigenous peoples as it is used in the EJ context versus formal consultation with tribes.[35] The federal government has a unique government-to-government relationship with federally-recognized tribes, which arises from Indian treaties, statutes, executive orders and the historical relations between the United States and Indian Nations. The federal government has a trust responsibility to federally-recognized tribes, and the EPA, like other federal agencies, must act consistently with the federal trust responsibility when taking actions that affect tribes. Part of this responsibility includes consulting with tribes and considering their interests when taking regulatory actions that may affect tribes or their resources. Tribal consultation is the subject of EO 13175 and the Agency's Tribal Consultation Policy (http://www.epa.gov/tribal/consultation/consult-policy.htm).

Text Box 18: Web-based IT Tools

Referred to as "web 2.0 tools," these tools generally include tools that:

- Emphasize participation;
- Harness collective intelligence;
- Reach a variety of audiences by facilitating customer self-service;
- Redesign information and services based on the features that customers are using most;
- Provide information that can be accessed by more devices that just a computer (e.g., mobile phone, MP3 player); and
- Develop and deploy applications that can scale quickly to meet the size of the task.

Two additional documents finalized in 2013 may be useful resources for rule-writers considering appropriate outreach techniques and approaches: the "Notice of Availability of Regional Actions to Promote Public Participation in the Permitting Process" and "Promising Practices for Permit

[35] For information on the development of EPA's Tribal Consultation Policy, please contact the office's tribal coordinator or the American Indian Environmental Office. Also see EPA *Policy on Environmental Justice for Working with Federally Recognized Tribes and Indigenous Peoples* (2014). This policy establishes principles and affirms EPA's commitment to provide to federally recognized tribes and indigenous peoples in all areas of the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands, and others living in Indian country, fair treatment and meaningful involvement in EPA decisions that may affect their health or environment.

Applicants Seeking EPA-Issued Permits," 78 FR 27,220 (May 9, 2013).[36] While intended for use in permitting actions, these documents identify useful strategies for promoting greater public involvement and improving communication and understanding between facility operators and potentially-affected populations.

C. Assessment of Best Practices and Recommendations

The EPA identified examples of best practices on how to promote meaningful involvement in a September 2012 report entitled *Recommendations for Opportunities for Including Meaningful Environmental Justice Public Involvement in Agency Rulemaking Activities: Achieving Environmental Justice Results in Rules and Rule Implementation*.[37] The document provides recommendations regarding several important factors that rule-writers should consider when developing opportunities for meaningful involvement in the rulemaking process. For example, some of the factors include: careful consideration of cultural implications, linguistics, effective stakeholder outreach techniques, pre-meeting stakeholder capacity building efforts and carefully planned logistical strategies which promote successful meeting participation by minority populations, low-income populations, tribes, and indigenous peoples with the EPA.

Recommendations for rule-writers include:

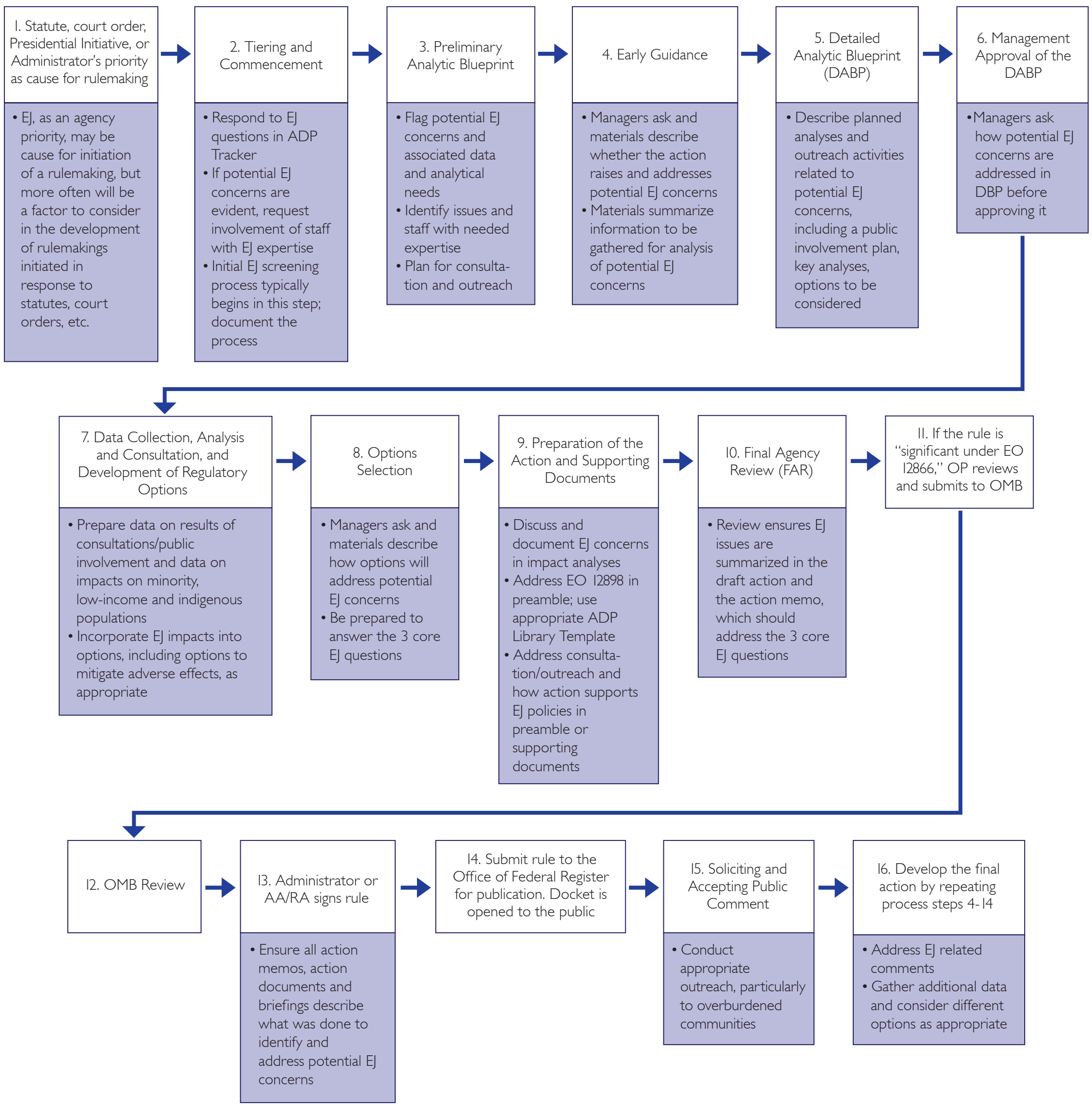
- Identify and utilize Agency EJ staff and others who are trained in cultural, linguistic and stakeholder outreach techniques.
- Draw on available tools, expertise and resources. For example, investigate whether other EPA offices have developed training modules rule-writers may need or whether they have experts who can provide some of the increased support needed through interoffice technology transfer.
- Provide capacity building for minority populations, low-income populations, tribes, and indigenous peoples to help them participate more effectively in the rulemaking process.
- Work closely with EPA headquarters program and regional office EJ Coordinators and consider contacting the National Environmental Justice Advisory Council (NEJAC) and/or other federal/state agencies that may have relevant and useful lessons learned, best practices or approaches to providing opportunities for meaningful involvement for overburdened populations.

More information is available in the report, which can be accessed at http://intranet.epa.gov/oeca/oej/rulemaking.html#involvement. In addition, the Agency developed 11 case studies of EPA rules that appropriately reflect a range of meaningful involvement opportunities provided to minority populations, low-income populations, tribes, and indigenous peoples and may be instructional for rule-writers that are looking for assistance or ideas on how to meaningfully engage these and other stakeholders in the development of their rule.

[36] Available at https://www.federalregister.gov/articles/2013/05/09/2013-10945/epa-activities-to-promote-environmental-justice-in-the-permit-application-process.

[37] This report was produced by the Public Involvement (PI) Sub-Team of EPA's Cross Agency Environmental Justice in Rulemaking (EJR) Team. This team was made up of rulemaking experts from each NPM.

Appendix A: Incorporating Environmental Justice into Tier 1 and 2 Actions Under the ADP[38]



Note: While some of the ADP steps described above may be relevant only to Tier 1 and 2 actions, tiering level does not preclude the applicability of either EO 13045 or the Children's Health Policy. See *Guide to Considering Children's Health When Developing EPA Actions* (http://www2.epa.gov/children/guide-considering-childrens-health-when-developing-epa-actions-implementing-executive-order) for more information. Additional information may also be obtained from consultation with the Office of Children's Health and Protection (OCHP).

[38] See http://intranet.epa.gov/adplibrary.

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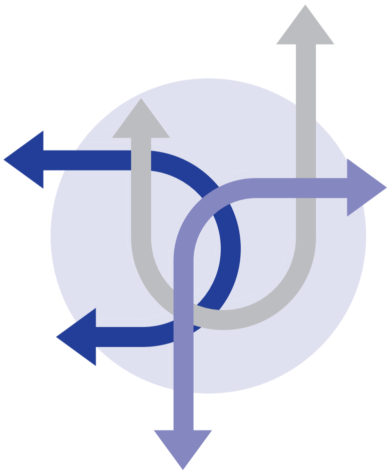
Appendix B: A Quick Reference Guide for EPA Decision-Makers: Integrating EJ into the Development of Regulatory Actions Under the ADP

This document is intended to serve as a quick reference for EPA decision-makers by providing a ***brief overview*** of the guidance provided in this Guide. It is not intended to replace the information provided in main body of the Guide and does not, therefore, repeat the details provided there or elsewhere.[39]



What is meant by "environmental justice"?

The EPA defines "environmental justice" as the ***fair treatment*** and ***meaningful involvement*** of all people, particularly minority populations, low-income populations, tribes, and indigenous peoples in the development, implementation and enforcement of environmental laws, regulations and policies.[40]

What is the decision-maker's overall role?

The EPA decision-makers direct workgroup activities related to identifying potential EJ concerns for Agency regulatory actions under development. This direction may be made in the context of a particular action, or can also be made for a category of actions that are similar and have the same general impacts. Decisions-makers communicate expectations to the rule-writers, establish policy priorities, identify issues of significant concern and guide the process of developing the action. As a result, decision-makers play a key role in ensuring that the potential EJ implications of a regulatory action are considered during the development of that action, and that populations affected by the action have an opportunity to participate.

When and how can decision-makers participate?

- **Consider EJ when decisions are made regarding which regulatory actions to pursue**. The decision to initiate regulatory actions is an opportunity to consider whether the actions under consideration involve—or have the potential to involve—potential EJ concerns.

[39] A refresher on the process steps involved in the ADP is provided in the chart in Appendix A of the Guide.
[40] See Part 1, Section A.

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- **Identify the potential for EJ concerns at the beginning**. Potential EJ concerns may arise when a proposed regulatory action would: a) create new, exacerbate existing, or present an opportunity to address existing disproportionate impacts; b) not create sufficient opportunities for meaningful participation in the development of the action; or c) involve an actual or potential lack of fair treatment or meaningful involvement in the implementation or enforcement of the action.
- **Set clear expectations about potential EJ concerns in the Early Guidance provided to the rule-writers.** To start, provide the "three core EJ questions," which the rule-writers will be expected to answer at the end of their effort. Consider also providing guidance on the level of analysis needed to make decisions later, as well as the level of outreach to and involvement of populations affected by the regulatory action. Consider asking for an assessment of resource needs to perform different levels of analyses and/or outreach.
- **Review the analytic blueprint (ABP) to ensure the rule-writers address potential EJ concerns.** The review and approval of the ABP may be the final opportunity to provide direction before resources are committed. In this review, consider whether the ABP includes the following information:
    - The identification of potentially affected populations and related stakeholders, along with a plan for how the rule-writers will ensure outreach and meaningful involvement of these populations, including minority populations, low-income populations, tribes, and indigenous peoples.
    - The identification of analytical needs (scientific and economic), and a plan for ensuring the consideration of EJ in those analyses.
    - An identification of related resources needed to address both the outreach activities and analytical needs, along with whether additional resources are needed to meet expectations.
- **Consider potential EJ concerns related to the options presented.** Different options may involve different potential EJ concerns, or provide different opportunities to address existing disproportionate impacts. The rule-writers should highlight this information for consideration in decisions-making about the options.

What are the "three core EJ questions"?

The Guide suggests that decision-makers ask rule-writers about their efforts to address the following three core EJ questions at key points during the development of regulatory actions under the ADP (such as at Early Guidance, options selection or Final Agency Review):

1. How will (or did) the public participation process provide transparency and meaningful participation for minority populations, low-income populations, tribes, and indigenous peoples?
2. How do the rule-writers plan to (or how did the rule-writers) identify and address existing and new disproportionate environmental and public health impacts on minority populations, low-income populations, and/or indigenous peoples during the rulemaking process?
3. How did the actions taken under #1 and #2 impact the outcome or final decision?

Appendix C: A Checklist for EPA Rule-Writers: Integrating EJ into the Development of Regulations Under the ADP

EPA rule-writers can use this checklist to identify what they may need to know and/or do in order to integrate EJ into the development of their regulatory action. The checklist is based on available guidance, including that provided in this Guide. This checklist is not intended to replace the information provided in main body of the Guide and does not, therefore, repeat the details provided there or elsewhere.

Activity
1. BEFORE THE ADP PROCESS STARTS – Learn the basics about the ADP and EJ.
☐ Are rule-writers familiar with the process steps under the ADP?[41] *If a refresher on the process steps involved in the ADP is needed, please see the charts provided in Appendix A of the Guide.*
☐ Have the rule-writers read the Guide?
☐ Do the rule-writers know what the Executive Order on EJ requires?
☐ What is meant by "environmental justice"?
☐ What is meant by an "EJ concern"?
☐ Do the rule-writers know how it can identify, assess and address potential EJ concerns during the development of the action?
☐ Do the rule-writers know their different roles?
☐ Do the rule-writers know the "three core EJ questions"? (See item #5 on this checklist)
☐ Does the office have any applicable program specific requirements or guidance on EJ?
☐ Are the rule-writers familiar with the *Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis* (U.S. EPA 2013)?
2. GETTING STARTED – Screen the action.
☐ Have the rule-writers responded to the EJ question in ADP TRACKER?
☐ Have the rule-writers completed an initial screening process to evaluate whether the action has the potential to raise or address potential EJ concerns and documented the analytic basis for the conclusions?

Appendix C

[41] Agency Guidance on the ADP is available at http://intranet.epa.gov/adplibrary/.

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Activity
3. PLANNING – Complete an Analytic Blueprint (ABP) for the action.
☐ Have the rule-writers identified the potentially impacted minority populations, low-income populations, tribes, and/or indigenous peoples and their concerns?[42]
☐ Does the ABP address its plans for achieving meaningful involvement and contain plans for effectively engaging the minority populations, low-income populations, tribes, and indigenous peoples affected by the action?
☐ Have the rule-writers identified the factors that contribute to potential EJ concerns?
☐ Have the rule-writers identified the data needs and data sources for an appropriate EJ assessment, the scope and basic methodology of the EJ assessment and the outputs of the EJ assessment?
☐ Have the rule-writers explored alternative approaches for addressing potential EJ concerns (regulatory, voluntary and/or innovative approaches)?
☐ Have the rule-writers identified the resources needed to achieve meaningful involvement, gather needed data and conduct identified analyses?
☐ Have the rule-writers identified the key activities, analyses, consultation activities (including those called for by relevant statutes and EOs), contributors and timeline?
4. OPTIONS SELECTION – Identify and prepare options for decision-makers.
☐ Is input from affected minority populations, low-income populations and/or indigenous peoples reflected in the analysis of options, both in terms of potential impacts and options to consider?
☐ Have the rule-writers incorporated potential impacts on minority populations, low-income populations, and/or indigenous peoples into the analysis of options? ☐ Have the rule-writers described the ways in which the action can address any existing potentially disproportionate impacts? ☐ If the action has the potential to create new disproportionate impacts, has the rule-writers identified options that will avoid or mitigate those impacts?
☐ Are the rule-writers prepared to address how to answer the three core EJ questions?
5. DOCUMENTATION – Prepare the action and final documents.
☐ Have the rule-writers documented their outreach and consultation efforts, as well as the results of those efforts?
☐ Have the rule-writers used the appropriate ADP Library Template for the preamble discussion of EO 12898?
☐ Do the final economic and scientific analyses clearly present the potential EJ concerns?
☐ Have the rule-writers described in the preamble or supporting documents any identified potential disproportionate impacts and potential EJ concerns and how they are addressed by the action?
☐ Have the rule-writers addressed the "Three Core EJ Questions" in the Action Memo: 1. How did the public participation process provide transparency and meaningful participation for minority populations, low-income populations, tribes, and indigenous peoples? 2. How did the rule-writers identify and address existing and/or new disproportionate environmental and public health impacts on minority populations, low-income populations, and/or indigenous peoples? 3. How did the actions taken under #1 and #2 impact the outcome or final decision?

[42] In addition to providing meaningful involvement opportunities for indigenous communities and tribes, rule-writers should consider whether it is appropriate to offer tribes the opportunity for government-to-government consultation on the action. For additional information, see EPA's Tribal Consultation Policy.

Appendix D: References/ Resources

Please note that this document is written for EPA employees and contains links to resources on the EPA's intranet website. Those resources are inaccessible from non-EPA computers.

Policy and Guidance Documents

Title and URL	Description
Executive Order 12898: Environmental Justice http://www.epa.gov/environmentaljustice/resources/policy/exec_order_12898.pdf	Text of EO directing agencies to address Environmental Justice in minority populations and low-income populations.
EPA's Definition of Environmental Justice http://www.epa.gov/environmentaljustice/basics/index.html	Environmental Justice and related terms defined for use at EPA.
Memorandum for the Heads of All Departments and Agencies: Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994) http://www.epa.gov/environmentaljustice/resources/policy/clinton_memo_12898.pdf	President's cover memorandum for Executive Order 12898.
EPA's Environmental Justice Strategy (1995) http://www.epa.gov/environmentaljustice/resources/policy/ej_strategy_1995.pdf	Strategy developed in response to EO 12898.
Environmental Justice Implementation Plan http://www.epa.gov/environmentaljustice/resources/policy/implementation_plan_ej_1996.pdf	Plan to integrate environmental justice into the Agency's work under Carol Browner (1996).
Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis (1998) http://www.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_epa0498.pdf	Guidance for incorporating environmental justice goals into the EPA's preparation of environmental impact statements (EISs) and environmental assessments (EAs) under NEPA.
Environmental Justice: Guidance under the National Environmental Policy Act (1997) http://www.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_ceq1297.pdf	Original guidance provided by CEQ.
Toolkit for Assessing Potential Allegations of Environmental Justice (2004) http://www.epa.gov/environmentaljustice/resources/policy/ej-toolkit.pdf	Reference guide to assist Agency personnel in assessing potential allegations of environmental injustice and to provide a framework for understanding national policy on environmental justice.
Strengthening EPA's Environmental Justice Program (June 9, 2008) http://www.epa.gov/environmentaljustice/resources/policy/admin-ej-strength-memo-060908.pdf	Administrator Johnson directs the EPA to conduct EJ reviews of its program, policies and activities.

Title and URL	Description
Reaffirming the U.S. EPA's Commitment to Environmental Justice – Memo from Stephen L. Johnson (November 4, 2005) http://www.epa.gov/environmentaljustice/resources/policy/admin-ej-commit-letter-110305.pdf	Administrator Johnson outlines the Agency's commitment to Environmental Justice and its integration into all programs, policies, and activities.
Plan EJ 2014 http://www.epa.gov/environmentaljustice/plan-ej/index.html	Roadmap for how EPA will integrate EJ into the Agency's programs, policies, and activities.
EJ Legal Tools http://www.epa.gov/environmentaljustice/plan-ej/law.html	Identifies existing legal tools to help EPA advance the goal of EJ and provides an overview of a number of discretionary legal authorities that are or may be available to EPA under federal statutes and programs.
Draft Technical Guidance for Assessing Environmental Justice in Regulatory Analysis (U.S. EPA 2013) http://www.epa.gov/environmentaljustice/plan-ej/rulemaking.html	Helps analysts assess potential EJ concerns associated with EPA rules.
Plan EJ 2014: EJ in Permitting http://www.epa.gov/environmentaljustice/plan-ej/permitting.html	The EJ in Permitting Initiative seeks to enable overburdened communities to have full and meaningful access to the permitting process and to develop permits that address environmental justice issues to the greatest extent practicable under existing environmental laws.
EPA Policy on Environmental Justice for Tribes and Indigenous Peoples http://www.epa.gov/environmentaljustice/resources/policy/indigenous/ej-indigenous-policy.pdf	Clarifies and integrates environmental justice principles in a consistent manner in the Agency's work with federally recognized tribes and indigenous peoples throughout the United States, and with others living in Indian country to protect their environment and public health.
American Journal of Public Health Supplement "Environmental Justice and Disparities in Health" http://ajph.aphapublications.org/toc/ajph/101/S1	Useful resource for gaining a more complete understanding of how disproportionate impact factors can influence health outcomes.
EPA's Policy of Evaluating Health Risks to Children http://yosemite.epa.gov/ochp/ochpweb.nsf/content/riskpolicy.htm/$File/riskpolicy.pdf	Policy applied to assessments started or revised on or after November 1, 1995.
Executive Order 13175: Consultation and Coordination with Indian Tribal Governments http://www.epa.gov/tp/pdf/eo-13175.pdf	EO directing Federal agencies to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications.
EPA's Public Involvement Policy http://www.epa.gov/publicinvolvement/pdf/policy2003.pdf	Complete Agency policy with four appendices and two addenda.
Public Involvement http://www.epa.gov/publicinvolvement	Information on the full range of activities that EPA uses to engage the American people in the Agency's decision-making.
International Association for Public Participation www.IAP2.org	Provides discussion on the spectrum of public involvement; identifies useful publications and training opportunities.
Web 2.0 http://www2.epa.gov/webguide/epa-and-web-20-technologies-2007-memo	Provides information about the EPA's social media use and necessary steps for setting up Web 2.0 applications such as wikis and blogs.

Other Useful Resources

Title and URL	Description
Environmental Justice Coordinators – Media Offices http://epa.gov/environmentaljustice/contact/ej-contacts-media.html	List of contacts with name, phone, location, and areas of expertise identified.
Environmental Justice Coordinators – Regional Offices http://epa.gov/environmentaljustice/contact/ej-contacts-regional.html	List of contacts with name, phone, and address identified.
Action Development Process http://intranet.epa.gov/adplibrary/adp/index.htm	Information about each particular aspect of EPA's ADP.
Action Development Process: Guidance for EPA Staff on Developing Quality Actions http://intranet.epa.gov/adplibrary/documents/adp03-00-11.pdf	Lays out the ADP and where to get additional information and guidance as Agency actions are developed.
Action Development Checklist See Appendix C of this Guidance on Considering Environmental Justice During the Development of an Action	Illustrative list to help rule-writers determine whether the action being developed may involve a subject of particular interest to—or may have particular impacts on—vulnerable populations.
Environmental Justice Regulatory Preamble Templates http://intranet.epa.gov/adplibrary/adp-templates/index.htm#stat	Suggested language for addressing EO 12898 in preambles for proposed and final rules.
Action Development Guidelines for Preparing Analytic Blueprints http://intranet.epa.gov/adplibrary/documents/abp09-30-04.pdf	Discusses the timing and steps for the drafting and approval of Analytic Blueprints (applicable to all Tiers 1 and 2 actions); directs reader to resources for more information and guidance.
RegDaRRT http://yosemite.epa.gov/opei/RuleGate.nsf/	Offers the public a means of learning about and tracking EPA actions.
Cross-Agency EJ in Rulemaking Team's Resources for Incorporating EJ in Agency Rules http://intranet.epa.gov/oeca/oej/rulemaking.html	Resources identify opportunities for the Agency to advance the integration of EJ in rules.

Appendix E: Examples of Regulatory Responses That Directly or Indirectly Address Potential EJ Concerns

Significant progress in making EJ a part of the Agency's rulemaking process has already been made, as evidenced by the following examples:

- **Definition of Solid Waste 2015 (DSW)**: On January 13, 2015, EPA published the final revisions to the Definition of Solid Waste Rule, also known as the DSW rule. It represents a major environmental justice milestone by directly addressing impacts to communities, disproportionately borne by minority and low-income populations from the mismanagement of hazardous materials sent to recycling. EPA conducted a rigorous environmental justice analysis that examined the location of recycling facilities and their proximity and potential impact to adjacent residents. The methodology and scope was developed through a broad public engagement and expert peer review process. The analysis identified significant regulatory gaps in the previous DSW rule which could negatively impact communities adjacent to third party recyclers, including minority and low-income populations.

  EPA identified mismanagement that could pose a risk of fires, explosions, accidents and releases of hazardous constituents to the environment. The economics of commercial recycling contain market disincentives that encourage over-accumulation and mismanagement of hazardous secondary material. The 2008 DSW rule lacked the tools needed for proper oversight of these facilities by EPA, states and the communities affected by them. The final rule addresses the market disincentives in a way that helps encourage safe and legitimate recycling while addressing the need to protect communities. The final rule also includes a public participation component so that communities are notified prior to recycling operations beginning and have a chance to weigh in on the environmental decisions that affect them, which was a major issue identified in the environmental justice analysis.

- **Mercury and Air Toxics Standard (MATS)**: In December 2011, EPA finalized the first federal standards that require power plants to limit their emissions of toxic air pollutants like mercury, arsenic and metals. The Mercury and Air Toxics Standard (MATS) was supported by EPA's study of the public health hazards from power plant emissions as required by the Clean Air Act. EPA used data on subsistence fishing and potential health impacts of mercury deposition on the minority, low-income and indigenous populations engaged in subsistence fishing to arrive at an "appropriate and necessary" finding that moved the rulemaking forward. In addition, EPA held a series of webinars, community calls, and consultations with tribal leadership on this rule. Most plants will come into compliance in April 2015, with full implementation by April 2016. EPA projects that mercury emissions from sources covered by MATS are expected to be reduced from 27 tons without MATS in 2016 to 7 tons in 2016 with MATS, approximately a 74 percent reduction. Overall, the MATS rule will improve public health by lowering mercury exposure, especially for children and the elderly and for low-income, minority and indigenous populations that rely on subsistence fishing.

- **National Ambient Air Quality Standards for Particulate Matter**: In December 2012, EPA strengthened the annual health National Ambient Air Quality Standard (NAAQS) for fine particulate matter (PM). Under Section 109 of the Clean Air Act, EPA set the primary standard to protect public health with an adequate margin of safety, considering "sensitive or susceptible individuals or groups." People most at risk from PM exposure include people with heart or lung disease (including asthma), older adults, children and people of lower socioeconomic status. In writing the PM NAAQS Implementation Rule, EPA engaged with communities to help identify areas to provide guidance to states on targeting activities that address the impact on low-income communities. EPA met with the National Environmental Justice Advisory Committee (NEJAC) and had a training in North Carolina on this issue. The proposal for the Implementation Rule was put forth in March 2015 and will provide suggestions to the states on targeting emissions reductions in environmental justice communities as well as suggestions on how to engage communities in the development of the PM State Implementation Plans.

- **Petroleum Refinery Residual Risk and Technology Review**: In June 2014, EPA proposed the Petroleum Refinery Residual Risk and Technology Review (RTR) rule to achieve further controls on toxic air emissions from petroleum refineries. Early engagement with communities indicated a particular interest in fence-line monitoring, which was supported by EPA's emissions inventory data indicating a significant portion of emissions from refineries come from fugitive sources. Based on this community input and the risk and technology review analyses, EPA proposed requirements for:

  - Additional emission control requirements for storage tanks, flares and coking units;
  - Higher combustion efficiency for flaring operations; and
  - Monitoring of air concentrations at the fence-line of refinery facilities.

  After the proposal was released, EPA held community calls and webinars and conducted trainings in New Orleans, Louisiana, and in Oakland, California. As a result, a significant number of communities provided more substantive comments for consideration during the development of the final rule. Additionally, in the summer of 2014 the Agency held two public hearings on this rulemaking (one in Wilmington, California and one in Houston, Texas). The comment period for this rulemaking closed on October 28, 2014 and EPA is under a consent decree with environmental litigants to finalize this rule by June 16, 2015. EPA received 100,000 comments on this rulemaking. EPA is currently reviewing the comments received and will be considering all comments as we move forward with the final rulemaking.

- **Revisions to Agricultural Worker Protection Standards**: On March 19, 2014, EPA published a proposed rule to revise the current Worker Protection Standard (WPS), designed to protect workers on agricultural establishments from occupational exposure to pesticides. EPA recognizes

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that individuals working with pesticides, or contacting crop products on which pesticides have been used, are at greater risk of exposure. The estimated two million farmworkers are potentially exposed to pesticide residues, both during applications as well as when they re-enter treated areas for hand labor activities. The core concepts of EJ have been part the fundamental basis of the rule since its inception. EPA sought and received extensive input from the farmworker community over many years to help the Agency formulate the best set of improved protections in the proposed rule. Improvements where EJ consideration made a difference include training and notifications to workers, requirements to support the enforcement of required protections, and enhancements to decontamination supplies and emergency assistance requirements.

- **Implementation of Lead Renovation Repair and Painting Program**: In April 2008, EPA issued its final Lead Renovation, Repair, and Painting Program (RRP) rule that addressed lead-based paint hazards created by renovation, repair, and painting activities in target housing and child-occupied facilities. Recognizing that children in minority populations and children whose families are poor have an increased risk of exposure to harmful lead levels, EPA determined that effective implementation was one of the best ways to ensure that these populations are not exposed to additional leaded dust resulting from common, but improperly-performed, home renovation, repair, and painting work. EPA's Dust Study supported this approach because it demonstrated that renovation activities result in dust lead levels that can be orders of magnitude above the hazard standard and higher than the levels achievable if the RRP requirements were followed. EPA concluded that fully implementing the regulations can be a successful tool in addressing elevated blood lead levels in children. Implementation of the RRP rule is expected to minimize exposure to lead-based paint hazards and protect children and others. Because minority and low-income children are already at higher risk of lead poisoning, we expect that this activity will have specific benefits to populations with EJ concerns.

- **Unregulated Contaminant Monitoring Regulation (UCMR 3) for Public Water Systems Final Rule**: EPA uses the Unregulated Contaminant Monitoring program to collect data for contaminants suspected to be present in drinking water, but that do not have health-based standards or treatment technique regulations established under the Safe Drinking Water Act. After conducting an EJ analysis of the rule, EPA updated it to require that all public water systems report U.S. Postal Service zip codes in their service area. This additional data will enable EPA to identify areas that may have disproportionately high and adverse human health or environmental impacts on minority or low-income population water supplies.

Notes

Guidance on Considering Environmental Justice During the Development of Regulatory Actions

EPA's ACTION DEVELOPMENT PROCESS

Guidance on Executive Order 13132: Federalism

November 2008

The statements in this document are intended solely as guidance. This document is not intended, nor can it be relied upon, to create any rights enforceable by any party in litigation with the United States. This guidance may be revised without public notice to reflect changes in EPA's approach to implementing Executive Order 13132, Federalism, or to clarify and update text.

Table of Contents

List of Acronyms or Abbreviations in this Guidance

Big 10	The ten largest national representative organizations for State and local governments, including those commonly called the "Big 7," plus two other organizations with whom OMB has asked agencies to consult. EPA also includes the Environmental Council of the States (ECOS) in this list, although consultation with this organization alone does not constitute compliance with the EO since it is not comprised of elected officials. The organizations and their contacts are listed in Attachment C.
EO	Executive Order. When used alone, it refers to EO 13132.
FI	Federalism implications. Under EO 13132, these are "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government."
OCIR	EPA Office of Congressional and Intergovernmental Relations
OGC	EPA Office of General Counsel
OMB	Office of Management and Budget
OPEI	EPA Office of Policy, Economics and Innovation
ORC	EPA Office of Regional Counsel
Order	Executive Order 13132
RNOs	Representative National Organizations
SLEOs	State and Local Elected Representatives
S/L	State and local

How this Guidance Applies to You

This guidance is for EPA managers and staff who are planning or developing actions such as regulations, policies, legislative proposals, adjudications, and waivers. It summarizes the provisions of Executive Order 13132, "Federalism."

The guidance also provides the parameters of EPA's policy on consulting with State and local governments under this Executive Order. For some actions, including those which may not have federalism implications (FI), EPA policy is broader than the Executive Order, reflecting EPA's commitment to early and meaningful intergovernmental consultation.

Even if you believe your action will have either no effects or minimal effects on State and local governments, you still need to read further. A short introduction to the Executive Order follows. Then, a table directs you to the part of the guidance that applies to your action.

Introduction to Executive Order 13132

President Clinton issued Executive Order 13132, “Federalism,” on August 4, 1999[1]. It became effective on November 2, 1999. The Executive Order ("EO" or "Order") stresses consultation with State and local ("S/L") governments and more sensitivity to their concerns. It also sets up a specific process for agencies to follow as they develop and implement actions that affect S/L governments. EO 13132 revokes Executive Order 12875, "Enhancing the Intergovernmental Partnership," and all previous Executive Orders on Federalism. The full text of the Order is attached at the end of this guidance.

What is "Federalism?"

> “Federalism is rooted in the belief that issues that are not national in scope or significance are most appropriately addressed by the level of government closest to the people." [Sec.2.(a)]. The EO lists nine principles that convey the "spirit" of the Order. These principles guide agencies in formulating and implementing **"policies that have federalism implications" (FI).**

What actions are subject to the Order?

EO 13132 generally applies to policies that have FI, which refers to regulations, legislative comments or proposed legislation, and other policy statements that have "substantial direct effects" on:

(1) the States (the definition of "States" includes local governments);[2]
(2) the relationship between the national government and the States; or
(3) the distribution of power and responsibilities among the various levels of government.

The EO also applies to adjudications that preempt S/L law. An adjudication is the Agency’s process for formulating an order. An order is final agency action that is not a rulemaking, such as a permit, administrative order, license, registration, or determination of applicability.

What should I do if my action is subject to the Order?

What you should do depends on the type of action you have. In general, EO 13132 puts a strong emphasis on consulting with S/L officials, which are defined as **"elected officials or their representative national organizations."** Of course, you should continue to work with your professional S/L government counterparts, but consulting them alone will

[1] 64 FR 43255 (August 10, 1999).

[2] The definition of States does not include Tribal governments. Tribal governments are addressed by EO 13175.

not satisfy the requirements of EO 13132.

OMB has specifically designated nine national organizations as being representative of S/L officials for purposes of complying with the consultation requirements of the Order. It is EPA's policy that you also consult with a tenth organization – the Environmental Council of the States (ECOS) – if your action triggers the Order's requirements. However, consultation with ECOS alone does not constitute compliance with the EO since it is not comprised of elected officials. The Big 10 organizations offer the largest constituencies of elected and senior appointed officials in State and local government[3]. Attachment C includes addresses and websites for the Big 10 organizations.

The following table tells you where to continue reading, based on the type of action you have:

If your action is a	**Then go here for more information about whether the Order applies and what to do...**	
Regulation (or "rule")	Part 1	(page 7)
Legislative comments or proposed legislation	Part 2	(page 26)
Policy statement, guidance document, interpretive rule, or similar action	Part 3	(page 26)
Adjudication that preempts S/L law (such as a permit, registration, license, determination of applicability, etc.)	Part 4	(page 28)
S/L government request to waive some or all of the statutory or regulatory requirements that apply to it.	Part 5	(page 31)

[3] The Big 10 include the National Governors' Association, National Conference of State Legislatures, U.S. Conference of Mayors, National League of Cities, Council of State Governments, International City/County Management Association, and National Association of Counties, plus the National Association of Towns and Townships, County Executives of America, and the Environmental Council of the States.

Part 1 - Regulations (or "Rules")

1.1 How will I know if my rule is subject to the Order?

EO 13132 applies to rules with Federalism implications. As noted previously, this means a rule that has substantial direct effects on:

(1) the States (the definition of "States" includes local governments);
(2) the relationship between the national government and the States; or
(3) the distribution of power and responsibilities among the various levels of government.

Part 1.2 of this guidance, below, will help you identify several thresholds for determining whether your rule has FI (that is, *substantial direct effects*...). Later, part 1.5 of the guidance shows the steps in EPA's regulatory process where you determine FI. But, in short, work closely with your program office's Regulatory Steering Committee Representative or your Region's Regulatory Contact, and the attorney assigned to your rule from the Office of General Counsel (OGC). Or, if you are in a Region, work with your Regional Regulatory Contact and the attorney assigned to your rule by the Office of Regional Counsel (ORC). As you develop the rule and make preliminary regulatory decisions, continue to work with these contacts to review and revise, if necessary, your Federalism determination. If you determine your rule has FI, you should inform OCIR and Regulatory Steering Committee Representatives.[4]

1.2 What are the thresholds for determining if my rule has FI?

In most cases, EPA rules would have FI because they:

- impose substantial compliance costs, unless they are expressly required by statute or there are federal funds available to cover the S/L compliance costs; and

- preempt S/L law.

Even if your rule is not one of these two types, you still may determine that it meets the definition for FI. That is, the rule has "substantial direct effects" on S/L governments, even though these effects are unrelated to compliance costs or preemption.

OGC has created helpful flowcharts summarizing the EO's thresholds and requirements. These flowcharts are in Attachment B of this guidance.

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[4] To see the list of Regulatory Steering Committee Representatives or Regional Regulatory Contacts, go to "Intranet.epa.gov/adplibrary" and click on "Reg Steering Committee."

The threshold for each type of FI follows in paragraphs A, B, and C.

A. Substantial compliance costs

As described below, there are two ways an EPA rule can be deemed to have FI due to substantial compliance costs.

1. Annual State/local expenditures of $25 million or more

If your rule contains a federal intergovernmental mandate– i.e., it is likely to result in the expenditure by State and/or local, governments in the aggregate of $25 million or more in any one year -- **then EPA may conclude the rule has FI, unless:**

- the rule is expressly required by statute without the use of any discretion by EPA, or
- federal funds are available to cover the S/L governments' compliance costs for the rule.

The term, "required by statute," is a narrow test; such rules are very rare. We interpret this to mean "specifically and explicitly compelled by statute without the use of any discretion by EPA." While our rules are authorized by statute, most provide the Administrator with some discretion regarding content.

2. Impact on small governments

If the impact of your rule on small governments is likely to equal or exceed 1% of their annual revenues, then as a policy matter, **EPA may conclude the rule also has FI, unless:**

- the rule is expressly required by statute without the use of any discretion by EPA; or,
- federal funds are available to cover the S/L governments' compliance costs for the rule.

EPA's National Center for Environmental Economics has developed technical guidance for economists on how to conduct the 1% test. See Attachment A.

B. Preemption of S/L law

Generally, preemption is the doctrine that holds that certain matters are of such a national character that federal laws take precedence over S/L laws. When preemption occurs, an S/L government may not pass a law that is inconsistent with the federal law. There are three types of preemption:

- **Express preemption:** occurs when Congress' intent to preempt S/L law is stated expressly in the Federal statute.

- **Field preemption:** occurs when Congress' creation of a pervasive system of Federal regulation makes reasonable the inference that Congress left no room for S/L governments to supplement it, or where an act of Congress touches a field in which the Federal interest is so dominant that the federal system is assumed to preclude enforcement of S/L laws on the same subject.

- **Conflict preemption:** occurs when Federal and S/L law are in direct conflict or where S/L law stands as an obstacle to the achievement of Federal objectives.

In general, minor amendments to an existing preemptive program probably will not have FI. On the other hand, a significant new preemptive program may create FI.

Consult with your OGC workgroup representative and your Regulatory Steering Committee Representative or Regional Regulatory Contact to determine whether your rule preempts S/L law and has FI.

C. General FI (not addressed in A. or B. above)

We expect that the vast majority of rules determined to have FI will be rules that either have substantial compliance costs or that preempt S/L law. However, as stated earlier, there may be some rules that do not meet either of these thresholds yet you still determine have FI. This determination requires a judgment call.

As with preemptive rules in general, minor amendments to an existing program probably will not have Federalism implications. On the other hand, a significant new program may have Federalism implications. Consult with the attorney assigned to your rule and your Regulatory Steering Committee Representative or Regional Regulatory Contact (RRC).

1.3 What do I do if my rule has FI ?

A. All rules with FI

If you determine that your rule has FI under any of the three thresholds that are summarized above in part 1.2, then the following general policymaking criteria apply to your rule:

- With respect to Federal statutes and regulations administered by the States, grant the States the maximum administrative discretion possible;

- Encourage States to develop their own policies to achieve program objectives and to work with appropriate officials in other States;

- Where possible, defer to the States to establish standards;

- In determining whether to establish uniform national standards, consult with appropriate S/L elected officials or their representative national organizations as to the need for national standards and any alternatives that would limit the scope of national standards or otherwise preserve State prerogatives and authority; and

- Where national standards are required by Federal statutes, consult with appropriate S/L elected officials or their representative national organizations, prior to proposal, in developing those standards.

- If you are limiting the policy discretion of S/L governments in formulating or implementing the policy, then:

    - Carefully assess the necessity for such action. To the extent practicable, consult with S/L elected officials or their representative national organizations before implementing such action;

    - Only take the action if there is constitutional and statutory authority for the action and the national activity is appropriate in light of the presence of a problem of national significance; and

    - If you are uncertain as to whether national action is authorized or appropriate, consult with S/L elected officials or their representative national organizations to determine whether Federal objectives can be attained by other means.

Finally, if your rule has substantial compliance costs or preemption, go to the next paragraph (1.3 B). If your rule doesn't have substantial compliance costs or preemption, then under EPA policy you should consult to the extent practicable with either elected officials or other representatives of S/L governments (such as your professional counterparts). At a minimum, you should consult with the Big 10.
The Big 10 offers the largest constituencies of elected and senior appointed officials in S/L government and are considered "representative national organizations" for purposes of the EO 13132. (The exception is ECOS, which is not comprised of elected officials.) As with all rules, discuss Federalism in your preamble.

B. Rules with FI and substantial compliance costs or preemption

The following are additional requirements that apply if your rule has FI because of substantial compliance costs not expressly required by statute or covered by federal funds, or if your rule preempts S/L law and has FI[5]. For any such rule, the EO, Administration policy, and EPA policy direct you as follows:

- Consult with S/L elected officials or their Big 10 representative organizations

- Your consultation should be "meaningful and timely." Generally, we interpret "meaningful and timely" to mean that consultation should begin as early as possible and continue as you develop the proposed rule. This helps to ensure that S/L elected officials or their representative national organizations are given an opportunity to consider and comment on your proposed approach for the issues that are of concern to them. That is why it is important to identify, as soon as possible, any Federalism effects your action may have. If EPA substantially changes its selected approach on these issues after the proposed rule's comment period, you should let those you consulted know about the change and why you made it, as appropriate.

- In a separately identified portion of the preamble to the regulation, provide a "Federalism Summary Impact Statement", which consists of: (1) a description of the extent of the Agency's prior consultation with S/L elected officials or their representative national organizations, (2) a summary of the nature of their concerns and the Agency's position supporting the need to issue the regulation, and (3) a statement of the extent to which the concerns of S/L elected officials or their representative national organizations have been addressed.

- If your draft final rule is subject to OMB review under EO 12866, you must include in the package you send to OMB a **Federalism Certification Form** signed by EPA's **Designated Federalism Official** (the AA for the Office of Policy, Economics and Innovation) that EPA has met the requirements of the Order in a meaningful and timely manner in promulgating the rule.

Process for Federalism certification: For Tier 1 & 2 rules, OPEI's Regulatory Management Division (RMD) will generate the Federalism Certification Form in preparation for the Final Agency Review meeting and coordinate signature by the Designated Federalism Official. For Tier 3 rules, the Regulatory Steering Committee Representative or Regional Regulatory Contact will send the rule and an unsigned certification form to RMD when the rule is ready for certification and submission to OMB.

When submitting a draft final regulation to OMB for review, you must provide a copy of any formal policy-related correspondence from S/L elected officials or their representative national organizations, and must, upon request, make available a copy of any other written communications submitted to the agency by

[5] Preemption may cause the FI, or be in addition to any FI the rule otherwise has.

S/L elected officials or their representative national organizations.

The table in part 1.5 of this guidance shows where each of these requirements fits within EPA's process for developing regulations.

1.4 What do I do if my rule does *not* have FI?

The answer to this question depends on whether your rule has any adverse impacts on S/L governments that are above a minimal level.

A. No FI, but your rule has more than minimal adverse impacts on S/L governments

Even if your rule does not have FI, if it has any adverse impact on S/L governments above a minimal level, then you are subject to EPA's consultation requirements. In the spirit of EO 13132, it is EPA's policy to promote communications between EPA and S/L governments and solicit input from S/L government representatives when developing a regulation that will have any adverse impact above a minimal level on S/L governments. This internal policy is broader than EO 13132. It is EPA policy that, at a minimum, you:

- consult early, to the extent practicable given the nature and the timing of the action, with appropriate S/L government representatives. These can be elected officials, their representative national organizations, or your professional counterparts; and,

- discuss briefly in the preamble to your rule why the Order did not apply, any consultation that occurred, the nature of S/L government concerns, and how you addressed those concerns or why EPA decided not to implement the changes suggested.

B. No FI, and your rule does not have more than minimal adverse impacts on S/L governments

There are no special requirements or policies that apply to your rule, other than to discuss briefly in the preamble to your rule why the Order did *not* apply. Also, follow the steps that part 1.5 below identifies as applying to all rules.

1.5 What steps do I need to follow for my rule?

EPA's existing rulemaking process will serve as the vehicle for identifying Federalism impacts and complying with the Order.[6]

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[6] If you're not familiar with EPA's rulemaking process, you can refer to the 2008 Action Development Process Guidance. The 2008 guidance is posted on the Intranet at "intranet.epa.gov/adplibrary". Click on "Action Development Process." Alternatively, you can call your Regulatory Steering Committee Representative, Regional Regulatory Contact, or OPEI's Regulatory Management Division, 202-564-5480, for information.

The table that follows (pages 12-18) shows you where in EPA's regulatory process you comply with the Order's requirements and EPA policy. The table includes all the requirements discussed up to this point in this guidance.

Table for Rules: What To Do for Federalism at each Step in EPA's Regulatory Process

How to use this table

Λ After you determine whether your rule has FI, it will fall into one of the five categories below. Pick the category that fits your rule. Look for that category, or the word "all," in the table on the next page to see the Federalism procedures that apply to your rule at each step of EPA's regulatory process.

Category	Description	Where it was discussed in guidance
A	**Federalism implications/cost impacts.** Rule has FI because it is likely to result in expenditures by State and/or local governments, in the aggregate, of $25 million or more in any one year, or it might impact small governments (populations of 50,000 or less) at 1% or more of their revenues and the rule is not specifically and explicitly compelled by statute without the use of any discretion by EPA and federal funds are not available to cover the S/L governments' compliance costs for the rule.	Part 1.2A (Thresholds) Part 1.3A & B (Requirements)
B	**Federalism implications/preemption**. Rule has FI either because of, or in addition to, the rule's preemption of S/L law.	Part 1.2B (Thresholds) Part 1.3A & B (Requirements)
C	**Federalism implications/general.** Rule has FI because it meets the general definition of FI in the Order, but not because of cost impacts with preemption.	Part 1.2C (Thresholds) Part 1.3A (Requirements)
D	**No Federalism implications/more than minimal impacts.** Rule doesn't have FI, but has some adverse impact above the minimal level on S/L governments.	Part 1.4A
E	**No Federalism implications/only minimal impacts.** Rule doesn't have FI, and has no adverse impacts that are above a minimal level on S/L governments.	Part 1.4B

Important abbreviations in this Table

DFO = EPA's Designated Federalism Official (the AA for the Office of Policy, Economics and Innovation)

SLEO/RNOs = "State and local [elected] officials," which the Order defines and limits to **<u>s</u>tate and <u>l</u>ocal government <u>e</u>lected <u>o</u>fficials** *or* their **<u>r</u>epresentative <u>n</u>ational <u>o</u>rganizations.** For purposes of this EO, representative national organizations refers to the Big 10. Attachment C of this guidance includes a contact list.

SLG Reps = State and local government representatives. We are using this term to refer to non-elected representatives of State and local governments, such as our professional counterparts.

Regulatory Development Step...	**Category to which it applies.....**	**Prior to proposal, the following Federalism activities apply.**	**If you have a Final Rule, the following Federalism activities apply.**
Tiering	All	This first step of the rulemaking process begins with filling out an "Action Information Form" (also called the "Tiering Form"). The form will prompt you to identify if your rule will have **any** adverse effect on S/L governments, including preempting S/L law to any degree. Fill out the form as well as you can at this early stage.	N/A
Workgroup convenes to develop proposal (This applies to any workgroup, whether it's a formal Tier 1 or 2 workgroup or an informal Tier 3 workgroup).	All	Consult with your program's Regulatory Steering Committee Representative *and* the attorney assigned to your rule, and OCIR about Federalism. As the workgroup plans and develops the rule, begin to determine whether the Order applies to your rule and advise OGC/ORC about **any** adverse effects you think the rule may have on S/L governments. Inform OCIR and your Regulatory Steering Committee Representative as soon as possible if you determine your rule has FI.	N/A

Regulatory Development Step...	Category to which it applies.....	Prior to proposal, the following Federalism activities apply.	If you have a Final Rule, the following Federalism activities apply.
Analytic Blueprint if your rule is Tier 1 or 2, or your office develops a Blueprint -- OR -- **"State/local Consultation Plan"** if your rule is Tier 3 and your office doesn't use a Blueprint.	A, B, C	Write down how you will consult with SLEO/RNOs. Put this in your Analytic Blueprint or in a document titled "State/local Consultation Plan." Part 1.7 has guidance on consultation. **Complete the Blueprint or State/local Consultation Plan as soon as possible after Tiering the action.** This advance planning is critical to allocate resources for your rule and to develop a realistic timeline for completing it. Begin consulting as soon as possible.	N/A
	D, E	If your rule has an Analytic Blueprint, you are encouraged to address S/L government consultation. You don't have to develop an ABP for Tier 3 rules, but a "State/local Consultation Plan" is encouraged.	N/A
Consultation	A, B	Review the Federalism policymaking criteria in part 1.3A of this guidance. Consult with SLEO/RNOs. At a minimum it is the Administration's policy to consult with the nine national organizations and ECOS, often referred to as the Big 10. The Big 10 offers the largest constituencies of elected and senior appointed S/L government officials and are considered "representative national organizations" for purposes of the Federalism EO. See Attachment C of this guidance for the list of contact persons. Your consultation should be "meaningful and timely." Generally, we interpret "meaningful and timely" to mean that consultation should begin as early as possible and continue as you develop the proposed rule to ensure S/L elected officials or their representative national organizations are given an opportunity to consider and comment on our proposed approach for the issues that are of concern to them. That is why it is important to identify, as soon as possible, any Federalism effects your action may have. If EPA substantially changes its selected approach on these issues after the proposed rule's comment period, you should let those you consulted know about the change and why we made it, as appropriate.	

Regulatory Development Step...	Category to which it applies.....	Prior to proposal, the following Federalism activities apply.	If you have a Final Rule, the following Federalism activities apply.
	C	Review the Federalism policymaking criteria in part 1.3A of this guidance. Consult to the extent practicable with SLEO/RNOs or SLG reps [EPA policy]. At a minimum, you should consult with the Big 10. See Attachment C of this guidance for the list of contacts.	
	D	**Consult** early, to the extent practicable given the nature and the timing of the action, with appropriate SLG reps. These can be elected officials, their representative national organizations, *or* your professional counterparts.	
	E	This step does not apply to your rule.	
Drafting Preamble - Federalism Discussion	A, B	After consulting with SLEO/RNOs, OMB "strongly recommends" that you develop a preliminary "Federalism summary impact statement"(FSIS) to include in a separately identified portion of the preamble. The FSIS should have the following: (1) A description of the extent of the Agency's prior consultation with SLEO/RNOs; (2) A summary of the nature of their concerns; (3) The Agency's position supporting the need to issue the rule; and (4) A statement of the extent to which the concerns of SLEO/RNOs elected officials have been met.	Finalize the FSIS you developed for your proposed rule, addressing each of the four points.
	C, D, E	EPA policy: briefly summarize whether the EO applies, any consultation that occurred, the nature of S/L government concerns, and how you addressed them.	

Regulatory Development Step...	Category to which it applies.....	Prior to proposal, the following Federalism activities apply.	If you have a Final Rule, the following Federalism activities apply.
Final Agency Review OR other closure process for Tier 3 rules	A, B	In the preamble you send to your workgroup, include the FSIS you developed. If OCIR requests, you should also send them the rule for review prior to signature.	In the preamble you send to your workgroup, include the FSIS you developed. If OCIR requests, you must also send them the rule for review prior to signature. If you know your rule must go to OMB for review under EO 12866, you must get a Federalism Certification Form signed by EPA's Designated Federalism Official. See the following step concerning OMB review.
	C, D, E	In the preamble you send to your workgroup, include a discussion of Federalism. If OCIR requests, you must also send them the rule for review prior to signature.	
For Rules that will have OMB Review under EO 12866: Federalism Certification and Submission Requirements	A, B	N/A. No Federalism certification is required for proposed rules, and no Federalism-specific submission requirements apply.	You must include a Federalism Certification Form signed by EPA's Designated Federalism Official (the AA for OPEI) in the package that you send to OMB for review. For Tier 1 & 2 rules, OPEI's Regulatory Management Division (RMD) will generate the Federalism Certification Form in preparation for the Final Agency Review meeting. RMD will coordinate signature by the Designated Federalism Official. For Tier 3 rules, the Regulatory Steering Committee Representative or Regional Regulatory Contact will send the rule and an unsigned certification form to RMD when the rule is ready for certification and submission to OMB. You must also give OMB a copy of any formal policy-related correspondence from SLEO/RNO officials and, on request, a copy of any other written communications sent to EPA by SLEO/RNO officials.

Regulatory Development Step...	Category to which it applies.....	Prior to proposal, the following Federalism activities apply.	If you have a Final Rule, the following Federalism activities apply.
	C, D, E	These categories don't need Federalism certification, and no Federalism-specific submission requirements apply.	
Action Memo Applies to rules for the Administrator's signature	All	Summarize your consultation, and give an assessment of any reactions you received about your rule or the adequacy of your consultation on the proposed rule from S/L governments, OMB, or OCIR.	Same as proposal. If EPA's Federalism Official certified your final rule, for category A or B rules that OMB reviewed under EO 12866, state that too.
Workgroup Reconvenes after Proposal This applies to a formal Tier 1 or 2 workgroup, or an informal Tier 3 workgroup.	All	N/A	If EPA substantially changes its **selected** approach on these issues after the proposed rule comment period, you should explain these changes in the preamble to the final rule.

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1.6 What help and participation can I expect from OCIR as I develop my rule?

OCIR is EPA's principal point of contact for Congress, States and local governments. It is also the coordination point for other EPA offices and officials to interact with these entities. OCIR staff can help you assess issues of concern to other government entities, identify interested government officials, suggest ways for achieving their education and involvement, tailor information about rules for S/L government audiences, and develop and implement consultation plans. OCIR also can provide information about the various national associations representing S/L elected officials and governments, their membership and how to contact them. **Make sure you contact OCIR, through your Regulatory Steering Committee representative, regarding your plans to consult with elected S/L officials pursuant to the EO.**

As part of EPA's Regulatory Steering Committee, OCIR will be reviewing Tiering forms, Regulatory Agenda entries, and other reports to identify rules in which they want to participate. You are encouraged to contact OCIR about any help they can give you as you plan or conduct your consultation.[7]

It's important that you give OCIR timely information they may request, such as drafts of consultation plans or draft Federalism Summary Impact Statements, and that you carefully consider and respond, as appropriate, to their comments at the earliest stages of rulemaking. Here's a summary of the stages in the rulemaking process where you will interact with OCIR:

[7] OCIR's Regulatory Steering Committee Representative is available to assist with your outreach to EPA's intergovernmental partners. To see an updated list of Regulatory Steering Committee Representatives or Regional Regulatory Contacts, go to "intranet.epa.gov/adplibrary" and click on "Regulatory Steering Committee."

Step	OCIR Participation on Rules
Tiering ...	OCIR may participate on your workgroup either as an active member or through a "side agreement" that asks the lead office to forward its consultation plan to OCIR. OCIR should participate in all rules that have FI. If you can't make an FI determination at the tiering stage, and for many rules you won't be able to, **inform OCIR's Regulatory Steering Committee Representative as soon as you determine your rule has FI.**
Analytic Blueprint/-Consultation Plan	OCIR may review your consultation plan and give you comments.
Final Agency Review (Tier 1 and 2 rules only)	If OCIR participates on your Tier 1 or Tier 2 workgroup, they will participate in Final Agency Review of your rule. Like all participating offices, OCIR will be asked to concur, concur with comment, or non-concur on the draft rule and preamble. If they non-concur, you should include their comments in the Action Memo you send the Administrator or the memo you send to your AA requesting his/her signature on your rule.
OMB Review under EO 12866	Under EO 13132, EPA's Designated Federalism Official [the AA for OPEI] must certify each final rule with FI that will be reviewed by OMB. OPEI will notify OCIR whenever a rule is certified.

1.7 About consulting with S/L elected officials...

EO 13132 is not meant to replace one type of outreach or interaction with another. Rather, it puts a strong emphasis on engaging elected officials or their representative national organizations. To this end, most existing techniques and practices are still useful. And, as stated earlier, you should continue to work with your S/L professional counterparts. But the challenge here is expanding the venues to encourage and highlight involvement by elected officials.

Why consult?

Consulting with officials from other levels of government:

- informs EPA about potential impacts on S/L governments and, therefore, helps us develop regulations that will work better in the field. This is particularly important because S/L governments carry out most of the day-to-day administration of many national environmental programs. Local governments often both manage environmental activities and operate regulated entities, such as waste and drinking water treatment facilities.

- can also help EPA develop proposed regulations that reflect approaches used in existing S/L government programs, taking advantage of existing mechanisms and lessons learned.

How much consultation is enough?

EPA's general policy is that the amount and type of intergovernmental outreach and consultation for a rule should be commensurate with its estimated impacts on S/L governments, its complexity, and the level of interest in the issues involved. This policy focuses the most extensive outreach and intensive consultation efforts on those regulations of greatest interest to, and potential effect on, S/L governments.

Recognizing that S/Ls are often in a better position than EPA to identify the potential political and resource implications of regulations EPA is considering, you are strongly encouraged to consult with potentially affected S/L leaders or their national organizations before deciding how much consultation would be appropriate and before preparing a final consultation plan. Consultation is especially important at key points in the process, such as just prior to options selection. OCIR can help you to determine appropriate levels of consultation.

For rules with FI as defined under the Order, at a minimum you should consult, to the extent practicable, with each of the relevant representative national organizations in the Big 10. You should also inform OCIR of any contacts you have with these organizations. See Attachment C for White House direction on consultation and a list of contacts for the Big 10.

How do I communicate with elected officials?

You should carefully consider what information to prepare and send to S/L government stakeholders. Information can serve two purposes: to promote understanding of what EPA is planning and why; and, to foster participation of these officials in the rulemaking process.

The Agency has a number of routine means to alert the public – including elected officials – that EPA is developing regulations. **EPA's Action Initiation List,** a web-based roster of regulatory actions that are entering the beginning stages of development, is made available to the public each month. http://www.epa.gov/regulations/documents/ail-epa Twice a year, EPA publishes the *Unified Agenda of Regulatory and Deregulatory Actions*, which describes EPA's planned rulemakings, indicates which rules are likely to have FI, and gives schedules for proposed and final rules.

In general, you will need to design information specifically for S/Ls needs and interests. You can begin your consultations with limited, preliminary information and provide more data as it becomes available. S/L government officials suggest that materials designed for them should be in plain language and, to the extent such information is available:

- Describe clearly the problem the rule is intended to address
- Explain the basis for determining there is a problem
- Indicate whether the problem is regional or national in scope
- Explain how the rule will improve on present conditions
- Identify who will benefit from the rule
- Identify what facilities or operations will be subject to the requirements
- Explain whether and how the benefits of the rule can be measured
- Identify who will be required to pay for the rule
- Provide cost information, such as cost per unit of compliance, cost to various sizes of governments, and cost versus benefits to be achieved
- Explain any flexibility in the rule that would allow for adjustments to local conditions or circumstances.

Some of this information will not be available until later in the development of a proposed rule. You can, however, begin your consultations with less than complete information and provide updates as more information becomes available.

Be sure to involve your OGC workgroup member when discussing these approaches in your outreach and consultation plans. You will need to be aware of any legal requirements, e.g., the Paperwork Reduction Act, that may apply to your approach and ensure your outreach and consultation activities are consistent with the law.

What types of consultation should I consider?

EPA officials can meet with external parties throughout the regulation development process. You should explore a variety of approaches for involving S/L government officials in developing a regulation – including one-on-one discussions, public meetings, and interest group forums.

Be sure to involve your OGC workgroup member when discussing these approaches in your outreach and consultation plans. You will need to be aware of any legal requirements that may constrain your approach and ensure your outreach and consultation activities are consistent with the law.

Does the Federal Advisory Committee Act (FACA) apply to consultations with S/L government representatives?

Under UMRA's FACA exemption, FACA does not apply to meetings that are "exclusively between federal officials and elected officials of S/L governments (or their designated employees authorized to act on their behalf) acting in their official capacities [if the] meetings are solely for the purposes of exchanging views, information, or advice relating to the management or implementation of federal programs established pursuant to public law that explicitly or inherently share intergovernmental responsibilities." [UMRA 204(b)].

OMB has construed this UMRA exemption broadly and has applied it to the Order: "This exemption applies to meetings between Federal officials and employees and State, local, or tribal government, acting through their elected officers, officials, employees, and Washington representatives, at which views, information, or advice are exchanged concerning the implementation of intergovernmental responsibilities or administration, including those that arise explicitly or implicitly under statute, regulation, or Executive Order. The scope of meetings covered by the exemption should be construed broadly to include any meetings called for any purpose relating to intergovernmental responsibilities or administration. Such meetings include, but are not limited to, meetings called for the purpose of seeking consensus; exchanging views, information, advice, and/or recommendations; or facilitating any other interaction relating to intergovernmental responsibilities or administration.[8]

Do I need to keep records of Federalism consultations?

Yes. You should keep good records of all consultation activities that you undertake related to the Order, and place them in the docket at the conclusion of the rulemaking. This helps to readily document compliance in the event of questions, either from EPA's Designated Federalism Official, OCIR, or from OMB.

What issues are most likely to be of interest to elected officials?

These are typical interests elected officials have expressed to EPA. They are concerned about rules that:

- Require money in the budget for program implementation;
- Require the S/L government to comply as a regulated party;
- May interfere with long standing divisions of responsibilities between levels of government;

[8]OMB's Guidance on Implementing Federalism, p.6. Available on the intranet at "intranet.epa.gov/adplibrary". Click "Statutes and Executive Orders".

- Appear to direct one single method of accomplishing a particular environmental objective;
- Impact industry or employment in the state or locality;
- Impact land use in the state or locality; and
- Raise controversial issues

What should be in a consultation plan?

The consultation plan will serve as the road map for implementing your outreach activities. See Attachment E for suggestions and recommendations in developing your plan.

Other sources of help

Rulewriters. Contact your office's Regulatory Steering Committee representative or Regional Regulatory Contact. You may also contact OPEI's Regulatory Management Division (RMD), (202) 564-5480, for general information about the EO 13132 and for help integrating consultation efforts into the regulatory development process. RMD supports the Agency's Designated Federalism Official and submits packages to OMB under the Order. Finally, OCIR has ongoing involvement with the Big 10 and other officials. They can help you throughout the consultation process, from planning to implementation.

Attorneys. If you have questions, contact OGC's Cross-Cutting Issues Law Office at (202) 564-7622 and ask to speak to the lead attorney for Federalism.

1.8 How will EPA ensure compliance with the Order?

OPEI will gather the following information as we prepare EPA's semi-annual Regulatory Agenda:

1. A listing of all rules that will have **any** adverse effect on S/L governments above a minimal level;
2. A listing of all rules under development with FI;
3. The status of Federalism consultation plans (e.g., under development, consulting with OCIR, etc.); and
4. Any reported problems in carrying out the consultation plan that may affect the Designated Federalism Official's ability to certify that EPA has met the requirements of the order in a meaningful and timely manner.

OPEI will provide reports and a summary of any issues and recommended actions to the Designated Federalism Official, who has principal responsibility for EPA's implementation of the Order.

Part 2 - Legislative Comments or Proposed Legislation

2.1 How does the Order apply to proposed legislation or legislative comments submitted by EPA?

The Order defines, "**policies that have federalism implications"** as including *legislative comments or proposed legislation* that have *substantial direct effects* on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

Accordingly, if EPA is submitting official agency legislative comments or proposed legislation to Congress or OMB, and the comments or proposed legislation have FI, the general policymaking criteria provided in Section 3 of the Order would apply (see part 1.3 of this guidance for a list of those criteria).

In addition, Section 5 of EO 13132 contains "Special Requirements for Legislative Proposals." It says that *agencies shall not submit to the Congress* legislation that would:

- directly regulate the States in ways that would interfere with functions essential to the States' separate existence or be inconsistent with the fundamental Federalism principles;
- attach to Federal grants conditions that are not reasonably related to the purpose of the grant; or
- otherwise preempt State law, unless such preemption is consistent with the Federalism policies in the Order, and unless a clearly legitimate national purpose, consistent with the Order's Federalism policymaking criteria cannot otherwise be met.

EPA is interpreting these provisions as applying to proposed legislation or legislative comments *that are official Agency positions with Administration clearance*. At EPA, OCIR is the Agency's principal point of contact with Congress, and has responsibility for developing and implementing the legislative agenda of the Agency.

Legislative comments or proposals that would fall within the scope of the Order are typically those on which OCIR has worked with all Agency offices to develop and/or draft, has worked with other departments and agencies within the Executive Branch to obtain Administration-wide concurrence and clearance through OMB, and has communicated to Congress.

As an example, if a Congressman or Senator has draft legislation he or she is planning to introduce, and sends a letter to the Administrator or an Assistant Administrator asking for *the Agency's position* on that legislation, our legislative comments on that bill potentially would be subject to the requirements of Sections 3 and 5 of the Order. Similarly, if a Congressman or Senator asks EPA to submit draft legislation to him or her for consideration, this potentially would be subject to the Order.

As with draft final rules that are subject to OMB review under EO 12866, when OCIR transmits to OMB for clearance any proposed legislation that has FI, OCIR must include a Federalism Certification Form signed by EPA's Designated Federalism Official that states EPA has met the requirements of the Order. In this case, the certification would be stating we have met the "Special Requirements for Legislative Proposals" contained in the Order.

Within EPA, the responsibility for determining whether there are FI and following the Order's requirements falls on the office that has the lead for drafting the substance of the draft legislation or legislative comments. The lead office should work closely with its OGC or ORC attorneys.

2.2 Does the Order apply when EPA provides comments to another agency on its draft legislation or provides technical assistance to congressional staff?

No. Responding to another agency's request for comments on its draft legislation or testimony would *not* be subject to the Order, as these are *not* comments *submitted by EPA* to Congress. The duty to determine whether there are any FI for the draft bill or legislative comments falls upon the agency that is submitting the bill or comments.

Similarly, responding to a Hill staffer's request for technical assistance on how to craft or word a bill would *not* be subject to the Order, as EPA is merely responding to the request for technical assistance, not submitting to Congress draft legislation or official agency legislative comments.

Part 3 - Other Policy Statements or Actions

3.1 Are EPA's policy statements, guidance documents, and similar actions covered by EO 13132?

EO 13132 applies to regulatory policies that have FI, which includes policies, guidelines, guidance, and interpretive documents ("guidance documents"). In general, EPA's guidance documents **do *not establish* legally binding requirements,** and thus, they probably will *not* have FI. If the guidance document doesn't establish any legally binding requirements, then it won't have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government." Nonetheless, EPA's internal policy on consultation with S/L governments may apply to your guidance document. See part 3.3 below.

3.2 What consultation should take place if my policy statement, guidance document, or similar action contains legally binding requirements?

Regardless of what it is called, if your document ***does* establish legally binding requirements,** you must determine in consultation with your program's Regulatory Steering Committee Representative and the OGC workgroup member whether your document has FI. Guidance documents that establish legally binding requirements are subject to the same FI analysis and consultation provisions that rules are subject to, as discussed in part 1 of this guidance. As with rules, the only clear-cut thresholds for FI are cost impacts on S/L governments (that is, whether your action either imposes $25 million or more in costs on State and/or local governments in any one year, or will impact small governments at or above 1% of their revenues).[9] As a reminder, applying the threshold for preemption and FI should be done with assistance from OGC.

3.3 An important note about EPA's internal policy on consulting with S/L governments on certain documents...

As noted in 3.1, EPA's guidance documents generally do not establish legally binding requirements and will not have FI. However, some guidance documents, while not

[9] In general, grant guidelines do not have FI under the substantial cost threshold (see part 1.2A) because conditions of federal assistance are excluded from the definition of federal intergovernmental mandate under Section 421(5) of UMRA. But you still need to determine whether your guideline meets any of the thresholds for determining FI (see part 1.2 B and C).

establishing legally binding requirements or FI, still may address matters *likely to be of significant interest* to S/L governments. While many EPA guidance documents are of *some* interest to S/L governments, we refer here to non-binding guidance documents or policy statements that may result in a higher level of interest to S/L governments because, for example, they announce for the first time how EPA is planning to address a significant environmental problem nationally and S/L governments may view our plan as having significant implications for them. Determining if your guidance document meets this threshold is a judgment call you should make in conjunction with your Regulatory Steering Committee Representative or Regional Regulatory Contact.

If your guidance document is likely to be of significant interest to S/L governments...

Even if your guidance document is exempt from EO 13132 because it doesn't have FI, in the spirit of EO 13132, and consistent with EPA's objective of promoting communication between EPA and S/L governments, EPA's policy is to solicit input from S/L officials on those guidance documents that are *likely to be of significant interest* to S/L governments. If you determine your guidance document meets this threshold, then EPA's policy is to:

- **Consult** early, to the extent practicable, given the nature and the timing of the action, with appropriate S/L government representatives. These can be elected officials, their representative national organizations, **<u>or</u>**, your professional counterparts. At a minimum, notify each of the Big 10 organizations (see part 1.7 of this guidance) and consult with them if they so desire; and

- **Discuss** briefly in your document any consultation that occurred, the nature of S/L government representatives' concerns, and how you addressed those concerns or why EPA decided not to implement suggested changes.

Part 4 - Adjudications

How will I know if my adjudication is subject to the Order?

Section 4 of the Order establishes requirements for adjudications *that preempt S/L law.* An adjudication is any agency's process for formulating an order. An order is the whole or part of a final agency action that is *not* a rulemaking, whether affirmative, negative, injunctive, or declaratory in form. Examples of some EPA orders are applicability determinations, administrative orders, permits, licenses, and registrations.

In general, EPA's adjudications do not preempt S/L law. To the extent the S/L law is preempted, it is the statute or regulation that affects the preemption. Thus, the requirements of Section 4 of the Order generally do not apply to EPA's adjudications. If you have questions about the applicability of Section 4 to your adjudication, consult with the attorney assigned to your action.

Part 5 - Waivers

What does the Order require for waivers?

Section 5 of EO 13132 contains requirements that apply to applications submitted to EPA by S/L governments seeking to waive some or all of the statutory or regulatory requirements that apply to them. These are the same requirements that previously were contained in EO 12875.

Specifically, if the authorizing statute gives EPA discretion to waive some or all of the statutory or regulatory requirements as applied to S/L governments, EO 13132 requires EPA, to the extent practicable and permitted by law, to:

- Consider any application by a S/L government for a waiver of statutory or regulatory requirements with a general view toward increasing flexible policy approaches at the S/L level, to the extent that the proposed waiver is consistent with applicable Federal policy objectives and is otherwise appropriate;

- Issue a decision within 120 days of receipt of a complete waiver application; and

- Provide timely written notice of the decision and rationale in the event that EPA denies any such waiver application.

Attachments

- Attachment A -

Guidance for Implementing the Federalism "1% Test"

Introduction

EPA's Guidance on Executive Order 13132, "Federalism", identifies various triggers for determining Federalism implications:

> "...[I]f the impact of your rule on small governments is likely to equal or exceed 1% of their revenues, then as a policy matter, EPA will conclude the rule also has Federalism implications..."

This document serves as a starting point in the implementation of the Federalism 1% test by providing Agency analysts a consistent framework for carrying out this analytical test. In order to provide meaningful advice to analysts, this document incorporates a number of working assumptions. As the Agency gains experience applying the Federalism 1% test, the approach presented here will be revisited and revised if necessary.

Applying the Federalism 1% Test

Before presenting guidance on implementing this test, at least one caveat is in order. The language contained in the Federalism Guidance suggests an "aggregate" test – the analyst should calculate total annualized costs as a percent of total revenues for the local governments that must conform to the rule. The "aggregate" test does not consider any information on the distribution of impacts among the small governments. The impacts may be very small for a majority of the small governments, but hit a number (probably the smallest of the small due to economies of scale) of small governments very hard without triggering Federalism implications. No single test can capture all situations of concern. Therefore, the analyst is encouraged to develop information that will signal other possible scenarios that may provide enough concern to warrant consultation with representatives of small governments.

The following questions outline the steps analysts will need to take as they apply the Federalism 1% test.

1. ***Will any small governments be subject to the rule's requirements?***

The default definition of small government is a government of a city, county, town, village, school district or special district which serves a population of less than 50,000. This is the same definition used by the Regulatory Flexibility Act, as amended by the Small Business Regulatory Enforcement Fairness Act (RFA/SBREFA), and similar to the definition of small government in the Unfunded Mandates Reform Act (UMRA).[10]

If no small governments are subject to the rule's requirements, then the Federalism 1% test is not applicable. If there are only a few (less than 50) local governments affected by this rule, then a 1% test is not applicable. Rather, the program office should consult with a meaningful segment of these governments directly in the course of developing the rule.

2. What are the total annualized compliance costs of all small governments subject to the rule's requirements?

This cost estimate should be an aggregate measure of the annualized direct compliance costs faced by all small governments subject to the rule's requirements. In many cases, this cost estimate may already be contained in the economic impact analysis done for the rule. To the extent possible, the small government cost estimate should be based on the same assumptions (e.g., concerning a baseline, a discount rate, etc.) made in the rule's economic analysis. If there is some reason why those assumptions should be different within this analysis, the analyst should highlight the assumptions that are different and provide a detailed description of why different assumptions were made. The rulewriter then should consult with his/her program's Regulatory Steering Committee (RSC) representative or Regional Regulation Contact (RRC) and the attorney assigned to the rule. EPA's Guidelines for Preparing Economic Analysis specifies the basic, broad principles that all EPA economic analyses should embody.

In most cases, it will be necessary to use a range to represent plausible estimates of annualized direct compliance costs. This range will reflect different assumptions about the extent of the environmental problem, the ease or difficulty of achieving meaningful reductions in pollution, the costs of abatement equipment, the interest rate, the growth in population, etc. EPA's Guidelines for Preparing Economic Analysis discusses these uncertainty drivers and how best to incorporate them into analyses. The Guidelines also stress the importance of incorporating all plausible estimates. In general, the analyst will not be able to conduct appropriate Monte Carlo analyses without additional information about the underlying statistical distributions of these uncertainty drivers. Therefore, the analyst must take great care explaining and selecting ranges that capture both high and low reasonable bounds.

[10] UMRA also includes tribal governments in its definition of small government.

In order to apply the Federalism 1% test, the midpoint or "best" estimate of that range should be used. A qualitative or quantitative description of the uncertainty surrounding the midpoint or "best" estimate should accompany the results of the test. Finally, if a non-trivial portion of the range exceeds 1% of revenues, then the analyst should discuss these findings with their RSC/RRC and attorney assigned to the rule before presenting the findings to the appropriate decision maker.

Note that, consistent with the guidance for RFA/SBREFA, the Federalism 1% test will not consider the indirect impacts of a rule on small governments (e.g., social service costs rising due to a plant closure in a community). These types of impacts should be explored in the full economic analysis of a rule but are not considered when determining whether a rule will impose substantial compliance costs on small governments for purposes of Federalism, and thus be deemed by EPA as having Federalism implications.

3. What are the total annual revenues of all small governments subject to the rule's requirements?

Data on "general revenue" can be found in the Census of Governments from the U.S. Census Bureau. General revenue is made up of intergovernmental revenue plus revenue from their own sources and excludes utility, liquor store and employee retirement revenue.

It is important that the analyst include all the revenues (and costs) from the same set of communities – those that must comply with the rule. For example, demonstrating compliance with a rule (e.g., monitoring) can be costly, even if abatement activities are not needed. In these situations, the analyst should include these costs in the direct cost totals and also include the revenue of these small governments in the revenue totals. The analyst cannot count the revenues of one set of governments and the costs faced by a different set.

In situations where the number of governments that must comply with this rule is unknown, then a range of revenue estimates reflecting this uncertainty should be quantified.

4. Is the ratio of small governments' costs to revenues equal to or greater than 1%?

The statement contained in the Federalism Guidance can be rephrased as follows:

$$\text{If} \quad \frac{\text{total annualized compliance costs of all small governments subject to the rule's requirements}}{\text{total annual revenues of all small governments subject to the rule's requirements}} \; \exists 1\%,$$

then EPA concludes that the rule has Federalism implications.

- Attachment B -

OGC Flowcharts Summarizing EO 13132's Requirements

These flowcharts summarize the Federalism Executive Order. The section citations in the flowchart (for example, Section 5) refer to the text of the Executive Order, not to this guidance.

OGC Flowcharts For EPA Actions

To determine . . .	See Flowchart
if you have a rule with FI based on substantial compliance costs	1-A
if you have a rule with FI that preempts S/L law	1-B
if you have a rule with FI that doesn't meet either of the above thresholds	1-C
the requirements that apply to "policies with FI"	1-D
the requirements that apply to legislative comments or proposed legislation	2
if you have a policy statement, guidance document or similar action with FI	3
the requirements that apply to requests from S/L governments to waive some or all statutory or regulatory requirements	4

Important abbreviations in flowcharts

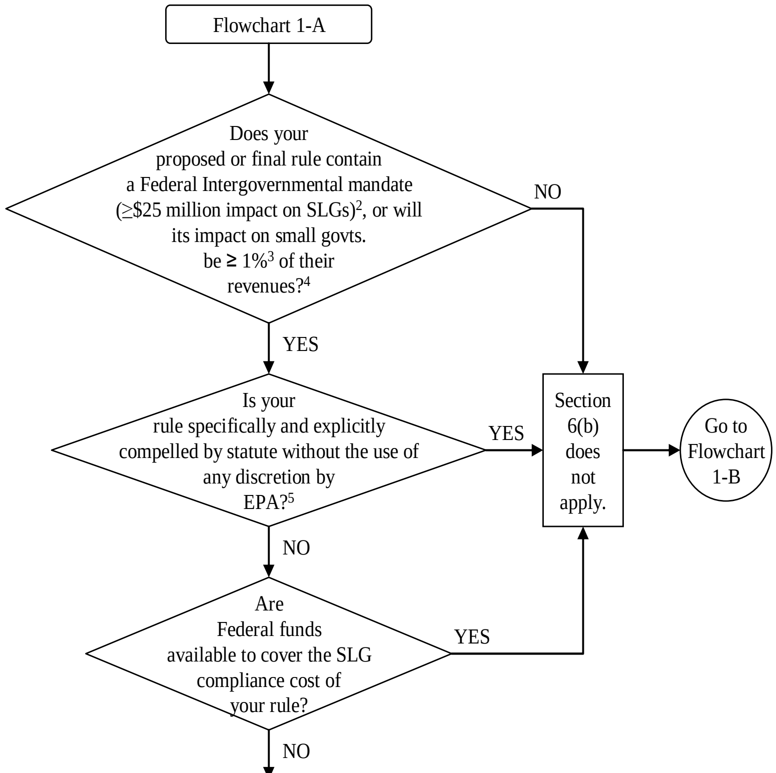
DFO = EPA's Designated Federalism Official (the AA for the Office of Policy, Economics and Innovation).

SLEO/RNOs = "State and local [elected] officials," which the Order defines as **state and local government elected officials** or their **representative national organizations**. For purposes of this EO, representative national organizations refers to the Big10. Attachment C of this guidance includes a contact list.

SLG Reps = State and local government representatives. We are using this term to refer to non-elected representatives of State and local governments, such as our professional counterparts.

Flowchart 1-A

To Determine If You Have a Rule with Federalism Implications (FI)[1]



Your rule has federalism implications.

- Refer to flowchart 1-D [summary of Sec. 3 requirements].
- Consult early with SLEO/RNOs [Sec. 6(a)]. At a minimum, you should consult with the Big 10.
- Give OMB a copy of any formal policy-related correspondence from SLEO/RNOs.
- Include Federalism Summary Impact Statement (FSIS) in preamble to rule [Sec. 6(b)].
- If rule is subject to OMB review under EO 12866, include with draft final rule the DFO's certification that EPA has met EO 13132's requirements [Sec. 8(a)].

1. Section 1(a) of EO 13132 defines "federalism implications" as "substantial direct effects on States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government."
2. If your rule contains a Federal intergovernmental mandate that may result in expenditures of $25 million or more in any one year by State and/or local governments, we consider it to have federalism implications and to impose substantial direct compliance costs under Section 6(b) of the Order.
3. For guidance on the >1% threshold for impacts on small governments, see attachment A of EPA Federalism guidance.
4. We interpret "required by Statute" in Section 6(b) of the Order to mean "specifically and explicitly compelled by statute without the use of any discretion by EPA." This is intended to be a very narrow test. While our rules generally are authorized by statute, most are not specifically and explicitly compelled by statute without the use of any discretion by EPA. Examples of rules that are "require by statue" include: if the statute says, "Use Form X," and the rule says "Use form X" and does not impose any other requirements; or if the statute says , "Set the emission limit at 100 ppm," and rule does only that.

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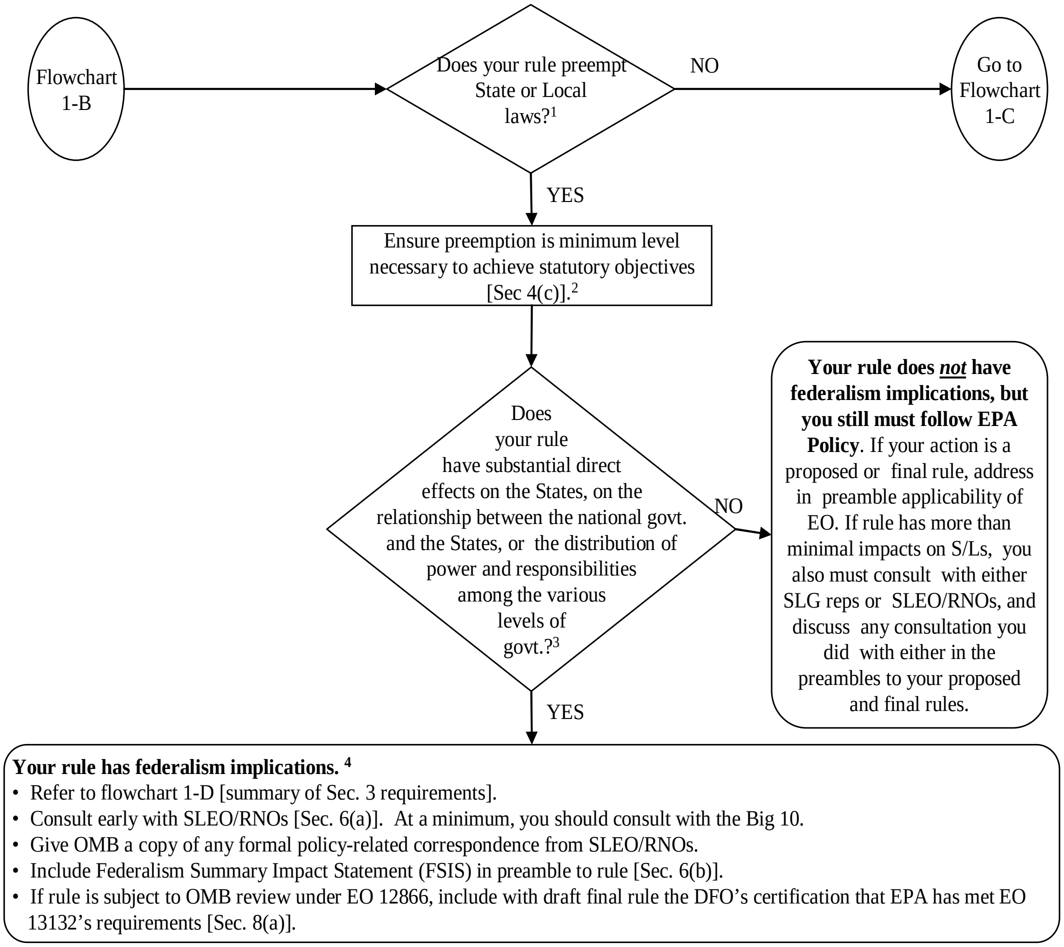
Flowchart 1-B

To Determine If You Have a Rule with Federalism Implications (FI)

(continued)



1. The question of whether your rule preempts State or local (S/L) law is a legal question. You should consult the OGC or ORC attorney assigned to your rule for a preemption determination.

2. An action may preempt S/L law in whole (e.g., States may not have any statutes or rules in an area once EPA enacts a rule in that area) or in part (e.g., States may not have any law that is less stringent than the federal law). Preemption may be: (1) express preemption—Congress' intent to preempt S/L law is stated expressly in the federal statute; (2) field preemption—Congress' creation of a pervasive system of federal regulation makes reasonable the inference that Congress left no room for S/L governments to supplement it, or Act of Congress touches a field in which the federal interest is so dominant that the federal system is assumed to preclude enforcement of S/L laws on the same subject; or (3) conflict preemption—federal and S/L law are in direct conflict, or S/L law stands as an obstacle to the achievement of federal objectives.

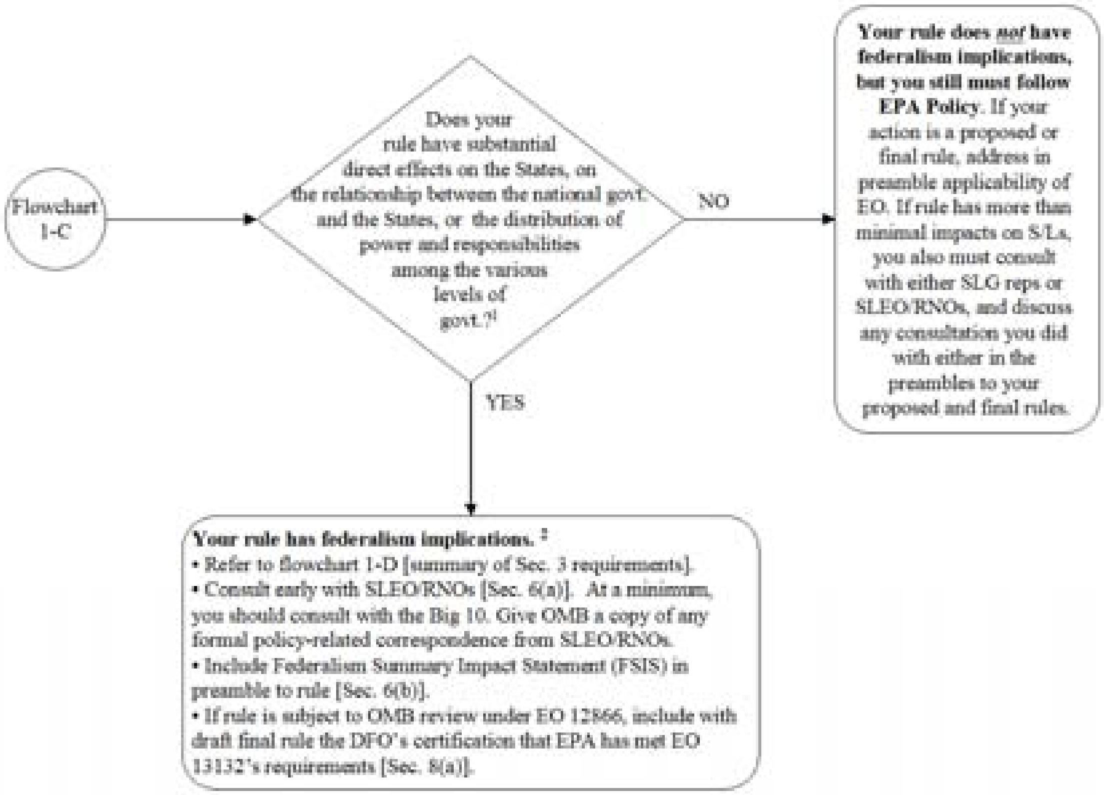
3. As shown on this flowchart, if the rule preempts S/L law to such a degree that it has federalism implications (i.e., "substantial direct effects…" [see large diamond]), or if the rule otherwise has federalism implications and also preempts S/L law, we must comply with the consultation requirements of Section 6(c). Determining whether the preemption creates federalism implications requires a judgment call. In general, minor amendments to an existing preemptive program probably will not have federalism implications. On the other hand, a significant new preemptive program may have federalism implications. You should consult with OGC/ORC and your program office's Regulatory Steering Committee representative or your Regional Regulatory Contact to determine whether the preemption creates federalism implications.

4. Determining whether a rule may have federalism implications for reasons other than compliance costs or preemption requires a judgment call. As with preemptive rules, in general, minor amendments to an existing program probably will not have federalism implications. On the other hand, a significant new program may have federalism implications. You should consult with OGC/ORC and your program office's Regulatory Steering Committee representative or your Regional Regulatory Contact to determine whether your rule may have federalism implications.

Flowchart 1-C

To Determine If You Have a Rule with Federalism Implications (FI)

(continued)



1. As shown on this flowchart, if the rule preempts S/L law to such a degree that it has federalism implications (i.e., "substantial direct effects…" [see large diamond]), or if the rule otherwise has federalism implications and also preempts S/L law, we must comply with the consultation requirements of Section 6(c). Determining whether the preemption creates federalism implications requires a judgment call. In general, minor amendments to an existing preemptive program probably will not have federalism implications. On the other hand, a significant new preemptive program may have federalism implications. You should consult with OGC/ORC and your program office's Regulatory Steering Committee representative or your Regional Regulatory Contact to determine whether the preemption creates federalism implications.

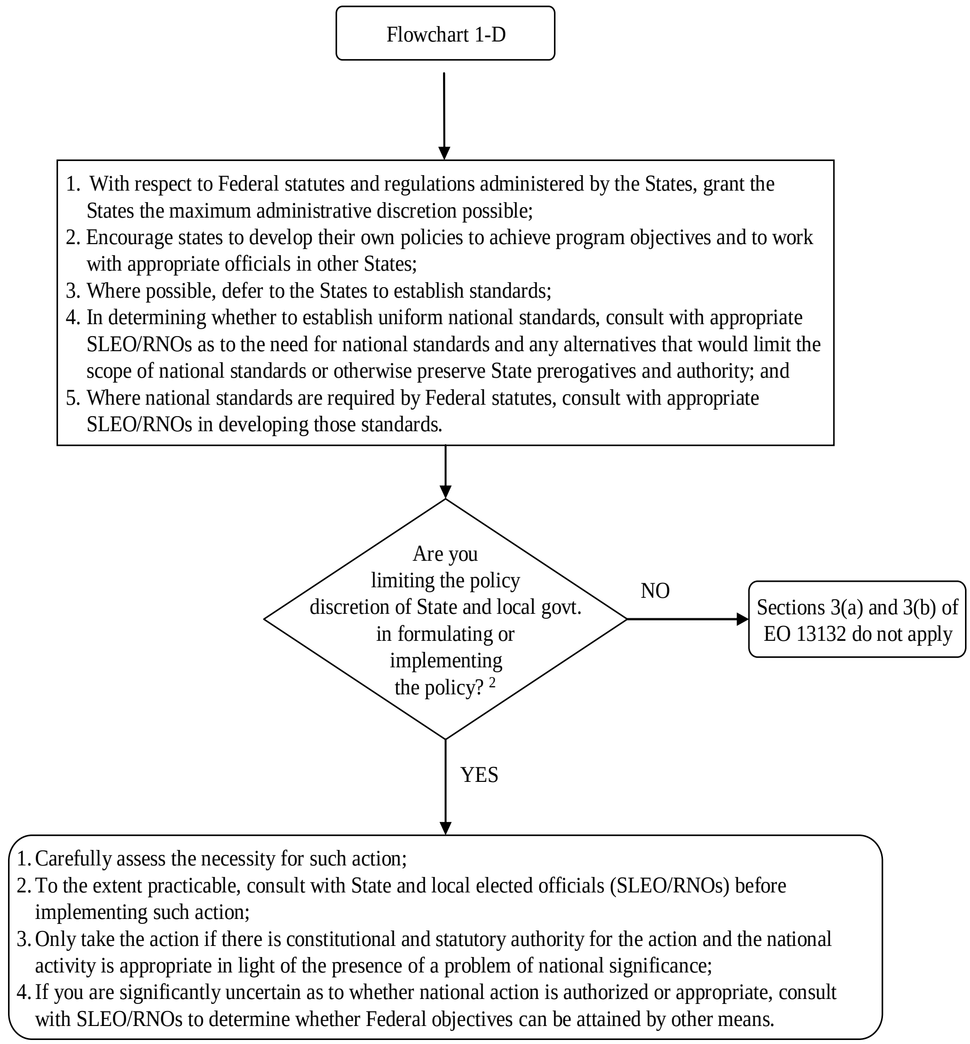
2. Determining whether a rule may have federalism implications for reasons other than compliance costs or preemption requires a judgment call. As with preemptive rules, in general, minor amendments to an existing program probably will not have federalism implications. On the other hand, a significant new program may have federalism implications. You should consult with OGC/ORC and your program office's Regulatory Steering Committee representative or your Regional Regulatory Contact to determine whether your rule may have federalism implications.

06088

Flowchart 1-D

To Determine If You Have a Rule with Federalism Implications (FI)

(continued)



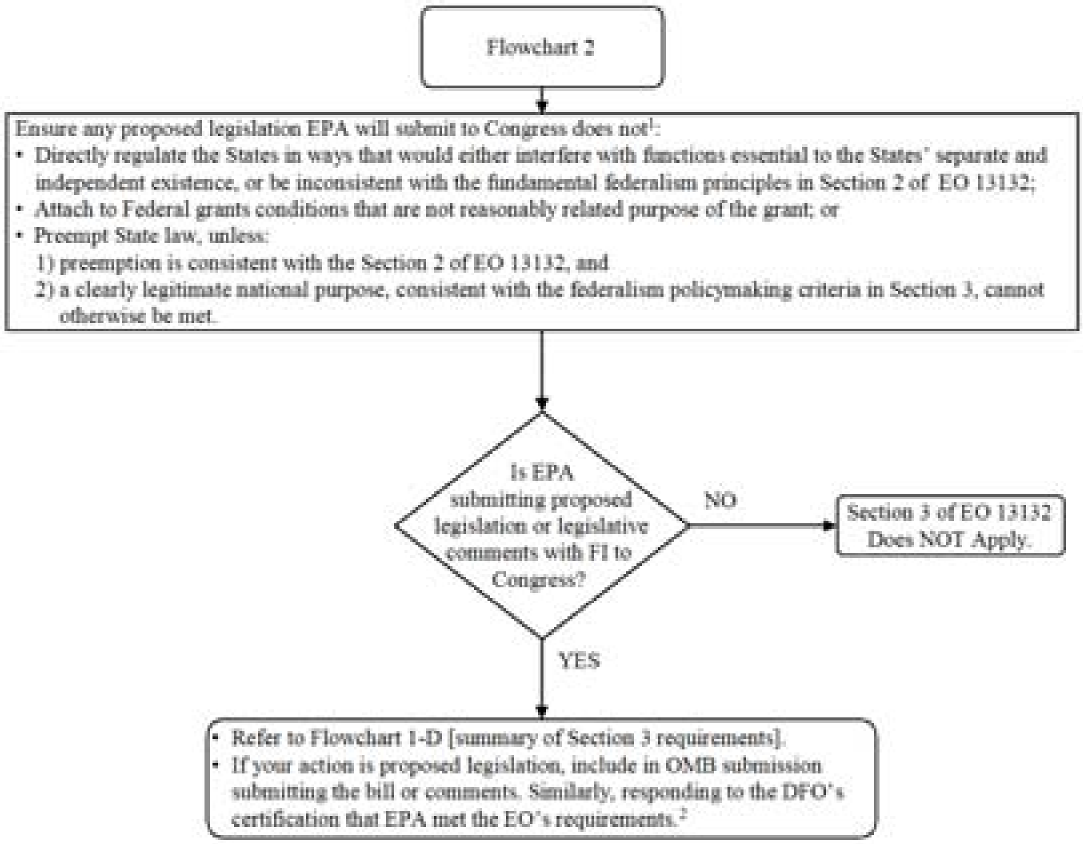
1. If you determine that your action has FI from Flowcharts 1-A, 1-B, 1-C, or 2, then the requirements of Section 3 of the Order, which are summarized here, apply. "Policies that have federalism implications (FI)" is broadly defined in the Order to include regulations, legislative comments or proposed legislation, and other policy statements or actions that have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

2. SLEO/RNOs = "State and local [elected] officials," which the Order defines and limits to state and local government elected officials or their representative national organizations. Representative national organizations for purposes of EO 13132 are the Big 10. The Big 10 offers the largest constituencies of elected and senior appointed officials in State and local government. Attachment C of EPA's interim Federalism guidance includes a contact list. At minimum, you must consult with each of these organizations if your action is a rule with federalism implications.

Flowchart 2

To Determine If You Have a Rule with Federalism Implications (FI)

(continued)



1. Official agency legislative comments or proposed legislation that have federalism implications (i.e., have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government) are subject to Section 3 of the Order (see Flowchart 1-D for summary of requirements). Section 5 also contains specific requirements that pertain to proposed legislation submitted by agencies to Congress (top box to the right).

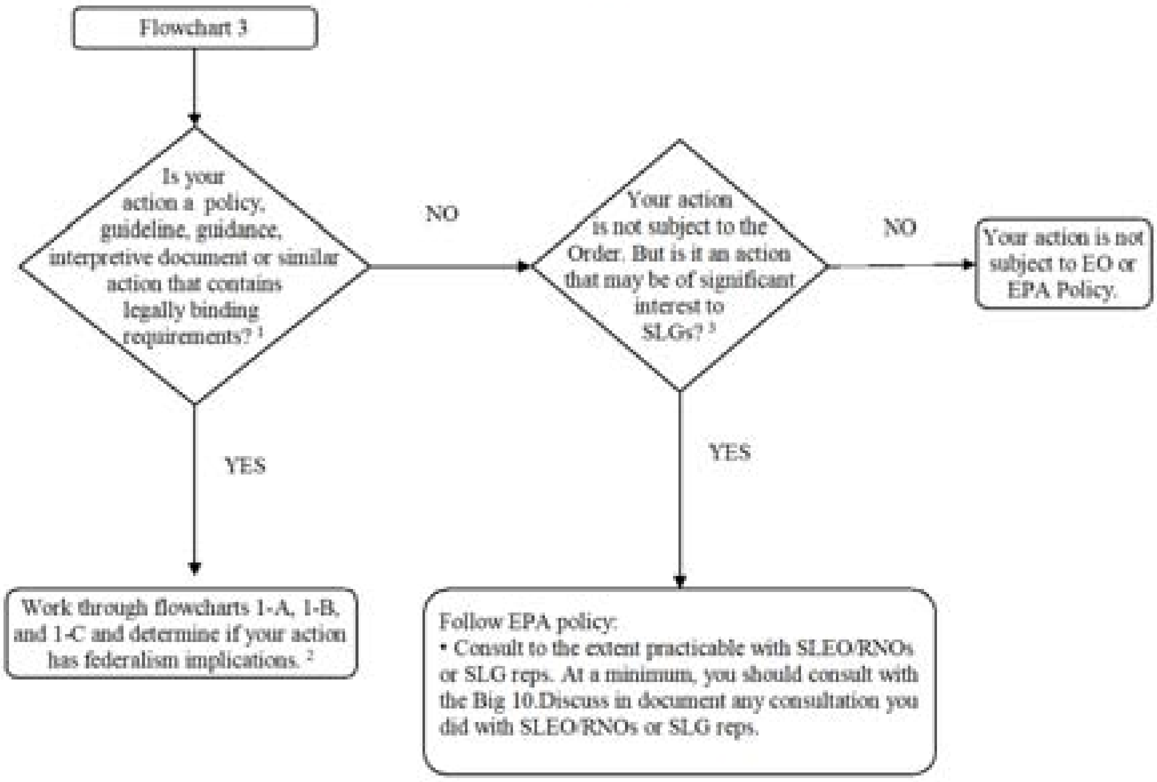
   EPA is interpreting these provisions as applying only to proposed legislation or legislative comments that are official Agency positions with Administration clearance. As an example, if a Congressman or Senator has draft legislation he or she is planning to introduce, and sends a letter to the Administrator or an Assistant Administrator Is EPA asking for the Agency's position on that legislation, our submitting proposed legislative comments on that bill potentially would be legislation or legislative subject to the requirements of Section 3 of the Order.

   The Order does not apply when you are responding to another agency's request for comments on their draft legislation or testimony, as these are not comments submitted by EPA to Congress. The duty to determine whether there are federalism implications on the draft bill.

2. EPA's legislative comments don't have to be certified.

06090

Flowchart 3
To Determine If You Have a Rule with Federalism Implications (FI)
(continued)



1. In general, EPA's policies, guidelines, guidance, interpretive documents, or similar actions ("guidance documents") do not contain legally binding requirements, and thus, they will not have federalism implications. This is because if the guidance document does not contain legally binding requirements, it will not have "substantial direct effects" on: (1) the States (the definition for "States" includes local governments); (2) the relationship between the national government and the States; or (3) the distribution of power and responsibilities among the various levels of government.

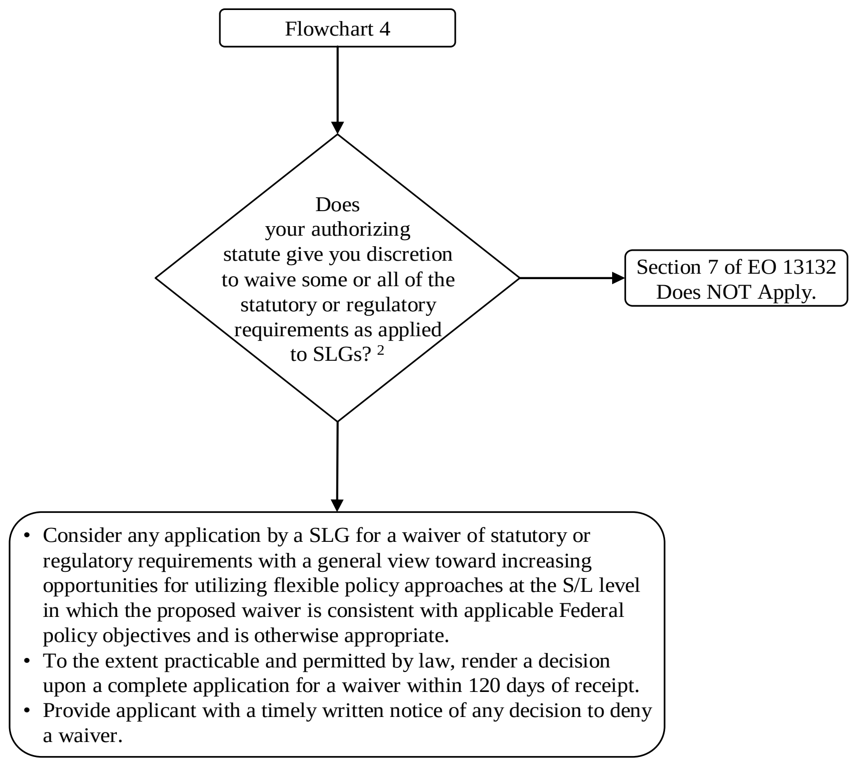
2. If your guidance document does contain legally binding requirements, it is subject to the same federalism implications analysis that rules are. Thus, you should refer to flowcharts 1-A, 1-B, and 1-C to make this determination. If you determine that your guidance document does contain legally binding requirements, and has federalism implications, it is subject to the same requirements that rules are.

3. Even if your guidance document does not contain legally binding requirements, if it may be of significant interest to SLGs, it is subject to EPA's internal policy on consultation with State and local governments.

Flowchart 4

To Determine If You Have a Rule with Federalism Implications (FI)

(continued)



1. Section 7 of EO 13132 contains requirements that apply to applications submitted to EPA by State or local governments seeking to waive some or all of the statutory or regulatory requirements that apply to them.

2. *If the authorizing statute gives EPA discretion* to waive some or all of the statutory or regulatory requirements as applied to State or local governments [e.g., Clean Air Act Section 111(d)], you must look to increase opportunities for using flexible policy approaches at the State or local level in which the proposed waiver is consistent with the program administered by EPA. See part 3.3 of EPA's Federalism guidance for details.

- Attachment C -

White House Letter on Consultation and List of "Representative National Organizations" Contacts

The White House
Washington

March 9, 2000

Mr. Donald J. Borut
Chair, Big 7 Organizations
Executive Director, National League of Cities
1301 Pennsylvania Ave, NW
Washington, DC 20004-3043

Dear Don:

Thank you for your January 13 letter making further suggestions concerning the implementation of Executive Order 13132.

We see no problem in having agency Federalism officials begin to notify and provide information to the Federalism contact person at each of the relevant Big 7 organizations, as well as the chair of the Big 7, when the agency identifies Federalism implications in a draft regulation for which consultations have not already occurred. There will, of course, be circumstances when it also would be appropriate for an agency to notify other representative national organizations of State and local elected officials.

Once this notification occurs, we would ask that each Big 7 organization promptly advise the agency's Federalism official whether it intends to provide comments on the Federalism issues presented by the rulemaking and to provide those comments as soon as possible, taking into account the length and complexity of the regulation. In order not to delay the regulatory process unnecessarily, it is the agencies' hope that concerned Big 7 organizations normally will provide those comments within three or four weeks.

The Big 7 organizations may also wish to review the semiannual Unified Agenda of Federal Regulatory and Deregulatory Actions in order to identify regulatory projects that they believe might raise FI. In this way, a concerned Big 7 organization could advise an agency's Federalism official of its potential interest in a particular regulation and facilitate early consultations.

Enclosed is our listing of Federalism officials. Please forward a list of the Federalism contact person for each of the Big 7 organizations at your earliest convenience.

Thank you again for suggestions.

Sincerely,

//// signed 3/9/00 ////

Mickey Ibarra
Assistant to the President and
Director of Intergovernmental Affairs

"Big 10" Organizations

Mr. Raymond Sheppach
National Governors' Association
444 North Capitol Street, NW
Suite 267
Washington, DC 20001
fax 202/624-5313
(staff: Beth Strobridge)

Mr. William Pound
National Conference of State Legislatures
444 North Capitol Street, NW
Suite 515
Washington, DC   20001
fax 202/737-1069
(staff: Tamra Spielvogel)

Mr. Daniel Sprague
Council of State Governments
444 North Capitol Street, NW
Suite 401
Washington, DC 20001
fax 202/624-5452
(staff: Gene Slusher)

Mr. Donald Borut
National League of Cities
1301 Pennsylvania Avenue, NW
Suite 550
Washington, DC 20004
fax 202/626-3043
(staff: Ken Rosenfeld)

Mr. Tom Cochran
U.S. Conference of Mayors
1620 Eye Street, NW
Fourth Floor
Washington, DC 20006
fax 202/293-2352
(staff: Judy Sheahan)

Mr. Larry Naake
National Association of Counties
25 Massachusetts Avenue, NW
Washington, DC 20001
fax 202/942-4281
(staff: Julie Uffner)

Mr. Robert O'Neill
International City/County Management Association
777 North Capitol Street, NE
Suite 500
Washington, DC 20002-4201
fax 202//962-3500
(staff: Mosi Kitwana)

Mr. Keith Hite
National Association of Towns and Townships
1130 Connecticut Ave, NW
Suite 300
Washington, DC 20001
fax 202/331-1598
(staff: Andrew Seth)

Mr. Mike Griffin
County Executives of America
1100 H Street, NW
Suite 910
Washington, DC 20001
fax 202/737-0556
(staff: Mike Griffin)

Mr. R. Steven Brown
Environmental Council of States
444 North Capitol Street, NW
Suite 445
Washington, DC 20001
fax 202/624-3666
(staff Lee Garrigan)

- Attachment D -

More Forums for Contacting Elected Officials

The Office of Congressional and Intergovernmental Relations (OCIR) is EPA's principal point of contact for Congress, States and local governments and is the coordination point for other EPA offices and officials to interact with these entities. [11] You are encouraged to contact OCIR as you develop your outreach and consultation plan.

Associations' Sponsored Activities

National associations of elected officials sponsor many forums, most of which are scheduled months in advance. These include:

- Policy Development Meetings
- National Meetings (in DC and elsewhere)
- Environment/Natural Resource Committee Sessions
- Program to Program Interactions
- Joint Sessions with EPA on Management Issues
- Association public policy research organizations' advisory groups
- Events and committees for stand-alone organizations created by S/L government associations (for example, Public Technology Inc).

National associations also produce publications, newsletters, "issue briefs," regulatory tracking reports, etc., which may be easy forums for communicating with elected officials.

EPA Sponsored Activities

EPA sponsors activities that can help you develop contacts or "leads" to contacts for consulting with S/L elected officials. Existing FACA committees may be a starting point. Individual members can point you toward potential work group members and resources for distributing information. OCIR can help identify those committees that might be best suited for involvement.

- Joint EPA-State Management Meetings [Such as the Water Directors, NEPPS]
- Work Group Memberships or Adjunct Memberships
- FACA Committees, especially the Local Government Advisory Committee, which is comprised principally of elected officials
- Specific Subject Meetings
- Technical Sessions
- OCIR association outreach meetings (monthly)

[11] OCIR's Regulatory Steering Committee Representative is available to assist with your outreach to EPA's intergovernmental partners. To see an updated list of Regulatory Steering Committee Representatives or Regional Contacts, go to "intranet.epa.gov/adplibrary" and click on "Reg Steering Committee".

- Federal Register Announcements and Solicitations
- Publications for Comment, Press Notices
- Presentations, Speeches, Appearances, etc., by the Administrator or Senior Officials
- Grant and Contract Financed Subject Development Efforts
- Open Forums

Regional/State Specific Activities

EPA regions interact routinely with, and do a great deal of outreach to, State and local organizations and elected officials. Generally, for the purposes of EO 13132, these contacts are not usually focused on regulatory and policy development, but on day to day program operations. These interactions, however, do offer: (1) an opportunity for expanding consultation under the Order; and (2) a base to build from to strengthen contacts with State and local contacts.

Regionally Sponsored Activities

- State Director/Mayors' Meetings
- State Commissioners/Directors' Meetings
- Mayors' Forums
- Intergovernmental Forums
- Topical Discussion Sessions
- Regional Administrator Appearances

Other Regional Meetings

There are many regional meetings of associations of elected and appointed officials (e.g. New England Governors, Western Governors, NCSL Southern Legislative Conference, etc). Many of these groups have working environmental and natural resource committees. Again, advance planning offers an opportunity to work with association staffers and officers to include specific issues as meeting topics. Such input can prove particularly valuable when a forthcoming rule is likely to have a significant or "disproportionate" effect on certain regions of the country.

- State/Municipal Leagues, County Associations Meetings
- Regional Elected Official Meetings [Western Governor's Association, etc.]

More S/L Government Venues

- Annual Planning and Community Development Sessions
- Intergovernmental Association Meetings
- Regional Governmental Meetings
- State Agency Strategic Planning Hearings

- Attachment E -

Building a Consultation Plan: Key Elements

The Office of Congressional and Intergovernmental Relations (OCIR) is EPA's principal point of contact for Congress, States and local governments and is the coordination point for other EPA offices and officials to interact with these entities. You are encouraged to contact OCIR about your consultation plans.[12]

General Recommendations

Identify Issues, Interests and Impacts

- What are the issues?
- What are the critical time lines and events?
- Who is involved?
- Who has an interest?
- Who will be impacted and how?

Involve from the beginning

- Early consultation is ideal.
- Carefully construct work groups to ensure needed expertise.
- Consider recruiting State and local representatives as participants on work groups, particularly on rules for which states serve as principal implementers. (see ADP guidance)
- Avoid prejudgment.
- Consultation schedules should reflect critical and appropriate points for interaction.
- Allow for a full spectrum of opinion and interaction.

Plan Outreach Strategies and Mechanisms

- The outreach process also requires planning, with strategies as to audience, method of communication and content.

Involve Regional Offices

- Regional Offices should be actively involved in identifying and working with elected officials from their own States and localities.

[12]OCIR's Regulatory Steering Committee Repsentative is available to assist with your outreach to EPA's intergovernmental partners. To see an updated list of Regulatory Steering Committee Representatives or Regional Contacts, go to "intranet.epa.gov/adplibrary" and click on "Reg Steering Committee".

Questions to Consider

The Intergovernmental Stakeholders

- Who are the principal S/L government stakeholders likely to be affected by and interested in this rule?
- Is the rule likely to be of interest to policy-level elected and appointed officials?
- Are there particular elected officials who have expressed interest in the subject area under development?
- Which environmental or technical agencies will administer the rule?
- What other governmental entities will have to take action (e.g., pass legislation, raise funds, be subject to requirements) because of the rule?
- Are any other government agencies (e.g., economic development, transportation, agriculture) likely to be affected or have an interest?

Intergovernmental Impacts

- What is known about costs and other implications of the rule?
- Will the rule impact different government entities to different degrees or in different ways?

Unique Impacts

- Will the rule have disproportionate impacts on any particular region of the country?
- Will the rule affect urban, rural, or other types of communities differently?
- How will outreach and consultation efforts be targeted and tailored in light of these unique or disproportionate impacts?
- Will small or very small communities be affected or be presented with unique compliance issues?
- What steps will be taken to notify small governments of the planned rule and to secure their participation?

Major Issues/Areas of Concern

- What information will S/L government officials need to help them understand the potential implications of the proposed rule and why they should be interested?
- What issues are likely to be of major concern to the various categories of government officials?
- What steps should be taken to identify additional issues?

S/L Participants

- What national associations represent the interests of the various government stakeholders?
- Is there an existing EPA advisory or operations committee that can provide intergovernmental perspectives?
- What other ways can EPA solicit S/L government input?

- How will other individual S/L officials interested in the rule be identified?
- How can Regional offices assist in securing their participation?

Outreach/Consultation Activities

- What outreach and consultation efforts have already been undertaken?
- Are there more categories of potentially interested government stakeholders who have not yet been informed about the proposed rulemaking?
- What is the plan for disseminating information about the rule?
- What kinds of information/briefing materials will be needed? (key issues should be communicated in a way that elicits meaningful feedback from "policy generalists" and/or "political" audiences.)
- How will S/L government officials be involved in resolving issues and areas of concern?
- How and when will S/L officials be informed about the results of cost and other impact analyses?
- Will the Paperwork Reduction Act apply to the outreach/consultation activities?

Expertise Needed

- What kinds of expertise from S/L officials would be especially helpful in designing this regulation or policy?
  Examples include:
  -- Experts in particular technologies, industries, or scientific disciplines;
  -- Economists, lawyers, or policy analysts specializing in particular areas;
  -- Managers with experience in administering comparable programs at another level of government.
  -- How can EPA enlist the help of experts at other levels of government?

Schedule/Resources

- What is the schedule for key outreach and consultation activities?
- What resources -- staff, extramural funds, or other resources -- will be needed to carry out the consultation plan?
- What assistance is needed from other EPA offices (e.g., Regions, OCIR, OGC, OPEI?)

- Attachment F -

Presidential Documents

Federal Register
Vol. 64, No. 153
Tuesday, August 10, 1999

Title 3— Executive Order 13132 of August 4, 1999

The President **Federalism**

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to guarantee the division of governmental responsibilities between the national government and the States that was intended by the Framers of the Constitution, to ensure that the principles of federalism established by the Framers guide the executive departments and agencies in the formulation and implementation of policies, and to further the policies of the Unfunded Mandates Reform Act, it is hereby ordered as follows:

Section 1. *Definitions*. For purposes of this order:

(a) ''Policies that have federalism implications'' refers to regulations, legislative comments or proposed legislation, and other policy statements or actions that have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government

(b) ''State'' or ''States'' refer to the States of the United States of America, individually or collectively, and, where relevant, to State governments, including units of local government and other political subdivisions established by the States.

(c) ''Agency'' means any authority of the United States that is an ''agency'' under 44 U.S.C. 3502(1), other than those considered to be independent regulatory agencies, as defined in 44 U.S.C. 3502(5).

(d) ''State and local officials'' means elected officials of State and local governments or their representative national organizations.

Section 2. Fundamental Federalism Principles. In formulating and implementing policies that have federalism implications, agencies shall be guided by the following fundamental federalism principles:

(a) Federalism is rooted in the belief that issues that are not national in scope or significance are most appropriately addressed by the level of government closest to the people.

(b) The people of the States created the national government and delegated to it enumerated governmental powers. All other sovereign powers, save those expressly prohibited the States by the Constitution, are reserved to the States or to the people.

(c) The constitutional relationship among sovereign governments, State and national, is inherent in the very structure of the Constitution and is formalized in and protected by the Tenth Amendment to the Constitution.

(d) The people of the States are free, subject only to restrictions in the Constitution itself or in constitutionally authorized Acts of Congress, to define the moral, political, and legal character of their lives.

(e) The Framers recognized that the States possess unique authorities, qualities, and abilities to meet the needs of the people and should function as laboratories of democracy.

(f) The nature of our constitutional system encourages a healthy diversity in the public policies adopted by the people of the several States according to their own conditions, needs, and desires. In the search for enlightened public policy, individual States and communities are free to experiment with a variety of approaches to public issues. One-size-fits-all approaches to public policy problems can inhibit the creation of effective solutions to those problems.

(g) Acts of the national government—whether legislative, executive, or judicial in nature—that exceed the enumerated powers of that government under the Constitution violate the principle of federalism established by the Framers.

(h) Policies of the national government should recognize the responsibility of—and should encourage opportunities for—individuals, families, neighborhoods, local governments, and private associations to achieve their personal, social, and economic objectives through cooperative effort.

(i) The national government should be deferential to the States when taking action that affects the policymaking discretion of the States and should act only with the greatest caution where State or local governments have identified uncertainties regarding the constitutional or statutory authority of the national government.

Section. 3. *Federalism Policymaking Criteria*. In addition to adhering to the fundamental federalism principles set forth in section 2, agencies shall adhere, to the extent permitted by law, to the following criteria when formulating and implementing policies that have federalism implications:

(a) There shall be strict adherence to constitutional principles. Agencies shall closely examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and shall carefully assess the necessity for such action. To the extent practicable, State and local officials shall be consulted before any such action is implemented. Executive Order 12372 of July 14, 1982 (''Intergovernmental Review of Federal Programs'') remains in effect for the programs and activities to which it is applicable.

(b) National action limiting the policymaking discretion of the States shall be taken only where there is constitutional and statutory authority for the action and the national activity is appropriate in light of the presence of a problem of national significance. Where there are significant uncertainties as to whether national action is authorized or appropriate, agencies shall consult with appropriate State and local officials to determine whether Federal objectives can be attained by other means.

(c) With respect to Federal statutes and regulations administered by the States, the national government shall grant the States the maximum administrative discretion possible. Intrusive Federal oversight of State administration is neither necessary nor desirable.

(d) When undertaking to formulate and implement policies that have federalism implications, agencies shall:

(1) encourage States to develop their own policies to achieve program objectives and to work with appropriate officials in other States;

(2) where possible, defer to the States to establish standards;

(3) in determining whether to establish uniform national standards, consult with appropriate State and local officials as to the need for national standards and any alternatives that would limit the scope of national standards or otherwise preserve State prerogatives and authority; and

(4) where national standards are required by Federal statutes, consult with appropriate State and local officials in developing those standards.

Section 4. *Special Requirements for Preemption.* Agencies, in taking action that preempts State law, shall act in strict accordance with governing law.

(a) Agencies shall construe, in regulations and otherwise, a Federal statute to preempt State law only where the statute contains an express preemption provision or there is some other clear evidence that the Congress intended preemption of State law, or where the exercise of State authority conflicts with the exercise of Federal authority under the Federal statute.

(b) Where a Federal statute does not preempt State law (as addressed in subsection (a) of this section), agencies shall construe any authorization in the statute for the issuance of regulations as authorizing preemption of State law by rulemaking only when the exercise of State authority directly conflicts with the exercise of Federal authority under the Federal statute or there is clear evidence to conclude that the Congress intended the agency to have the authority to preempt State law.

(c) Any regulatory preemption of State law shall be restricted to the minimum level necessary to achieve the objectives of the statute pursuant to which the regulations are promulgated.

(d) When an agency foresees the possibility of a conflict between State law and Federally protected interests within its area of regulatory responsibility, the agency shall consult, to the extent practicable, with appropriate State and local officials in an effort to avoid such a conflict.

(e) When an agency proposes to act through adjudication or rulemaking to preempt State law, the agency shall provide all affected State and local officials notice and an opportunity for appropriate participation in the proceedings.

Section 5. *Special Requirements for Legislative Proposals*. Agencies shall not submit to the Congress legislation that would:

(a) directly regulate the States in ways that would either interfere with functions essential to the States' separate and independent existence or be inconsistent with the fundamental federalism principles in section 2;

(b) attach to Federal grants conditions that are not reasonably related to the purpose of the grant; or

(c) preempt State law, unless preemption is consistent with the fundamental federalism principles set forth in section 2, and unless a clearly legitimate national purpose, consistent with the federalism policymaking criteria set forth in section 3, cannot otherwise be met.

Section 6. *Consultation.*

(a) Each agency shall have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. Within 90 days after the effective date of this order, the head of each agency shall designate an official with principal responsibility for the agency's implementation of this order and that designated official shall submit to the Office of Management and Budget a description of the agency's consultation process.

(b) To the extent practicable and permitted by law, no agency shall promulgate any regulation that has federalism implications, that imposes substantial direct compliance costs on State and local governments, and that is not required by statute, unless:

(1) funds necessary to pay the direct costs incurred by the State and local governments in complying with the regulation are provided by the Federal Government; or

(2) the agency, prior to the formal promulgation of the regulation,

> (A) consulted with State and local officials early in the process of developing the proposed regulation;

(B) in a separately identified portion of the preamble to the regulation as it is to be issued in the Federal Register, provides to the Director of the Office of Management and Budget a federalism summary impact statement, which consists of a description of the extent of the agency's prior consultation with State and local officials, a summary of the nature of their concerns and the agency's position supporting the need to issue the regulation, and a statement of the extent to which the concerns of State and local officials have been met; and

© makes available to the Director of the Office of Management and Budget any written communications submitted to the agency by State and local officials.

© To the extent practicable and permitted by law, no agency shall promulgate any regulation that has federalism implications and that preempts State law, unless the agency, prior to the formal promulgation of the regulation,

(b) consulted with State and local officials early in the process of developing the proposed regulation;

(2) in a separately identified portion of the preamble to the regulation as it is to be issued in the Federal Register, provides to the Director of the Office of Management and Budget a federalism summary impact statement, which consists of a description of the extent of the agency's prior consultation with State and local officials, a summary of the nature of their concerns and the agency's position supporting the need to issue the regulation, and a statement of the extent to which the concerns of State and local officials have been met; and

(3) makes available to the Director of the Office of Management and Budget any written communications submitted to the agency by State and local officials.

Section 7. **Increasing Flexibility for State and Local Waivers.**

(b) Agencies shall review the processes under which State and local governments apply for waivers of statutory and regulatory requirements and take appropriate steps to streamline those processes.

(b) Each agency shall, to the extent practicable and permitted by law, consider any application by a State for a waiver of statutory or regulatory requirements in connection with any program administered by that agency with a general view toward increasing opportunities for utilizing flexible policy approaches at the State or local level in cases in which the proposed waiver is consistent with applicable Federal policy objectives and is otherwise appropriate.

© Each agency shall, to the extent practicable and permitted by law, render a decision upon a complete application for a waiver within 120 days of receipt of such application by the agency. If the application for a waiver is not granted, the agency shall provide the applicant with timely written notice of the decision and the reasons therefore.

(d) This section applies only to statutory or regulatory requirements that are discretionary and subject to waiver by the agency.

Section 8. *Accountability.*

(b) In transmitting any draft final regulation that has federalism implications to the Office of Management and Budget pursuant to Executive Order 12866 of September 30, 1993, each agency shall include a certification from the official designated to ensure compliance with this order stating that the requirements of this order have been met in a meaningful and timely manner.

(b) In transmitting proposed legislation that has federalism implications to the Office of Management and Budget, each agency shall include a certification from the official designated to ensure compliance with this order that all relevant requirements of this order have been met.

(c) Within 180 days after the effective date of this order, the Director of the Office of Management and Budget and the Assistant to the President for Intergovernmental Affairs shall confer with State and local officials to ensure that this order is being properly and effectively implemented.

Section 9. *Independent Agencies*. Independent regulatory agencies are encouraged to comply with the provisions of this order.

Section 10. *General Provisions*.
(a) This order shall supplement but not supersede the requirements contained in Executive Order 12372 (''Intergovernmental Review of Federal Programs''), Executive Order 12866 (''Regulatory Planning and Review''), Executive Order 12988 (''Civil Justice Reform''), and OMB Circular A–19.
(b) Executive Order 12612 (''Federalism''), Executive Order 12875 (''Enhancing the Intergovernmental Partnership''), Executive Order 13083 (''Federalism''), and Executive Order 13095 (''Suspension of Executive Order 13083'') are revoked.
(c) This order shall be effective 90 days after the date of this order. Sec. 11. Judicial Review. This order is intended only to improve the internal management of the executive branch, and is not intended to create any right or benefit, substantive or procedural, enforceable at law by a party against the United States, its agencies, its officers, or any person.

THE WHITE HOUSE,
August 4, 1999.

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MEETING SUMMARY

of the

EXECUTIVE COUNCIL

of the

NATIONAL ENVIRONMENTAL JUSTICE ADVISORY COUNCIL

December 3, 4, and 6 2001
Seattle, Washington

Meeting Summary Accepted By:

Charles Lee	**Peggy Shepard**
Designated Federal Officer	**Acting Chair**

United States Environmental Protection Agency
Enforcement and Compliance Assurance (2201A)
December 2001
http://www.epa.gov/oeca/ej

Office of Environmental Justice

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Office of Environmental Justice
1200 Pennsylvania Avenue (MC 2201A)
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Telephone: (202) 564-2515

and requesting: NEJAC Meeting Summary December 2001

You may also review this report it, along with the previously published reports, on the web site: <*http://www.epa.gov/compliance/environmental justice*>

PREFACE

The National Environmental Justice Advisory Council (NEJAC) is a federal advisory committee that was established by charter on September 30, 1993, to provide independent advice, consultation, and recommendations to the Administrator of the U.S. Environmental Protection Agency (EPA) on matters related to environmental justice. The NEJAC is made up of 24 members, and one DFO, who serve on a parent council that has six subcommittees. Along with the NEJAC members who fill subcommittee posts, an additional 32 individuals serve on the various subcommittees. To date, NEJAC has held seventeen meetings in the following locations:

- Washington, D.C., May 20, 1994
- Albuquerque, New Mexico, August 3 through 5, 1994
- Herndon, Virginia, October 25 through 27, 1994
- Atlanta, Georgia, January 17 and 18, 1995
- Arlington, Virginia, July 25 and 26, 1995
- Washington, D.C., December 12 through 14, 1995
- Detroit, Michigan, May 29 through 31, 1996
- Baltimore, Maryland, December 10 through 12, 1996
- Wabeno, Wisconsin, May 13 through 15, 1997
- Durham, North Carolina, December 8 through 10, 1997
- Arlington, Virginia, February 23 through 24, 1998 (Special Business Meeting)
- Oakland, California, May 31 through June 2, 1998
- Baton Rouge, Louisiana, December 7 through 10, 1998
- Arlington, Virginia, November 30 through December 2, 1999
- Atlanta, Georgia, May 23 through 26, 2000
- Arlington, Virginia, December 11 through 14, 2000
- Washington, DC, August 8 through 10, 2001
- Seattle, Washington, December 3 through 6, 2001

The NEJAC also has held other meetings which include:

- Public Dialogues on Urban Revitalization and Brownfields: Envisioning Healthy and Sustainable Communities, held in Boston, Massachusetts; Philadelphia, Pennsylvania; Detroit, Michigan; Oakland, California; and Atlanta, Georgia in the Summer 1995
- Relocation Roundtable, Pensacola, Florida, May 2 through 4, 1996

- Environmental Justice Enforcement and Compliance Assurance Roundtable, San Antonio, Texas, October 17 through 19, 1996

- Environmental Justice Enforcement Roundtable, Durham, North Carolina, December 11 through 13, 1997

- International Roundtable on Environmental Justice on the U.S./Mexico Border, San Diego, California, August 19 through 21, 1999

As a federal advisory committee, the NEJAC is governed by all provisions of the Federal Advisory Committee Act (FACA) of October 6, 1972. Those requirements include:

- Members must be selected and appointed by EPA

- Members must attend and participate fully in meetings of the NEJAC

- Meetings must be open to the public, except as specified by the EPA Administrator

- All meetings must be announced in the Federal Register

- Public participation must be allowed at all public meetings

- The public must be provided access to materials distributed during the meeting

- Meeting minutes must be kept and made available to the public

- A designated federal official (DFO) must be present at all meetings of the NEJAC (and its subcommittees)

- The NEJAC must provide independent judgment that is not influenced by special interest groups

Each subcommittee, formed to deal with a specific topic and to facilitate the conduct of the business of the NEJAC, has a DFO and is governed by the provisions of FACA. Subcommittees of the NEJAC meet independently of the full NEJAC and present their findings to the NEJAC for review. Subcommittees cannot make recommendations independently to EPA. In addition to the six subcommittees, the NEJAC has established a Protocol Committee, the members of which are the chair of the NEJAC and the chair of each subcommittee.

Members of the Executive Council of the NEJAC are presented in the table on the following page. A list of the members of each of the six subcommittees are presented in the appropriate chapters of the report.

EPA's Office of Environmental Justice (OEJ) maintains transcripts of, summary reports on the meetings of the NEJAC, and copies of material distributed during the meetings. Those documents are available to the public upon request.

Comments or questions can be directed to OEJ through the Internet. OEJ's e-mail address is:

environmental-justice-epa@.epa.gov

Executive summaries of the reports on the meetings of the NEJAC are available in English and Spanish on the Internet at the NEJAC's World Wide Web home page:

<http://www.epa.gov/compliance/environmentaljustice/index.html> (click on the link to the National Environmental Justice Advisory Council)

NATIONAL ENVIRONMENTAL JUSTICE ADVISORY COUNCIL
MEMBERS OF THE EXECUTIVE COUNCIL
(2001)

Designated Federal Official:
Mr. Charles Lee, Associate Director for Policy and Interagency Liasion, U.S. Environmental Protection Agency Office of Environmental Justice

Chair:
Ms. Peggy Shepard

Members

Ms. Rose Augustine
Mr. Larry Charles
Mr. Fernando Cuevas
Ms. Anna Frazier
Mr. Michel Gelobter
Ms. Eileen Guana
Mr. Richard Gragg
Ms. Savonala Horne
Ms. Jennifer Hill-Kelly
Mr. Robert Harris
Ms. Annabelle Jaramillo
Mr. Harold Mitchell
Mr. David Moore
Ms. Mary Nelson
Ms. Graciela Ramirez-Toro
Mr. Alberto Saldamando
Ms. Jane Stahl
Ms. Wilma Subra
Ms. Jana Walker
Mr. Kenneth Warren
Ms. Pat K. Wood
Mr. Tseming Yang

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EXECUTIVE SUMMARY

INTRODUCTION

This executive summary presents highlights of the sixteenth meeting of the National Environmental Justice Advisory Council (NEJAC), held December 3 through 5, 2001 at the Renaissance Madison Hotel in Seattle, Washington. Each of the six subcommittees of the NEJAC met for a full day on December 5, 2001. On December 4, the NEJAC hosted a public comment period that focused on fish consumption and contamination of fish populations. Approximately 300 persons attended the meetings and the public comment period.

The NEJAC is a federal advisory committee that was established by charter on September 30, 1993 to provide independent advice, consultation, and recommendations to the Administrator of the U.S. Environmental Protection Agency (EPA) on matters related to environmental justice. Ms. Peggy Shepard, West Harlem Environmental Action, serves as the chair of the Executive Council of the NEJAC. Mr. Charles Lee, Associate Director for Policy and Interagency Liaison, EPA Office of Environmental Justice (OEJ), serves as the Designated Federal Officer (DFO) for the Executive Council. Exhibit ES-1 lists the chair, the vice-chair, and the DFO of the Executive Council, as well as the individuals who serve as chairs and vice-chairs of the six subcommittees of the NEJAC and the EPA staff appointed to serve as DFOs for those subcommittees.

OEJ maintains transcripts and summary reports of the proceedings of the meetings of the NEJAC. Those documents are available to the public upon request. The public also has access to the executive summaries of reports of previous meetings, as well as other publications of the NEJAC, through the World Wide Web at **<***http://www.epa.gov/oeca/main/ej/nejac/index.html* > (click on the publications icon). The summaries are available in both English and Spanish.

Exhibit ES-1

NATIONAL ENVIRONMENTAL JUSTICE ADVISORY COUNCIL CHAIRS AND DESIGNATED FEDERAL OFFICERS (DFO)

Executive Council:
- Ms. Peggy Shepard, **Chair**
- Mr. Charles Lee, **DFO**

Air and Water Subcommittee:
- Ms. Annabelle Jaramillo, **Chair**
- Ms. Eileen Guana, **Vice-Chair**
- Ms. Alice Walker, **co-DFO**
- Dr. Wil Wilson, **co-DFO**

Enforcement Subcommittee:
- Ms. Savonala Horne, **Chair**
- Mr. Robert Kuehn, **Vice-Chair**
- Ms. Shirley Pate, **DFO**

Health and Research Subcommittee:
- Ms. Rose Marie Augustine, **Chair**
- Ms . Jane Stahl, **Vice-Chair**
- Ms. Brenda Washington, **co-DFO**
- Ms. Aretha Brockett, **co-DFO**

Indigenous Peoples Subcommittee:
- Ms. Jennifer Hill-Kelly, **Chair**
- Ms. Jana Walker, **Vice-Chair**
- Mr. Daniel Gogal, **DFO**
- Mr. Bob Smith, **alternate-DFO**

International Subcommittee:
- Mr. Alberto Saldamando, **Chair**
- Mr. Tseming Yang, **Vice-Chair**
- Ms. Wendy Graham, **DFO**

Puerto Rico Subcommittee:
- Dr. Graciela Ramirez-Toro, **Chair**
- Ms. Teresita Rodriguez, **DFO**

Waste and Facility Siting Subcommittee:
- Ms. Veronica Eady, **Chair**
- Mr. Reiniero Rivera, **DFO**

REMARKS

Mr. Ron Kreizenbeck, Deputy Regional Administrator, EPA Region 10, welcomed the participants in the meeting of the NEJAC to Seattle. He stated that EPA Region 10 includes the states of Washington, Oregon, Idaho, and Alaska and is home to many diverse, low-income communities; communities of color; and more than 270 native tribes, the members of which subsist on fish, plants, and wildlife. The degradation of habitats and depletion of resources threatens the very way of life of those people, he continued. Mr. Kreizenbeck then stated that issues related to subsistence life styles must be addressed to ensure equal environmental protection, regardless of race, income, culture, or ethnicity.

Governor Gary Locke, (D), sent greetings to the members of the NEJAC, welcoming them to Seattle. In his letter, Governor Locke emphasized that the issues related to water quality and fish consumption were especially important to the residents of Washington. Exhibit 1-2 in Chapter One of this report contains a copy of that letter.

Ms. Rosa Franklin, State Senator, Washington State Legislature and former member of the NEJAC, commented on the timeliness of the current meeting of the NEJAC, held to discuss the relationship between among water quality, fish consumption, and environmental justice. While contaminated air and toxic streams affect all citizens, she continued, the changing demographics in the state of Washington and the Pacific Northwest have brought a new urgency to the issue of fish consumption. Therefore, she said, there is an urgent need in the region to further identify and quantify the types and magnitudes of risks to communities and tribes that subsist on wild fish, plants, and other wildlife. Ms. Franklin stressed that the activities of the NEJAC could have a long-term effect on the health of those communities.

Ms Velma Veloria, Washington State Representatives and former member of the NEJAC, explained that the state of Washington had worked over the past three years to ensure that water is clean and that fish populations continue to flourish in the state of Washington. She discussed environmental justice legislation passed in the state, including a bill that charged the state's Department of Ecology and Department of Health with jointly preparing a report on environmental risks faced by low-income and minority groups; legislation that reformed the way work at cleanup sites is taxed; and legislation that requires the Department of Health to examine the health effects of noise, particularly in the vicinity of the city of Seattle's international airport.

Ms. Yalonda Sinde, Community Coalition for Environmental Justice, stated that her organization had been the first non-profit environmental justice group in the Seattle area. She then expressed her excitement about the opportunity to bring issues related to fish consumption and water quality before the NEJAC during the current meeting.

Mr. Moses Squeochs, Yakima Nation and member of the Indigenous Peoples Subcommittee, stated his appreciation for the efforts of the NEJAC, but he also expressed concern that such a federal advisory committee is needed to carry out the laws related to environmental justice enacted by the Congress of the United States. Continuing, he said that the "hunter-gatherer" way of life continues to be practiced and that there is a strong intent to preserve that way of life. He then stated that the search for justice, fairness, and equality in relation to environmental issues must continue.

REPORTS AND PRESENTATIONS

The members of the Executive Council received the following presentations:

Members of the NEJAC Fish Consumption Work Group provided an update on the NEJAC's *Draft Fish Consumption Report*. During their presentation, the members of the work group reviewed the findings of the work group, as outlined in the *Draft Fish Consumption Report* that had been compiled in preparation for the December 2001 meeting of the NEJAC. The members of the Fish Consumption Work Group also presented a number of "overarching recommendations" based on the conclusions presented in the draft report. The members of the NEJAC then discussed the report and the recommendations at length, suggesting revisions in the draft report and identifying additional recommendations. Members of the NEJAC requested that final comments on the *Draft Fish Consumption Report* be submitted to OEJ by January 31, 2002. The anticipated date for completion of the report is March 15, 2002. Mr. Lee stated that a conference call was to be scheduled with affected communities, tribes, and stakeholders to discuss the report.

Ms. Shepard presented the NEJAC's *Strategic Plan* to the members of the Executive Council. The plan incorporates the issues raised and conclusions reached during the special business meeting of the Executive Council of the NEJAC, held in Washington, D.C. in August 2001, and outlines the strategy of the NEJAC for: (1) redesigning its activities to better fulfill its role as an advisor; (2) collaborating with EPA to provide alternative mechanisms through which communities can bring site-specific issues to the attention of EPA; and (3) developing, through a deliberative process that involves all stakeholders, an effective work product that addressed issues related to environmental justice that are of principal concern to communities. The *strategic plan* will guide the work of the NEJAC through September 27, 2003, Ms. Shepard announced.

Mr. Lee identified a series of tasks and provided assignments to members of the NEJAC to assist in implementing the strategic plan. The tasks are:

Finalization of the NEJAC Policy Advice Development Model
Finalization of the NEJAC Model for incorporating community issues and concerns into the NEJAC policy dialogue
Development of definitions of consensus and consensus-building
Development of a scoping report from the Ad Hoc Scoping Work Group on Cumulative Risk Issues

WORK GROUP REPORTS AND COMMENTS

The members of the Executive Council of the NEJAC received reports and comments from the following individuals:

- Ms. Eileen Guana, Southwestern University School of Lawn and Vice-Chair of the Air and Water Subcommittee, made a presentation on the Interagency Environmental Justice Implementation Work Group.

- Mr. Brandon Carter, EPA Federal Facilities Restoration and Reuse Office (FFRRO), provided an update on the Federal Facilities Work Group.

- Ms. Wilma Subra, Louisiana Environmental Action Now, member of the Air and Water Subcommittee, and chair of the newly formed Pollution Prevention Work Group, presented an update on the status of the development of the work group.

Mr. Lee reported that the Federal Facilities Work Group will work in coordination with and report to the NEJAC Waste and Facility Siting Subcommittee because the primary support for this work group is being provided by the Office of Solid Waste and Emergency Response (OSWER), which also supports that subcommittee. OSWER has committed to adding another member to the subcommittee to provide interface with the work group, he said.

Other presentations received by the Executive Council of the NEJAC were:

- Mr. Barry Hill, Director, EPA OEJ, reported on the status of EPA's efforts to implement recommendations included in the report of the Environmental Law Institute (ELI) report titled *Opportunities for Advancing Environmental Justice: An Analysis of U.S. EPA Statutory Authorities*. The ELI report reviews EPA's major environmental regulations that govern air and water quality, waste management, use of pesticides and other chemicals, and the public's right to know. The report identifies specific statutory authorities that can be used to promote environmental justice in the full range of EPA program functions, including the establishment of standards and the permitting process.

- Ms. Ann Goode, Senior Consultant, Center for the Economy and Environment, National Academy of Public Administration (NAPA), made a presentation on NAPA's research and evaluation of EPA's efforts to address the widely recognized fact that low-income communities and communities of people of color that are exposed to significantly greater environmental and public health hazards than other communities face. NAPA's research and associated recommendations, reported Ms. Goode, are presented in a report titled *Environmental Justice in EPA Permitting: Reducing Pollution in High-Risk Communities is Integral to the Agency's Mission."* In the report, she continued, NAPA recommends that EPA make changes in four distinct areas related to environmental justice: leadership, permitting procedures, setting of priorities, and public participation.

- Mr. Martin Halper, Senior Science Advisor, EPA OEJ, provided an overview of EPA's draft *Framework for Cumulative Risk Assessment* prepared by the Cumulative Risk Technical Panel of the EPA Risk Assessment Forum, a standing committee of senior EPA scientists. The purpose of this briefing is to help NEJAC prepare to address the issues of cumulative risk, which will be the policy issue area to be discussed in 2003.

VIRTUAL TOUR AND RELATED DIALOGUE

Members of the NEJAC participated in a "virtual tour" dialogue of selected communities that are affected by issues related to environmental justice, fish consumption, and water quality. Representatives of five community organizations presented information about the contamination of waterways on which Native Americans and impoverished people depend for survival and the loss of Native American heritage and culture, as well as issues related to the exposure of farm workers to pesticides and herbicides. The topics discussed are described briefly below.

Mr. Frank Roberts, Coeur d'Alene Tribe, Idaho, discussed the exposure of the Coeur d'Alene Tribe to contamination caused by strip mining practices carried out on properties located near tribal lands. Mr. Roberts explained that, although contamination currently is being cleaned up, preservation of tribal culture has been threatened because the tribe cannot use the land for traditional purposes.

Mr. Daniel Morfin, Granger, Washington, explained that the application of herbicides and pesticides for agriculture use is contaminating rivers and exposing farm workers to contaminants. The incidence of respiratory ailments in the Granger area is high, and existing regulations are not being enforced, said Mr. Morfin.

Ms. Jeri Sundvall, Environmental Justice Action Group of Portland, Portland, Oregon, pointed out the high rate of cancer among Native American fishermen. In addition, she charged, Native Americans are being robbed of their heritage and are expected to become assimilated into the broader culture.

Ms. Rosemary Ahtuangaruak Inupiat Community of Arctic Slope, Barrow, Alaska, expressed concern that state agencies often "favor profit" over protection of the interests and concerns of tribes. Ms. Ahtuangaruak explained that, although federal agencies have declared fish populations safe to eat, the methodology for assessing risk does not consider the higher-than-average rates of fish consumption among Native Americans.

Ms. Lee Tanuvasa, Korean Woman's Association, Tacoma, Washington, reported that her organization was conducting a study to determine the safety of shellfish consumed by communities of Asian Pacific Island people. She requested assistance in overcoming the language barrier and in determining how best to present the findings of the study to the communities affected by the issue.

PUBLIC COMMENT PERIOD

The Executive Council of the NEJAC hosted a public comment period on December 4, 2001, at which approximately 29 people participated. Described below are a summary of key concerns citizens expressed during the evening session.

- A majority of the public comments focused on the issue of contaminated waterways and the land on which Native Americans and other impoverished people depend for living a subsistence life style. Commenters pointed to rates of cancer and respiratory ailments among Native American populations that are higher than the rates among non-Native populations in the United States. The commenters stated that the inability of Native peoples to "live off the land" has led to a decline in the transfer of spiritual and cultural values from generation to generation. The best way to reduce contamination in waterways is to eliminate the source of the pollution, declared a number of commenters.

- Several commenters spoke about the ineffectiveness of risk assessments. Risk assessments, as currently conducted, do not account for the cumulative effect of numerous chemicals on the environment, they stated. Rather, those risk assessments examine only a single chemical, they claimed. Risk assessments focus only on cancer and fail to consider other health issues, they added. Further, they do not account for the effect of chemicals on sensitive populations, several commenters noted.

- A number of commenters criticized EPA for failing to make an adequate effort to hold the U.S. Department of Defense (DoD) accountable for the contamination of communities located on or near military installations. EPA is not enforcing existing environmental regulations that govern DoD facilities, the commenters claimed.

OTHER CONCERNS AND COMMITMENTS OF THE NEJAC

During their meeting, the members of the Executive Council of the NEJAC recommended that a work group be established to address communications within the NEJAC and between the NEJAC and EPA program offices. In addition, the members agreed to review and provide comments on the *Framework for Cumulative Risk Assessment.* Formal development of the guidance will begin in 2002.

SUMMARIES OF THE SUBCOMMITTEE MEETINGS

Summarized below are the deliberations of the subcommittees of the NEJAC held on December 5, 2001.

Air and Water Subcommittee

The members of the Air and Water Subcommittee of the NEJAC received the presentations and reports described below and discussed the topics summarized.

Mr. James Hanlon, EPA Office of Science and Technology (OST), provided preliminary comment on the feasibility of implementing the recommendations presented in the NEJAC's *Draft Fish Consumption Report*. Mr. Hanlon commended the Fish Consumption Work Group for its efforts and emphasized that the availability of resources for the most part will determine what EPA can accomplish. Mr. Hanlon also reviewed the logistics associated with the completion of the report and its submittal to the EPA Administrator.

Mr. Lee presented an overview of and led discussions about the NEJAC *Strategic Plan*. He also discussed the meeting of the NEJAC scheduled for December 2002 that will focus on issues related to pollution prevention and environmental justice.

Mr. Jeff Bigler, EPA OST, provided to the Fish Consumption Work Group an update on plans to revise volume four of EPA's *Guidance Document for Assessing Chemical Contamination Data for Use in Fish Advisories* to incorporate awareness of issues related to environmental justice.

Mr. Peter Murchie, EPA Region 10 Office of Air Quality Planning and Standards (OAQPS), presented to the Air Toxics Work Group an overview of EPA's air toxics program.

The members of the subcommittee discussed the need to establish priorities among the recommendations presented in the *Draft Fish Consumption Report* to (1) help EPA focus its efforts and (2) avoid overwhelming the agency with numerous recommendations. The members agreed that, although the list of recommendations may appear lengthy, individual items can be grouped under a few overall themes.

The members of the subcommittee discussed the potential effect of the *NEJAC Strategic Plan* on the manner in which the subcommittee conducts its business. The members agreed that the subcommittee must focus its efforts on only a few key issues, rather than attempting to "cover the whole waterfront" as it had done in its early days. The members also agreed to explore methods of evaluating the effectiveness of the subcommittee's work groups on specific issues.

The members of the subcommittee emphasized that the work of the Fish Consumption Work Group must be used as a model to guide planning for the meeting of the NEJAC to be held in December 2002. The members also requested that, in preparation for that meeting, the newly formed Pollution Prevention Work

Group should examine issues related to (1) environmental restoration, (2) clean production, (3) low-impact development, and (3) the costs and benefits of pollution prevention.

Members of the Fish Consumption Work Group discussed the plans of EPA's Office of Water to revise volume four of its *Guidance Document for Assessing Chemical Contamination Data for Use in Fish Advisories*. The members of the work group agreed to (1) review the document and provide comment on it to EPA and (2) identify and recommend individuals to serve on various EPA stakeholder work groups and as technical consultants for the issuance of fish advisories. The members of the subcommittee also discussed the future of the Fish Consumption Work Group, once the *Draft Fish Consumption Report* has been completed. The members recommended that the work group expand its scope to explore other issues related to water quality, such as total maximum daily loads (TMDL), confined animal feeding operations (CAFO), and water permits.

The Permitting and Public Utilities work groups participated in a joint session, during which they agreed to combine the two groups into a single work group. The members of the work groups discussed EPA's White Paper No. 3 on flexible permitting, a report on a new source review study prepared by EPA's Office of Air and Radiation (OAR), and other issues related to the permitting process. The members of the newly combined work group agreed to develop a document that will describe "best practices" for permitting that are sensitive to environmental justice issues, as well as review and provide comment on the report on a new source review study the release of which is expected in January or February 2002. Members of the work group also expressed concern that staffing of the work group was inadequate, in light of the number of issues the group had taken under consideration.

The members of the Air Toxics Work Group discussed EPA's air toxics program. The members agreed to review and provide comment on EPA OAR's *Work Plan for the National Air Toxics and Integrated Air Toxics Strategy.*

Health and Research Subcommittee

The members of the Health and Research Subcommittee of the NEJAC received the presentations and reports described below and discussed the topics summarized.

Mr. Patrick C. West, Emeritus Faculty, Environmental Sociology, School of Natural Resources and Environment, University of Michigan, commented on research needed in the realm of environmental justice and application of that research. Mr. West stated that lack of research should not be a barrier to action, that existing information can be used, and that current research must be investigated to identify the information to support action. Mr. West stressed that systematic and qualitative assessment of both cumulative effects and co-risk factors must be included in the assessment of risks for such sensitive groups as communities of color, low-income communities, and Native American tribes.

Ms. Tala Henry, Mid-Continent Ecology Division, EPA National Health and Environmental Effects Research Laboratory, provided information about the parameters that are factors in the calculation of risk. She emphasized that there is no specific procedure for the calculation of risk and that the default parameters are not applicable under certain circumstances, such as assessment of the risks to sensitive groups. Therefore, she explained, partnerships between experts and communities must be fostered so that defensible and appropriate risk parameters can be established.

Mr. Wardner G. Penberthy, EPA Chemical Control Division, presented an overview of Section 4 of the Toxic Substances and Control Act, which focuses on chemical testing. He provided detailed information about EPA's High Production Volume (HPV) Challenge program, a voluntary testing program for facilities that produce large volumes of chemicals. The goal of the program is to increase the availability to the public of baseline data on the effects on health and the environment for approximately 2,800 HPV chemicals, reported Mr. Penberthy.

Mr. Jeffrey Morris, EPA Office of Science Policy, Office of Research and Development (ORD), recommended a change in the structure of the subcommittees of the NEJAC. Citing EPA's goals related to the Government Performance and Results Act (GPRA), Mr. Morris explained that, because health and research issues related to environmental justice cross boundaries among the various subcommittees, such issues should be handled by a special interest work group, rather than an individual subcommittee.

The members of the subcommittee conducted a number of discussions about the accurate calculation of risk for sensitive groups. The specific recommendations they agreed upon are:

- It is essential that various factors related to cultural and spiritual concerns be included in models for assessing risk. In addition, such factors as culture shock and cultural disintegration must be addressed.
- Parameters used in the calculation of risk must be specific to each particular community. Parameters that currently are not included in risk assessment models include peak exposure and consumption of whole fish, rather than the more widely used parameters of chronic exposure and consumption of only the fillet of a fish.
- The types of foods identified as components of a subsistence diet should include many more foods that are not consumed by the general population.
- Co-risk and cumulative risk factors should be used as a more accurate gauge of “true risk” because people are exposed to more than one chemical at a time.
- If the recommendations of the subcommittee on the subject of calculation of risk are to be adopted, the definitions of “health” for a community and of what is to be considered “normal” must be reconsidered.

The subcommittee recommended that the NEJAC consider the subsistence consumption needs of such groups as Native Hawaiians and people in the Virgin Islands who were not considered as the report was developed. The members of the subcommittee agreed that inclusion of those groups would help achieve recognition of cultural groups that traditionally have been ignored in research related to environmental justice.

The members of the subcommittee agreed that the need for research often is used as a barrier to action and acknowledged that the information available is adequate to support the initiation of work. There is an abundance of information that, although originally was not applied to issues of environmental justice, can be reevaluated for its significance in the field of environmental justice, they noted. In addition, the members recommended that extensive investigation of previous research be conducted to identify available resources.

The members of the subcommittee agreed that the evaluation of HPV chemicals and the distribution to the public of the baseline health data are crucial actions. Although some members expressed concern about whether industry could be trusted to report reliably on production, the members agreed that there are many safeguards related to testing and that the penalty for falsification is severe.

The subcommittee recommended increased cooperation between government agencies and local organizations in sharing data and calling upon the expertise of indigenous organizations. Noting that local people have first-hand knowledge and understanding of their communities and can gather information more efficiently than outsiders, the members recommended that research be best conducted by local groups, with the assistance and support of EPA.

Indigenous Peoples Subcommittee

The members of the Indigenous Peoples Subcommittee of the NEJAC received the presentations and reports described below and discussed the topics summarized.

Mr. Merv George, Administrator, Klamath River Inter-Tribal Fish and Water Council and member of the Hupa Tribe, provided background information about the history of the council, outlined the five issues the council addresses, and submitted his recommendations for improving the *Draft Fish Consumption Report*.

He stressed that the Hupa and Yura tribes constantly must balance environmental and economic issues when developing standards for water quality.

Ms. Gillian Mittelsteadt, Environmental Policy Analyst, Tulalip Tribes Natural Resource Program, and Mr. Daryl Williams, Developer, Tulalip Tribes Natural Resource Program, presented the results of their study that examined the consumption by members of the Tulalip Tribe of fish taken from Puget Sound. Ms. Mittelsteadt described the statistical framework of the study and outlined the benefits and lessons learned through completion of the study. Mr. Williams discussed the problems that arise because, he said, programs allow the trading of pollution emissions credits. Mr. Williams emphasized the negative effects such programs have on tribal communities.

Mr. Tom Goldtooth, Executive Director, Indigenous Environmental Network and former chair of the Indigenous Peoples Subcommittee, presented his recommendations for improving the *Draft Fish Consumption Report*. He urged that the NEJAC consider the negative effects of radioactive contaminants on habitats and focus attention on precautionary actions, rather than traditional risk assessment. He also recommended that the NEJAC promote outreach to tribal communities to help those communities develop a better understanding of the mission and responsibilities of the NEJAC.

Dr. Roseanne Lorenzana, liaison between Region 10 and EPA ORD, presented a list of five specific recommendations for consideration by the subcommittee. She also presented the report *Comparative Dietary Risks: Balancing the Risks and Benefits of Fish Consumption*, for which a risk assessment model was used to define the conditions under which consumption of fish is a healthful dietary choice. She urged that the subcommittee advise EPA to work with tribes to develop guidelines on cumulative risk that are appropriate to the needs of tribes.

Ms. June Martin, Alaska Community Action on Toxics, began her presentation by telling the story of Annie Aloa, a health aide in her village who had spoken out on behalf of the tribal community and who had been awarded a grant by the National Institute for Environmental Health Sciences (NIEHS) to survey the health problems of members of the tribe. Ms. Martin then discussed the failure of the U.S. Army Corps of Engineers to clean up the military facility located near her village.

Ms. Ahtuangaruak, who is a native of the village of Nuigant, Alaska, expressed her concern about and recommendations for improving the representation of Alaskan Natives on the Indigenous Peoples Subcommittee. She also urged that, in the *Draft Fish Consumption Report*, the subcommittee address the tribal lands of Alaskan Natives, such as Prudhoe Bay. Residents of those lands, she pointed out, rely on fishing and whaling for subsistence.

Ms. Pam Miller, Alaska Community Action on Toxics, expressed concern about the health of Alaskan Natives tribal communities that are located on or near sites that have been abandoned by DoD. She also voiced the concern of tribes about persistent organic pollutants (POP) that originate thousands of miles south of Alaska, travel northward, and accumulate over northern Alaska. She requested that the subcommittee advise EPA to hold DoD accountable for previous contamination and to focus on the phased elimination of POPs.

Mr. Enoch Sheidt, Subsistence Coordinator, Maniilaq Association, and Mr. Francis Chin, Environmental Justice Coordinator, Maniilaq Association, emphasized the importance of a subsistence lifestyle to Alaskan Natives who are nomadic and migrate to locations where food is available. Consequently, the presenters reported, tribes do not recognize the concept of “on reservation” and “off reservation.” To an Alaskan Natives, fishing is not merely a method of obtaining food, but rather is a spiritual experience, they explained. In addition, Mr. Chin stated that the unemployment rate in the Indian community is 90 to 95 percent. Therefore, a subsistence lifestyle is an essential way of life that cannot be compromised, he said.

Mr. Art C. Ivanoff, Native Village of Unalakleet, expressed his concern about the effects of climate change on the health of Alaskan Natives. Mr. Ivanoff requested that the *Draft Fish Consumption Report* include climate change as a factor that affects the quality of fish. Climate change has depleted greatly the running stock of salmon, while the migration patterns of salmon and animals used for food have not been studied sufficiently, he explained.

Ms. Cheryl Steele, Elem Indian Colony, stated that fish advisories do not address issues related to the consumption of fish sufficiently. She urged that EPA provide indigenous peoples better guidance about contaminated fish populations and that the agency work with local communities to eliminate sources of contamination.

Mr. Kevin McKernan, Yurok Tribe, urged EPA to acknowledge those tribes that have developed and adopted water quality standards. He stated that the use of EPA core standards might direct resources away from tribes that have their own standards.

Ms. August Rozema, Swinomish Tribe, stated that the subcommittee and the NEJAC must "spread the word" about its future meetings. She also encouraged the subcommittee to clarify the definition of the word "fish" provided in the *Draft Fish Consumption Report* to include both fin- and shellfish.

The members of the subcommittee requested that the Alaskan Native community provide them more information about issues related to fish consumption and water quality standards. After listening to testimony offered by representatives of Alaskan Native communities, the members recognized that the concerns of all indigenous peoples throughout the world, including those of Hawaii and the Caribbean, also must be represented equally.

The members of the subcommittee discussed the effectiveness of risk assessment in adequately addressing issues related to fish consumption, noting that traditional risk assessment models currently do not include reference to pollution prevention and sustainability. The members recommended that a "precautionary principle" approach to risk assessment replace the traditional model to account for the benefits of preservation. The members also noted that risk assessment currently does not take into account the fact that the variable average grams per day (gpd) used in most models cannot be extrapolated to the lifestyle of members of indigenous communities, who consume many more fish in a much shorter period of time than do members of other groups, thereby increasing their risk to a level disproportionate to that affecting other groups.

The members expressed concern that fewer than 20 WQSs created by individual tribal communities have been approved. Additional discussion focused on the difficulties tribal communities encounter in their efforts to achieve the standards outlined in the WQSs because of economic setbacks.

The members of the subcommittee agreed to advise the NEJAC to urge EPA to augment its education programs for tribal communities by providing more information about the role of the NEJAC. In addition, the members recommended that tribes be included regularly in the deliberative process and that the subcommittee change its role from that of "consultation" to that of "collaboration," a role that would include deliberative dialogue. Such a change would improve communication between the NEJAC and indigenous communities, they suggested.

International Subcommittee

The members of the International Subcommittee of the NEJAC received the presentations and reports described below and discussed the topics summarized.

Mr. Goldtooth discussed the need to focus on issues of environmental justice related to transborder matters that affect the First Peoples of North America and indigenous tribes in the Great Lakes basin. He reported that First Nations and tribes in the Great Lakes basin suffer a disproportionate share of environmental problems associated with the transport of POPs. The effects of POPs are intensified among people who rely on a subsistence diet, he pointed out.

Ms. Katy Taylor, Assistant Director of Community Health Services, Alaska Native Tribal Health Services, presented an overview of recent studies of the effects of POPs on the health of Alaskan Native women and children who rely on subsistence consumption as the mainstay of their diets.

Ms. Miller provided information about the movement of POPs, facilitated by air and ocean currents, into Alaska and the Arctic region. She also discussed contamination of DoD sites in Alaska.

Ms. Amy Fraenkel, EPA Office of International Activities (OIA), addressed the transborder risks associated with exposure to POPs. She also presented information about progress toward completion of the Global Persistent Organic Pollutants Treaty (also known as the Stockholm POPs Convention). She emphasized that environmental justice groups must work to influence the process of planning how the United States will implement the provisions of the treaty.

Ms. Eileen Henninger, EPA OIA, stated that it is important that the NEJAC provide comment to OIA on issues related to biodiversity. Some of the work in that area will bring about major worldwide reductions in the use of key harmful chemicals in farming and industrial applications, she said.

Mr. Lionel L. Brown Jr., Senior Information Management Officer, EPA OIA, presented an update on the efforts of OIA to promote environmental awareness in Africa. Many areas in Africa are experiencing rapid urbanization, he reported, adding that OIA has been working to educate local communities about issues related to environmental justice. Mr. Brown also emphasized the heavy reliance on fish in the diets of African people.

Mr. Enrique Manzanilla, Director, Cross Media Division, EPA Region 9, provided background information about EPA's work related to the border areas of the United States and Mexico. He reviewed the activities undertaken by Region 9 during the two years since the Roundtable on Environmental Justice on the U.S.-Mexico Border was held in San Diego, California and reported on the success of outreach efforts conducted by the Region 9 Border Liaison Office, located in San Diego.

Ms. Olivia Balandran, Office of the Regional Administrator, EPA Region 6, presented an update on the outreach activities of the region's border office. She reported that the recent activities of that office included efforts to respond to the recommendations presented at the roundtable meeting on the U.S.-Mexico border.

Ms. Nelda Pérez, Small Grants Coordinator, EPA Region 6 OEJ, presented information about activities related to grants awarded to groups located in the U.S.-Mexico border area.

Mr. Richard Moore, Executive Director, Southwest Network for Environmental and Economic Justice, and former chair of the NEJAC, described letters his organization had written to EPA Administrator Christine Todd Whitman and President Bush. Mr. Moore discussed the effects of increased militarization along the U.S.-Mexico border that has taken place since the terrorist attacks of September 11, 2001. He also requested that the subcommittee complete the reports produced for the Roundtable on Environmental Justice on the U.S.-Mexico Border and prepared by the NEJAC Farm Worker Work Group.

Mr. Apichart Thongyou, Secretary General, Thailand Research and Action for Development Institute, discussed efforts undertaken in Thailand to reduce adverse effects on conditions of concern to the environmental justice community that are caused by modernization and the development of heavy industry. He and several other members of the delegation of visitors from Thailand discussed several studies that examined heavy contamination by industry and its effect on fishermen who rely on fishing for subsistence. Mr. Thongyou also described the work of EPA and its counterpart in Thailand to create a public participation process, reauthorize environmental laws, and create a new ministry for the environment.

The members of the subcommittee also participated in discussions related to various topics:

- The members of the subcommittee identified similarities in the shortcomings of enforcement and public participation efforts in Thailand and other nations. They discussed the value of, and the need for, an international environmental network to support the transfer of information and data.

- The members of the subcommittee concluded that the NEJAC and OIA should collaborate to build a strong relationship between the work of OIA in Africa and the environmental issues addressed by the NEJAC.

- The members of the subcommittee discussed OIA's strategy of deploying culturally diverse teams to represent EPA in international discussions. The members concluded that such a strategy is essential in engaging communities in discussions of treaties and encouraging collaboration between the United States and other countries in the sharing of resources.

- The members agreed that practices that contaminate water in one country and thereby affect the health of residents of another country illustrate the "interconnectedness" of the global environment. The members noted the similarity of the predicaments of subsistence fisherman in the United States and other nations.

- The members of the subcommittee concluded that there is a significant opportunity for the NEJAC to participate in the development of the plan for the implementation by the United States of the Stockholm POPs Convention. They also agreed to provide comment to OIA about the level of implementation of the treaty. In addition, the members discussed the need to include in the treaty provisions for a system for tracking the movement of POPs across the borders of the United States.

Waste and Facility Siting Subcommittee

The members of the Waste and Facility Siting Subcommittee of the NEJAC received the presentations and reports described below and discussed the topics summarized.

Mr. Michael Shapiro, Deputy Assistant Administrator, EPA Office of Solid Waste and Emergency Response (OSWER), and Ms. Linda Garczynski, EPA OSWER, provided an overview of the direction new senior managers plan for OSWER. They discussed the vision, mission, priorities, and values of the office, reviewed changes that are taking place, and identified several key priorities for OSWER:

- Pursuit of the One Cleanup Program Initiative, which is designed to make the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) programs more consistent with one another and to increase the right-to-know component of each.

- Establishment of revitalization and reuse as core issues of the OSWER action agenda.

- Implementation of recycling and pollution prevention programs to encourage partnerships and demonstration pilot projects in the area of reduction in source contamination.

- Implementation of the Retail Initiative, which is designed to increase focus on public involvement in the use of solid and hazardous waste and improve dialogue among communities.

- Implementation of work force development programs to strengthen the effort to train new staff of OSWER to meet its future challenges.

Mr. Samuel J. Coleman, EPA Region 6, provided an update on issues of environmental justice that affect the community of Mossville, Calcasieu Parish, Louisiana. Mr. Coleman identified several specific milestones:

- Installation of an enhanced air monitoring network sanctioned by the Lake Area Industrial Alliance and the Louisiana Department of Environmental Protection (LDEP).

- Achievement of overall compliance with the requirements of LDEP and establishment of parishwide dioxin screening as a standard procedure.

- Creation of an advisory council that works closely with the community, industry, and LDEP.

- Conduct a pilot health symposium designed to address health problems associated with exposure to environmental hazards and contaminants.

Ms. Sharon Beard, NIEHS, made a presentation on worker education and training.

Mr. Carter; Dr. Mildred McClain, Executive Director, Citizens for Environmental Justice; and Ms. Doris Bradshaw, Executive Director, Defense Depot Memphis Tennessee Concerned Citizens Committee, made a presentation on the role of FFRRO in working with communities affected by adverse environmental conditions. They explained that FFRRO plans to:

- Identify and evaluate key issues of concern to such communities.
- Provide a forum for dialogue between members of local communities and representatives of government agencies.
- Compile a list of resources available to communities and stakeholders that can help support increased public participation.
- Formulate a set of recommendations to the NEJAC, including the identification of "best practices" for improving environmental cleanups and ways in which the NEJAC can best address issues related to federal facilities.

The members of the subcommittee discussed the development of a strategic plan for the subcommittee. Key issues they identified included the creation of a work force development committee and examination of the role of the subcommittee on the Pollution Prevention Working Group. Additional themes they identified included exploration of EPA's role in fostering strategic planning by communities for the re-use and revitalization of contaminated sites, action to be taken after cleanup has been completed, and use of lessons learned through demonstration projects conducted by the Integrated Work Group on Environmental Justice and other outstanding projects.

The members of the subcommittee discussed at length three pending action items for 2002:

- Transfer of the Federal Facilities Work Group to the Waste and Facility Siting Subcommittee and addition of another member to that work group.
- Provision of assistance to FFRRO in its efforts to integrate issues related to land use, development, and redevelopment into the programs and procedures of EPA.
- Identification of models, such as the Washington Naval Yard and other sites, to be used as positive examples of OSWER's work with communities to achieve revitalization and reuse.

NEXT MEETING

The next meeting of the NEJAC is scheduled for December 9 through 12, 2002 in Baltimore, Maryland. The meeting will focus on pollution prevention. Planned activities include one opportunity for the public to offer comments. More information about the upcoming meeting will be available on the NEJAC's Internet home page at <*http://www.epa.gov/compliance/environmentaljustice/index.html*> (click on the link to the National Environmental Justice Advisory Council) or by telephone on EPA's toll-free environmental justice hotline at 1 (800) 962-6215.

CHAPTER ONE MEETING OF THE EXECUTIVE COUNCIL

1.0 INTRODUCTION

The sixteenth meeting of the Executive Council of the National Environmental Justice Advisory Council (NEJAC) took place Thursday, December 3 through 6, 2001, in Seattle, Washington. Ms. Peggy Shepard, West Harlem Environmental Action, serves as the newly appointed chair of the Executive Council. Mr. Charles Lee, Associate Director for Policy and Interagency Liaison, U.S., Environmental Protection Agency (EPA) Office of Environmental Justice (OEJ), continues to serve as the Designated Federal Officer (DFO) for the Executive Council. Exhibit 1-1 presents a list of members of the Executive Council who were present and identifies those members who were unable to attend. Approximately 300 people attended the meeting.

On December 5, 2001, each member of the Executive Council who was present on that day participated in the deliberations of the NEJAC subcommittees. Chapters Three through Seven of this meeting summary describe those deliberations. In addition, the Executive Council hosted one public comment period on the evening of December 4, 2001, as well as participated in a "virtual tour" of environmental justice sites in EPA Region 10 on December 3, 2001. Approximately 30 people offered comments during the public comment session. Chapter Two presents a summary of the public comments offered and the presentations made during the virtual tour.

Exhibit 1-1

EXECUTIVE COUNCIL

Members Who Attended the Meeting
December 3 through December 6, 2001

Ms. Peggy Shepard, Chair
Mr. Charles Lee, DFO

Mr. Larry Charles
Ms. Veronica Eady
Ms. Anna Frazier**
Ms. Eileen Guana
Dr. Richard Gragg, III
Dr. Michael Gelobter*
Mr. Robert Harris*
Ms. Savonala "Savi" Horne
Ms. Annabelle Jaramillo
Ms. Mary Nelson
Dr. Graciela Ramirez-Toro
Ms. Jane Stahl
Mr. Dean Suagee
Ms. Wilma Subra
Ms. Jana Walker
Mr. Kenneth Warren

List of Members
Who Were Unable To Attend

Ms. Rose Augustine
Mr. Fernando Cuevas
Ms. Jennifer Hill-Kelley
Mr. Harold Mitchell
Mr. David Moore
Mr. Alberto Saldamondo
Ms. Pat Wood
Mr. Tseming Yang

*Attended December 3 and 4, 2001 only
**Attended December 4 and 6, 2001 only

This chapter, which provides a summary of the deliberations of the Executive Council, is organized in six sections, including this *Introduction*. Section 2.0, *Remarks*, summarizes the remarks offered by various speakers. Section 3.0, *Discussion of the Relationship Between Water Quality, Fish Consumption, and Environmental Justice*, provides a summary of the testimony provided by the Fish Consumption Work Group of the NEJAC and describes the recommendations discussed by the members of the work group and the members of the Executive Council. Section 4.0, *Draft Strategic Plan of the NEJAC,* presents a summary of the discussions of the members of the Executive Council about matters related to the NEJAC strategic plan. Section 5.0, *Presentations and Reports*, provides summaries of reports and presentations made to the Executive Council on various other topics. Section 6.0, *Miscellaneous Business*, presents summaries of discussions by the members of the Executive Council of other items before the council, including recognition of those members whose terms were soon to expire.

Chapter Two of this report presents a summary of the virtual tour and public comment sessions held December 3 and 4, 2001. Chapters Three through Seven of this report present summaries of the deliberations of each of the subcommittees that met on December 5, 2001. Appendix A presents a list of the proposed revisions of the draft Fish Consumption Report and recommendations proposed for additions to it.

2.0 REMARKS

This section summarizes the remarks of the Deputy Regional Administrator of EPA Region 10 and representatives of local community organizations and the Washington State legislature. Exhibit 1-2 provides a copy of the letter sent by Washington Governor Gary Locke to the NEJAC.

2.1 Remarks of the Deputy Regional Administrator, U.S. Environmental Protection Agency Region 10

Mr. Ron Kreizenbeck, Deputy Regional Administrator, EPA Region 10, welcomed the members of the NEJAC, commenting on the appropriateness of the selection of Region 10 to host the current meeting, with its focus on subsistence fish consumption, water quality, and environmental justice. He explained that EPA Region 10, which includes the states of Washington, Oregon, Idaho, and Alaska, is home to many diverse, low-income communities, communities of color, and more than 270 Native American tribes and Alaskan Native villages. Many of those communities and tribes subsist on fish, plants, and wildlife, he said, and the harvesting, preparation, and consumption of wild species is prevalent, as well as fundamental to the heritage and traditions of their cultures. Mr. Kreizenbeck stressed that the degradation of habitats and the depletion of resources threatens the very way of life of those communities and tribes.

Mr. Kreizenbeck also pointed out that, for many such communities, there is no practicable alternative to the resources of the land. Therefore, he continued, it is not feasible to switch to or substitute other food resources if the resources of their land are contaminated. Moreover, he stated, for the communities of concern, to abstain from consumption of such resources is unimaginable for cultural, traditional, or religious reasons. A subsistence lifestyle, he stressed, is more than simply a tradition — it is fundamental to the very concept of self-determination.

Continuing, Mr. Kreizenbeck stated that issues of environmental justice arise during the everyday work at EPA Region 10, as the Agency issues and reviews permits, reviews and approves water quality standards, works on environmental impact statements, performs risk assessments, and develops monitoring plans. Addressing subsistence issues as the Agency pursues those activities is necessary to ensure that all communities receive equal environmental protection, he said. Lacking equal environmental protection for all, regardless of race, income, culture, or ethnicity, he declared, there can be no environmental justice.

2.2 Remarks of Local Elected Officials, Community Members, and Tribal Leaders

Ms. Rosa Franklin, State Senator, Washington State Legislature and former member of the NEJAC, commented on the timeliness of the current meeting of the NEJAC, held to discuss the relationship between among water quality, fish consumption, and environmental justice. While contaminated air and toxic streams affect all citizens, she continued, the changing demographics in the state of Washington and the Pacific Northwest have brought a new urgency to the issue of fish consumption. Therefore, she said, there is an urgent need in the region to further identify and quantify the types and magnitudes of risks to communities and tribes that subsist on wild fish, plants, and other wildlife. Ms. Franklin stressed that the activities of the NEJAC could have a long-term effect on the health of those communities.

Ms. Velma Veloria, State Representative, Washington State Legislature and former member of the NEJAC, noted that the convening of the NEJAC in the state of Washington to discuss this issue of fish consumption and environmental justice reaffirmed that the quality of salmon and fish is a concern not only of the fishing industry, but also of tribes and other minority populations.

Ms. Veloria informed the members of the NEJAC that the state of Washington had done much to ensure that its water is clean and that fish remain healthy. She explained that, in 1994, she, Ms. Franklin, and several other legislators had introduced a bill before the state legislature that requested that the Washington Department of Ecology and the Washington Department of Health jointly prepare a report on the environmental risks that threaten low-income and minority groups. She noted that the initial funding to support the work had been obtained. Ms. Veloria commented that the victory had been "an incredible first step" in addressing the disproportionate adverse effects of hazardous and solid waste sites on low-income communities and peoples of color.

Exhibit 1-2

GARY LOCKE
Governor

STATE OF WASHINGTON

OFFICE OF THE GOVERNOR

P.O. Box 40002 • Olympia, Washington 98504-0002 • (360) 753-6780 • www.governor.wa.gov

Greetings from the Governor

December 3, 2001

As governor of the state of Washington, I am pleased to welcome you to the 17th meeting of the National Environmental Justice Advisory Council (NEJAC).

Your visit will facilitate the exchange of valuable ideas and information among stakeholder groups represented on the NEJAC and the general public. The policy question being considered, "What is the relationship between water quality, fish consumption, and environmental justice?" is especially important to the citizens of Washington State.

While you are here, I hope you will take some time to enjoy the tremendous charm and beauty of the Evergreen State. You will find an extraordinary array of attractions in and around Seattle to help make your visit a memorable one.

Best wishes for a successful meeting and an enjoyable stay in Washington!

Sincerely,

Gary Locke

Gary Locke
Governor

In 1997, Ms. Veloria continued, the legislature worked to incorporate environmental health into the state's overall public health improvement plan. That effort, she explained, had allowed the Washington Department of Health to consider environmental health risks to communities when performing assessments of public health. She added that, in that same year, legislation had been enacted that reformed the way in which the work at clean-up sites is taxed.

Ms. Veloria explained that, before the legislation was passed, the owner of a cleanup site was taxed at a particular rate if the owner cleaned up the site voluntarily, but was taxed at a lower rate if the owner waited until the Washington Department of Ecology formally placed the site on a list of sites that required cleanup. Such a tax system, she pointed out, encouraged owners to delay cleanup, thereby increasing the potential that contamination from the sites would spread. By changing the system to include a uniform tax for cleanups, she added, the legislature removed site owners' incentive to delay cleanup.

Continuing, Ms. Veloria stated that, in 1998, the Washington state legislature enacted legislation that requested that the Washington Department of Health investigate the health effects of noise, particularly in the vicinity of Washington's Seattle-Tacoma International Airport (SEATAC) and review existing studies of noise pollution to evaluate whether disadvantaged groups are subject to disproportionately high levels of exposure to unhealthy noise pollution. Further, she continued, in early 2001, the legislature's Agriculture and Ecology Committee conducted a hearing on proposed legislation that would require that the public be notified of releases of hazardous substances. Specifically, she explained, notices would be mailed to residents, land owners, and businesses located within one mile of a facility involved in such a release and would provide detailed information about the chemicals involved, the address of the facility, and the date of the release. While the legislation has not yet been enacted, she added, it is to be reintroduced in 2002.

Mr. Moses Squeochs, Yakama Nation and member of the NEJAC Indigenous Peoples Subcommittee, observed that, while he appreciates the responsibility and effort of the NEJAC, he is troubled that such an "extra effort" is necessary to enforce legislation that has been enacted by the Congress of the United States. For example, he pointed out, federal law requires that federal agencies identify the need to ensure the protection of populations that exhibit patterns of subsistence consumption of fish and wildlife and to assist in providing such protection. Federal law also requires that federal agencies collect, maintain, and analyze information about the consumption patterns of populations that rely primarily on fish or wildlife for subsistence, added Mr. Squeochs. He stressed that EPA has been charged with implementation of federal environmental statutes. He asked why it has been so difficult for EPA to carry out that responsibility.

Continuing, Mr. Squeochs explained that he represents the 14 Confederated Tribes and Bands of the Yakama Nation that reside in the interior mid-Columbia River basin. After reciting the names of the 14 tribes and bands, he explained that each of those communities, along with many other indigenous communities, continue to maintain a subsistence, or "hunter-gatherer," way of life and sustain the customs and practices of their valuable and rich heritage. He also commented that there is a renewed and important effort among indigenous peoples to restore their language and preserve their culture, which reflects and maintains a deep connection to the Earth, "their Mother."

Mr. Squeochs shared his remembrance of the first time he had recited as a small child in school the words of the Pledge of Allegiance "...with liberty and justice for all." Ironically, he continued, more than 50 years later, he finds himself participating as a member of the Indigenous Peoples Subcommittee in an attempt to make such justice a reality for all and to achieve some sense of fairness and equality. In closing, Mr. Squeochs, stated his hope that the NEJAC would continue to make history in the search for justice.

Ms. Yolanda Sinde, Community Coalition for Environmental Justice, also welcomed the members of the NEJAC to the city of Seattle. She first noted that the Community Coalition for Environmental Justice, a multiracial organization, had been the first official nonprofit environmental justice group formed in the Seattle area. She then invited the members of the NEJAC to attend a community reception to be held that evening.

Ms. Sinde then briefly expressed her concern about rumors that the NEJAC might be dissolved. She stressed the importance of maintaining the connection the NEJAC provides between EPA and environmental justice communities and asked that representatives of EPA or members of the NEJAC address the concern during the meeting.

3.0 POLICY DIALOGUE ABOUT THE RELATIONSHIP BETWEEN WATER QUALITY, FISH CONSUMPTION, AND ENVIRONMENTAL JUSTICE

The NEJAC, in its continuing efforts to provide independent advice to the Administrator of EPA in areas related to environmental justice, focused its sixteenth meeting on the relationship between water quality, fish consumption, and environmental justice. On Tuesday, December 4, the members of the NEJAC heard a panel presentation by the members of the Fish Consumption Work Group of the NEJAC. The NEJAC had established the work group to assist in developing a report and recommendations on this issue.

Ms. Annabelle Jaramillo, Benton County Board of Commissioners and chair of the Air and Water Subcommittee, served as facilitator during the policy dialogue. She began the discussion by reminding the members of the NEJAC of the purpose of the current meeting of the NEJAC. She explained that the issue that the NEJAC had been asked to consider and provide recommendations on was:

> *"How should EPA improve the quality, quantity, and integrity of our Nation's aquatic ecosystems in order to protect the health and safety of people consuming or using fish, aquatic plants, and wildlife?"*

Ms. Jaramillo then stated that, in preparation for the meeting, a report, Fish Consumption Report: Pre-meeting Discussion Draft, had been developed to provide a context for the discussions. The Fish Consumption Work Group, she continued, had prepared the report, with the assistance of Ms. Catherine O'Neill, Associate Professor, Seattle University School of Law.

3.1 Overview of the Fish Consumption Report

Ms. Jana Walker, Law Offices of Jana Walker and vice-chair of the Indigenous Peoples Subcommittee, provided an overview of the fish consumption report. Ms. Walker first explained that the report is a discussion draft intended to promote open dialogue among the members of the NEJAC, as well as to encourage public comment on its content. She stated that the work group would welcome comments on the draft report through January 2002.

Ms. Walker reported that the draft report includes a background section and four chapters. The background section explores the reasons contamination of fish and aquatic ecosystems

Members of the NEJAC discuss presentations made by the members of the NEJAC Fish Consumption Work Group.

causes concern about environmental justice. It does so, she continued, through the perspectives of real people who have suffered the harmful effects of such contamination. She explained that, while there are important differences among affected groups, communities of color, low-income communities, and tribes generally consume greater quantities of fish than do other segments of the population and depend on healthy fish and aquatic ecosystems to a greater extent and in different ways than does the general population. Therefore, she continued, these communities and tribes are forced to bear a disproportionate share of the environmental effects that result from pollution of the waters.

Continuing, Ms. Walker explained that fish not caught commercially are a healthy, cheap, and readily available source of protein in the diet. Persons who subsist chiefly or solely on such fish therefore are more likely to be members of communities of color, low-income communities, or tribes. Affected groups also may consume or use fish, aquatic plants, and wildlife for cultural, traditional, or religious reasons. They also may eat different parts of the fish than do other segments of the population, and they may prepare the fish in different ways, as well. Conventional understandings about catching, harvesting, preparing, and eating fish do not capture such practices adequately.

Ms. Walker then pointed out that communities of color, low-income communities, and tribes also may be exposed to different, and often numerous, types of exposures to environmental pollutants than is the case among the general population. Many toxins and toxic chemicals persist in the environment for very long periods of time and bioaccumulate in fish, plants, wildlife, and ultimately the people who eat them, she explained. Although the specific health risks posed by such multiple exposures are unknown, she said, it has been documented that many of the chemicals of concern are highly toxic to humans. Such chemicals, continued Ms. Walker, can cause reproductive, neurological, and endocrine disorders; cancer; and negative developmental effects in children.

Ms. Walker stressed that "healthy waters and watersheds mean healthy people." She acknowledged that EPA has made progress in addressing water pollution over the past 30 years, but declared that much more must be done because, today, only 60 percent of the nation's lakes, rivers, and estuaries are clean enough to be used for fishing and swimming. Continuing, Ms. Walker pointed out that 40 percent of assessed waters are degraded to the point that they no longer support their designated uses. Further, some 300,000 miles of rivers and streams and more than 5 million acres of lakes do not meet water quality goals, she added. Many of those waters are not safe for swimming and cannot support healthy fish, she said.

Ms. Walker then reported that Chapter 1 of the draft fish consumption report evaluates the tools that EPA uses to define, evaluate, and respond to the adverse health effects of exposure to contaminated aquatic ecosystems. She explained that fish consumption is the primary route of exposure to many toxic contaminants. To establish environmental standards, EPA uses exposure data related to the ingestion of contaminated fish, she said. To develop those national water quality standards and criteria, she went on, certain assumptions must be made about how much fish people eat, which parts of the fish they eat, and which people are eating those fish. However, such exposure assumptions often reflect only the habits of the general population; the increased potential for exposure among populations that consume larger quantities of fish, such as communities of color, low-income communities, and tribes, are not considered.

Providing an example, Ms. Walker stated that, until recently, federal water quality standards were based on the exposure assumption that the average person consumes only 6.5 grams per day (g/day) of fish. However, studies of rates of consumption of fish in tribal, low-income, and minority communities have revealed rates that are more than 100 times the value assumed by EPA. Ms. Walker added that the draft report provides ample evidence that ethnic minorities and tribes are more likely to eat the whole fish, including the skin, head, and tail, and that those parts contain higher levels of pollutants than the filet, which is the part of the fish most likely to be consumed by individuals in the general population.

Continuing, Ms. Walker said that Chapter 1 of the report also discusses the issues related to aggregate or multiple exposures and cumulative risks, noting that current EPA methodologies proceed as if humans are exposed to only one contaminant at a time.

In summary, Chapter 1 of the fish consumption report addresses issues related to assumptions made by EPA about patterns of fish consumption, said Ms. Walker. Exposure assumptions must be revised to reflect the lives and circumstances of all people, including those subject to high levels of exposure, she emphasized.

Chapter 2 of the fish consumption report focuses on EPA's risk reduction strategies that require risk producers, usually the polluters, to clean up, reduce, or prevent environmental contamination, Ms. Walker then reported. The chapter also examines existing legal authorities under federal environmental statutes that might be exercised more effectively to address contaminants of concern and to protect the health of people who consume large quantities of fish, she added.

Chapter 3 of the fish consumption report, continued Ms. Walker, examines EPA's risk avoidance strategies, under which affected communities and tribes are asked to change their practices to avoid exposure to harmful contaminants. She explained that the chapter examines the role fish consumption advisories should play in protecting the health of people who consume or use fish and concludes that the role of such an advisory varies, depending on the community or tribe affected by it. Chapter 3 also identifies several significant concerns related to reliance on fish advisories, she said.

Ms. Walker then stated that Chapter 4 of the fish consumption report addresses considerations unique to the 556 federally recognized tribes, including 229 Alaskan Native villages. She explained that, while tribes share many of the concerns described in the preceding chapters, their unique political and legal status distinguishes them from all other affected groups in many ways and warrants separate treatment in the report. Unlike other affected groups, tribes also are government entities and regulators that exercise broad inherent sovereignty over their members, territories, and resources, she said. Chapter 4 also discusses the unique susceptibilities of tribes to the adverse effects of pollution on health.

In closing, Ms. Walker stressed that the fish consumption report is not intended to ignore or belittle the progress EPA has made in addressing water pollution. However, she stated, it is clear that many obligations remain unfulfilled and much work remains to be done. As the members of the NEJAC continue their discussions over the coming months, she suggested, their challenge will be to develop meaningful advice about the approach EPA should take in the effort to improve the quality of aquatic ecosystems, thereby protecting the health of all people who consume fish, especially highly exposed communities and tribes.

In response to the overview of the fish consumption report provided by Ms. Walker, Mr. Jim Hanlon, EPA Office of Water (OW) Office of Science and Technology recognized the high quality of the work produced by the work group. He then expressed his belief that the report will be important to EPA as the Agency works to address issues related to fish contamination. He remarked that EPA had made great strides in improving water quality over the past 10 years, but acknowledged that much work remains to be done. Mr. Hanlon reminded the audience that the objectives of EPA OW are to ensure that water is safe to drink; that water resources are safe for aquatic recreation; that fish are safe to eat; and that our water resources provide a balanced, high-quality system that supports aquatic life.

Mr. Hanlon then stated that, only 10 years earlier, fewer than five states in the country used risk-based methodologies to develop fish consumption advisories. However, he continued, through cooperation with the states, EPA OW had developed a set of guidelines that states used in developing the fish consumption advisories that are now in place. The guidelines include guidance on sampling methodologies, analytical methodologies of laboratories, risk management, and risk communication. Mr. Hanlon then reported that more than 40 states now use risk-based methodologies to develop fish consumption advisories for their populations.

In conjunction with the Minnesota Department of Health, Mr. Hanlon continued, EPA recently had sponsored a conference in Chicago, Illinois, that was attended by more than 400 people, representing all 50 states and more than 50 tribal entities. The focus of the conference was risk communication related to fish consumption. The proceedings of that conference had been released, he said, and would be discussed during the meeting of the Air and Water Subcommittee to be held on December 5, 2001. Mr. Hanlon added that he also would discuss with the members of the Air and Water Subcommittee the further actions that the agency is considering. Those actions would focus on the development of additional tools to assist states in improving their risk communication capabilities.

Responding to Ms. Walker's comments about outdated methodology for the development of human health criteria, Mr. Hanlon stated that EPA recently had replaced a document that had been in use since the early 1980s with updated information that is based on available statistical information about average consumption levels for general populations, sport fishers, and subsistence populations. He noted that the release of the updated information represented an important transition from the use of historical bioconcentration factors to the use of bioaccumulation factors in the derivation of water quality criteria. The new approach has the effect of lowering the acceptable criteria by a factor of as much as 100. Mr. Hanlon added that the new methodology also recognizes, for the first time, the concept of relative source contribution. That is, he explained, individuals do not receive their entire body burden of a particular toxic pollutant from consumption of fish tissue alone, but rather from a combination of exposure routes, all of which must be considered.

Continuing his discussion of the activities of EPA OW, Mr. Hanlon stated that the office, in cooperation with the U.S. Department of Health and Human Services (HHS), recently completed its second mailing to health care providers. Through the mailing, he explained, packages of information about the contamination of fish was disseminated to more than 135,000 health care providers across the United States, including pediatricians, obstetricians, gynecologists, family physicians, physician's assistants, and midwives. Mr. Hanlon then stated that EPA does not believe that consumption advisories are the solution to problems related to the contamination of fish. Rather, he said, such advisories are temporary measures taken to advise the public about health risks that may be associated with the consumption of contaminated fish.

Mr. Hanlon then reported that EPA's Total Maximum Daily Load (TMDL) Program is making "giant steps forward." Exhibit 1-3 presents the definition of TMDL. During 2002, he continued, some 2,000 TMDL projects will be underway nationwide. He added that approximately 33 states operate under consent agreements or court orders that require that the states and EPA step forward and complete development schedules reflecting the priority ranking of each pollutant.

Concluding his remarks, Mr. Hanlon emphasized that the "Achilles heel" of the national water program continues to be the lack of robust information or data about watersheds throughout the United States. Referring to Ms. Walker's comment that 40 percent of assessed water bodies do not meet standards for their designated uses, Mr. Hanlon pointed out that only 20 to 25 percent of the nation's water bodies have been assessed.

Ms. Shepard also offered several comments about the information presented in the draft fish consumption report. She stated that in her own state, New York, many groups have been in consultation with the state Department of Environmental Conservation about fish advisories for the Hudson River, in which contamination has been known to exist for many years. However, she pointed out, authorities have posted no fish consumption advisories related to the river. Ms. Shepard said that, along the Hudson River, subsistence fishers are selling fish to local fish markets. EPA, she suggested, should find a way to mandate that fish advisories be posted. She suggested further that a public information campaign be mounted to reach affected communities. Ms. Shepard then stated that the glaring disparity between how water quality standards, enforcement, and cleanup are implemented confirms continuing unequal enforcement in communities that are among the most highly exposed to contaminants — communities of color, low-income communities, and tribes. She then stated her belief that the information presented in the draft report reinforces recognition of the need for accelerated investigation projects and protocols for determining the cumulative effects of multiple exposures.

Finally, Ms. Shepard commented that financial resources should be made available to affected groups so that they can educate their own communities in their own languages and in a manner that reflects their own cultures and customs.

3.2 Fish Consumption, Research Methods, and Approaches to Risk Assessment

Dr. Patrick West, Professor Emeritus, University of Michigan, provided a detailed summary of information about research methods and approaches to risk assessment that agencies use to define, evaluate, and respond to the adverse health effects caused by contamination of aquatic environments. Chapter 1 of the draft fish consumption report presents that information.

Dr. West stated that the contamination of fish, aquatic plants, and wildlife is an especially pressing concern for many communities of color, low-income communities, and tribes, whose consumption and use practices differ, often profoundly so, from those of the general population. He explained that members of those communities often consume far greater quantities of fish, aquatic plants, and wildlife than does the general population. Further, they consume and use different species and parts than the general population, and they employ culturally different methods of procuring and preparing the fish, aquatic plants, and wildlife that they use. Therefore, continued Dr. West, communities of color, low-income communities, and tribes are among the segments of the population that are most highly exposed to contaminants in the fish, plants, wildlife, and aquatic environment. He explained that available literature documents that the 95th percentile fish consumption rates for various affected communities and tribes range from 225 g/day to 489 g/day. Yet, he pointed out, EPA regularly and routinely approves a human consumption rate of 6.5 g/day in risk assessment methodologies.

Dr. West then discussed policy related to fish consumption in a legal and cultural context. He stated that the contamination of fish, aquatic plants, and wildlife also is troubling to many communities of color, low-income communities, and tribes because such groups consume and use fish, aquatic plants, and wildlife in different cultural, traditional, religious, historical, economic, and legal contexts than what agencies have defined as the general population. For example, tribes have rights guaranteed by treaty to take fish. The unique legal obligations established under such treaties are relevant to EPA's decisions that affect the health of the fish and the fishery resource, he said.

Dr. West explained that fish consumption and use of fish often is prescribed by the culture and tied closely to the collective and individual identity of a community or tribe. The existence of such different contexts is demonstrated abundantly by both testimonial evidence and study in social science, he continued. For the reasons he had identified, said Dr. West, current fish consumption practices are, in an important sense, indispensable for many communities and tribes.

Dr. West then discussed the possibility of a "suppression effect" related to fish consumption. He explained that a suppression effect occurs when a fish consumption rate for a given group reflects a current level of consumption that is diminished artificially from the appropriate baseline level for the group. Suppression effects may occur because of contamination or fear of consuming contaminated items (members of a group consume fewer fish than they naturally would because they fear that the fish are contaminated) or depletion of resources (members of a group consume fewer fish than they naturally would because fewer fish are available for consumption), he said. He explained that, when standards are based on fish consumption rates that are not adjusted for suppressed consumption, the standards initiate a "downward spiral," with more contamination permitted, leading to a greater suppression effect, and so on.

Continuing, Dr. West stated that current risk assessment methods do not account adequately for susceptibilities and co-risk factors that affect individual responses to environmental contaminants. Co-risk factors include underlying health status, quality of diet, genetics, socioeconomic status, access to health care, and other factors. For example, he said, low-income socioeconomic status may combine with and intensify health effects of consuming contaminated fish in environmental justice communities.

Dr. West then stated that current risk assessment methods also evaluate risks as if humans were exposed to a single contaminant at a time by a single route of exposure. He explained that members of environmental justice communities, however, often are exposed to numerous contaminants, at a given time or in succession, often by more than one route of exposure. For example, he stated, the 13 Confederated Bands of the Yakama Nation fish in the Columbia River; more than 100 contaminants have been identified in the tissues of fish taken from that river.

Dr. West then observed that the efforts of affected communities and tribes are integral in producing relevant, accurate, scientifically defensible data. He said that affected communities and tribes therefore must be involved at every stage of research on the issues he had discussed, from identifying research needs to designing research methods; interpreting the policy implications of the finding of such research; and determining the importance of the research to the agency's risk assessment, management, remediation, and emission permitting processes.

Continuing his remarks, Dr. West stated that environmental justice communities also have a broader policy role to play beyond the arena of research. He stated that tribal populations throughout the country have challenged the NEJAC and EPA to "walk in their moccasins" — to see and experience the importance of fish consumption and related use of subsistence resources taken from the waters and the land and the harsh effects of pollution and pollution policy as the tribes themselves experience them. The same ideal, Dr. West added, holds true for other environmental justice communities and cultures.

Dr. West then stated that, at the recent conference in Chicago that Mr. Hanlon had mentioned, he had heard members of tribes and other environmental justice communities repeatedly urge EPA to take a broader, more holistic view that goes beyond the very important, but very short-term, narrow, and focused, policy of exclusive reliance on advisories.

Dr. West then asked the members of the NEJAC if they would be willing to "walk in the moccasins" of affected communities and, with renewed determination, take on the difficult issues of prevention and remediation.

3.3 Fish Consumption and the Exercise of Existing Legal Authorities

Ms. Walker provided a summary of the information presented in Chapter 2 of the fish consumption report. She stated that approximately 40 percent of assessed waters in the United States do not support use for fishing or swimming. She added that some 10 percent by volume of all sediments under waters in the United States are contaminated heavily; the list of sediments in surface waters that require cleanup is long, she said, and the number of fish consumption advisories rises each year. Ms. Walker explained that, because people of color, low-income people, and American Indians and Alaskan Natives are disproportionately among the populations that experience the greatest exposure to contamination, any lapses in the efforts of agencies to prevent, reduce, clean up, and restore contaminated aquatic environments will impose a disproportionate burden on those affected groups. Referring to the regulation of mercury emissions, Ms. Walker noted her understanding that, in the near future, EPA was to address rule-making for the regulation of mercury emissions from institutional, industrial, and commercial boilers. She stated that such regulation is needed.

Continuing, Ms. Walker stated that a rule regulating mercury emissions from coal-fired power plants might not be proposed until December 2003. Meanwhile, she pointed out, coal-fired power plants are the single largest source of air emissions of mercury in the country. She then stated that a rule regulating emissions of mercury from chloroalkaline plants is needed. Although only approximately one dozen such plants are located in the United States, she explained, each plant is a very significant source of such emissions. In some cases, a plant may be the most significant local source of emissions of mercury. She then cited as an example two chloroalkaline plants in Louisiana that contribute more mercury emissions than all the coal-fired power plants in the state combined.

Continuing her presentation, Ms. Walker stated that EPA's guidance documents and standards consider a higher level of cancer risk to be "acceptable" for "more highly exposed subgroups" than for the general population. That standard is inequitable and deeply troubling, as a matter of environmental justice, because it is people of color, low-income people, and American Indians and Alaskan Natives who make up the "more highly exposed subgroups," she said.

3.4 Fish and Wildlife Consumption Advisories

Ms. Marianne Yamaguchi Santa Monica Bay Restoration Project provided a summary of the information about fish and wildlife consumption advisories that Chapter 3 of the fish consumption report presents. Ms. Yamaguchi pointed out that fish advisories are just one component of a comprehensive strategy for the management of health risks. She also noted that fish advisories are a strategy for risk avoidance rather than risk reduction. She explained that, typically, advisories are intended to provide information about the nature and the extent of contamination and its potential adverse effects on health. Their purpose, she noted, is to encourage consumers to avoid consuming contaminated species and to suggest alternative ways in which people could continue to eat fish. However, she added, fish advisories are not effective in many environmental justice communities because fish substitutes are not readily available or because changes in fish consumption practices may cause great anguish or cultural harm. Therefore, said Ms. Yamaguchi, a comprehensive strategy for the control of health risks should go beyond the issuance of fish advisories.

Continuing, Ms. Yamaguchi observed that, while advisories are useful, if they are to be effective, they must be tailored to the specific locations and communities of concern. She pointed out that there is no "one-size-fits-all" strategy and suggested that attempts to ensure consistency across broad regions or among population groups may not be useful or appropriate.

She stated that affected communities and tribes play an integral role in relevant, appropriate, and effective risk communication efforts. Affected communities and tribes, she continued, therefore must be involved as partners, or in the case of tribal governments, as "co-managers," at every stage of the communication process — in identifying needs and priorities, in developing content for advisories that is appropriate for the groups of concern, in helping to prepare translations and communicate the message, and in helping to interpret communities' responses to risk management efforts.

3.5 Fish Consumption Concerns Among American Indian Tribes and Alaskan Native Villagers

Mr. Dean Suagee, Vermont Law School discussed information presented in Chapter 4 of the fish consumption report. Mr. Suagee stated that the political and legal status of tribes is unique among affected groups and so warrants separate treatment. As sovereign entities, federally recognized tribes maintain a government-to-government relationship with the federal government and its agencies, he explained. Continuing, Mr. Suagee stated that the unique legal status of tribes includes a trust responsibility on the part of the federal government and, for many tribes, treaty rights, as well. He then remarked that EPA must demonstrate respect for the unique status of Native American tribes and Alaskan Native villages.

Mr. Suagee explained further that, in general, there is no environmental protection infrastructure in Indian country because Indian country had been overlooked during the development of the first federal environmental laws. He stated that, because tribes do not have the same kinds of resources as states have to devote to program development, tribes are for the most part dependent on EPA and other federal agencies, such as the Bureau of Indian Affairs (BIA), the Indian Health Service (IHS), and the U.S. Department of Housing and Urban Development (HUD).

Turning to the role of tribes as regulators in protecting the environment, Mr. Suagee stated that, although tribal governments and EPA are responsible for implementing water quality standards in Indian County and on Alaskan Native lands, only 16 of the 565 federally recognized tribes and Alaskan Native villages have water quality standards that have been promulgated or approved by EPA. Therefore, continued Mr. Suagee, there are considerable gaps in water quality standards in Indian country, as well as gaps related to other statutes.

Mr. Suagee then noted that EPA had been engaged for some two and one-half years in consultations with tribes related to EPA's proposal to promulgate core federal water quality standards for Indian country. The proposed rule finally was signed on January 19, 2001, he said. However, he continued, the rule became subject to the moratorium on new rules and was "passed back" to EPA by Office of Management and Budget (OMB). Mr. Suagee then explained that, during the November 2001 meeting of the Tribal Caucus of the Tribal Operations Committee (TOC) in Albuquerque, New Mexico, he had been told that OMB provided two suggested options when the rule was returned to EPA. He then noted that he was unsure of the current status of the rule. He remarked, however, that the Tribal Caucus was near consensus that EPA should move forward to promulgate the current rule as a proposed rule.

Mr. Suagee also stated that, because of the historical difference in the way Alaskan Natives have been treated, the implications of the Alaska Native Claims Settlement Act and case law interpreting that act, and the use of the term "reservation" in the provisions of the Clean Water Act and the Clear Air Act that authorize treatment of tribes like states, the solutions for Indian country that are available in the lower 48 states are not available in Alaska.

Mr. Suagee then stated that EPA also should explore the development of more appropriate designated uses for culturally important water bodies in Alaska than those currently in place. Although those issues had not yet been included in the draft fish consumption report, suggested Mr. Suagee, the work group and the NEJAC should revise the report to include a recommendation that is specific to Alaskan Natives.

The members of the Executive Council then discussed the draft fish consumption report and developed proposed revisions and additional recommendations. Appendix A presents a list of those proposed revisions and additional recommendations.

4.0 DRAFT STRATEGIC PLAN OF THE NEJAC

Ms. Shepard presented the strategic plan of the NEJAC to the members of the Executive Council. She explained that the strategic plan incorporates the issues raised and conclusions reached at the August 2001 meeting of the Executive Council, held in Washington, D.C. Ms. Shepard advised that the introduction section of the strategic plan will be revised to reflect the Executive Council's appreciation for the efforts of past NEJAC members, especially the efforts of those who had served as founding members. In addition, these revisions will note the past contributions of NEJAC in advancing policy development within the EPA related to environmental justice.

4.1 Goals and Objectives

Over the previous year, Ms. Shephard noted, the NEJAC had been reviewing its role and discussing how the NEJAC could best promote environmental justice and fulfill the mission set forth in its charter. In general, said Ms. Shepard, the members of the NEJAC had concluded that they can better fulfill the mission of their charter by refocusing their own processes and work products, while redirecting the site-specific issues to the appropriate EPA regional offices that have both the responsibility to address such issues and the authority to do so. She stressed that, during its meetings, the NEJAC would continue to solicit public comment on policy issues before the NEJAC.

Ms. Shepard then read the revised mission statement for the NEJAC that is presented in the strategic plan. The mission statement reads as follows:

> *"The NEJAC is a federal advisory committee that provides timely, relevant, cogent, and independent advice to the EPA Administrator on matters of environmental justice to ensure the fair treatment of all peoples, including minority, low-income, and indigenous populations and federally recognized tribes, and often overlooked populations, such as agricultural workers."*

Continuing, Ms. Shepard explained that the Strategic Plan outlines the strategy of the NEJAC to (1) redesign its activities to better perform the advisory role its charter establishes; (2) collaborate with EPA to provide regional and other alternative mechanisms other than meetings of the NEJAC, such as regional listening sessions, through which communities can bring site-specific issues to the attention of EPA; and (3) develop, through a deliberative process that involves all stakeholders, an effective work product grounded in issues of importance to environmental justice communities. She added that the strategic plan is to guide the work of the NEJAC through September 27, 2003.

Ms. Shepard stressed that disproportionate adverse effects on communities of color, low-income communities, and tribes are at the very heart of environmental justice. They also, she continued, are the impetus of the grassroots activism that prompted the development of several key products, including President Clinton's Executive Order 12898 on Environmental Justice and the subsequent formation of the NEJAC, along with numerous other products over the years. The NEJAC, she declared, will continue to make strong recommendations to EPA on the conduct of regional listening sessions and other mechanisms that will take place in the coming year, as well as recommendations on follow-up to those sessions.

Ms. Shepard then briefly outlined the six goals for the Executive Council of the NEJAC and its subcommittees, which, she noted, are presented in the strategic plan. Those goals, she said, will guide the NEJAC in accomplishing its mission.

First, Ms. Shepard explained, a work product goal was developed to identify several methods of providing cogent, timely, relevant, and effective advice, both formal and informal, to the EPA Administrator. Second, the strategic plan sets forth a process goal aimed at developing and implementing a deliberative, consultative, and collaborative process on which the NEJAC can base its advice to the EPA Administrator, she said. A third goal is the public participation and public input goal that outlines how the NEJAC actively will employ mechanisms for soliciting the views of minority, low-income, indigenous, and agricultural worker populations and of federally recognized tribes, she continued. She explained that the third goal addresses (1) public participation at meetings of the NEJAC, (2) the incorporation of community concerns and issues into the policy dialogue of the NEJAC, and (3) public participation at the regional level.

Continuing, Ms. Shepard stated that a fourth goal included in the strategic plan is an organizational and procedural goal. She explained that, the purpose of the fourth goal is to obtain better briefings from EPA about its initiatives and activities and to become better able to communicate externally with the larger environmental justice movement, communities, other stakeholders, government and industry. The NEJAC, she said, would request that EPA initiate a review of the NEJAC organizational structure and procedures. Implementation of the initiative will enable the NEJAC to more effectively and efficiently develop advice and render it to the EPA Administrator, she said.

A fifth goal presented in the strategic plan, Ms. Shepard continued, is a communications goal that outlines a communication plan for improving the flow of information from EPA to the NEJAC and for creating a listserv to enable members of the Executive Council and DFOs to discuss matters properly between meetings of the NEJAC. Last, she said, the strategic plan includes the goal of developing an effective orientation program for new members of the NEJAC and its subcommittees.

Ms. Shepard then publicly thanked Ms. Jaramillo, who chaired the committee that drafted the strategic plan, and the members of the drafting committee, Mr. Kenneth Warren, Wolf, Block, Schorr and Solis-Cohen and member of the Enforcement Subcommittee; Ms. Wilma Subra, Louisiana Environmental Action Now and member of the Health and Research Subcommittee; and Ms. Veronica Eady, Massachusetts Executive Office of Environmental Affairs and chair of the Waste and Facility Siting Subcommittee.

Ms. Jaramillo commented that the development and implementation of the plan would be a dynamic process. That is, she continued, the strategic plan will "grow and move with the times." She also echoed Ms. Shepard's praise for Ms. Subra, Mr. Warren, and Ms. Eady for their hard work in writing the strategic plan.

Ms. Jane Stahl, Connecticut Department of Environmental Protection, stated her belief that the strategic plan would set the stage for a wonderfully productive collaboration between the NEJAC, which was created to help give communities a voice in the world of environmental protection and environmental management, and the organizations and bureaucracies that are supposed to be doing that work on behalf of all communities and constituencies.

The importance of the plan, Ms. Stahl continued, is that it provides the NEJAC and communities with a structure through which they can move forward. Everyone is on the same side, she stressed, but different individuals bring different talents and different views to the table. She stated that all stakeholders must communicate and work with one another, but that they should do so in a structured fashion. In that way, she observed, they will achieve an end result, rather than bringing about increased division and controversy over issues that are important to all stakeholders.

In closing, Ms. Stahl expressed her belief that the organized process presented in the strategic plan would help not only the NEJAC as a group to achieve its goals, but also the communities that the NEJAC serves to accomplish the same outcome.

She added that implementation of the strategic plan also would help EPA move forward in addressing issues that are important to communities that have been "excluded from the table" in the past.

Dr. Graciela Ramirez-Toro, Interamerican University of Puerto Rico and chair of the Puerto Rico Subcommittee, applauded the work of the drafting and writing committee (that developed the draft strategic plan. She then offered several suggestions for revision or clarification of the plan. First, she suggested that the strategic plan include some discussion of the ways in which the work groups will include individuals, such as technical experts, who are not members of the NEJAC. She also suggested that the strategic plan outline at least a general time line and protocol for scheduling conference calls. Finally, Dr. Ramirez-Toro suggested that the strategic plan be revised to identify the role of members who live in a particular region during listening sessions held in that region.

Ms. Savonala "Savi" Horne, Land Loss Prevention Project and chair of the Enforcement Subcommittee, congratulated the members of the Executive Council for dealing with the reality that the NEJAC is a federal advisory committee and therefore must conform to the requirements of the act that governs such a body. She echoed the concern voiced by Dr. Ramirez-Toro that the strategy for and goals of the regional listening sessions should be defined more clearly in the draft strategic plan. In particular, she noted, the plan should describe clearly how comment and advice generated during regional listening sessions would be funneled to the Executive Council of the NEJAC.

Responding to Ms. Horne's concerns, Ms. Stahl, while noting that she was pleased that the EPA regions have moved forward in accepting the notion of regional listening sessions, expressed agreement that a means of conveying information to the NEJAC should be included in the strategy developed for the regional listening sessions. Ms. Stahl added that the NEJAC must monitor the issues that arise during those sessions so that its members will be cognizant of such issues on a national level, rather than leaving them confined only to a regional level.

Expressing concern that EPA might find it necessary to secure state participation, Ms. Shepard asked Ms. Stahl to discuss her perspective on the role of state governments in the regional listening process. Ms. Stahl responded that she believed that the states would want to participate in the listening sessions. She pointed out that there are issues of environmental justice in all states. The states, she said, cannot afford to withhold participation. Ms. Stahl then expressed her belief that the listening sessions would prove to be an effective way for EPA to engage the states on a regional basis. She stated further that she hoped that the regional sessions will be conducted in a manner that will be an opportunity for sharing of concerns and of information, rather than an avenue for the "demonization" of state bureaucracies or state environmental agencies.

Mr. Lee warned against the implementation of the regional listening sessions lacking an "action plan" or guidance on the format of the sessions, how the sessions will be evaluated, and how action taken in response to issues raised during the sessions will be measured. He stressed that it is the business of the NEJAC to encourage and advise EPA to ensure that the agency develops a standard operational and procedural process for the regional listening sessions. He suggested that, in the future, NEJAC may, if it chooses, to provide advice and recommendations on regional listening sessions.

Ms. Subra commented that each EPA regional office had provided the drafting and writing committee with a report on the status of the issues on which that region was working. She suggested that the information provided be disseminated to communities in each region so that members of the communities can review the actions of regional offices. Ms. Subra noted that, if repeated on at least an annual basis, such action also could serve as an effective mechanism by which the EPA regional offices can provide information to the NEJAC on the regional issues and initiatives.

Referring to the involvement of the states in the regional listening sessions, Ms. Subra commented that some state agencies perform at a "less-than-appropriate" level. Therefore, she continued, citizens look to the EPA regional office for assistance. Ms. Subra stressed that it is important that both the EPA regional offices and the states attend the listening sessions, so that tasks and responsibilities can be delegated. She added that it will be important that the NEJAC "keep its finger on the pulse," continuing to be fully cognizant of what issues have been identified, what individual or entity has been assigned to address those issues, and whether the issues are being addressed.

Ms. Eileen Guana, Southwestern University School of Law and vice-chair of the Air and Water Subcommittee, pointed out that the NEJAC does not have oversight authority over the EPA regional offices. However, she added, the NEJAC can work to prompt the establishment of a standard of accountability for the regions and a voluntary mechanism for informing the NEJAC of activities conducted by the regions.

Mr. Warren pointed out two important themes that he said were apparent in the strategic plan. First, the proposed deliberative process, which intends that the NEJAC focus on delivering work products to EPA that can be integrated into EPA policy and practice, is the most effective way the NEJAC can influence environmental justice, he said. Another key theme of the strategic plan, he continued, is that the proposed processes are collaborative — collaborative processes between the NEJAC and EPA and between the NEJAC and communities are envisioned in the strategic plan, he noted. Mr. Warren also stressed that the development of a communication plan is a key element of the strategic plan. He said that a communication plan that provides for a number of channels of communication with EPA will allow the members of the NEJAC to better understand EPA's actions, in turn allowing the NEJAC to act more effectively to accomplish the mission set forth under its charter.

Ms. Anna Frazier, DINE' CARE and member of the Indigenous Peoples Subcommittee, informed the members of the NEJAC that she had talked with several representatives of grassroots organizations who wish to comment on the draft strategic plan. Those individuals would offer their comments during the public comment period to be held in conjunction with the current meeting of the NEJAC, she reported.

Mr. Robert "Bob" Harris, Pacific Gas and Electric Company and member of the Waste and Facility Siting Subcommittee, stressed that the draft strategic plan establishes a foundation that will allow the NEJAC to have influence nationwide in resolving problems because the plan involves all stakeholders. Mr. Harris commended EPA's regional administrators for their understanding of the importance of the role that they must play in developing and implementing the strategic plan and for the role they will play in bringing together all stakeholders in their regions.

Ms. Shepard then turned to Mr. Lee for remarks about specific plans for implementation of the draft strategic plan.

4.2 Implementation of the Strategic Plan

Mr. Lee first pointed out that the decision to "refocus" the NEJAC did not arise from a discussion that had started six months earlier, but had resulted from discussions that began some five or six years ago. He then emphasized that the draft strategic plan effectively incorporates community involvement and public participation. For example, he said, the draft fish consumption report is an excellent example of a work product of the NEJAC that was developed through a deliberative process and based on the views of communities about the issues and concerns of importance to those communities. Such processes and products have the potential to translate effectively into true improvements for communities, he stressed.

Mr. Lee then reviewed the NEJAC's schedule for 2002, as set forth on page 12 of the draft strategic plan. He first stated that the Pollution Prevention Work Group was to be established formally in January 2002. Mr. Lee added that Ms. Subra and Mr. Warren were to serve as co-chairs of the work group.

Continuing, Mr. Lee reported that the Fish Consumption Work Group was to make its report and the recommendations associated with it final by March or April 2002. Similarly, he added, the Interagency Environmental Justice Implementation Work Group was to complete its strategies report and recommendations on the same timetable.

Also in April 2002, Mr. Lee continued, OEJ was to provide a document that sets forth uniform procedures for the operation of subcommittees. He explained that the draft strategic plan of the NEJAC identifies five elements that are key to the successful operation of the subcommittees and work groups of the NEJAC: leadership; membership; the role of DFOs; support from and communication with EPA program offices; and development of strategic goals and plans. Recognizing that there are significant differences among the subcommittees of the NEJAC with respect to the five elements of success, OEJ, in consultation with the NEJAC, will develop procedures that will provide an operational baseline for all subcommittees and work groups, explained Mr. Lee. In developing the procedures, he added, the NEJAC, in consultation with the OEJ and relevant EPA program offices, was to develop a process for evaluating the effectiveness of the subcommittees of the NEJAC. Ms. Shepard would lead that initiative, said Mr. Lee.

Mr. Lee identified a series of tasks and provided assignments to members of the NEJAC to complete these tasks. The tasks are:

- Finalization of NEJAC Policy Advice Development Model

- Finalization of NEJAC Model for Incorporation Community Issues and Concerns into NEJAC Policy Dialogue

- Development of a definition of consensus and consensus-building

- Scoping report from Ad Hoc Scoping Work Group on Cumulative Risk Issue

Continuing, Mr. Lee stated that the NEJAC also would complete its work on the above tasks by June 30, 2002.

Mr. Lee explained that, as prescribed in the draft strategic plan of the NEJAC, the subcommittees of the NEJAC were to be asked to prepare annual strategic plans and progress reports to be submitted to the Executive Council of the NEJAC, OEJ, and the appropriate EPA program offices. He said that each subcommittee should submit a new or revised strategic plan to OEJ by September 30, 2002. Progress reports, he continued, would be due each year at least 30 days before each meeting of the NEJAC. The progress reports should describe in detail the subcommittee's progress in meeting the goals stated in its strategic plan, he noted.

Finally, Mr. Lee stated that the next meeting of the NEJAC was to be held in Baltimore, Maryland in December 2002. The issue that the NEJAC would be asked to consider and provide recommendations about during that meeting, he announced, was to be:

> *"How can EPA promote innovative pollution prevention approaches to ensure a clean and healthy environment and improve the quality of life for all people, including low-income communities, minority communities, and Tribes?"*

Ms. Horne asked how the reports, procedures, and processes developed for implementation of the strategic plan were to be incorporated into the current document. She also noted some ambiguities in the language of the current version of the document, asking whether it would be possible to amend the current text. Mr. Lee responded that suggested revisions of the text and the products developed for implementation over the time period covered by the plan would be incorporated into a revised document after December 2002.

Returning his attention to the implementation of public participation at the regional level, Mr. Lee stated that OEJ is developing a process that EPA regional offices can implement in hosting listening sessions. He stated that many questions must considered during development of the process, including:

- Who should be invited to participate

- How the various regions can integrate the listening sessions into their regional plans

- Whether sub-regional meetings should be conducted, when appropriate

Mr. Lee then stated that, once a draft strategy for conducting the regional sessions has been formulated by OEJ, in conjunction with the EPA regional offices, OEJ was to provide a report to the NEJAC. He stated that the NEJAC then would advise EPA about the implementation of the strategy for the regional listening sessions and provide the agency recommendations about that effort.

Ms. Stahl suggested that members of the NEJAC should be able to work directly with the regional offices of EPA to engage in the regional listening sessions, noting that the Executive Council could glean many "lessons learned" from the public comment period process. She also commented that the members of the NEJAC perhaps could confer with EPA regional administrators during a meeting of the NEJAC.

Dr. Richard Gragg, III, Florida A&M University and member of the Health and Research Subcommittee, commented that the public also should have the opportunity to provide comments on the process for conducting regional listening sessions.

Ms. Eady expressed her belief that the listening sessions would be a useful addition to EPA's strategy for increasing public participation. However, she also expressed concern that the sessions would not lead to action by the EPA regional offices, pointing out that, in the past, citizens often had traveled to address the NEJAC only after regional authorities ignored them. She also expressed concern that the NEJAC would not be able to monitor the activities of 10 EPA regions. Ms. Shepard responded that communities still would have the opportunity to address the NEJAC during public comment periods. Ms. Shepard agreed, however, that reporting to the NEJAC about the progress of the listening sessions would be an important issue to be considered during the development of the process for those sessions.

5.0 PRESENTATIONS AND REPORTS

This section summarizes the presentations and reports made to the Executive Council of the NEJAC.

5.1 Update on the Interagency Environmental Justice Implementation Work Group

Ms. Guana provided an overview of the draft document, The National Environmental Justice Advisory Council's Report on Integration of Environmental Justice in Federal Agency Programs. That document was developed by the Interagency Environmental Justice Implementation Work Group to present information about the progress of the federal government in integrating environmental justice into the policies, programs, and activities of its agencies in a manner consistent with the provisions of existing laws and Executive Order 12898. The draft report, she explained, provides an analysis of information presented during the December 2000 meeting of the NEJAC, which had been held in Arlington, Virginia.

Ms. Guana reported further that the work group faced particular challenges in developing recommendations for EPA about interagency implementation on the basis of the panel discussions heard during the December 2000 meeting. She said that the policy issue related to interagency implementation is broad. Many of the presentations, she continued, did not provide complete descriptions of the pertinent activities of agencies because the presentations, of necessity, were limited in length. Some individuals, Ms. Guana explained further, made very general presentations that failed to provide specific information. Although other presenters provided a few, very specific examples of an agency's activities, time limitations prevented them from providing details about those activities, she added.

The work group faced another challenge in organizing the report, continued Ms. Guana. Different agencies have different missions and work under completely different legal authorities, she explained. She pointed out that it was problematic for the work group to present the report in a way that could capture that diversity without inviting comparisons that may be unfair, given the differing activities and legal authorities of the various agencies of the federal government.

Continuing, Ms. Guana stated that a third challenge that the work group faced in developing the report was that they could not verify independently that agencies were doing what they said they would be doing or to evaluate the effectiveness of the efforts of the agencies.

To meet those challenges, said Ms. Guana, the members of the work group drew on various additional sources in an attempt to obtain more complete information about the actions of federal agencies. Such sources, she noted, included the web sites of the various agencies. She pointed out that the sources were not independently verified sources, a circumstance that introduced yet another limitation on the information included in the report.

Discussing the structure of the report, Ms. Guana stated that, to provide a legal context for the discussion of the activities of the agencies, the report began with a discussion of legal authorities. She noted that the discussion of legal authorities was limited principally to those authorities granted the various agencies under environmental statutes. However, she noted, many agencies have authorities under other statutes. To her knowledge, she said, the agencies have not performed a systematic study of all their legal authorities within the context of environmental justice. Therefore, she reported, in its report, the work group had recommended to the NEJAC that the NEJAC advise EPA to request each federal agency to undertake a review of all its legal authorities.

Ms. Guana then pointed out that the report also included information about legal developments that had taken place since the December 2000 meeting and the potential implications of such developments for the environmental justice movement. She cited the Supreme Court decision in the Sandoval case in which a divided court said the Civil Rights Act of 1964 does not authorize private lawsuits that contend state government policies have a discriminatory effect. Title VI of the act allows a suit only if litigants can prove discrimination was intentional, the court ruled.

Continuing, Ms. Guana noted that the work group had organized the report in a manner that would alert the reader to the differences among agencies in terms of their potential for exerting influence on environmental issues and their varying levels of legal authority. The report includes a table that categorizes the agencies by the nature of their activities, she added. Continuing, she explained that the work group also made an effort to convey an understanding of the types of activities in which the various agencies are engaged, including an analysis of activities the various agencies have in common.

Concluding her remarks, Ms. Guana stated that the intent of the report was to provide the reader with a complete and fair picture, or "baseline snapshot," of the actions in which the various agencies currently are engaged. The report, she suggested, therefore can be used in the future to measure progress in integrating environmental justice into the policies, programs, and activities of the agencies. She added that the report could be helpful to the agencies themselves by providing information about the activities of sister agencies in areas of common interest that may assist them in determining how they can address environmental concerns related to their own missions. Ms. Guana then stated that the work group welcomes suggestions and comments from the members of the NEJAC about strengthening the report and making it more useful to EPA and other federal agencies.

Ms. Walker suggested that a representative of the Indigenous Peoples Subcommittee be invited to participate in preparing the final report. She stated that the Indigenous Peoples Subcommittee had made several recommendations to the work group as the report was being drafted; she noted that those recommendations had not been included in the report. Ms. Guana responded that the work group had focused first on the organization of the information in the report. She added that the work group would be interested in reviewing the recommendations of the Indigenous Peoples Subcommittee and incorporating those suggestions into the final report.

Ms. Stahl expressed her understanding that all the subcommittees had provided recommendations during the planning stages of the report. She suggested that the recommendations of all the subcommittees be reviewed as the final report is prepared.

Ms. Walker then asked when the final report was expected to be available. Mr. Lee responded that the final report was to be completed and distributed in March or April 2002.

5.2 Report on the Community-Based Health Research Model

Mr. Lee provided an update on the status of the report on the community-based health research model that the NEJAC had undertaken to develop. He reminded the participants in the meeting that, in response to issues discussed during the meeting of the NEJAC in Atlanta, Georgia, in May 2000, a 20-member work group, made up of members of the NEJAC and representatives of HHS and EPA, had been formed to develop such a model. The final report of that work group had been distributed to the Executive Council in early 2001, he added.

Mr. Lee explained that a primary theme of community-based health research models was the need for interagency collaboration. To provide a meaningful response to the recommendations set forth in the health report, EPA's Office of Research and Development (ORD), in collaboration with OEJ and EPA's Office of Prevention, Pesticides, and Toxic Substances (OPPTS), had developed a strategy for interagency collaboration in the area of community-based health research. The strategy, continued Mr. Lee, had been forwarded to the office of the EPA Administrator for review. He stated that he expected a response from the Administrator in the near future. That expectation expressed, Mr. Lee then tabled discussion of the proposed strategy, pending receipt of that response.

5.3 Update on the Federal Facilities Work Group

Mr. Brandon Carter, EPA Federal Facilities Restoration and Reuse Office and DFO of the Federal Facilities Work Group of the NEJAC, provided an update on the activities of the work group.

Mr. Carter explained that the task of the work group is to identify and evaluate key issues related to the activities and operations of federal facilities that are of concern to environmental justice communities. The objectives of the work group, he stated, are to:

- Formulate national policy recommendations to address such concerns
- Provide a forum for the conduct of dialogue communities
- Compile a list of resources available to communities and stakeholders
- Produce a written report that summarizes the findings and recommendations of the work group

Mr. Carter stated that the work group had begun reviewing case studies in January 2001 to identify the key issues related to federal facilities that are of concern to environmental justice communities and to gather information that could serve as a basis for the development of the work group's policy recommendations. He noted that work group also evaluated the effectiveness of previous policy recommendations made by various other federal advisory committees. He also noted that, during the meeting of the NEJAC in December 2000, the U.S. Department of Energy (DOE), the U.S. Department of Defense (DoD), and the U.S. Department of the Interior (DOI) had signed a memorandum of understanding (MOU) that ensured their cooperation with the Federal Facilities Work Group and assigned staff members to collaborate with the work group.

Mr. Carter then announced that the work group expects to submit a final report to the NEJAC before the December 2002 meeting of the NEJAC to be held in Baltimore, Maryland. Mr. Lee reported that the NEJAC Federal Facilities Work Group will work in coordination with and report to the NEJAC Waste and Facility Siting Subcommittee. This will improve coordination between EPA and the NEJAC because the primary support being provided to this work group is being provided by the OSWER, which also supports the NEJAC Waste and Facility Siting Subcommittee. OSWER has committed to adding another member to the subcommittee to provide interface with the work group, he said.

Ms. Subra asked whether the working group was to evaluate the level of consistency between cleanup efforts at federal facilities and those at other cleanup sites, such as Superfund sites. Mr. Carter responded that the work group was reviewing case studies from a representative sample of various types of sites, including a formerly used defense site (FUDS), a base realignment and closure (BRAC) site) site, and a DOE site. The work group, he stated, would compare the principles and recommendations that are being implemented by the various authorities. Mr. Carter added, however, that such a comparison is difficult because the authorities that regulate how and by whom sites are cleaned up differ significantly.

Mr. Subra then asked whether the work group had considered the possibility that inactive federal facilities currently undergoing cleanup will be reactivated in response to the terrorist attacks of September 11, 2001. She asked whether it would be necessary to complete cleanup at a site before new activities could begin. Mr. Carter responded that sites that have been identified by Congress under the BRAC Program would not reopen because those properties are to be transferred out of the ownership of the DoD. Other sites that are put on standby by the federal government could be reactivated, he noted. Many sites on the National Priority List (NPL), a list of national priorities for sites with known or threatened releases of hazardous substances, are active facilities that continue to operate while undergoing cleanup, explained Mr. Carter.

Ms. Stahl reminded Mr. Carter and the members of the Executive Council that the Environmental Council of States (ECOS) also had provided recommendations to the EPA Administrator through resolution. Ms. Stahl suggested that, as it develops its report, the work group draw on staff of ECOS as a resource.

Ms. Eady asked whether the work group was to address the recurring issue of the determination of the lead agency when more than one federal agency has legal authority over cleanup of a federal facility. Mr. Carter responded that the work group planned to address the issue, commenting that issues related to the authority of the lead agency and that of EPA authority under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the National Contingency Plan (NCP) are "implicit in the issues related to federal facility sites."

Ms. Subra pointed out that one issue linked to federal facilities with increasing frequency over the past few years is contamination with perchlorate, a soluble oxidating agent used in the manufacture of explosives. Ms. Subra asked Mr. Carter whether, in its report, the work group would address specifically issues related to perchlorate. Mr. Carter responded that the report was not intended to address issues related to specific contaminants or implementation of measures to address such specific contaminants under cleanup programs. However, he continued, EPA currently is developing a new maximum concentration level (MCL) for perchlorate. He then agreed to provide the Executive Council of the NEJAC updates on the status of the development of the MCL.

Dr. Gragg asked whether the report would identify the number of communities that may be affected directly by environmental conditions at federal facilities and the status of cleanup efforts at the facilities identified. Mr. Carter responded that the work group had examined the possibility of cataloguing environmental justice communities that are located at or near federal facility sites but had discontinued the effort because of constraints imposed by limitations on resources. Instead, the work group decided to focus the report on the implementation of cleanup programs at federal facilities, he said. Mr. Carter added that the work group would be able to identify the total number of federal facility sites.

Ms. Mary Nelson, Bethel New Life and member of the Waste and Facility Siting Subcommittee, commented that, to ensure that contamination does not reoccur at cleanup sites, standards for prevention should be included in the report.

Mr. Lee commented that lessons learned from several positive developments in the cleanup of federal facilities could be incorporated into the report. For example, he said, the cleanup and restoration of the Metlakatla Indian community of Metlakatla, Alaska, an environmental justice and national Brownfields showcase community, successfully involved DoD, the U.S. Coast Guard, and the U.S. Federal Aviation Administration (FAA). He also mentioned the success of Bridges to Friendship, an environmental justice demonstration project underway at the Washington Navy Yard in southeast Washington, D.C. Mr. Lee noted that the progress such efforts illustrate is significant.

5.4 Update on the Pollution Prevention Work Group

Ms. Subra, co-chair of the newly formed Pollution Prevention Work Group, provided a brief overview of the preliminary objectives of that work group.

Ms. Subra stated that the primary objective of the work group would be to evaluate how existing technologies, mechanisms, and programs for pollution prevention can be implemented in environmental justice communities to improve the quality of the environments of those communities. In light of information presented by the Fish Consumption Work Group, she said, her work group will consider how pollution prevention efforts can reduce contamination of aquatic environments. Continuing, Ms. Subra reported that the working group also would investigate mechanisms for measuring the effectiveness of pollution prevention measures.

Ms. Subra informed the members of the Executive Council that she and Mr. Warren, co-chairs of the working group, were to submit to EPA a list of potential members of the work group before the end of 2001. She requested that the members of the Executive Council submit names of suggested members of the work group to her and Mr. Warren. Mr. Barry E. Hill, Director, EPA OEJ, added that the members of the Executive Council also should recommend to EPA consultants that have experience in pollution prevention.

Ms. Walker requested that a representative of the Indigenous Peoples Subcommittee be appointed to serve on the work group. She also asked that the work group consider whether an evaluation of the issue of the “precautionary principle” would be appropriate in light of the objectives of the work group.

Ms. Jaramillo suggested that the work group also evaluate the cost and benefits of environmental restoration, clean production, and low-impact development.

Mr. Suagee reported that his clinic currently is working with three tribes to develop tribal environmental policy and acts, specifically by creating an environmental review process for the tribes. The purpose of the effort, he explained, is to avoid pollution and other environmental degradation that might arise as a result of economic development. Mr. Suagee then volunteered to participate on the work group.

Ms. Eady noted that there are several valuable resources in the state of Massachusetts, including the Toxicities Reduction Institute and the Center for Sustainable Production. She volunteered to suggest some individuals representing those organizations as potential members of the Pollution Prevention Work Group.

Dr. Gragg suggested that the work group also consider pollution prevention at DOE and DoD facilities.

Mr. Larry Charles, ONE/CHANE and member of the International Subcommittee, specifically asked that Ms. Dianne Wilkins, Oklahoma Department of Environmental Quality be selected to represent the International Subcommittee on the Pollution Prevention Work Group.

5.5 Briefing on the Cumulative Risk Technical Panel of the EPA Risk Assessment Forum

Mr. Lee introduced Mr. Martin Halper, EPA OEJ, to provide an overview of the current draft Framework for Cumulative Risk Assessment prepared by the Cumulative Risk Technical Panel of the EPA Risk Assessment Forum, a standing committee of senior EPA scientists. The purpose of this briefing is to help NEJAC prepare to address the policy issue area for 2003, which is slated to be cumulative risk.

Mr. Halper explained that the framework document was developed to provide a basic structure and definition of key principles for EPA’s cumulative risk assessments. In the future, he said, the framework document will be used as a foundation for comprehensive guidance for cumulative risk assessment. Mr. Halper noted that, in some cases, concepts introduced in the framework document require the application and knowledge of methods that currently are not available. Therefore, he continued, the document also outlines research and development needs that must be met to support evaluation of cumulative risks.

Mr. Halper singled out two elements of the framework document that he considered particularly significant to the environmental justice movement. First, he said, the chapter on planning, scoping, and formulation of problems requires that public officials, experts on risk, community leaders, and interested and affected parties seek agreement on the purpose, scope, and approach for the risk assessment through extensive dialogue before the assessment begins. Second, he continued, the framework document addresses the concepts of the vulnerability, and specifically the susceptibility, of a population as important factors in the assessment of cumulative risk. Mr. Halper explained that a vulnerable population is a population at increased risk of adverse effect. The concept, he explained further, includes individuals or sensitive subgroups that may be highly susceptible to risk because of a number of possible factors, such as stage of life, prior exposure, or existing state of disease.

Mr. Halper then stated that the framework document, which includes traditional quantitative considerations, as well as qualitative considerations, has the potential to affect the ways in which EPA and other federal agencies operate.

Continuing, Mr. Halper stated that, in general, the framework document has been applauded universally. He then said that a full peer review of the document was to be conducted in the fall of 2002. After the framework document is final, he continued, the first steps in the development of a formal guidance document will include the development of new studies and the evaluation of existing studies that can be used as case studies and the testing of some of the concepts of cumulative risk assessment identified in the case studies. He added that the development of the guidance document would take approximately two years.

Ms. Guana asked whether the framework document addresses the concept of peak periods of exposure as a qualitative consideration in cumulative risk assessment. She also asked whether the framework document identifies an optimal geographic scale at which to assess cumulative risk, noting that an assessment of only large-scale exposures might mask the effects of a number of small sources of exposure.

Mr. Halper reminded the members of the NEJAC that the framework document is not a guidance document. Therefore, specific methods for evaluating peak-period exposures and determining the optimal geographic scale for a risk assessment are not included in the document, he said. However, he continued, the framework document does point out that the duration and geographic scale of exposure are important considerations that should be included in a cumulative risk assessment. He added that such considerations can be site-specific and should be discussed by all stakeholders during the planning and scoping phase of a cumulative risk assessment.

Calling attention to the preface of the framework document, Mr. Suagee pointed out that tribes had not been included in the extensive peer review of the document. He stressed that tribal peoples should be involved in the review process. Dr. Gragg noted that the list of reviewers in the preface did not appear to include representatives of environmental justice communities or other affected groups. Mr. Halper responded that those groups would be included in the formal peer review process. Mr. Lee also stressed to Mr. Halper that the experiences and expertise of the members of the NEJAC and their relationships with tribes, environmental justice communities, states, and other entities make the members important and valuable resources for the panel in developing the framework document and future guidance documents on cumulative risk assessment.

Mr. Lee noted that the NEJAC Ad Hoc Scoping Work Group is being asked to address two questions in preparation for addressing the cumulative risk issue. The questions will address:

- What are some focused approaches (specific definitions, conceptual frameworks, questions, methodologies, areas, etc.) to the issue of cumulative risks (and impacts) that will make a significant contribution at this time to addressing environmental justice concerns related to the issue?

- How can the NEJAC make best use of its own capacities (membership, constituencies, outreach and deliberative processes, knowledge base, etc.) to address the issue of cumulative risks (and impacts)?

Dr. Gragg asked whether the framework document addresses the issue of the "precautionary principle" as a strategy for risk management. Mr. Halper responded that the document does not discuss principles of risk management, but rather addresses issues and considerations that are important in evaluating cumulative risk.

Ms. Shepard asked about the implications of the document for state permitting programs. She asked whether state environmental quality review acts or new legislation that specifically identifies cumulative risk as a required consideration would be necessary before the concepts presented in the framework document could influence state permitting processes. In response, Mr. Halper expressed his belief that the document will provide an impetus to the adoption of the concept of cumulative risk in the approach to assessment.

5.6 Update on the Implementation of Permitting Recommendations

Mr. Hill made a presentation on the status of EPA's implementation of recommendations made in the report of the Environmental Law Institute (ELI) "Opportunities for Advancing Environmental Justice: An Analysis of U.S. EPA Statutory Authorities." The ELI report reviews the principal environmental regulations of EPA) that govern maintenance of air and water quality, management of waste, regulation of the use of pesticides and chemicals, and fulfillment of public right-to-know legislation, reported Mr. Hill. The report also identifies specific statutory authorities for promoting environmental justice in the full range of EPA program functions, including permitting and the setting of standards, he said.

Mr. Hill then described the context in which the ELI report was developed. He first shared an observation of one of the framers of the Constitution of the United States, "This is a government of laws and not of men". Therefore, observed Mr. Hill, if there is no law, there can be no regulations. Because there is no stand-alone federal environmental justice statute, he continued, supporters of the environmental justice movement must look at the existing laws and implementing regulations to determine whether and how environmental justice is in fact embedded in those laws.

Continuing, Mr. Hill noted that, to integrate the concept of environmental justice into the regulatory process, supporters of environmental justice must answer two questions:

- "What is the legal authority?"
- "Assuming the legal authority exists, how can environmental justice be incorporated administratively into permitting programs?"

Mr. Hill then presented the five steps necessary to incorporate environmental justice into EPA's regulatory process. The starting point, he said, is the advice and recommendations of the NEJAC. In response to discussions that took place at its 1999 meeting, he continued, the NEJAC had issued a report in July 2000 that focused on permitting authorities under the Resource Conservation and Recovery Act (RCRA), the Clean Air Act (CAA), and the Clean Water Act (CWA). In that report, he said, the NEJAC had recommended that EPA examine all the statutes under which it exercises regulatory authority to determine whether the legal authority to incorporate environmental justice into the agency's regulations is embedded in those statutes.

Continuing, Mr. Hill stated that the next step in incorporating environmental justice into EPA's regulatory process is legal analysis of existing statutes, as recommended by the NEJAC, and evaluation of how environmental justice can be incorporated in EPA's regulatory process from an administrative point of view. At the request of OEJ, ELI had performed a legal analysis, Mr. Hill explained, examining every statute under which EPA exercises authority, to identify opportunities to use existing statutory authorities to advance environmental justice. He also noted that, in December 2000, Mr. Gary Guzzi, EPA Office of General Counsel, had issued a memorandum that stated that environmental justice indeed is embedded in existing laws and implementing regulations. Therefore, there is no need for a stand-alone environmental justice statute, declared Mr. Hill.

With regard to the incorporation of environmental justice from an administrative point of view, Mr. Hill stated that OEJ had asked the National Academy of Public Administrators (NAPA) to evaluate how environmental justice might be incorporated into the permitting process under RCRA, the CWA, and the CAA. Mr. Hill then announced that, after his presentation, Ms. Ann Goode, senior consultant for NAPA, was to discuss the findings of that organization's evaluation.

The third step, Mr. Hill continued, is training. A training collaborative made up of representatives of EPA headquarters, EPA regional offices, industry, and community groups has been convened to develop a basic course on environmental justice that reflects recommendations made in the ELI and NAPA reports, he said. Further, EPA will develop

CAA and CWA training modules targeted to federal and state permit writers. The modules will train those individuals in integrating considerations of environmental justice into state and federal permits.

Mr. Hill then said that, after training has been provided, the next step is implementation. EPA OEJ would work with senior managers at EPA and EPA's Environmental Justice Steering Committee to implement environmental justice, as recommended in the ELI and NAPA reports, into their daily work under the authority provided by existing laws, he said.

Mr. Hill stated that the last step is evaluation. The EPA Inspector General will be asked to evaluate all programs for success in integrating environmental justice, as outlined in the NAPA and ELI reports, he said.

Ms. Ann Goode then gave a presentation on NAPA's research and evaluation of EPA's efforts to address the widely recognized fact that some communities of low-income people and people of color are exposed to significantly greater environmental and public health hazards that other communities. NAPA's research and associated recommendations are presented in the report "Environmental Justice in EPA Permitting: Reducing Pollution in High-Risk Communities is Integral to the Agency's Mission," she said.

Ms. Goode then explained that NAPA, an independent nonprofit organization that was chartered by Congress in 1967, is made up of some 500 fellows, including former members of Congress, leaders of nonprofit organizations and local government officials. Specifically, she said, NAPA was asked to prepare a report that would help the public better understand how considerations of environmental justice can be incorporated into the permitting process under RCRA, the CWA, and the CAA.

Ms. Goode stated that, in the report, NAPA recommended to EPA that changes be made in four distinct areas related to environmental justice: leadership, permitting procedures, setting of priorities, and public participation.

In the area of EPA's leadership in integrating environmental justice into permitting processes, Ms. Goode stated that President Clinton's Executive Order 12898 on environmental justice, as well as the policy statement Administrator Christine Todd Whitman issued to EPA assistant administrators on August 9, 2001 and statements made by former EPA administrators, clearly articulated a commitment to environmental justice. However, despite the commitment of senior EPA leadership and, in many cases, allocation of substantial resources to the effort, Ms. Goode said, environmental justice has not yet been integrated fully into the agency's core mission or staff functions. There remains a "disconnect" between policy pronouncements and program realities, she added, although EPA has significant statutory and regulatory authority, as well as numerous opportunities to exercise discretion to incorporate considerations of environmental justice into its permitting processes, she added. Specific expectations for outcomes have not accompanied the commitments made, she continued, nor has EPA adopted methods of measuring progress in achieving outcomes or accountability to ensure that EPA managers and staff work to implement policies related to environmental justice.

Ms. Goode stated that NAPA's recommendations for EPA leadership in the area of integrating considerations of environmental justice into the agency's permitting processes are:

- Building on the EPA Administrator's recent environmental justice memorandum, EPA's assistant administrators for air, water, and waste and EPA's regional administrators should reinforce the importance of the policy on the incorporation of considerations of environmental justice, the role of that policy in the accomplishment of EPA's core mission, and the expectation that managers and staff will implement consideration of environmental justice in their projects and activities.

- EPA should complete its draft national guidance on environmental justice and develop practical tools that permit writers can use to identify and address issues of environmental justice related to air, water, and waste permits.

- EPA's offices of Air and Radiation, Water, and Solid Waste and Emergency Response should develop strategic plans that demonstrate how environmental justice is to be integrated into the substance and procedures of their permitting programs. Further, they should explore carefully ways in which they can use the authorities set forth in the General Counsel's legal opinion dated December 1, 2001 to incorporate considerations of environmental justice into permits for new and ongoing projects.

- Each strategic plan for incorporating environmental justice into a permitting program should specify goals, measures of performance, expected outcomes, mechanisms for measuring accountability, and time frames for meeting the goals set forth in the plan.

- EPA should establish an accountability process that includes clear measures of performance for evaluating the success of EPA managers and staff in incorporating considerations of environmental justice into air, water, and waste permits.

- EPA should identify disproportionately affected and other adversely affected communities and establish explicit goals for reducing the risks posed to such communities. Further, EPA should set clear expectations for producing results that are linked directly to the agency's mission and give staff an important measure of performance that the staff can support whole-heartedly. Such tasks also could provide measures of EPA's progress in implementing environmental justice and could be reinforced by agencywide reporting that tracks such progress.

- EPA should develop a communication mechanism for agency wide sharing of information about tools that are effective in addressing environmental justice, including descriptions of best practices and lessons that all media programs, regional offices, and states can learn. The mechanism should coordinate EPA's activities in incorporating considerations of environmental justice into permitting processes, so that permit writers in all EPA's media programs and EPA regional offices can become more effective and efficient in responding to concerns related to environmental justice.

- EPA should evaluate the effectiveness of its national workshop on Fundamentals of Environmental Justice to determine how well the workshop meets its intended objectives, including the effective implementation of environmental justice in permitting.

- EPA should develop a program for rewarding the extra efforts of employees in addressing environmental justice in permitting through recognition under existing national awards programs and through the development of additional recognition programs.

Turning to a discussion of opportunities for integrating considerations of environmental justice into individual permitting programs, Ms. Goode explained that a recent legal opinion issued by EPA's Office of General Counsel (OGC) made it clear that the CAA, the CWA, and RCRA provide permitting staff ample authority to address the concerns of high-risk communities when developing the terms and conditions of individual permits. The EPA Administrator reaffirmed that opinion in her August 9, 2001, memorandum to senior EPA officials, she said. However, EPA managers have not made it routine procedure to provide their permitting staff with straightforward, practical tools and procedures for incorporating community concerns into permits, nor have they directed that staff to ensure that concerns related to environmental justice are considered systematically in the conduct of EPA's permitting programs, continued Ms. Goode. Further, many EPA permit writers have not been provided the opportunity to learn how they can contribute to the resolution of issues related to environmental justice through an increased awareness of the community that may be affected by a proposed permit. Such awareness, said Ms. Goode, would include consideration of the nature of the risks the community faces; the concerns of the community about the activity related to the proposed permit, the capacity of the community to participate in the permitting process, and the best methods of communicating with the community.

Continuing, Ms. Goode pointed out that, because EPA's legal authority to issue permits is based on the provisions of RCRA, the CAA, and the CWA, EPA's ability to address other common concerns among high-risk communities, such as noise pollution, traffic concerns, and odor, is limited. She also explained that, in the area of permitting programs, EPA's credibility in high-risk communities depends upon its ability to visibly use opportunities for enforcing permit conditions, including more frequent inspections, local monitoring of environmental conditions, and reductions in backlogs of permit renewals for existing facilities.

Ms. Goode stated that NAPA's recommendations to EPA in the area of integrating considerations of environmental justice into individual permitting programs are:

- Senior program managers of EPA's air, water, and waste programs should take prompt steps to use their authorities, as outlined in the legal opinion issued by OGC, to prepare guidance documents for staff on how to fully incorporate considerations of environmental justice into their permitting programs. The managers should develop these documents after consulting with representatives of affected communities and regulated entities. The programs also should use legal mandates and discretionary authorities to the fullest extent possible to expand opportunities for public participation in permitting programs; increase monitoring and public reporting; and impose in new, revised, and renewed permits conditions designed to reduce the burdens of pollution and public health hazards on disproportionately affected communities.

- In the short term, EPA should determine whether it can provide communities with earlier notice of permit applications so that the public will have a better opportunity to interact directly with EPA's permit writers and the community's concerns can be considered during the drafting and negotiating stages of the permitting process.

- Over the long term, EPA should revise its permitting regulations to ensure that nearby communities are notified of a permit application as early as possible.

- EPA should revise its public notification practices to ensure that public notices are provided in languages commonly spoken in the affected communities and placed in libraries, churches, community centers, and other locations accessible to members of those communities.

- EPA managers should provide permit writers with check lists or similar tools the permit writers can use in identifying and considering concerns related to environmental justice.

- EPA budget and administrative staff should recognize the additional time and effort that permit writers must devote to developing permit conditions that take into account issues of environmental justice and to working more closely with community groups. The agency's workload models should be adjusted as appropriate to indicate the average number of permits to be handled by a permit writer in light of such additional effort.

Continuing her overview of the NAPA evaluation, Ms. Goode discussed NAPA's findings related to EPA's use of permitting as a strategic element in pollution prevention and risk reduction. She stated that EPA had undertaken efforts to improve the science of cumulative risk assessment so that more tools are available to better assess disproportionate and adverse effects on communities. However, while waiting for advances in the science of cumulative risk assessment, she explained, EPA and states currently have several tools available to support analysis of exposures of disproportionately affected communities to actual or potential multiple pollutants. She also said that EPA could perform more frequent and comprehensive environmental monitoring in communities to determine whether those communities should be given priority attention.

Ms. Goode stated that NAPA's recommendations to EPA in the area of the use of permitting as a strategic element in pollution prevention and risk reduction are:

- EPA should consult with state and local health and environmental officials to address concerns related to environmental justice and identify high-priority communities in which residents are exposed to disproportionately high levels of pollution.

- EPA should evaluate tools that have been developed by its regional and program offices, such as the Office of Policy, the Office of Civil Rights, and OEJ. EPA should identify among those tools potential best practices the Agency can recommend when it develops practical guidance documents to assist permitting staff in incorporating considerations of environmental justice into EPA permits nationwide.

Referring to improvement by EPA in increasing public participation in the permitting process, Ms. Goode stated that the Agency had experimented with various techniques for enhancing public participation. The techniques, however, she noted, have not yet been made standard operating procedure for EPA's permitting processes in the air, water, and waste programs. Ms. Goode then stated that NAPA's recommendations to EPA in the area of the use of permitting as a strategic element in pollution prevention are:

- EPA should expand its Technical Assistance Grant (TAG) and Technical Outreach Services for Communities (TOSC) programs to offer more timely and accessible technical assistance to communities that need such support.

- Using its discretionary authority, EPA should adopt procedures for providing early notice to communities once permit applications have been completed. Such notices should provide the name of an Agency community liaison and solicit comments from the community before the

Agency negotiates the terms and conditions of a permit.

Concluding her remarks, Ms. Goode stated that OEJ also had asked NAPA to next evaluate three state permitting programs. She commented that, while EPA itself performs relatively little permitting compared with the states, EPA could serve as a model for state permitting programs.

Mr. Hill added that the states selected for NAPA's evaluation would fall into the following categories: (1) a state that has passed or enacted environmental justice legislation; (2) a state that has issued an official statement that environmental justice is a policy issue; and (3) a state that has established an environmental justice commission or a body similar to the NEJAC. He explained that the purpose of evaluating states that fall into those categories is to demonstrate how such states can serve as models for their sister states.

Ms. Stahl expressed her belief that the next step should be development of the guidelines and standards to be applied through the appropriate authorities. She explained that, until standards have been developed, permitting and enforcement programs would not have the tools necessary to apply the principles.

Ms. Subra commented that, in the area of public participation, it is not sufficient to give communities

Exhibit 1-3

RETIRING MEMBERS OF THE NATIONAL ENVIRONMENTAL JUSTICE ADVISORY COUNCIL

Ms. Rose Augustine
Ms. Elaine Barron
Ms. Daisy Carter
Mr. Fernando Cuevas
Ms. Denise Feiber
Dr. Michel Gelobter
Mr. Dan Greenbaum
Ms. Rita Harris
Ms. A. Caroline Hotaling
Ms. Jennifer Hill-Kelley
Ms. Savi Horne
Ms. Annabelle Jaramillo
Mr. Philip Lewis
Mr. Neftali Garcia Martinez
Ms. Zulene Mayfield
Mr. David Moore
Mr Carlos Porras
Mr. Leonard Robinson
Mr. Alberto Saldamando
Mr. Mervyn Tano
Mr. Michael Taylor
Ms. Marianne Yamaguchi

Ms. Shephard presents Ms. Horne with a certificate of appreciation for her years of service on the NEJAC.

the opportunity to comment. She stressed that there is a real need, particularly in environmental justice communities, for capacity building and access to technical assistance. Ms. Subra said that the community must understand what the rules are, where the application violates the rule, and how a community can ensure that such information is entered into the record. Ms. Goode responded that the NAPA report includes explicit recommendations about increasing support for technical assistance for communities.

6.0 MISCELLANEOUS BUSINESS

6.1 Acknowledgments

Mr. Lee announced that OEJ would recognize and honor members of the NEJAC whose terms were to expire on December 31, 2001. Exhibit 1-3 presents the names of the retiring members of the NEJAC.

Mr. Lee also commended the efforts of the DFOs of the various subcommittees and work groups of the NEJAC: Ms. Wendy Graham, Ms. Shirley Pate, Mr. Will Wilson, Ms. Alice Walker, Mr. Rey Rivera, Mr. Brandon Carter, Ms. Brenda Washington, Ms. Aretha Brockett, Ms. Teresita Rodriguez, and Mr. Daniel Gogal. He also thanked the staff of EPA Region 10, including Ms. Joyce Kelly, Mr. Michael Letourneau,

Dr. Gragg suggested that the membership of the Puerto Rico Subcommittee of the NEJAC be expanded to include representatives from the Virgin Islands. Dr. Gragg pointed out that other dependencies of the United States, particularly those that are islands, are faced with issues of environmental justice. Ms. Horne commented that she strongly agreed with Dr. Gragg's suggestion. Dr. Ramirez-Toro suggested that the recommendation be communicated to EPA Region 2 office and the Caribbean Field Office, noting that those offices provide financial support for the Puerto Rico Subcommittee.

Ms. Shepard stated that she would like to compile a year-end report on the accomplishments of the NEJAC during 2001. She asked that the chair of each subcommittees e-mail a list of that subcommittee's accomplishments to herself and Ms. Marva King, NEJAC Program Manager, EPA OEJ, by January 15, 2002.

Ms. Victoria Plata, and Ms. Ony Okorna, for their support in coordination of the planning of the meeting of the NEJAC with community groups in the region.

Continuing, Mr. Lee recognized the efforts of the staff of OEJ, especially Mr. Hill, Director of OEJ; Ms. Linda K. Smith, Associate Director for Resources Management, EPA OEJ; Marva E. King, NEJAC Program Manager; and Ms. Jaime Song, OEJ Intern, and thanked them for their hard work.

Ms. Jaramillo personally thanked Mr. Lee for his efforts, stating that the meetings of the NEJAC "could not happen" without his guidance. She then thanked Ms. Shepard for her hard work and for her leadership during the meeting of the NEJAC.

6.2 New Business

This section summarizes items of new business discussed during the closing remarks of the members of the Executive Council of the NEJAC. Ms. Shepard stated that the items should be noted in the record and would be discussed by the members of the Executive Council in the future.

United States Environmental Protection Agency

Office of Water
EPA 823-B-94-005a
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Water Quality Standards Handbook

Chapter 3: Water Quality Criteria

06158

Water Quality Standards Handbook
CHAPTER 3: WATER QUALITY CRITERIA

(40 CFR 131.11)

CHAPTER 3 WATER QUALITY CRITERIA

The term "water quality criteria" has two different definitions under the Clean Water Act (CWA). Under section 304(a), EPA publishes water quality criteria that consist of scientific information regarding concentrations of specific chemicals or levels of parameters in water that protect aquatic life and human health (see section 3.1 of this Handbook). The States may use these contents as the basis for developing enforceable water quality standards. Water quality criteria are also elements of State water quality standards adopted under section 303(c) of the CWA (see sections 3.2 through 3.6 of this Handbook). States are required to adopt water quality criteria that will protect the designated use(s) of a water body. These criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use.

3.1 EPA Section 304(a) Guidance

EPA and a predecessor agency have produced a series of scientific water quality criteria guidance documents. Early Federal efforts were the "Green Book" (FWPCA, 1968) and the "Red Book" (USEPA, 1976). EPA also sponsored a contract effort that resulted in the "Blue Book" (NAS/NAE, 1973). These early efforts were premised on the use of literature reviews and the collective scientific judgment of Agency and advisory panels. However, when faced with the need to develop criteria for human health as well as aquatic life, the Agency determined that new procedures were necessary. Continued reliance solely on existing scientific literature was deemed inadequate because essential information was not available for many pollutants. EPA scientists developed formal methodologies for establishing scientifically defensible criteria. These were subjected to review by the Agency's Science Advisory Board of outside experts and the public. This effort culminated on November 28, 1980, when the Agency published criteria development guidelines for aquatic life and for human health, along with criteria for 64 toxic pollutants (USEPA, 1980a,b). Since that initial publication, the aquatic life methodology was amended (Appendix H), and additional criteria were proposed for public comment and finalized as Agency criteria guidance. EPA summarized the available criteria information in the "*Gold Book*" (USEPA, 1986a), which is updated from time to time. However, the individual criteria documents (see Appendix I), as updated, are the official guidance documents.

EPA's criteria documents provide a comprehensive toxicological evaluation of each chemical. For toxic pollutants, the documents tabulate the relevant acute and chronic toxicity information for aquatic life and derive the criteria maximum concentrations (acute criteria) and criteria continuous concentrations (chronic criteria) that the Agency recommends to protect aquatic life resources. The methodologies for these processes are described in Appendices H and J and outlined in sections 3.1.2 and 3.1.3 of this Handbook

3.1.1 State Use of EPA Criteria Documents

EPA's water quality criteria documents are available to assist States in:

- adopting water quality standards that include appropriate numeric water quality criteria;
- interpreting existing water quality standards that include narrative "no toxics in toxic amounts" criteria;
- making listing decisions under section 304(1) of the CWA;
- writing water quality-based NPDES permits and individual control strategies; and
- providing certification under section 401 of the CWA for any Federal permit or license (e.g., EPA-issued NPDES permits, CWA section 404 permits, or Federal Energy Regulatory Commission licenses).

In these situations, States have primary authority to determine the appropriate level to protect human health or welfare (in accordance with section 303(c)(2) of the CWA) for each water body. However, under the Clean Water Act, EPA must also review and approve State water quality standards; section 304(1) listing decisions and draft and final State-issued individual control strategies; and in States where EPA writes NPDES permits, EPA must develop appropriate water quality-based permit limitations. The States and EPA therefore have a strong interest in assuring that the decisions are legally defensible, are based on the best information available, and are subject to full and meaningful public comment and participation. It is very important that each decision be supported by an adequate record. Such a record is critical to meaningful comment, EPA's review of the State's decision, and any subsequent administrative or judicial review.

Any human health criterion for a toxicant is based on at least three interrelated considerations:

- cancer potency or systemic toxicity,
- exposure, and
- risk characterization.

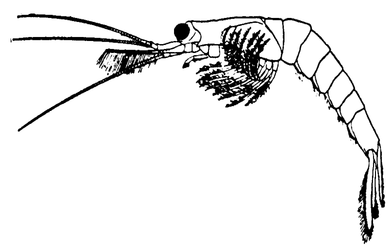
States may make their own judgments on each of these factors within reasonable scientific bounds, but documentation to support their judgments, when different from EPA's recommendation, must be clear and in the public record. If a State relies on EPA's section 304(a) criteria document (or other EPA documents), the State may reference and rely on the data in these documents and need not create duplicative or new material for inclusion in their records. However, where site-specific issues arise or the State decides to adopt an approach to any one of these three factors that differs from the approach in EPA's criteria document, the State must explain its reasons in a manner sufficient for a reviewer to determine that the approach chosen is based on sound scientific rationale (40 CFR 131.11(b)).

3.1.2 Criteria for Aquatic Life Protection

The development of national numerical water quality criteria for the protection of aquatic organisms is a complex process that uses information from many areas of aquatic toxicology. (See Appendix H for a detailed discussion of this process.) After a decision is made that a national criterion is needed for a particular material, all available information concerning toxicity to, and bioaccumulation by, aquatic organisms is collected and reviewed for acceptability. If enough acceptable data for 48- to 96-hour toxicity tests on aquatic plants and animals are available, they are used to derive the acute criterion. If sufficient data on the ratio of acute to chronic toxicity concentrations are available, they are used to derive the chronic or long-term exposure criteria. If justified, one or both of the criteria may be related to other water quality characteristics, such as pH, temperature, or hardness. Separate criteria are developed for fresh and salt waters.

The Water Quality Standards Regulation allows States to develop numerical criteria or modify EPA's recommended criteria to account for site-specific or other scientifically defensible factors. Guidance on modifying national criteria is found in sections 3.6 and 3.7. When a criterion must be developed for a chemical for which a national criterion has not been established, the regulatory authority should refer to the EPA guidelines (Appendix H).

Magnitude for Aquatic Life Criteria



Water quality criteria for aquatic life contain two expressions of allowable magnitude: a criterion maximum concentration (CMC) to protect against acute (short-term) effects; and a criterion continuous concentration (CCC) to protect against chronic (long-term) effects. EPA derives acute criteria from 48- to 96-hour tests of lethality or immobilization. EPA derives chronic criteria from longer term (often greater than 28-day) tests that measure survival, growth, or reproduction. Where appropriate, the calculated criteria may be lowered to be protective of commercially or recreationally important species.

Duration for Aquatic Life Criteria

The quality of an ambient water typically varies in response to variations of effluent quality, stream flow, and other factors. Organisms in the receiving water are not experiencing constant, steady exposure but rather are experiencing fluctuating exposures, including periods of high concentrations, which may have adverse effects. Thus, EPA's criteria indicate a time period over which exposure is to be averaged, as well as an upper limit on the average concentration, thereby limiting the duration of exposure to elevated concentrations. For acute criteria, EPA recommends an averaging period of 1 hour. That is, to protect against acute effects, the 1-hour average exposure should not exceed the CMC. For chronic criteria, EPA recommends an averaging period of 4 days. That is, the 4-day average exposure should not exceed the CCC.

Frequency for Aquatic Life Criteria

To predict or ascertain the attainment of criteria, it is necessary to specify the allowable frequency for exceeding the criteria. This is because it is statistically impossible to project that criteria will never be exceeded. As ecological communities are naturally subjected to a series of stresses, the allowable frequency of pollutant stress may be set at a value that does not significantly increase the frequency or severity of all stresses combined.

EPA recommends an average frequency for excursions of both acute and chronic criteria not to exceed once in 3 years. In all cases, the recommended frequency applies to actual ambient concentrations, and excludes the influence of measurement imprecision. EPA established its recommended frequency as part of its guidelines for deriving criteria (Appendix H). EPA selected the 3-year average frequency of criteria exceedence with the intent of providing for ecological recovery from a variety of severe stresses. This return interval is roughly equivalent to a 7Q10 design flow condition. Because of the nature of the ecological recovery studies available, the severity of criteria excursions could not be rigorously related to the resulting ecological impacts. Nevertheless, EPA derives its criteria intending that a single marginal criteria excursion (i.e., a slight excursion over a 1-hour period for acute or over a 4-day period for chronic) would require little or no time for recovery. If the frequency of marginal criteria excursions is not high, it can be shown that the frequency of severe stresses, requiring measurable recovery periods, would be extremely small. EPA thus expects the 3-year return interval to provide a very high degree of protection.

3.1.3 Criteria for Human Health Protection

This section reviews EPA's procedures used to develop assessments of human health effects in developing water quality criteria and reference ambient concentrations. A more complete human health effects discussion is included in the *Guidelines and Methodology Used in the Preparation of Health Effects Assessment Chapters of the Consent Decree Water Documents* (Appendix J). The procedures contained in this document are used in the development and updating of EPA water quality criteria and may be used in updating State criteria and in developing State criteria for those pollutants lacking EPA human health criteria. The procedures may also be applied as site-specific interpretations of narrative standards and as a basis for permit limits under 40 CFR 122.44 (d)(1)(vi).

Magnitude and Duration

Water quality criteria for human health contain only a single expression of allowable magnitude; a criterion concentration generally to protect against long-term (chronic) human health effects. Currently, national policy and prevailing opinion in the expert community establish that the duration for human health criteria for carcinogens should be derived assuming lifetime exposure, taken to be a 70-year time period. The duration of exposure assumed in deriving criteria for noncarcinogens is more complicated owing to a wide variety of endpoints: some developmental (and thus age-specific and perhaps gender-specific), some lifetime, and some, such as organoleptic effects, not duration-related at all. Thus, appropriate durations depend on the individual noncarcinogenic pollutants and the endpoints or adverse effects being considered.

Human Exposure Considerations

A complete human exposure evaluation for toxic pollutants of concern for bioaccumulation would encompass not only estimates of exposures due to fish consumption but also exposure from background concentrations and other exposure routes, The more important of these include recreational and occupational contact, dietary intake from other than fish, intake from air inhalation, and drinking water consumption. For section 304(a) criteria development, EPA typically considers only exposures to a pollutant that occur through the ingestion of water and contaminated fish and shellfish. This is the exposure default assumption, although the human health guidelines provide for considering other sources where data are available (see 45 F.R. 79354). Thus the criteria are based on an assessment of risks related to the surface water exposure route only (57 F.R. 60862-3).

The consumption of contaminated fish tissue is of serious concern because the presence of even extremely low ambient concentrations of bioaccumulative pollutants (sublethal to aquatic life) in surface waters can result in residue concentrations in fish tissue that can pose a human health risk. Other exposure route information should be considered and incorporated in human exposure evaluations to the extent available.

Levels of actual human exposures from consuming contaminated fish vary depending upon a number of case-specific consumption factors. These factors include type of fish species consumed, type of fish tissue consumed, tissue lipid content, consumption rate and pattern, and food preparation practices. In addition, depending on the spatial variability in the fishery area, the behavior of the fish species, and the point of application of the criterion, the average exposure of fish may be only a small fraction of the expected exposure at the point of application of the criterion. If an effluent attracts fish, the average exposure might be greater than the expected exposure.

With shellfish, such as oysters, snails, and mussels, whole-body tissue consumption commonly occurs, whereas with fish, muscle tissue and roe are most commonly eaten. This difference in the types of tissues consumed has implications for the amount of available bioaccumulative contaminants likely to be ingested. Whole-body shellfish consumption presumably means ingestion of the entire burden of bioaccumulative contaminants. However, with most fish, selective cleaning and removal of internal organs, and sometimes body fat as well, from edible tissues, may result in removal of much of the lipid material in which bioaccumulative contaminants tend to concentrate.

Fish Consumption Values

EPA's human health criteria have assumed a human body weight of 70 kg and the consumption of 6.5 g of fish and shellfish per day. Based on data collected in 1973-74, the national per capita consumption of freshwater and estuarine fish was estimated to average 6.5 g/day. Per capita consumption of all seafood (including marine species) was estimated to average 14.3 g/day. The 95th percentile for consumption of all seafood by individuals over a period of 1 month was estimated to be 42 g/day. The mean lipid content of fish and shellfish tissue consumed in this study was estimated to be 3.0 percent (USEPA, 1980c).

Currently, four levels of fish and shellfish consumption are provided in EPA guidance (USEPA, 1991a):

- 6.5 g/day to represent an estimate of average consumption of fish and shellfish from estuarine and freshwaters by the entire U.S. population. This consumption level is based on the average of both consumers and nonconsumers of.
- 20 g/day to represent an estimate of the average consumption of fish and shellfish from marine, estuarine, and freshwaters by the U.S. population. This average consumption level also includes both consumers and nonconsumers of.
- 165 g/day to represent consumption of fish and shellfish from marine, estuarine, and freshwaters by the 99.9th percentile of the U.S. population consuming the most fish or seafood.
- 180 g/day to represent a "reasonable worst case" based on the assumption that some individuals would consume fishand shellfish at a rate equal to the combined consumption of red meat, poultry, fish, and shellfish in the United States.

EPA is currently updating the national estuarine and freshwater fish and shellfish consumption default values and will provide a range of recommended national consumption values. This range will include:

- mean values appropriate to the population at large; and
- values appropriate for those individuals who consume a relatively large proportion of fish and shellfish in their diets (maximally exposed individuals).

Many States use EPA's 6.5 g/day consumption value. However, some States use the above-mentioned 20 g/day value and, for saltwaters, 37 g/day. In general, EPA recommends that the consumption values used in deriving criteria from the formulas in this chapter reflect the most current, relevant, and/or site-specific information available.

Bioaccumulation Considerations

The ratio of the contaminant concentrations in fish tissue versus that in water is termed either the bioconcentration factor (BCF) or the bioaccumulation factor (BAF). Bioconcentration is defined as involving contaminant uptake from water only (not from food). The bioaccumulation factor (BAF) is defined similarly to the BCF except that it includes contaminant uptake from both water and food. Under laboratory conditions, measurements of tissue/water partitioning are generally considered to involve uptake from water only. On the other hand, both processes are likely to apply in the field since the entire food chain is exposed.
The BAF/BCF ratio ranges from 1 to 100, with the highest ratios applying to organisms in higher trophic levels, and to chemicals with logarithm of the octanol-water partitioning coefficient (log P) close to 6.5.

Bioaccumulation considerations are integrated into the criteria equations by using food chain multipliers (FMs) in conjunction with the BCF. The bioaccumulation and bioconcentration factors for a chemical are related as follows:

BAF = FM x BCF

By incorporating the FM and BCF terms into the criteria equations, bioaccumulation can be addressed.

*These recommended FMs are conservative estimates; FMs for log P values greater than 6.5 may range from the values given to as low as 0.1 for contaminants with very low bioavailability.
In Table 3-1, FM values derived from the work of Thomann (1987, 1989) are listed according to log P value and trophic level of the organism. For chemicals with log P values greater than about 7, there is additional uncertainty regarding the degree of bioaccumulation, but generally, trophic level effects appear to decrease due to slow transport kinetics of these chemicals in fish, the growth rate of the fish, and the chemical's relatively low bioavailability. Trophic level 4 organisms are typically the most desirable species for sport fishing and, therefore, FMs for trophic level 4 should generally be used in the equations for calculating criteria. In those very rare situations where only lower trophic level organisms are found, e.g., possibly oyster beds, an FM for a lower trophic level might be considered.

Measured BAFs (especially for those chemicals with log P values above 6.5) reported in the literature should be used when available. To use experimentally measured BAFs in calculating the criterion, the (FM x BCF) term is replaced by the BAF in the equations in the following section. Relatively few BAFs have been measured accurately and reported, and their application to sites other than the specific ecosystem where they were developed is problematic and subject to uncertainty. The option is also available to develop BAFs experimentally, but this will be extremely resource intensive if done on a site-specific basis with all the necessary experimental and quality controls.

Table 3-1. Estimated Food Chain Multipliers (FMs)

Trophic Levels			
Log P	2	3	4
3.5	1.0	1.0	1.0
3.6	1.0	1.0	1.0
3.7	1.0	1.0	1.0
3.8	1.0	1.0	1.0
3.9	1.0	1.0	1.0
4.0	1.1	1.0	1.0
4.1	1.1	1.1	1.1
4.2	1.1	1.1	1.1
4.3	1.1	1.1	1.1
4.4	1.2	1.1	1.1
4.5	1.2	1.2	1.2
4.6	1.2	1.3	1.3
4.7	1.3	1.4	1.4
4.8	1.4	1.5	1.6
4.9	1.5	1.8	2.0
5.0	1.6	2.1	2.6
5.1	1.7	2.5	3.2
5.2	1.9	3.0	4.3
5.3	2.2	3.7	5.8
5.4	2.4	4.6	8.0
5.5	2.8	5.9	11
5.6	3.3	7.5	16
5.7	3.9	9.8	23
5.8	4.6	13	33
5.9	5.6	17	47
6.0	6.8	21	67
6.1	8.2	25	75
6.2	10	29	84
6.3	13	34	92
6.4	15	39	98
6.5	19	45	100
≥6.5	19.2*	45*	100*

Updating Human Health Criteria Using IRIS

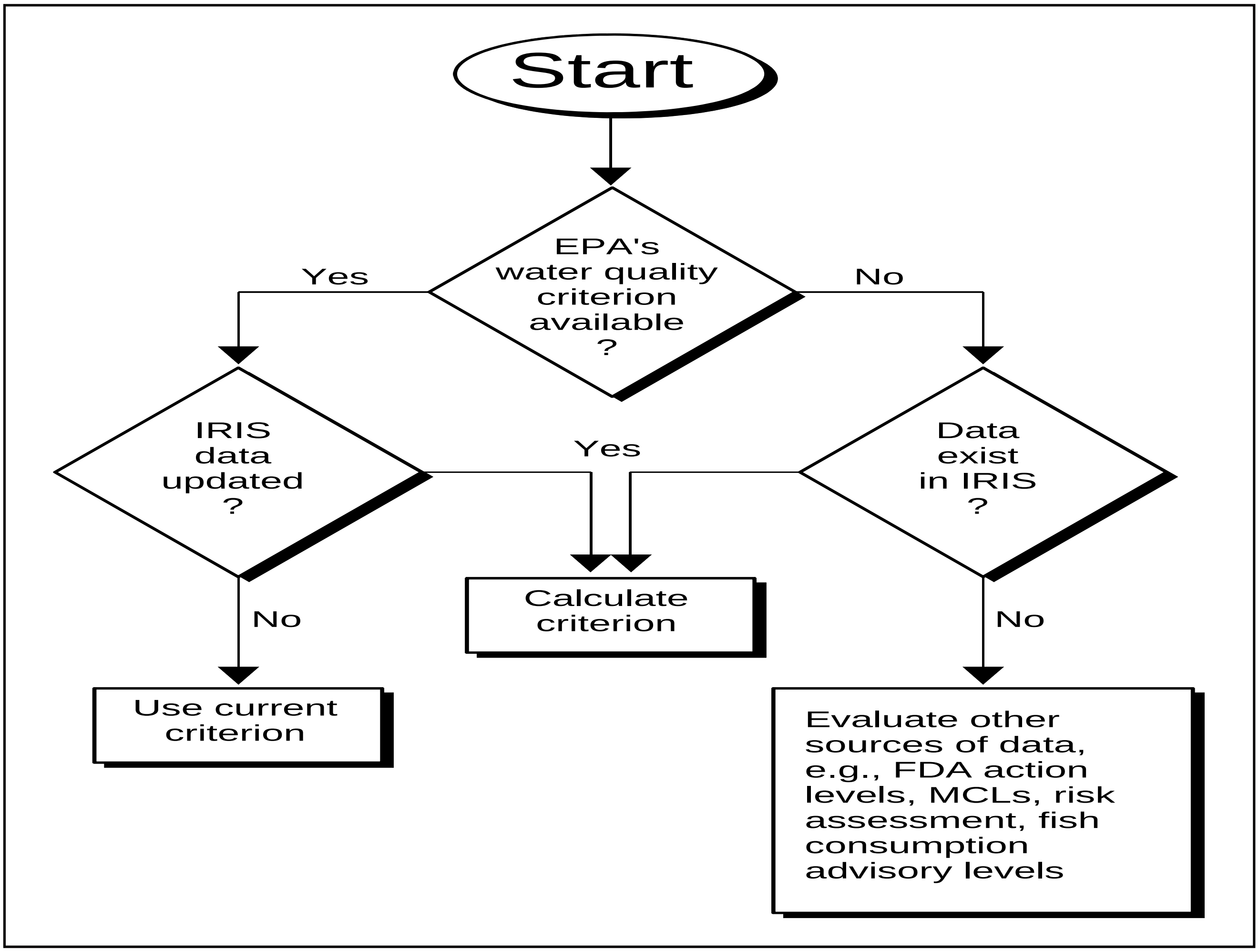
EPA recommends that States use the most current risk information in the process of updating human health criteria. The Integrated Risk Information System (IRIS) (Barns and Dourson, 1988; Appendix N) is an electronic data base of the USEPA that provides chemical-specific risk information on the relationship between chemical exposure and estimated human health effects. Risk assessment information contained in IRIS, except as specifically noted, has been reviewed and agreed upon by an interdisciplinary group of scientists representing various Program Offices within the Agency and represent an Agency-wide consensus. Risk assessment information and values are updated on a monthly basis and are approved for Agency-wide use. IRIS is intended to make risk assessment information readily available to those individuals who must perform risk assessments and also to increase consistency among risk assessment/risk management decisions.

IRIS contains two types of quantitative risks values: the oral Reference Dose (RfD) and the carcinogenic potency estimate or slope factor. The RfD (formerly known as the acceptable daily intake or ADI) is the human health hazard assessment for noncarcinogenic (target organ) effects. The carcinogenic potency estimate (formerly known as q_1*) represents the upper bound cancer-causing potential resulting from lifetime exposure to a substance. The RfD or the oral carcinogenic potency estimate is used in the derivation of EPA human health criteria.

EPA periodically updates risk assessment information, including RfDs, cancer potency estimates, and related information on contaminant effects, and reports the current information on IRIS. Since IRIS contains the Agency's most recent quantitative risk assessment values, current IRIS values should be used by States in updating or developing new human health criteria. This means that the 1980 human health criteria should be updated with the latest IRIS values. The procedure for deriving an updated human health water quality criterion would require inserting the current Rfd or carcinogenic potency estimate on IRIS into the equations in Exhibit 3.1 or 3.2, as appropriate.

Figure 3-1 shows the procedure for determining an updated criterion using IRIS data. If a chemical has both carcinogenic and non-carcinogenic effects, i.e., both a cancer potency estimate and a RfD, both criteria should be calculated. The most stringent criterion applies

Figure 3-1. Procedure for determining an updated criterion using IRIS data.



Calculating Criteria for Non-carcinogens

The RfD is an estimate of the daily exposure to the human population that is likely to be without appreciable risk of causing deleterious effects during a lifetime. The RfD is expressed in units of mg toxicant per kg human body weight per day.

RfDs are derived from the "no-observed-adverse-effect level" (NOAEL) or the "lowest-observed-adverse-effect level" (LOAEL) identified from chronic or subchronic human epidemiology studies or animal exposure studies. (Note: "LOAEL" and "NOAEL" refer to animal and human toxicology and are therefore distinct from the aquatic toxicity terms "no-observed-effect concentration" (NOEC) and "lowest-observed-effect concentration" (LOEC).) Uncertainty factors are then applied to the NOAEL or LOAEL to account for uncertainties in the data associated with variability among individuals, extrapolation from nonhuman test species to humans, data on other than long-term exposures, and the use of a LOAEL (USEPA, 1988a). An additional uncertainty factor may be applied to account for significant weakness or gaps in the database.

The RfD is a threshold below which systemic toxic effects are unlikely to occur. While exposures above the RfD increase the probability of adverse effects, they do not produce a certainty of adverse effects. Similarly, while exposure at or below the RfD reduces the probability, it does not guarantee the absence of effects in all persons. The RfDs contained in IRIS are values that represent EPA's consensus (and have uncertainty spanning perhaps an order of magnitude). This means an RfD of 1.0 mg/kg/day could range from 0.3 to 3.0 mg/kg/day.

For noncarcinogenic effects, an updated criterion can be derived using the equation in Exhibit 3-1.

Exhibit 3-1. Equation for Deriving Human Health Criteria Based on Noncarcinogenic Effects

$$C\ (\text{mg/l}) = \frac{(RfD \times WT) - (DT + IN) \times WT}{WI + [FC \times L \times FM \times BCF]}$$

Where:

C=	updated water quality criterion (mg/l)
RfD =	oral reference dose (mg toxicant/kg human body weight/day)
WT =	weight of an average human adult (70 kg)
DT =	dietary exposure (other than fish) (mg toxicant/kg body human weight/day)
IN =	inhalation exposure (mg toxicant/kg body human weight/day)
WI =	average human adult water intake (2 l/day)
FC =	daily fish consumption (kg fish/day)
L =	ratio of lipid fraction of fish tissue consumed to 3%
FM =	food chain multiplier (from Table 3-1)
BCF =	bioconcentration factor (mg toxicant/kg fish divided by mg toxicant/L water) for fish with 3% lipid content

If the receiving water body is not used as a drinking water source, the factor WI can be deleted. Where dietary and/or inhalation exposure values are unknown, these factors may be deleted from the above calculation.

Calculating Criteria for Carcinogens

Any human health criterion for a carcinogen is based on at least three interrelated considerations: cancer potency, exposure, and risk characterization. When developing State criteria, States may make their own judgments on each of these factors within reasonable scientific bounds, but documentation to support their judgments must be clear and in the public record.

Maximum protection of human health from the potential effects of exposure to carcinogens through the consumption of contaminated fish and/or other aquatic life would require a criterion of zero. The zero level is based upon the assumption of non-threshold effects (i.e., no safe level exists below which any increase in exposure does not result in an increased risk of cancer) for carcinogens. However, because a publicly acceptable policy for safety does not require the absence of all risk, a numerical estimate of pollutant concentration (in µg/l) which corresponds to a given level of risk for a population of a specified size is selected instead. A cancer risk level is defined as the number of new cancers that may result in a population of specified size due to an increase in exposure (e.g., 10^{-6} risk level = 1 additional cancer in a population of 1 million). Cancer risk is calculated by multiplying the experimentally derived cancer potency estimate by the concentration of the chemical in the fish and the average daily human consumption of contaminated fish. The risk for a specified population (e.g., 1 million people or 10^{-6}) is then calculated by dividing the risk level by the specific cancer risk. EPA's ambient water quality criteria documents provide risk levels ranging from 10^{-5} to 10^{-7} as examples.

The cancer potency estimate, or slope factor (formerly known as the q_1*), is derived using animal studies. High-dose exposures are extrapolated to low-dose concentrations and adjusted to a lifetime exposure period through the use of a linearized multistage model. The model calculates the upper 95 percent confidence limit of the slope of a straight line which the model postulates to occur at low doses. When based on human (epidemiological) data, the slope factor is based on the observed increase in cancer risk and is not extrapolated. For deriving criteria for carcinogens, the oral cancer potency estimates or slope factors from IRIS are used.

It is important to note that cancer potency factors may overestimate or underestimate the actual risk. Such potency estimates are subject to great uncertainty because of two primary factors:

- adequacy of the cancer data base (i.e., human vs. animal data); and
- limited information regarding the mechanism of cancer causation.

Risk levels of 10^{-5}, 10^{-6}, and 10^{-7} are often used by States as minimal risk levels in interpreting their standards. EPA considers risks to be additive, i.e., the risk from individual chemicals is not necessarily the overall risk from exposure to water. For example, an individual risk level of 10^{-6} may yield a higher overall risk level if multiple carcinogenic chemicals are present.

For carcinogenic effects, the criterion can be determined by using the equation in Exhibit 3-2.

Exhibit 3-2. Equation for Deriving Human Health Criteria Based on Carcinogenic Effects

$$C\ (mg/l) = \frac{(RL \times WT)}{q_1^* \,[WI + FC \times L \times (FM \times BCF)]}$$

Where:

C =	updated water quality criterion (mg/l)
RL =	risk level (10^{-x}) where x is usually in the range of 4 to 6
WT =	weight of an average human adult (70 kg)
q_1* =	carcinogenic potency factor (kg day/mg)
WI =	average human adult water intake (2 l/day)
FC =	daily fish consumption (kg fish/day)

$$C\ (mg/l) = \frac{(RL \times WT)}{q_1^* \left[WI + FC \times L \times (FM \times BCF)\right]}$$

L = ratio of lipid fraction of fish tissue consumed to 3% assumed by EPA
FM = food chain multiplier (from Table 3-1)
BCF = bioconcentration factor (mg toxicant/kg fish divided by mg toxicant/L water) for fish with 3% lipid content

If the receiving water body is not designated as a drinking water source, the factor WI can be deleted.

Deriving Quantitative Risk Assessments in the Absence of IRIS Values

The RfDs or cancer potency estimates comprise the existing dose-response factors for developing criteria. When IRIS data are unavailable, quantitative risk level information may be developed according to a State's own procedures. Some States have established their own procedures whereby dose-response factors can be developed based upon extrapolation of acute and/or chronic animal data to concentrations of exposure protective of fish consumption by humans.
here owing to the complexity of the subject.

3.2 Section 304(a) Criteria to State Designated Uses

The section 304(a)(1) criteria published by EPA from time to time can be used to support the designated uses found in State standards. The following sections briefly discuss the relationship between certain criteria and individual use classifications. Additional information on this subject also can be found in the "Green Book" (FWPCA, 1968); the "Blue Book" (NAS/NAE, 1973); the "Red Book" USEPA, 1976); the EPA *Water Quality Criteria Documents* (see Appendix I); the"Gold Book" (USEPA, 1986a); and future EPA section 304(a)(1) water quality criteria publications.

Where a water body is designated for more than one use, criteria necessary to protect the most sensitive use must be applied. The following four sections discuss the major types of use categories.

3.2.1 Recreation

Recreational uses of water include activities such as swimming, wading, boating, and fishing. Often insufficient data exist on the human health effects of physical and chemical pollutants, including most toxics, to make a determination of criteria for recreational uses. However, as a general guideline, recreational waters that contain chemicals in concentrations toxic or otherwise harmful to man if ingested, or irritating to the skin or mucous membranes of the human body upon brief immersion, should be avoided. The section 304(a)(1) human health effects criteria based on direct human drinking water intake and fish consumption might provide useful guidance in these circumstances. Also, section 304(a)(1) criteria based on human health effects may be used to support this designated use where fishing is included in the State definition of "recreation." In this latter situation, only the portion of the criterion based on fish consumption should be used. Section 304(a)(1) criteria to protect recreational uses are also available for certain physical, microbiological, and narrative "free from" aesthetic criteria.

Research regarding bacteriological indicators has resulted in EPA recommending that States use *Escherichia coli* or enterococci as indicators of recreational water quality (USEPA, 1986b) rather than fecal coliform because of the better correlation with gastroenteritis in swimmers.

The "Green Book" and "Blue Book" provide additional information on protecting recreational uses such as pH criteria to prevent eye irritation and microbiological criteria based on aesthetic considerations.

3.2.2 Aquatic Life

The section 304(a)(1) criteria for aquatic life should be used directly to support this designated use. If subcategories of this use are adopted (e.g., to differentiate between coldwater and warmwater fisheries), then appropriate criteria should be set to reflect the varying needs of such subcategories.

3.2.3 Agricultural and Industrial Uses

The "Green Book" (FWPCA, 1968) and "Blue Book" (NAS/NAE, 1973) provide some information on protecting agricultural and industrial uses. Section 304(a)(1) criteria for protecting these uses have not been specifically developed for numerous parameters pertaining to these uses, including most toxics.

Where criteria have not been specifically developed for these uses, the criteria developed for human health and aquatic life are usually sufficiently stringent to protect these uses. States may also establish criteria specifically designed to protect these uses.

3.2.4 Public Water Supply

The drinking water exposure component of the section 304(a)(1) criteria based on human health effects can apply directly to this use classification. The criteria also may be appropriately modified depending upon whether the specific water supply system falls within the auspices of the Safe Drinking Water Act's (SDWA) regulatory control and the type and level of treatment imposed upon the supply before delivery to the consumer. The SDWA controls the presence of contaminants in finished ("at-the-tap") drinking water.

A brief description of relevant sections of the SDWA is necessary to explain how the Act will work in conjunction with section 304(a)(1) criteria in protecting human health from the effects of toxics due to consumption of water. Pursuant to section 1412 of the SDWA, EPA has promulgated "National Primary Drinking Water Standards" for certain radionuclide, microbiological, organic, and inorganic substances. These standards establish maximum contaminant levels (MCLs), which specify the maximum permissible level of a contaminant in water that may be delivered to a user of a public water system now defined as serving a minimum of 25 people. MCLs are established based on consideration of a range of factors including not only the health effects of the contaminants but also treatment capability, monitoring availability, and costs. Under section 1401(1)(D)(i) of the SDWA, EPA is also allowed to establish the minimum quality criteria for water that may be taken into a public water supply system.

Section 304(a)(1) criteria provide estimates of pollutant concentrations protective of human health, but do not consider treatment technology, costs, and other feasibility factors. The section 304(a)(1) criteria also include fish bioaccumulation and consumption factors in addition to direct human drinking water intake. These numbers were not developed to serve as "at-the-tap" drinking water standards, and they have no regulatory significance under the SDWA. Drinking water standards are established based on considerations, including technological and economic feasibility, not relevant to section 304(a)(1) criteria. Section 304(a)(1) criteria are more analogous to the maximum contaminant level goals (MCLGs) (previously known as RMCLs) under section 1412(b)(1)(B) of the SDWA in which, based upon a report from the National Academy of Sciences, the Administrator should set target levels for contaminants in drinking water at which "no known or anticipated adverse effects occur and which allow an adequate margin of safety." MCLGs do not take treatment, cost, and other feasibility factors into consideration. Section 304(a)(1) criteria are, in concept, related to the health-based goals specified in the MCLGs.

MCLs of the SDWA, where they exist, control toxic chemicals in finished drinking water. However, because of variations in treatment, ambient water criteria may be used by the States as a supplement to SDWA regulations. When setting water quality criteria for public water supplies, States have the option of applying MCLs, section 304(a)(1) human health effects criteria, modified section 304(a)(1) criteria, or controls more stringent than these three to protect against the effects of contaminants by ingestion from drinking water.

For treated drinking water supplies serving 25 people or greater, States must control contaminants down to levels at least as stringent as MCLs (where they exist for the pollutants of concern) in the finished drinking water. However, States also have the options to control toxics in the ambient water by choosing section 304(a)(1) criteria, adjusted section 304(a)(1) criteria resulting from the reduction of the direct drinking water exposure component in the criteria calculation to the extent that the treatment process reduces the level of pollutants, or a more stringent contaminant level than the former three options.

3.3 State Criteria Requirements

Section 131.11(a)(1) of the Regulation requires States to adopt water quality criteria to protect the designated use(s). The State criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use(s). For waters with multiple use designations, the criteria must support the most sensitive use.

In section 131.11, States are encouraged to adopt both numeric and narrative criteria. Aquatic life criteria should protect against both short-term (acute) and long-term (chronic) effects. Numeric criteria are particularly important where the cause of toxicity is known or for protection against pollutants with potential human health impacts or bioaccumulation potential. Numeric water quality criteria may also be the best way to address nonpoint source pollution problems. Narrative criteria can be the basis for limiting toxicity in waste discharges where a specific pollutant can be identified as causing or contributing to the toxicity but where there are no numeric criteria in the State standards. Narrative criteria also can be used where toxicity cannot be traced to a particular pollutant.

Section 131.11(a)(2) requires States to develop implementation procedures which explain how the State will ensure that narrative toxics criteria are met.

To more fully protect aquatic habitats, it is EPA's policy that States fully integrate chemical-specific, whole-effluent, and biological assessment approaches in State water quality programs (see Appendix R). Specifically, each of these three methods can provide a valid assessment of <u>non-attainment</u> of designated aquatic life uses but can rarely demonstrate use <u>attainment</u> separately. Therefore, EPA supports a policy of independent application of these three water quality assessment approaches. Independent application means that the validity of the results of any one of the approaches does not depend on confirmation by one or both of the other methods. This policy is based on the unique attributes, limitations, and program applications of each of the three approaches. Each method alone can provide valid and independently sufficient evidence of non-attainment of water quality standards, irrespective of any evidence, or lack thereof, derived from the other two approaches. The failure of one method to confirm impacts identified by another method does not negate the results of the initial assessment.

It is also EPA's policy that States should designate aquatic life uses that appropriately address biological integrity and adopt biological criteria necessary to protect those uses (see section 3.5.3 and Appendices C, K, and R).

3.4 Criteria for Toxicants

Applicable requirements for State adoption of water quality criteria for toxicants vary depending upon the toxicant. The reason for this is that the 1983 Water Quality Standards Regulation (Appendix A) and the Water Quality Act of 1987 which amended the Clean Water Act (Public Law 100-4) include more specific requirements for the particular toxicants listed pursuant to CWA section 307(a). For regulatory purposes, EPA has translated the 65 compounds and families of compounds listed pursuant to section 307(a) into 126 more specific substances, which EPA refers to as "priority toxic pollutants." The 126 priority toxic pollutants are listed in the WQS regulation and in Appendix P of this Handbook. Because of the more specific requirements for priority toxic pollutants, it is convenient to organize the requirements applicable to State adoption of criteria for toxicants into three categories:

- requirements applicable to priority toxic pollutants that have been the subject of CWA section 304(a)(1) criteria guidance (see section 3.4.1);
- requirements applicable to priority toxic pollutants that have not been the subject of CWA section 304(a)(1) criteria guidance (see section 3.4.1); and
- requirements applicable to all other toxicants (e.g., non-conventional pollutants like ammonia and chlorine) (see section 3.4.2).

3.4.1 Priority Toxic Pollutant Criteria

The criteria requirements applicable to priority toxic pollutants (i.e., the first two categories above) are specified in CWA section 303(c)(2)(B). Section 303(c)(2)(B), as added by the Water Quality Act of 1987, provides that:

Whenever a State reviews water quality standards pursuant to paragraph (1) of this subsection, or revises or adopts new standards pursuant to this paragraph, such State shall adopt criteria for all toxic pollutants listed pursuant to section 307(a)(1) of this Act for which criteria have been published under section 304(a), the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses. Such criteria shall be specific numerical criteria for such toxic pollutants. Where such numerical criteria are not available, whenever a State reviews water quality standards pursuant to paragraph (1), or revises or adopts new standards pursuant to this paragraph, such State shall adopt criteria based on biological monitoring or assessment methods consistent with information published pursuant to section 304(a)(8). Nothing in this section shall be construed to limit or delay the use of effluent limitations or other permit conditions based on or involving biological monitoring or assessment methods or previously adopted numerical criteria.

EPA, in devising guidance for section 303(c)(2)(B), attempted to provide States with the maximum flexibility that complied with the express statutory language but also with the overriding congressional objective: prompt adoption and implementation of numeric toxics criteria. EPA believed that flexibility was important so that each State could comply with section 303(c)(2)(B) and to the extent possible, accommodate its existing water quality standards regulatory approach.

General Requirements

To carry out the requirements of section 303(c)(2)(B), whenever a State revises its water quality standards, it must review all available information and data to first determine whether the discharge or the presence of a toxic pollutant is interfering with or is likely to interfere with the attainment of the designated uses of any water body segment.

If the data indicate that it is reasonable to expect the toxic pollutant to interfere with the use, or it actually is interfering with the use, then the State must adopt a numeric limit for the specific pollutant. If a State is unsure whether a toxic pollutant is interfering with, or is likely to interfere with, the designated use and therefore is unsure that control of the pollutant is necessary to support the designated use, the State should undertake to develop sufficient information upon which to make such a determination. Presence of facilities that manufacture or use the section 307(a) toxic pollutants or other information indicating that such pollutants are discharged or will be discharged strongly suggests that such pollutants could be interfering with attaining designated uses. If a State expects the pollutant not to interfere with the designated use, then section 303(1)(2)(B) does not require a numeric standard for that pollutant.

Section 303(c)(2)(B) addresses only pollutants listed as "toxic" pursuant to section 307(a) of the Act, which are codified at 40 CFR 131.36(b). The section 307(a) list contains 65 compounds and families of compounds, which potentially include thousands of specific compounds. The Agency has interpreted that list to include 126 "priority" toxic pollutants for regulatory purposes. Reference in this guidance to toxic pollutants or section 307(a) toxic pollutants refers to the 126 priority toxic pollutants unless otherwise noted. Both the list of priority toxic pollutants and recommended criteria levels are subject to change.

The national criteria recommendations published by EPA under section 304(a) (see section 3.1, above) of the Act include values for both acute and chronic aquatic life protection; only chronic criteria recommendations have been established to protect human health. To comply with the statute, a State needs to adopt aquatic life and human health criteria where necessary to support the appropriate designated uses. Criteria for the protection of human health are needed for water bodies designated for public water supply. When fish ingestion is considered an important activity, then the human health-related water quality criteria recommendation developed under section 304(a) of the CWA should be used; that is, the portion of the criteria recommendation based on fish consumption. For those pollutants designated as carcinogens, the recommendation for a human health criterion is generally more stringent than the aquatic life criterion for the same pollutant. In contrast, the aquatic life criteria recommendations for noncarcinogens are generally more stringent than the human health recommendations. When a State adopts a human health criterion for a carcinogen, the State needs to select a risk level. EPA has estimated risk levels of 10^{-5}, 10^{-6}, and 10^{-7} in its criteria documents under one set of exposure assumptions. However, the State is not limited to choosing among the risk levels published in the section 304(a) criteria documents, nor is the State limited to the base case exposure assumptions; it must choose the risk level for its conditions and explain its rationale.

EPA generally regulates pollutants treated as carcinogens in the range of 10^{-6} to 10^{-4} to protect average exposed individuals and more highly exposed populations. However, if a State selects a criterion that represents an upper bound risk level less protective than 1 in 100,000 (e.g., 10^{-5}), the State needs to have substantial support in the record for this level. This support focuses on two distinct issues. First, the record must include documentation that the decision maker considered the public interest of the State in selecting the risk level, including documentation of public participation in the decision making process as required by the Water Quality Standards Regulation at 40 CFR 131.20(b). Second, the record must include an analysis showing that the risk level selected, when combined with other risk assessment variables, is a balanced and reasonable estimate of actual risk posed, based on the best and most representative information available. The importance of the estimated actual risk increases as the degree of conservatism in the selected risk level diminishes. EPA carefully evaluates all assumptions used by a State if the State chose to alter any one of the standard EPA assumption values (57 F.R. 60864, December 22, 1993).

EPA does not intend to propose changes to the current requirements regarding the bases on which a State can adopt numeric criteria (40 CFR 131.11(b)(1)). Under EPA's regulation, in addition to basing numeric criteria on EPA's section 304(a) criteria documents, States may also base numeric criteria on site-specific determinations or other scientifically defensible methods.

EPA expects each State to comply with the new statutory requirements in any section 303(c) water quality standards review initiated after enactment of the Water Quality Act of 1987. The structure of section 303(c) is to require States to review their water quality standards at least once each 3 year period. Section 303(c)(2)(B) instructs States to include reviews for toxics criteria whenever they initiate a triennial review. Therefore, even if a State has complied with section 303(c)(2)(B), the State must review its standards each triennium to ensure that section 303(c)(2)(B) requirements continue to be met, considering that EPA may have published additional section 304(a) criteria documents and that the State will have new information on existing water quality and on pollution sources.

It should be noted that nothing in the Act or in the Water Quality Standards Regulation restricts the right of a State to adopt numeric criteria for any pollutant not listed pursuant to section 307(a)(1), and that such criteria may be expressed as concentration limits for an individual pollutant or for a toxicity parameter itself as measured by whole-effluent toxicity testing. However, neither numeric toxic criteria nor whole-effluent toxicity should be used as a surrogate for, or to supersede the other.

State Options

States may meet the requirements of CWA section 303(c)(2)(B) by choosing one of three scientifically and technically sound options (or some combination thereof):

1. Adopt statewide numeric criteria in State water quality standards for all section 307(a) toxic pollutants for which EPA has developed criteria guidance, regardless of whether the pollutants are known to be present;
2. Adopt specific numeric criteria in State water quality standards for section 307(a) toxic pollutants as necessary to support designated uses where such pollutants are discharged or are present in the affected waters and could reasonably be expected to interfere with designated uses;
3. Adopt a "translator procedure" to be applied to a narrative water quality standard provision that prohibits toxicity in receiving waters. Such a procedure is to be used by the State in calculating derived numeric criteria, which shall be used for all purposes under section 303(c) of the CWA. At a minimum, such criteria need to be developed for section 307(a) toxic pollutants, as necessary to support designated

uses, where these pollutants are discharged or present in the affected waters and could reasonably be expected to interfere with designated uses.

Option 1 is consistent with State authority to establish water quality standards. Option 2 most directly reflects the CWA requirements and is the option recommended by EPA. Option 3, while meeting the requirements of the CWA, is best suited to supplement numeric criteria from option 1 or 2. The three options are discussed in more detail below.

OPTION 1:
Adopt statewide numeric criteria in State water quality standards for all section 307(a) toxic pollutants for which EPA has developed criteria guidance, regardless of whether the pollutants are known to be present.

Pro:

- simple, straightforward implementation
- ensures that States will satisfy statute
- makes maximum uses of EPA recommendations
- gets specific numbers into State water quality standards fast, at first

Con:

- some priority toxic pollutants may not be discharged in State
- may cause unnecessary monitoring by States
- might result in "paper standards"

Option 1 is within a State's legal authority under the CWA to adopt broad water quality standards. This option is the most comprehensive approach to satisfy the statutory requirements because it would include all of the priority toxic pollutants for which EPA has prepared section 304(a) criteria guidance for either or both aquatic life protection and human health protection. In addition to a simple adoption of EPA's section 304(a) guidance as standards, a State must select a risk level for those toxic pollutants which are carcinogens (i.e., that cause or may cause cancer in humans).

Many States find this option attractive because it ensures comprehensive coverage of the priority toxic pollutants with scientifically defensible criteria without the need to conduct a resource-intensive evaluation of the particular segments and pollutants requiring criteria. This option also would not be more costly to dischargers than other options because permit limits would be based only on the regulation of the particular toxic pollutants in their discharges and not on the total listing in the water quality standards. Thus, actual permit limits should be the same under any of the options.

The State may also exercise its authority to use one or more of the techniques for adjusting water quality standards:

- establish or revise designated stream uses based on use attainability analyses (see section 2.9);
- develop site-specific criteria; or
- allow short-term variances (see section 5.3) when appropriate.

All three of these techniques may apply to standards developed under any of the three options discussed in this guidance. It is likely that States electing to use option 1 will rely more on variances because the other two options are implemented with more site-specific data being available. It should be noted, however, that permits issued pursuant to such water quality variances still must comply with any applicable antidegradation and antibacksliding requirements.

OPTION 2:

Adopt specific numeric criteria in State water quality standards for section 307(a) toxic pollutants as necessary to support designated uses where such pollutants are discharged or are present in the affected waters and could reasonably be expected to interfere with designated uses.

Pro:

- directly reflects statutory requirement
- standards based on demonstrated need to control problem pollutants
- State can use EPA's section 304(a) national criteria recommendations or other scientifically acceptable alternative, including site-specific criteria
- State can consider current or potential toxic pollutant problems
- State can go beyond section 307(a) toxics list, as desired

Con:

- may be difficult and time consuming to determine if, and which, pollutants are interfering with the designated use
- adoption of standards can require lengthy debates on correct criteria limit to be included in standards
- successful State toxic control programs based on narrative criteria may be halted or slowed as the State applies its limited resources to developing numeric standards
- difficult to update criteria once adopted as part of standards
- to be absolutely technically defensible, may need site-specific criteria in many situations, leading to a large workload for regulatory agency

EPA recommends that a State use this option to meet the statutory requirement. It directly reflects all the Act's requirements and is flexible, resulting in adoption of numeric water quality standards as needed. To assure that the State is capable of dealing with new problems as they arise, EPA also recommends that States adopt a translator procedure the same as, or similar to, that described in option 3, but applicable to all chemicals causing toxicity and not just priority pollutants as is the case for option 3.

Beginning in 1988, EPA provided States with candidate lists of priority toxic pollutants and water bodies in support of CWA section 304(l) implementation. These lists were developed because States were required to evaluate existing and readily available water-related data to comply with section 304(l), 40 CFR 130.10(d). A similar "strawman" analysis of priority pollutants potentially requiring adoption of numeric criteria under section 303(c)(2)(B) was furnished to most States in September or October of 1990 for their use in ongoing and subsequent triennial reviews. The primary differences between the "strawman" analysis and the section 304(l) candidate lists were that the "strawman" analysis (1) organized the results by chemical rather than by water body, (2) included data for certain STORET monitoring stations that were not used in constructing the candidate lists, (3) included data from the Toxics Release Inventory database, and (4) did not include a number of data sources used in preparing the candidate lists (e.g., those, such as fish kill information, that did not provide chemical-specific information).

EPA intends for States, at a minimum, to use the information gathered in support of section 304(l) requirements as a starting point for identifying (1) water segments that will need new and/or revised water quality standards for section 307(a) toxic pollutants, and (2) which priority toxic pollutants require adoption of numeric criteria. In the longer term, EPA expects similar determinations to occur during each triennial review of water quality standards as required by section 303(c).

In identifying the need for numeric criteria, EPA is encouraging States to use information and data such as:

- presence or potential construction of facilities that manufacture or use priority toxic pollutants;
- ambient water monitoring data, including those for sediment and aquatic life (e.g., fish tissue data);
- NPDES permit applications and permittee self-monitoring reports;
- effluent guideline development documents, many of which contain section 307(a)(1) priority pollutant scans;
- pesticide and herbicide application information and other records of pesticide or herbicide inventories;
- public water supply source monitoring data noting pollutants with Maximum Contaminant Levels (MCLs); and
- any other relevant information on toxic pollutants collected by Federal, State, interstate agencies, academic groups, or scientific organizations.

States are also expected to take into account newer information as it became available, such as information in annual reports from the Toxic Chemical Release Inventory requirements of the Emergency Planning and Community Right-To-Know Act of 1986 (Title III, Public Law 99-499).

Where the State's review indicates a reasonable expectation of a problem from the discharge or presence of toxic pollutants, the State should identify the pollutant(s) and the relevant segment(s). In making these determinations, States should use their own EPA-approved criteria or existing EPA water quality criteria for purposes of segment identification. After the review, the State may use other means to establish the final criterion as it revises its standards.

As with option 1, a State using option 2 must follow all its legal and administrative requirements for adoption of water quality standards. Since the resulting numeric criteria are part of a State's water quality standards, they are required to be submitted by the State to EPA for review and either approval or disapproval.

EPA believes this option offers the State optimum flexibility. For section 307(a) toxic pollutants adversely affecting designated uses, numeric criteria are available for permitting purposes. For other situations, the State has the option of defining site-specific criteria.

OPTION 3:

Adopt a procedure to be applied to the narrative water quality standard provision that prohibits toxicity in receiving waters. Such a procedure would be used by a State in calculating derived numeric criteria to be used for all purposes of water quality criteria under section 303(c) of the CWA. At a minimum such criteria need to be derived for section 307(a) toxic pollutants where the discharge or presence of such pollutants in the affected waters could reasonably be expected to interfere with designated uses, as necessary to support such designated uses.

Pro:

- allows a State flexibility to control priority toxic pollutants
- reduces time and cost required to adopt specific numeric criteria as water quality standards regulations
- allows immediate use of latest scientific information available at the time a State needs to develop derived numeric criteria
- revisions and additions to derived numeric criteria can be made without need to revise State law
- State can deal more easily with a situation where it did not establish water quality standards for the section 307(a) toxic pollutants during the most recent triennial review
- State can address problems from non-section 307(a) toxic pollutants

Con:

- EPA is currently on notice that a derived numeric criterion may invite legal challenge

- once the necessary procedures are adopted to enhance legal defensibility (e.g., appropriate scientific methods and public participation and review), actual savings in time and costs may be less than expected
- public participation in development of derived numeric criteria may be limited when such criteria are not addressed in a hearing on water quality standards

EPA believes that adoption of a narrative standard along with a translator mechanism as part of a State's water quality standard satisfies the substantive requirements of the statute. These criteria are subject to all the State's legal and administrative requirements for adoption of standards plus review and either approval or disapproval by EPA, and result in the development of derived numeric criteria for specific section 307(a) toxic pollutants. They are also subject to an opportunity for public participation. Nevertheless, EPA believes the most appropriate use of option 3 is as a supplement to either option 1 or 2. Thus, a State would have formally adopted numeric criteria for toxic pollutants that occur frequently; that have general applicability statewide for inclusion in NPDES permits, total maximum daily loads, and waste load allocations; and that also would have a sound and predictable method to develop additional numeric criteria as needed. This combination of options provides a complete regulatory scheme.

Although the approach in option 3 is similar to that currently allowed in the Water Quality Standards Regulation (40 CFR 131.11(a)(2)), this guidance discusses several administrative and scientific requirements that EPA believes are necessary to comply with section 303(c)(2)(B).

1. The Option 3 Procedure Must Be Used To Calculate Derived Numeric Water Quality Criteria

States must adopt a specific procedure to be applied to a narrative water quality criterion. To satisfy section 303(c)(2)(B), this procedure shall be used by the State in calculating derived numeric criteria, which shall be used for all purposes under section 303(c) of the CWA. Such criteria need to be developed for section 307(a) toxic pollutants as necessary to support designated uses, where these pollutants are discharged or are present in the affected waters and could reasonably be expected to interfere with the designated uses.

To assure protection from short-term exposures, the State procedure should ensure development of derived numeric water quality criteria based on valid acute aquatic toxicity tests that are lethal to half the affected organisms (LC50) for the species representative of or similar to those found in the State. In addition, the State procedure should ensure development of derived numeric water quality criteria for protection from chronic exposure by using an appropriate safety factor applicable to this acute limit. If there are saltwater components to the State's aquatic resources, the State should establish appropriate derived numeric criteria for saltwater in addition to those for freshwater.

The State's documentation of the tests should include a detailed discussion of its quality control and quality assurance procedures. The State should also include a description (or reference existing technical agreements with EPA) of the procedure it will use to calculate derived acute and chronic numeric criteria from the test data, and how these derived criteria will be used as the basis for deriving appropriate TMDLs, WLAs, and NPDES permit limits.

As discussed above, the procedure for calculating derived numeric criteria needs to protect aquatic life from both acute and chronic exposure to specific chemicals. Chronic aquatic life criteria are to be met at the edge of the mixing zone. The acute criteria are to be met (1) at the end-of-pipe if mixing is not rapid and complete and a high rate diffuser is not present; or (2) after mixing if mixing is rapid and complete or a high rate diffuser is present. (See EPA's *Technical Support Document for Water Quality-based Toxics Control*, USEPA 1991a.)

EPA has not established a national policy specifying the point of application in the receiving water to be used with human health criteria. However, EPA has approved State standards that apply human health criteria for fish consumption at the mixing zone boundary and/or apply the criteria for drinking water consumption, at a minimum, at the point of use. EPA has also proposed more stringent requirements for the application of human health criteria for highly bioaccumulative pollutants in the *Water Quality guidance for the Great Lakes System* (50 F.R. 20931, 21035, April 16, 1993) including elimination of mixing zones.

In addition, the State should also include an indication of potential bioconcentration or bioaccumulation by providing for:

- laboratory tests that measure the steady-state bioconcentration rate achieved by a susceptible organism; and/or
- field data in which ambient concentrations and tissue loads are measured to give an appropriate factor.

In developing a procedure to be used in calculating derived numeric criteria for the protection of aquatic life, the State should consider the potential impact that bioconcentration has on aquatic and terrestrial food chains.

The State should also use the derived bioconcentration factor and food chain multiplier to calculate chronically protective numeric criteria for humans that consume aquatic organisms. In calculating this derived numeric criterion, the State should indicate data requirements to be met when dealing with either threshold (toxic) or non-threshold (carcinogenic) compounds. The State should describe the species and the minimum number of tests, which may generally be met by a single mammalian chronic test if it is of good quality and if the weight of evidence indicates that the results are reasonable. The State should provide the method to calculate a derived numeric criterion from the appropriate test result.

Both the threshold and non-threshold criteria for protecting human health should contain exposure assumptions, and the State procedure should be used to calculate derived numeric criteria that address the consumption of water, consumption of fish, and combined consumption of both water and fish. The State should provide the assumptions regarding the amount of fish and the quantity of water consumed per person per day, as well as the rationale used to select the assumptions. It needs to include the number of tests, the species necessary to establish a dose-response relationship, and the procedure to be used to calculate the derived numeric criteria. For non-threshold contaminants, the State should specify the model used to extrapolate to low dose and the risk level. It should also address incidental exposure from other water sources (e.g., swimming). When calculating derived numeric criteria for multiple exposure to pollutants, the State should consider additive effects, especially for carcinogenic substances, and should factor in the contribution to the daily intake of toxicants from other sources (e.g., food, air) when data are available.

2. The State Must Demonstrate That the Procedure Results in Derived Numeric Criteria Are Protective

The State needs to demonstrate that its procedures for developing criteria, including translator methods, yield fully protective criteria for human health and for aquatic life. EPA's review process will proceed according to EPA's regulation of 40 CFR 131.11, which requires that criteria be based on sound scientific rationale and be protective of all designated uses. EPA will use the expertise and experience it has gained in developing section 304(a) criteria for toxic pollutants by application of its own translator method (USEPA, 1980b; USEPA, 1985b).

Once EPA has approved the State's procedure, the Agency's review of derived numeric criteria, for example, for pollutants other than section 307(a) toxic pollutants resulting from the State's procedure, will focus on the adequacy of the data base rather than the calculation method. EPA also encourages States to apply such a procedure to calculate derived numeric criteria to be used as the basis for deriving permit limitations for nonconventional pollutants that also cause toxicity.

3. The State Must Provide Full Opportunity for Public Participation in Adoption of the Procedure

The Water Quality Standards Regulation requires States to hold public hearings to review and revise water quality standards in accordance with provisions of State law and EPA's Public Participation Regulation (40 CFR 25). Where a State plans to adopt a procedure to be applied to the narrative criterion, it must provide full opportunity for public participation in the development and adoption of the procedure as part of the State's water quality standards.

While it is not necessary for the State to adopt each derived numeric criterion into its water quality standards and submit it to EPA for review and approval, EPA is very concerned that all affected parties have adequate opportunity to participate in the development of a derived numeric criterion even though it is not being adopted directly as a water quality standard.

A State can satisfy the need to provide an opportunity for public participation in the development of derived numeric criteria in several ways, including:

- a specific hearing on the derived numeric criterion;
- the opportunity for a public hearing on an NPDES permits as long as public notice is given that a criterion for a toxic pollutant as part of the permit issuance is being contemplated; or
- a hearing coincidental with any other hearing as long as it is made clear that development of a specific criterion is also being undertaken.

For example, as States develop their lists and individual control strategies (ICSs) under section 304(1), they may seek full public participation. NPDES regulations also specify public participation requirements related to State permit issuance. Finally, States have public participation requirements associated with Water Quality Management Plan updates. States may take advantage of any of these public participation requirements to fulfill the requirement for public review of any resulting derived numeric criteria. In such cases, the State must give prior notice that development of such criteria is under consideration.

4. The Procedure Must Be Formally Adopted and Mandatory

Where a State elects to supplement its narrative criterion with an accompanying implementing procedure, it must formally adopt such a procedure as a part of its water quality standards. The procedure must be used by the State to calculate derived numeric criteria that will be used as the basis for all standards' purposes, including the following: developing TMDLs, WLAs, and limits in NPDES permits; determining whether water use designations are being met; and identifying potential nonpoint source pollution problems.

5. The Procedure Must Be Approved by EPA as Part of the State's Water Quality Standards Regulation

To be consistent with the requirements of the Act, the State's procedure to be applied to the narrative criterion must be submitted to EPA for review and approval, and will become a part of the State's water quality standards. (See 40 CFR 131.21 for further discussion.) This requirement may be satisfied by a reference in the standards to the procedure, which may be contained in another document, which has legal effect and is binding on the State, and all the requirements for public review, State implementation, and EPA review and approval are satisfied.

Criteria Based on Biological Monitoring

For priority toxic pollutants for which EPA has not issued section 304(a)(1) criteria guidance, CWA section 303(c)(2)(B) requires States to adopt criteria based on biological monitoring or assessment methods. The phrase "biological monitoring or assessment methods" includes:

- whole-effluent toxicity control methods;
- biological criteria methods; or
- other methods based on biological monitoring or assessment.

The phrase "biological monitoring or assessment methods" in its broadest sense also includes criteria developed through translator procedures. This broad interpretation of that phrase is consistent with EPA's policy of applying chemical-specific, biological, and whole-effluent toxicity methods independently in an integrated toxics control program. It is also consistent with the intent of Congress to expand State standards programs beyond chemical-specific approaches.

States should also consider developing protocols to derive and adopt numeric criteria for priority toxic pollutants (or other pollutants) where EPA has not issued section 304(a) criteria guidance. The State should consider available laboratory toxicity test data that may be sufficient to support derivation of chemical-specific criteria. Existing data need not be as comprehensive as that required to meet EPA's 1985 guidelines in order for a State to use its own protocols to derive criteria. EPA has described such protocols in the proposed *Water Quality Guidance for the Great Lakes System* (58 F.R. 20892, at 21016, April 16, 1993.) This is particularly important where other components of a State's narrative criterion implementation procedure (e.g., WET controls or biological criteria) may not ensure full protection of designated uses. For some pollutants, a combination of chemical-specific and other approaches is necessary (e.g., pollutants where bioaccumulation in fish tissue or water consumption by humans is a primary concern).

Biologically based monitoring or assessment methods serve as the basis for control where no specific numeric criteria exist or where calculation or application of pollutant-by-pollutant criteria appears infeasible. Also, these methods may serve as a supplemental measurement of attainment of water quality standards in addition to numeric and narrative criteria. The requirement for both numeric criteria and biologically based methods demonstrates that section 303(c)(2)(B) contemplates that States develop a comprehensive toxics control program regardless of the status of EPA's section 304(a) criteria.

The whole-effluent toxicity (WET) testing procedure is the principal biological monitoring guidance developed by EPA to date. The purpose of the WET procedure is to control point source dischargers of toxic pollutants. The procedure is particularly useful for monitoring and controlling the toxicity of complex effluents that may not be well controlled through chemical-specific numeric criteria. As such, biologically based effluent testing procedures are a necessary component of a State's toxics control program under section 303(c)(2)(B) and a principal means for implementing a State's narrative "free from toxics" standard.

Guidance documents EPA considers to serve the purpose of section 304(a)(8) include the *Technical Support Document for Water Quality-based Toxics Control* (USEPA, 1991a; *Guidelines for Deriving National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (Appendix H); *Guidelines and Methodology Used in the Preparation of Health Effect Assessment Chapters of the Consent Decree Water Criteria Documents* (Appendix J); *Methods for Measuring Acute Toxicity of Effluents to Freshwater and Marine Organisms* (USEPA, 1991d); *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (USEPA, 1991e); and *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (USEPA, 1991f).

3.4.2 Criteria for Nonconventional Pollutants

Criteria requirements applicable to toxicants that are not priority toxic pollutants (e.g., ammonia and chlorine), are specified in the 1983 Water Quality Standards Regulation (see 40 CFR 131.11). Under these requirements, States must adopt criteria based on sound scientific rationale that cover sufficient parameters to protect designated uses. Both numeric and narrative criteria (discussed in sections 3.5.1 and 3.5.2, below) may be applied to meet these requirements.

3.5 Forms of Criteria

States are required to adopt water quality criteria, based on sound scientific rationale, that contain sufficient parameters or constituents to protect the designated use. EPA believes that an effective State water quality standards program should include both parameter-specific (e.g., ambient numeric criteria) and narrative approaches.

3.5.1 Numeric Criteria

Numeric criteria are required where necessary to protect designated uses. Numeric criteria to protect aquatic life should be developed to address both short-term (acute) and long-term (chronic) effects. Saltwater species, as well as freshwater species, must be adequately protected. Adoption of numeric criteria is particularly important for toxicants known to be impairing surface waters and for toxicants with potential human health impacts (e.g., those with high bioaccumulation potential). Human health should be protected from exposure resulting from consumption of water and fish or other aquatic life (e.g., mussels, crayfish). Numeric water quality criteria also are useful in addressing nonpoint source pollution problems.

In evaluating whether chemical-specific numeric criteria for toxicants that are <u>not</u> priority toxic pollutants are required, States should consider whether other approaches (such as whole-effluent toxicity criteria or biological controls) will ensure full protection of designated uses. As mentioned above, a combination of independent approaches may be required in some cases to support the designated uses and comply with the requirements of the Water Quality Standards Regulation (e.g., pollutants where bioaccumulation in fish tissue or water consumption by humans is a primary concern).

3.5.2 Narrative Criteria

To supplement numeric criteria for toxicants, all States have also adopted narrative criteria for toxicants. Such narrative criteria are statements that describe the desired water quality goal, such as the following:

All waters, including those within mixing zone, shall be free from substances attributable to wastewater discharge or other pollutant sources that:

1. Settle to form objectionable deposits;
2. Float as debris, scum, oil, or other matter forming nuisances;
3. Produce objectionable color, odor, taste, or turbidity;
4. Cause injury to or are toxic to, or produce adverse physiological responses in humans, animals, or plants; or
5. Produce undesirable or nuisance aquatic life (54 F.R.28627, July 6, 1989).

EPA considers that the narrative criteria apply to all designated uses at all flows and are necessary to meet the statutory requirements of section 303(c)(2)(A) of the CWA.

Narrative toxic criteria (No. 4, above) can be the basis for establishing chemical-specific limits for waste discharges where a specific pollutant can be identified as causing or contributing to the toxicity and the State has not adopted chemical-specific numeric criteria. Narrative toxic criteria are cited as a basis for establishing whole-effluent toxicity controls in EPA permitting regulations at 40 CFR 122.44(d)(1)(v).

To ensure that narrative criteria for toxicants are attained, the Water Quality Standards Regulation requires States to develop implementation procedures (see 40 CFR 131.11(a)(2)). Such implementation procedures.

Exhibit 3-3. Components of a State Implementation Procedure for Narrative Toxics Criteria

State implementation procedures for narrative toxics criteria should describe the following:

- Specific, scientifically defensible methods by which the State will implement its narrative toxics standard for all toxicants, including:
    - methods for chemical-specific criteria, including methods for applying chemical-specific criteria in permits, developing or modifying chemical-specific criteria via a "translator procedure" (defined and discussed below),

    and calculating site-specific criteria based on local water chemistry or biology);
  - methods for developing and implementing whole-effluent toxicity criteria and/or controls; and
  - methods for developing and implementing biological criteria.

- How these methods will be integrated in the State's toxics control program (i.e., how the State will proceed when the specified methods produce conflicting or inconsistent results).
- Application criteria and information needed to apply numerical criteria, for example:
  - methods the State will use to identify those pollutants to be regulated in a specific discharge;
  - an incremental cancer risk level for carcinogens;
  - methods for identifying compliance thresholds in permits where calculated limits are below detection;
  - methods for selecting appropriate hardness, pH, and temperature variables for criteria expressed as functions;
  - methods or policies controlling the size and in-zone quality of mixing zones
  - design flows to be used in translating chemical-specific numeric criteria for aquatic life and human health into permit limits; and
  - other methods and information needed to apply standards on a case-by-case basis.

(Exhibit 3-3) should address all mechanisms to be used by the State to ensure that narrative criteria are attained. Because implementation of chemical-specific numeric criteria is a key component of State toxics control programs, narrative criteria implementation procedures must describe or reference the State's procedures to implement such chemical-specific numeric criteria (e.g., procedures for establishing chemical-specific permit limits under the NPDES permitting program). Implementation procedures must also address State programs to control whole-effluent toxicity (WET) and may address programs to implement biological criteria, where such programs have been developed by the State. Implementation procedures therefore serve as umbrella documents that describe how the State's various toxics control programs are integrated to ensure adequate protection for aquatic life and human health and attainment of the narrative toxics criterion. In essence, the procedure should apply the "independent application" principle, which provides for independent evaluations of attainment of a designated use based on chemical-specific, whole-effluent toxicity, and biological criteria methods (see section 3.5.3 and Appendices C, K, and R).

EPA encourages, and may ultimately require, State implementation procedures to provide for implementation of biological criteria. However, the regulatory basis for requiring whole-effluent toxicity (WET) controls is clear. EPA regulations at 40 CFR 122.44(d)(1)(v) require NPDES permits to contain WET limits where a permittee has been shown to cause, have the reasonable potential to cause, or contribute to an in-stream excursion of a narrative criterion. Implementation of chemical-specific controls is also required by EPA regulations at 40 CFR 122.44(d)(1). State implementation procedures should, at a minimum, specify or reference methods to be used in implementing chemical-specific and whole-effluent toxicity-based controls, explain how these methods are integrated, and specify needed application criteria.

In addition to EPA's regulation at 40 CFR 131, EPA has regulations at 40 CFR 122.44 that cover the National Surface Water Toxics Control Program. These regulations are intrinsically linked to the requirements to achieve water quality standards, and specifically address the control of pollutants both with and without numeric criteria. For example, section 122.44(d)(1)(vi) provides the permitting authority with several options for establishing effluent limits when a State does not have a chemical-specific numeric criterion for a pollutant present in an effluent at a concentration that causes or contributes to a violation of the State's narrative criteria.

3.5.3 Biological Criteria

The Clean Water Act of 1972 directs EPA to develop programs that will evaluate, restore, and maintain the chemical, physical, and biological integrity of the Nation's waters. In response to this directive, States and EPA have implemented chemically based water quality programs that address significant water pollution problems. However, over the past 20 years, it has become apparent that these programs alone cannot identify and address all surface water pollution problems. To help create a more comprehensive program, EPA is setting a priority for the development of biological criteria as part of State water quality standards. This effort will help States and EPA (1) achieve the biological integrity objective of the CWA set forth in section 101, and (2) comply with the statutory requirements under sections 303 and 304 of the Act (see Appendices C and K).

Regulatory Bases for Biocriteria

The primary statutory basis for EPA's policy that States should develop biocriteria is found in sections 101(a) and 303(c)(2)(B) of the Clean Water Act. Section 101(a) of the CWA gives the general goal of biological criteria. It establishes as the objective of the Act the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters. To meet this objective, water quality criteria should address biological integrity. Section 101(a) includes the interim water quality goal for the protection and propagation of fish, shellfish, and wildlife.

Section 304(a) of the Act provides the legal basis for the development of informational criteria, including biological criteria. Specific directives for the development of regulatory biocriteria can be found in section 303(c), which requires EPA to develop criteria based on biological assessment methods when numerical criteria are not established.

Section 304(a) directs EPA to develop and publish water quality criteria and information on methods for measuring water quality and establishing water quality criteria for toxic pollutants on bases other than pollutant-by-pollutant, including biological monitoring and assessment methods that assess:

- the effects of pollutants on aquatic community components (". . . plankton, fish, shellfish, wildlife, plant life . . .") and community attributes (". . . biological community diversity, productivity, and stability . . .") in any body of water; and
- factors necessary " . . . to restore and maintain the chemical, physical, and biological integrity of all navigable waters . . ." for " . . . the protection of shellfish, fish, and wildlife for classes and categories of receiving waters ..."

Once biocriteria are formally adopted into State standards, biocriteria and aquatic life use designations serve as direct, legal endpoints for determining aquatic life use attainment/non-attainment. CWA section 303(c)(2)(B) provides that when numeric criteria are not available, States shall adopt criteria for toxics based on biological monitoring or assessment methods; biocriteria can be used to meet this requirement.

Development and Implementation of Biocriteria

Biocriteria are numerical values or narrative expressions that describe the expected reference biological integrity of aquatic communities inhabiting waters of a designated aquatic life use. In the most desirable scenario, these would be waters that are either in pristine condition or minimally impaired. However, in some areas these conditions no longer exist and may not be attainable. In these situations, the reference biological communities represent the best attainable conditions. In either case, the reference conditions then become the basis for developing biocriteria for major surface water types (streams, rivers, lakes, wetlands, estuaries, or marine waters).

Biological criteria support designated aquatic life use classifications for application in State standards (see chapter 2). Each State develops its own designated use classification system based on the generic uses cited in the Act (e.g., protection and propagation of fish, shellfish, and wildlife). Designated uses are intentionally general. However, States may develop subcategories within use designations to refine and clarify the use class. Clarification of the use class is particularly helpful when a variety of surface waters with distinct characteristics fit within the same use class, or do not fit well into any category.

For example, subcategories of aquatic life uses may be on the basis of attainable habitat (e.g., coldwater versus warmwater stream systems as represented by distinctive trout or bass fish communities, respectively). Special uses may also be designated to protect particularly unique, sensitive, or valuable aquatic species, communities, or habitats.

Resident biota integrate multiple impacts over time and can detect impairment from known and unknown causes. Biological criteria can be used to verify improvement in water quality in response to regulatory and other improvement efforts and to detect new or continuing degradation of waters. Biological criteria also provide a framework for developing improved best management practices and management measures for nonpoint source impacts. Numeric biological criteria can provide effective monitoring criteria for more definitive evaluation of the health of an aquatic ecosystem.

The assessment of the biological integrity of a water body should include measures of the structure and function of the aquatic community within a specified habitat. Expert knowledge of the system is required for the selection of appropriate biological components and measurement indices. The development and implementation of biological criteria requires:

- selection of surface waters to use in developing reference conditions for each designated use;
- measurement of the structure and function of aquatic communities in reference surface waters to establish biological criteria;
- measurement of the physical habitat and other environmental characteristics of the water resource; and
- establishment of a protocol to compare the biological criteria to biota in comparable test waters to determine whether impairment has occurred.

These elements serve as an interactive network that is particularly important during early development of biological criteria where rapid accumulation of information is effective for refining both designated uses and developing biological criteria values and the supporting biological monitoring and assessment techniques.

3.5.4 Sediment Criteria

While ambient water quality criteria are playing an important role in assuring a healthy aquatic environment, they alone have not been sufficient to ensure appropriate levels of environmental protection. Sediment contamination, which can involve deposition of toxicants over long periods of time, is responsible for water quality impacts in some areas.

EPA has authority to pursue the development of sediment criteria in streams, lakes and other waters of the United States under sections 104 and 304(a)(1) and (2) of the CWA as follows:

- section 104(n)(1) authorizes the Administrator to establish national programs that study the effects of pollution, including sedimentation, in estuaries on aquatic life;
- section 304(a)(1) directs the Administrator to develop and publish criteria for water quality, including information on the factors affecting rates of organic and inorganic sedimentation for varying types of receiving waters;
- section 304(a)(2) directs the Administrator to develop and publish information on, among other issues, "the factors necessary for the protection and propagation of shellfish, fish, and wildlife for classes and categories of receiving waters. . . ."

To the extent that sediment criteria could be developed that address the concerns of the section 404(b)(1) Guidelines for discharges of dredged or fill material under the CWA or the Marine Protection, Research, and Sanctuaries Act, they could also be incorporated into those regulations.

EPA's current sediment criteria development effort, as described below, focuses on criteria for the protection of aquatic life. EPA anticipates potential future expansion of this effort to include sediment criteria for the protection of human health.

Chemical Approach to Sediment Criteria Development

Over the past several years, sediment criteria development activities have centered on evaluating and developing the Equilibrium Partitioning Approach for generating sediment criteria. The Equilibrium Partitioning Approach focuses on predicting the chemical interaction between sediments and contaminants. Developing an understanding of the principal factors that influence the sediment/contaminant interactions will allow predictions to be made regarding the level of contaminant concentration that benthic and other organisms may be exposed to. Chronic water quality criteria, or possibly other toxicological endpoints, can then be used to predict potential biological effects. In addition to the development of sediment criteria, EPA is also working to develop a standardized sediment toxicity test that could be used with or independently of sediment criteria to assess chronic effects in fresh and marine waters.

Equilibrium Partitioning (EqP) Sediment Quality Criteria (SQC) are the U.S. Environmental Protection Agency's best recommendation of the concentration of a substance in sediment that will not unacceptably affect benthic organisms or their uses.

Methodologies for deriving effects-based SQC vary for different classes of compounds. For non-ionic organic chemicals, the methodology requires normalization to organic carbon. A methodology for deriving effects-based sediment criteria for metal contaminants is under development and is expected to require normalization to acid volatile sulfide. EqP SQC values can be derived for varying degrees of uncertainty and levels of protection, thus permitting use for ecosystem protection and remedial programs.

Application of Sediment Criteria

SQC would provide a basis for making more informed decisions on the environmental impacts of contaminated sediments. Existing sediment assessment methodologies are limited in their ability to identify chemicals of concern, responsible parties, degree of contamination, and zones of impact. To make the most informed decisions, EPA believes that a comprehensive approach using SQC and biological test methods is preferred.

Sediment criteria will be particularly valuable in site-monitoring applications where sediment contaminant concentrations are gradually approaching a criterion over time or as a preventive tool to ensure that point and nonpoint sources of contamination are controlled and that uncontaminated sediments remain uncontaminated. Also comparison of field measurements to sediment criteria will be a reliable method for providing early warning of a potential problem. An early warning would provide an opportunity to take corrective action before adverse impacts occur. For the reasons mentioned above, it has been identified that SQC are essential to resolving key contaminated sediment and source control issues in the Great Lakes.

Specific Applications

Specific applications of sediment criteria are under development. The primary use of EqP-based sediment criteria will be to assess risks associated with contaminants in sediments. The various offices and programs concerned with contaminated sediment have different regulatory mandates and, thus, have different needs and areas for potential application of sediment criteria. Because each regulatory need is different, EqP-based sediment quality criteria designed specifically to meet the needs of one office or program may have to be implemented in different ways to meet the needs of another office or program.

One mode of application of EqP-based numerical sediment quality criteria would be in a tiered approach. In such an application, when contaminants in sediments exceed the sediment quality criteria the sediments would be considered as causing unacceptable impacts. Further testing may or may not be required depending on site-specific conditions and the degree in which a criterion has been violated. (In locations where contamination significantly exceeds a criterion, no additional testing would be required. Where sediment contaminant levels are close to a criterion, additional testing might be necessary.) Contaminants in a sediment at concentrations less than the sediment criterion would not be of concern. However, in some cases the sediment could not be considered safe because it might contain other contaminants above safe levels for which no sediment criteria exist. In addition, the synergistic, antagonistic, or additive effects of several contaminants in the sediments may be of concern.

Additional testing in other tiers of an evaluation approach, such astoxicity tests, could be required to determine if the sediment is safe. It is likely that such testing would incorporate site-specific considerations. Examples of specific applications of sediment criteria after they are developed include the following:

- Establish permit limits for point sources to ensure that uncontaminated sediments remain uncontaminated or sediments already contaminated have an opportunity to cleanse themselves. Of course, this would occur only after criteria and the means to tie point sources to sediment contamination are developed.
- Establish target levels for nonpoint sources of sediment contamination.
- For remediation activities, SQC would be valuable in identifying:
    - need for remediation,
    - spatial extent of remediation area,
    - benefits derived from remediation activities,
    - responsible parties,
    - impacts of depositing contaminated sediments in water environments, and
    - success of remediation activities.

In tiered testing sediment evaluation processes, sediment criteria and biological testing procedures work very well together.

Sediment Criteria Status

Science Advisory Board Review

The Science Advisory Board has completed a second review of the EqP approach to deriving sediment quality criteria for non-ionic contaminants. The November 1992 report (USEPA, 1992c) endorses the EqP approach to deriving criteria as ". . . sufficiently valid to be used in the regulatory process if the uncertainty associated with the method is considered, described, and incorporated," and that "EPA should establish criteria on the basis of present knowledge within the bounds of uncertainty"

The Science Advisory Board also identified the need for ". . . a better understanding of the uncertainty around the assumptions inherent in the approach, including assumptions of equilibrium, bioavailability, and kinetics, all critical to the application of the EqP."

Sediment Criteria Documents and Application Guidance

EPA efforts at producing sediment criteria documents are being directed first toward phenanthrene, fluoranthene, dieldrin, acenaphthene, and endrin. Efforts are also being directed towards producing a guidance document on the derivation and interpretation of sediment quality criteria. The criteria documents were announced in the *Federal Register* in January 1994; the public comment period ended June 1994. Final documents and implementation guidance should be available in early 1996.

Methodology for Developing Sediment Criteria for Metal Contaminants

EPA is proceeding to develop a methodology for calculating sediment criteria for benthic toxicity to metal contaminants, with key work focused on identifying and understanding the role of acid volatile sulfides (AVS), and other binding factors, in controlling the bioavailability of metal contaminants. A variety of field and laboratory verification studies are under way to add additional support to the methodology. Standard AVS sampling and analytical procedures are under development. Presentation of the metals methodology to the SAB for review is anticipated for Fall 1994.

Biological Approach to Sediment Criteria Development

Under the Contaminated Sediment Management Strategy, EPA programs have committed to using consistent biological methods to determine if sediments are contaminated. In the water program, these biological methods will be used as a complement to the sediment-chemical criteria under development. The biological methods consist of both toxicity and bioaccumulation tests. Freshwater and saltwater benthic species, selected to represent the sensitive range of species' responses to toxicity, are used in toxicity tests to measure sediment toxicity. Insensitive freshwater and saltwater benthic species that form the base of the food chain are used in toxicity tests to measure the bioaccumulation potential of sediment. In FY 1994, acute toxicity tests and bioaccumulation tests selected by all the Agency programs should be standardized and available for use. Training for States and EPA Regions on these methods is expected to begin in FY1995.

In the next few years, research will be conducted to develop standardized chronic toxicity tests for sediment as well as toxicity identification evaluation (TIE) methods. The TIE approach will be used to identify the specific chemicals in a sediment causing acute or chronic toxicity in the test organisms. Under the Contaminated Sediment Management Strategy, EPA's programs have also agreed to incorporate these chronic toxicity and TIE methods into their sediment testing when they are available.

3.5.5 Wildlife Criteria

Terrestrial and avian species are useful as sentinels for the health of the ecosystem as a whole. In many cases, damage to wildlife indicates that the ecosystem itself is damaged. Many wildlife species that are heavily dependent on the aquatic food web reflect the health of aquatic systems. In the case of toxic chemicals, terminal predators such as otter, mink, gulls, terns, eagles, ospreys, and turtles are useful as integrative indicators of the status or health of the ecosystem.

Statutory and Regulatory Authority

Section 101(a)(2) of the CWA sets, as an interim goal of,

> …wherever attainable…water quality which provides for the protection and propagation of fish, shellfish, and <u>wildlif</u>e…(emphasis added).

Section 304(a)(1) of the Act also requires EPA to:

> …develop and publish… criteria for water quality accurately reflecting…the kind and extent of all identifiable effects on health and welfare including…wildlife.

The Water Quality Standards Regulation reflect the statutory goals and requirements by requiring States to adopt, where attainable, the CWA section 101(a)(2) goal uses of protection and propagation of fish, shellfish, and wildlife (40 CFR 131.10), and to adopt water quality criteria sufficient to protect the designated use (40 CFR 131.11).

Wildlife Protection in Current Aquatic Criteria

Current water quality criteria methodology is designed to protect fish, benthic invertebrates, and zooplankton; however, there is a provision in the current aquatic life criteria guidelines (Appendix H) that is intended to protect wildlife that consume aquatic organisms from the bioaccumulative potential of a compound. The final residue value can be based on either the FDA Action Level or a wildlife feeding study. However, if maximum permissible tissue concentration is not available from a wildlife feeding study, a final residue value cannot be derived and the criteria quantification procedure continues without further consideration of wildlife impacts. Historically, wildlife have been considered only after detrimental effects on wildlife populations have been observed in the environment (this occurred with relationship to DDT, selenium, and PCBs).

Wildlife Criteria Development

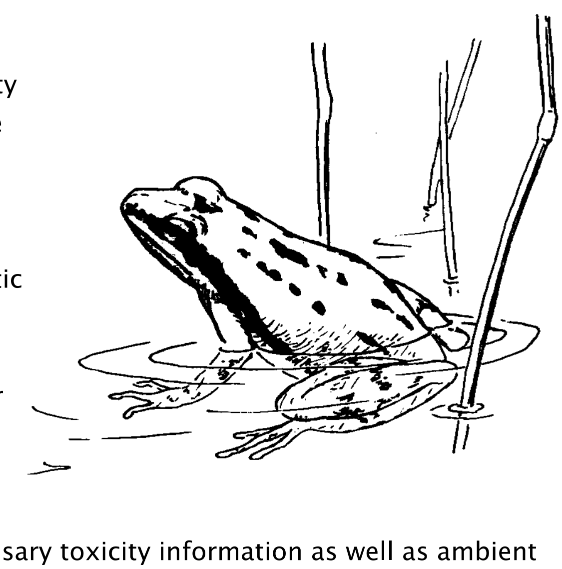
EPA's national wildlife criteria effort began following release of a 1987 Government Accounting Office study entitled *Wildlife Management - National Refuge Contamination Is Difficult To Confirm and Clean Up* (GAO, 1987). After waterfowl deformities observed at Kesterson Wildlife Refuge were linked to selenium contamination in the water, Congress requested this study and recommended that "the Administrator of EPA, in close coordination with the Secretary of the Interior, develop water quality criteria for protecting wildlife and their refuge habitat."

In November of 1988, EPA's Environmental Research Laboratory in Corvallis sponsored a workshop entitled *Water Quality Criteria To Protect Wildlife Resources*, (USEPA, 1989g) which was co-chaired by EPA and the Fish and Wildlife Service (FWS). The workshop brought together 26 professionals from a variety of institutions, including EPA, FWS, State governments, academia, and consultants who had expertise in wildlife toxicity, aquatic toxicity, ecology, environmental risk assessment, and conservation. Efforts at the workshop focused on evaluating the need for, and developing a strategy for production of wildlife criteria. Two recommendations came out of that workshop:

1. The process by which ambient water quality criteria are established should be modified to consider effects on wildlife; and
2. chemicals should be prioritized based on their potential to adversely impact wildlife species.

Based on the workshop recommendations, screening level wildlife criteria (SLWC) were calculated for priority pollutants and chemicals of concern submitted by the FWS to gauge the extent of the problem by:

1. evaluating whether existing water quality criteria for aquatic life are protective of wildlife, and
2. prioritizing chemicals for their potential to adversely impact wildlife species.



There were 82 chemicals for which EPA had the necessary toxicity information as well as ambient water quality criteria, advisories, or lowest-observed-adverse-effect levels (LOAELs) to compare with the SLWC values.

As would be expected, the majority of chemicals had SLWC larger than existing water quality criteria, advisories, or LOAELs for aquatic life. However, the screen identified classes of compounds for which current ambient water quality criteria may not be adequately protective of wildlife: chlorinated alkanes, benzenes, phenols, metals, DDT, and dioxins. Many of these compounds are produced in very large amounts and have a variety of uses (e.g., solvents, flame retardants, organic syntheses of fungicides and herbicides, and manufacture of plastics and textiles. The manufacture and use of these materials produce waste byproduct). Also, 5 of the 21 are among the top 25 pollutants identified at Superfund sites in 1985 (3 metals, 2 organics).

Following this initial effort, EPA held a national meeting in April 1992 to constructively discuss and evaluate proposed methodologies for deriving wildlife criteria to build consensus among the scientific community as to the most defensible scientifically approach(es) to be pursued by EPA in developing useful and effective wildlife criteria.

The conclusions of this national meeting were as follows:

- wildlife criteria should have a tissue-residue component when appropriate;
- peer-review of wildlife criteria and data sets should be used in their derivation
- wildlife criteria should incorporate methods to establish site-specific wildlife criteria;
- additional amphibian and reptile toxicity data are needed;
- further development of inter-species toxicological sensitivity factors are needed; and
- criteria methods should measure biomarkers in conjunction with other studies.

On April 16, 1993, EPA proposed wildlife criteria in the *Water Quality Guidance for the Great Lakes System* (58 F.R. 20802). The proposed wildlife criteria are based on the current EPA noncancer human health criteria approach. In this proposal, in addition to requesting comments on the proposed Great Lakes criteria and methods, EPA also requested comments on possible modifications of the proposed Great Lakes approach for consideration in the development of national wildlife criteria.

3.5.6 Numeric Criteria for Wetlands

Extension of the EPA national 304(a) numeric aquatic life criteria to wetlands is recommended as part of a program to develop standards and criteria for wetlands. Appendices D and E provide an overview of the need for standards and criteria for wetlands. The 304(a) numeric aquatic life criteria are designed to be protective of aquatic life for surface waters and are generally applicable to most wetland types. Appendix E provides a possible approach, based on the site-specific guidelines, for detecting wetland types that might not be protected by direct application of national 304(a) criteria. The evaluation can be simple and inexpensive for those wetland types for which sufficient water chemistry and species assemblage data are available, but will be less useful for wetland types for which these data are not readily available. In Appendix E, the site-specific approach is described and recommended for wetlands for which modification of the 304(a) numeric criteria are considered necessary. The results of this type of evaluation, combined with information on local or regional environmental threats, can be used to prioritize wetland types (and individual criteria) for further site-specific evaluations and/or additional data collection. Close coordination among regulatory agencies, wetland scientists, and criteria experts will be required.

3.6 Policy on Aquatic Life Criteria for Metals

It is the policy of the Office of Water that the use of dissolved metal to set and measure compliance with water quality standards is the recommended approach, because dissolved metal more closely approximates the bioavailable fraction of metal in the water column than does total recoverable metal. This conclusion regarding metals bioavailability is supported by a majority of the scientific community within and outside EPA. One reason is that a primary mechanism for water column toxicity is adsorption at the gill surface which requires metals to be in the dissolved form.

Until the scientific uncertainties are better resolved, a range of different risk management decisions can be justified by a State. EPA recommends that State water quality standards be based on dissolved metal--a conversion factor must be used in order to express the EPA criteria articulated as total recoverable as dissolved. (See the paragraph below for technical details on developing dissolved criteria.) EPA will also approve a State risk management decision to adopt standards based on total recoverable metal, if those standards are otherwise approvable as a matter of law. (*Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria* USEPA, 1993f)

3.6.1 Background

The implementation of metals criteria is complex due to the site-specific nature of metals toxicity. This issue covers a number of areas including the expression of aquatic life criteria; total maximum daily loads (TMDLs), permits, effluent monitoring, and compliance; and ambient monitoring. The following Sections, based on the policy memorandum referenced above, provide additional guidance in each of these areas. Included in this Handbook as Appendix J are three guidance documents issued along with the Office of Water policy memorandum with additional technical details. They are: *Guidance Document on Expression of Aquatic Life Criteria as Dissolved Criteria* (Attachment #2), *Guidance Document on Dynamic Modeling and Translators* (Attachment #3), and *Guidance Document on Monitoring* (Attachment #4). These will be supplemented as additional information becomes available.

Since metals toxicity is significantly affected by site-specific factors, it presents a number of programmatic challenges. Factors that must be considered in the management of metals in the aquatic environment include: toxicity specific to effluent chemistry; toxicity specific to ambient water chemistry; different patterns of toxicity for different metals; evolution of the state of the science of metals toxicity, fate, and transport; resource limitations for monitoring, analysis, implementation, and research functions; concerns regarding some of the analytical data currently on record due to possible sampling and analytical contamination; and lack of standardized protocols for clean and ultraclean metals analysis. The States have the key role in the risk management process of balancing these factors in the management of water programs. The site-specific nature of this issue could be perceived as requiring a permit-by-permit approach to implementation. However, EPA believes that this guidance can be effectively implemented on a broader level, across any waters with roughly the same physical and chemical characteristics, and recommends that States work with the EPA with that perspective in mind.

3.6.2 Expression of Aquatic Life Criteria

Dissolved vs. Total Recoverable Metal

A major issue is whether, and how, to use dissolved metal concentrations ("dissolved metal") or total recoverable metal concentrations ("total recoverable metal") in setting State water quality standards. In the past, States have used both approaches when applying the same EPA Section 304(a) criteria guidance. Some older criteria documents may have facilitated these different approaches to interpretation of the criteria because the documents were somewhat equivocal with regards to analytical methods. The May 1992 interim guidance continued the policy that either approach was acceptable.

The position that the dissolved metals approach is more accurate has been questioned because it neglects the possible toxicity of particulate metal. It is true that some studies have indicated that particulate metals appear to contribute to the toxicity of metals, perhaps because of factors such as desorption of metals at the gill surface, but these same studies indicate the toxicity of particulate metal is substantially less than that of dissolved metal.

Furthermore, any error incurred from excluding the contribution of particulate metal will generally be compensated by other factors which make criteria conservative. For example, metals in toxicity tests are added as simple salts to relatively clean water. Due to the likely presence of a significant concentration of metals binding agents in many discharges and ambient waters, metals in toxicity tests would generally be expected to be more bioavailable than metals in discharges or in ambient waters.

If total recoverable metal is used for the purpose of specifying water quality standards, the lower bioavailability of particulate metal and lower bioavailability of sorbed metals as they are discharged may result in an overly conservative water quality standard. The use of dissolved metal in water quality standards gives a more accurate result in the water column. However, total recoverable measurements in ambient water have value, in that exceedences of criteria on a total recoverable basis are an indication that metal loadings could be a stress to the ecosystem, particularly in locations other than the water column (*e.g.*, in the sediments).

The reasons for the potential consideration of total recoverable measurements include risk management considerations not covered by evaluation of water column toxicity alone. The ambient water quality criteria are neither designed nor intended to protect sediments, or to prevent effects in the food webs containing sediment dwelling organisms. A risk manager, however, may consider sediments and food chain effects and may decide to take a conservative approach for metals, considering that metals are very persistent chemicals. This conservative approach could include the use of total recoverable metal in water quality standards. However, since consideration of sediment impacts is not incorporated into the criteria methodology, the degree of conservatism inherent in the total recoverable approach is unknown. The uncertainty of metal impacts in sediments stem from the lack of sediment criteria and an imprecise understanding of the fate and transport of metals. EPA will continue to pursue research and other activities to close these knowledge gaps.

Dissolved Criteria

In the toxicity tests used to develop EPA metals criteria for aquatic life, some fraction of the metal is dissolved while some fraction is bound to particulate matter. The present criteria were developed using total recoverable metal measurements or measures expected to give equivalent results in toxicity tests, and are articulated as total recoverable. Therefore, in order to express the EPA criteria as dissolved, a total recoverable to dissolved conversion factor must be used. Attachment #2 in Appendix J provides guidance for calculating EPA dissolved criteria from the published total recoverable criteria. The data expressed as percentage metal dissolved are presented as recommended values and ranges. However, the choice within ranges is a State risk management decision. EPA has recently supplemented the data for copper and is proceeding to further supplement the data for copper and other metals. As testing is completed, EPA will make this information available and this is expected to reduce the magnitude of the ranges for some of the conversion factors provided. EPA also strongly encourages the application of dissolved criteria across a watershed or waterbody, as technically sound and the best use of resources.

Site-Specific Criteria Modifications

While the above methods will correct some site-specific factors affecting metals toxicity, further refinements are possible. EPA has issued guidance for three site-specific criteria development methodologies: recalculation procedure, water-effect ratio (WER) procedure (called the indicator species procedure in previous guidance) and resident species procedure. (See Section 3.7 of this Chapter.)

In the National Toxics Rule (57 FR 60848, December 22, 1992), EPA recommended the WER as an optional method for site-specific criteria development for certain metals. EPA committed in the NTR preamble to provide additional guidance on determining the WERs. The *Interim Guidance on the Determination and Use of Water-Effect Ratios for Metals* was issued by EPA on February 22, 1994 and is intended to fulfill that commitment. This interim guidance supersedes all guidance concerning water-effect ratios and the recalculation procedure previously issued by EPA. This guidance is included as Appendix L to this Handbook.

In order to meet current needs, but allow for changes suggested by protocol users, EPA issued the guidance as "interim." EPA will accept WERs developed using this guidance, as well as by using other scientifically defensible protocols.

3.6.3 Total Maximum Daily Loads (TMDLs) and National Pollutant Discharge Elimination System (NPDES) Permits

Dynamic Water Quality Modeling

Although not specifically part of the reassessment of water quality criteria for metals, dynamic or probabilistic models are another useful tool for implementing water quality criteria, especially for those criteria protecting aquatic life. These models provide another way to incorporate site-specific data. The *Technical Support Document for Water Quality-based Toxics Control* (TSD) (USEPA, 1991a) describes dynamic, as well as static (steady-state) models. Dynamic models make the best use of the specified magnitude, duration, and frequency of water quality criteria and, therefore, provide a more accurate representation of the probability that a water quality standard exceedence will occur. In contrast, steady-state models frequently apply a number of simplifying, worst case assumptions which makes them less complex but also less accurate than dynamic models.

Dynamic models have received increased attention over the last few years as a result of the widespread belief that steady-state modeling is over-conservative due to environmentally conservative dilution assumptions. This belief has led to the misconception that dynamic models will always lead to less stringent regulatory controls (e.g., NPDES effluent limits) than steady-state models, which is not true in every application of dynamic models. EPA considers dynamic models to be a <u>more accurate</u> approach to implementing water quality criteria and continues to recommend their use. Dynamic modeling does require a commitment of resources to develop appropriate data. (See Appendix J, Attachment #3 and the USEPA, 1991a for details on the use of dynamic models.)

Dissolved-Total Metal Translators

Expressing ambient water quality criteria for metals as the dissolved form of a metal poses a need to be able to translate from dissolved metal to total recoverable metal for TMDLs and NPDES permits. TMDLs for metals must be able to calculate: (1) dissolved metal in order to ascertain attainment of water quality standards, and (2) total recoverable metal in order to achieve mass balance necessary for permitting purposes.

EPA's NPDES regulations require that limits of metals in permits be stated as total recoverable in most cases (see 40 CFR §122.45(c)) except when an effluent guideline specifies the limitation in another form of the metal, the approved analytical methods measure only dissolved metal, or the permit writer expresses a metals limit in another form (e.g., dissolved, valent specific, or total) when required to carry out provisions of the Clean Water Act. This is because the chemical conditions in ambient waters frequently differ substantially from those in the effluent, and there is no assurance that effluent particulate metal would not dissolve after discharge. The NPDES rule does not require that State water quality standards be expressed as total recoverable; rather, the rule requires permit writers to translate between different metal forms in the calculation of the permit limit so that a total recoverable limit can be established. Both the TMDL and NPDES uses of water quality criteria require the ability to translate between dissolved metal and total recoverable metal. Appendix J, Attachment #3 provides guidance on this translation.

3.6.4 Guidance on Monitoring

Use of Clean Sampling and Analytical Techniques

In assessing waterbodies to determine the potential for toxicity problems due to metals, the quality of the data used is an important issue. Metals data are used to determine attainment status for water quality standards, discern trends in water quality, estimate background loads for TMDLs, calibrate fate and transport models, estimate effluent concentrations (including effluent variability), assess permit compliance, and conduct research. The quality of trace level metal data, especially below 1 ppb, may be compromised due to contamination of samples during collection, preparation, storage, and analysis. Depending on the level of metal present, the use of "clean" and "ultraclean" techniques for sampling and analysis may be critical to accurate data for implementation of aquatic life criteria for metals.

The significance of the sampling and analysis contamination problem increases as the ambient and effluent metal concentration decreases and, therefore, problems are more likely in ambient measurements. "Clean" techniques refer to those requirements (or practices for sample collection and handling) necessary to produce reliable analytical data in the part per billion (ppb) range. "Ultraclean" techniques refer to those requirements or practices necessary to produce reliable analytical data in the part per trillion (ppt) range. Because typical concentrations of metals in surface waters and effluents vary from one metal to another, the effect of contamination on the quality of metals monitoring data varies appreciably.

EPA plans to develop protocols on the use of clean and ultra-clean techniques and is coordinating with the United States Geological Survey (USGS) on this project, because USGS has been doing work on these techniques for some time, especially the sampling procedures. Draft protocols for clean techniques were presented at the Norfolk, VA analytical methods conference in the Spring of 1994 and final protocols are expected to be available in early 1995. The development of comparable protocols for ultra-clean techniques is underway and are expected to be available in late 1995. In developing these protocols, we will consider the costs of these techniques and will give guidance as to the situations where their use is necessary. Appendix L, pp. 98-108 provide some general guidance on the use of clean analytical techniques. We recommend that this guidance be used by States and Regions as an interim step, while the clean and ultra-clean protocols are being developed.

Use of Historical Data

The concerns about metals sampling and analysis discussed above raise corresponding concerns about the validity of historical data. Data on effluent and ambient metal concentrations are collected by a variety of organizations including Federal agencies (e.g., EPA, USGS), State pollution control agencies and health departments, local government agencies, municipalities, industrial dischargers, researchers, and others. The data are collected for a variety of purposes as discussed above.

Concern about the reliability of the sample collection and analysis procedures is greatest where they have been used to monitor very low level metal concentrations. Specifically, studies have shown data sets with contamination problems during sample collection and laboratory analysis, that have resulted in inaccurate measurements. For example, in developing a TMDL for New York Harbor, some historical ambient data showed extensive metals problems in the harbor, while other historical ambient data showed only limited metals problems. Careful resampling and analysis in 1992/1993 showed the latter view was correct. The key to producing accurate data is appropriate quality assurance (QA) and quality control (QC) procedures. EPA believes that most historical data for metals, collected and analyzed with appropriate QA and QC at levels of 1 ppb or higher, are reliable. The data used in development of EPA criteria are also considered reliable, both because they meet the above test and because the toxicity test solutions are created by adding known amounts of metals.

With respect to effluent monitoring reported by an NPDES permittee, the permittee is responsible for collecting and reporting quality data on a Discharge Monitoring Report (DMR). Permitting authorities should continue to consider the information reported to be true, accurate, and complete as certified by the permittee. Where the permittee becomes aware of new information specific to the effluent discharge that questions the quality of previously submitted DMR data, the permittee must promptly submit that information to the permitting authority. The permitting authority will consider all information submitted by the permittee in determining appropriate enforcement responses to monitoring/reporting and effluent violations. (See Appendix J, Attachment #4 for additional details.)

3.7 Site-Specific Aquatic Life Criteria

The purpose of this section is to provide guidance for the development of site-specific water quality criteria which reflect local environmental conditions. Site-specific criteria are allowed by regulation and are subject to EPA review and approval. The Federal water quality standards regulation at section 131.11(b)(1)(ii) provides States with the opportunity to adopt water quality criteria that are "...modified to reflect site-specific conditions." Site-specific criteria, as with all water quality criteria, must be based on a sound scientific rationale in order to protect the designated use. Existing guidance and practice are that EPA will approve site-specific criteria developed using appropriate procedures.

A site-specific criterion is intended to come closer than the national criterion to providing the intended level of protection to the aquatic life at the site, usually by taking into account the biological and/or chemical conditions (i.e., the species composition and/or water quality characteristics) at the site. The fact that the U.S. EPA has made these procedures available should not be interpreted as implying that the agency advocates that states derive site-specific criteria before setting state standards. Also, derivation of a site-specific criterion does not change the intended level of protection of the aquatic life at the site.

3.7.1 History of Site-Specific Criteria Guidance

National water quality criteria for aquatic life may be under- or over-protective if:

1. the species at the site are more or less sensitive than those included in the national criteria data set (*e.g.*, the national criteria data set contains data for trout, salmon, penaeid shrimp, and other aquatic species that have been shown to be especially sensitive to some materials), or
2. physical and/or chemical characteristics of the site alter the biological availability and/or toxicity of the chemical (*e.g.*, alkalinity, hardness, pH, suspended solids and salinity influence the concentration(s) of the toxic form(s) of some heavy metals, ammonia and other chemicals).

Therefore, it is appropriate that site-specific procedures address each of these conditions separately as well as the combination of the two. In the early 1980's, EPA recognized that laboratory-derived water quality criteria might not accurately reflect site-specific conditions and, in response, created three procedures to derive site-specific criteria. This Handbook contains the details of these procedures, referenced below.

1. The <u>Recalculation Procedure</u> is intended to take into account relevant differences between the sensitivities of the aquatic organisms in the national dataset and the sensitivities of organisms that occur at the site (see Appendix L, pp. 90-97).
2. The <u>Water-Effect Ratio Procedure</u> (called the Indicator Species Procedure in USEPA, 1983a; 1984f) provided for the use of a water-effect ratio (WER) that is intended to take into account relevant differences between the toxicities of the chemical in laboratory dilution water and in site water (see Appendix L).
3. The <u>Resident Species Procedure</u> intended to take into account both kinds of differences simultaneously (see Section 3.7.6).

These procedures were first published in the 1983 *Water Quality Standards Handbook* (USEPA, 1983a) and expanded upon in the *Guidelines for Deriving Numerical Aquatic Site-Specific Water Quality Criteria by Modifying National Criteria* (USEPA, 1984f). Interest has increased in recent years as states have devoted more attention to chemical-specific water quality criteria for aquatic life. In addition, interest in water-effect ratios increased when they were integrated into some of the aquatic life criteria for metals that were promulgated for several states in the National Toxics Rule (57 FR 60848, December 22, 1992). The *Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Criteria for Metals* (USEPA, 1993f) (see Section 3.6 of this Handbook) provided further guidance on site-specific criteria for metals by recommending the use of dissolved metals for setting and measuring compliance with water quality standards.

The early guidance concerning WERs (USEPA, 1983a; 1984f) contained few details and needed revision, especially to take into account newer guidance concerning metals. To meet this need, EPA issued *Interim Guidance on the Determination and Use of Water-Effect Ratios for Metals* in 1994 (Appendix L). Metals are specifically addressed in Appendix L because of the National Toxics Rule and because of current interest in aquatic life criteria for metals; although most of this guidance also applies to other pollutants, some obviously applies only to metals. Appendix L supersedes all guidance concerning water-effect ratios and the Indicator Species Procedure given in Chapter 4 of the *Water Quality Standards Handbook* (USEPA, 1983a) and in *Guidelines for Deriving Numerical Aquatic Site-Specific Water Quality Criteria by Modifying National Criteria* (USEPA, 1984f). Appendix L (p. 90-98) also supersedes the guidance in these earlier documents for the Recalculation Procedure for performing site-specific criteria modifications. The Resident Species Procedure remains essentially unchanged since 1983 (except for changes in the averaging periods to conform to the 1985 aquatic life criteria guidelines (USEPA, 1985b) and is presented in Section 3.7.6, below.

The previous guidance concerning site-specific procedures did not allow the Recalculation Procedure and the WER procedure to be used together in the derivation of a site-specific aquatic life criterion; the only way to take into account both species composition and water quality characteristics in the determination of a site-specific criterion was to use the Resident Species Procedure. <u>A specific change contained Appendix L is that, except in jurisdictions that are subject to the National Toxics Rule, the Recalculation Procedure and the WER Procedure may now be used together</u> provided that the recalculation procedure is performed first. Both the Recalculation Procedure and the WER Procedure are based directly on the guidelines for deriving national aquatic life criteria (USEPA 1985) and, when the two are used together, use of the Recalculation Procedure must be performed first because the Recalculation Procedure has specific implications concerning the determination of the WER.

3.7.2 Preparing to Calculate Site-Specific Criteria

Adopting site-specific criteria in water quality standards is a State option--not a requirement. Moreover, EPA is not advocating that States use site-specific criteria development procedures for setting all aquatic life criteria as opposed to using the National Section 304(a) criteria recommendations. Site-specific criteria are not needed in all situations. When a State considers the possibility of developing site-specific criteria, it is essential to involve the appropriate EPA Regional office at the start of the project.

This early planning is also essential if it appears that data generation and testing may be conducted by a party other than the State or EPA. The State and EPA need to apply the procedures judiciously and must consider the complexity of the problem and the extent of knowledge available concerning the fate and effect of the pollutant under consideration. If site-specific criteria are developed without early EPA involvement in the planning and design of the task, the State may expect EPA to take additional time to closely scrutinize the results before granting any approval to the formally adopted standards.

The following sequence of decisions need to be made before any of the procedures are initiated:

- verify that site-specific criteria are actually needed (*e.g.*, that the use of clean sampling and/or analytical techniques, especially for metals, do not result in attainment of standards.)
- Define the site boundaries.
- Determine from the national criterion document and other sources if physical and/or chemical characteristics are known to affect the biological availability and/or toxicity of a material of interest.
- If data in the national criterion document and/or from other sources indicate that the range of sensitivity of the selected resident species to the material of interest is different from the range for the species in the national criterion document, and variation in physical and/or chemical characteristics of the site water is not expected to be a factor, use the *Recalculation Procedure* (Section 3.7.4).
- If data in the national criterion document and/or from other sources indicate that physical and/or chemical characteristics of the site water may affect the biological availability and/or toxicity of the material of interest, and the selected resident species range of sensitivity is <u>similar</u> to that for the species in the national criterion document, use the *Water-Effect Ratio Procedure* (Section 3.7.5).
- If data in the national criterion document and/or from other sources indicated that physical and/or chemical characteristics of the site water may affect the biological availability and/or toxicity of the material of interest, and the selected resident species range of sensitivity is <u>different</u> from that for the species in the national criterion document, and if both these differences are to be taken into account, use the *Recalculation Procedure in conjunction with the Water-Effect Ratio Procedure* or use the *Resident Species Procedure* (Section 3.7.6).

3.7.3 Definition of a Site

Since the rationales for site-specific criteria are usually based on potential differences in species sensitivity, physical and chemical characteristics of the water, or a combination of the two, the concept of site must be consistent with this rationale.

In the general context of site-specific criteria, a "site" may be a state, region, watershed, waterbody, or segment of a waterbody. The site-specific criterion is to be derived to provide adequate protection for the entire site, however the site is defined.

If water quality effects on toxicity are not a consideration, the site can be as large as a generally consistent biogeographic zone permits. For example, large portions of the Chesapeake Bay, Lake Michigan, or the Ohio River may be considered as one site if their respective aquatic communities do not vary substantially. However, when a site-specific criterion is derived using the Recalculation Procedure, all species that "occur at the site" need to be taken into account when deciding what species, if any, are to be deleted from the dataset. Unique populations or less sensitive uses within sites may justify a designation as a distinct site.

If the species of a site are toxicologically comparable to those in the national criteria data set for a material of interest, and physical and/or chemical water characteristics are the only factors supporting modification of the national criteria, then the site can be defined on the basis of expected changes in the material's biological availability and/or toxicity due to physical and chemical variability of the site water. However, when a site-specific criterion is derived using a WER, the WER is to be adequately protective of the entire site. If, for example, a site-specific criterion is being derived for an estuary, WERs could be determined using samples of the surface water obtained from various sampling stations, which, to avoid confusion, should not be called "sites". If all the WERs were sufficiently similar, one site-specific criterion could be derived to apply to the whole estuary. If the WERs were sufficiently different, either the lowest WER could be used to derive a site-specific criterion for the whole estuary, or the data might indicate that the estuary should be divided into two or more sites, each with its own criterion.

3.7.4 The Recalculation Procedure

The Recalculation Procedure is intended to cause a site-specific criterion to appropriately differ from a national aquatic life criterion if justified by demonstrated pertinent toxicological differences between the aquatic species that occur at the site and those that were used in the derivation of the national criterion. There are at least three reasons why such differences might exist between the two sets of species.

- First, the national dataset contains aquatic species that are sensitive to many pollutants, but these and comparably sensitive species might not occur at the site.
- Second, a species that is critical at the site might be sensitive to the pollutant and require a lower criterion. (A critical species is a species that is commercially or recreationally important at the site, a species that exists at the site and is listed as threatened or endangered under section 4 of the Endangered Species Act, or a

species for which there is evidence that the loss of the species from the site is likely to cause an unacceptable impact on a commercially or recreationally important species, a threatened or endangered species, the abundances of a variety of other species, or the structure or function of the community.)

- Third, the species that occur at the site might represent a narrower mix of species than those in the national dataset due to a limited range of natural environmental conditions.

The procedure presented in Appendix L, pp. 90-98 is structured so that corrections and additions can be made to the national dataset without the deletion process being used to take into account taxa that do not occur at the site; in effect, this procedure makes it possible to update the national aquatic life criterion. All corrections and additions that have been approved by EPA are required, whereas use of the deletion process is optional. The deletion process may <u>not</u> be used to remove species from the criterion calculation that are not currently present at a site due to degraded conditions.

The Recalculation Procedure is more likely to result in lowering a criterion if the net result of addition and deletion is to decrease the number of genera in the dataset, whereas the procedure is more likely to result in raising a criterion if the net result of addition and deletion is to increase the number of genera in the dataset.

For the lipid soluble chemicals whose national Final Residue Values are based on Food and Drug Administration (FDA) action levels, adjustments in those values based on the percent lipid content of resident aquatic species is appropriate for the derivation of site-specific Final Residue Values. For lipid-soluble materials, the national Final Residue Value is based on an average 11 percent lipid content for edible portions for the freshwater chinook salmon and lake trout and an average of 10 percent lipids for the edible portion for saltwater Atlantic herring. Resident species of concern may have higher (e.g., Lake Superior siscowet, a race of lake trout) or lower (e.g., many sport fish) percent lipid content than used for the national Final Residue Value.

For some lipid-soluble materials such as polychlorinated biphenyls (PCB) and DDT, the national Final Residue Value is based on wildlife consumers of fish and aquatic invertebrate species rather than an FDA action level because the former provides a more stringent residue level. See the National Guidelines (USEPA, 1985b) for details.

For the lipid-soluble materials whose national Final Residue Values are based on wildlife effects, the limiting wildlife species (mink for PCB and brown pelican for DDT) are considered acceptable surrogates for resident avian and mammalian species (e.g., herons, gulls, terns, otter, etc.) Conservatism is appropriate for those two chemicals, and no less restrictive modification of the national Final Residue Value is appropriate. The site-specific Final Residue Value would be the same as the national value.

3.7.5 The Water-Effect Ratio (WER) Procedure

The guidance on the Water-Effect Ratio Procedure presented in Appendix L is intended to produce WERs that may be used to derive site-specific aquatic life criteria from most national and state aquatic life criteria that were derived from laboratory toxicity data.

As indicated in Appendix L, the determination of a water-effect ratio may require substantial resources. A discharger should consider cost-effective, preliminary measures described in this Appendix L (e.g., use of "clean" sampling and chemical analytical techniques especially for metals, or in non-NTR States, a recalculated criterion) to determine if an indicator species site-specific criterion is really needed. In many instances, use of these other measures may eliminate the need for deriving water-effect ratios. The methods described in the 1994 interim guidance (Appendix L) should be sufficient to develop site-specific criteria that resolve concerns of dischargers when there appears to be no instream toxicity but, where (a) a discharge appears to exceed existing or proposed water quality-based permit limits, or (b) an instream concentration appears to exceed an existing or proposed water quality criterion.

<u>WERs obtained using the methods described in Appendix L should only be used to adjust aquatic life criteria that were derived using laboratory toxicity tests.</u> WERs determined using the methods described herein cannot be used to adjust the residue-based mercury Criterion Continuous Concentration (CCC) or the field-based selenium freshwater criterion.

Except in jurisdictions that are subject to the NTR, the WERs may also be used with site-specific aquatic life criteria that are derived using the Recalculation Procedure described in Appendix L (p.90).

Water-Effect Ratios in the Derivation of Site-Specific Criteria

A central question concerning WERs is whether their use by a State results in a site-specific criterion subject to EPA review and approval under Section 303(c) of the Clean Water Act?

Derivation of a water-effect ratio by a State is a site-specific criterion adjustment subject to EPA review and approval/disapproval under Section 303(c). There are two options by which this review can be accomplished.

Option 1:

A State may derive and submit each individual water-effect ratio determination to EPA for review and approval. This would be accomplished through the normal review and revision process used by a State.

Option 2:

A State can amend its water quality standards to provide a formal procedure which includes derivation of water-effect ratios, appropriate definition of sites, and enforceable monitoring provisions to assure that designated uses are protected. Both this procedure and the resulting criteria would be subject to full public participation requirements. EPA would review and approve/disapprove this protocol as a revised standard as part of the State's triennial review/revision. After adoption of the procedure, public review of a site-specific criterion could be accomplished in conjunction with the public review required for permit issuance. For public information, EPA recommends that once a year the State publish a list of site-specific criteria.

An exception to this policy applies to the waters of the jurisdictions included in the National Toxics Rule. The EPA review is not required for the jurisdictions included in the National Toxics Rule where EPA established the procedure for the State for application to the criteria promulgated. The National Toxics Rule was a formal rulemaking process (with notice and comment) in which EPA pre-authorized the use of a correctly applied water-effect ratio. That same process has not yet taken place in States not included in the National Toxics Rule.

However, the National Toxics Rule does not affect State authority to establish scientifically defensible procedures to determine Federally authorized WERs, to certify those WERs in NPDES permit proceedings, or to deny their application based on the State's risk management analysis.

As described in Section 131.36(b)(iii) of the water quality standards regulation (the official regulatory reference to the National Toxics Rule), the water-effect ratio is a site-specific calculation. As indicated on page 60866 of the preamble to the National Toxics Rule, the rule was constructed as a rebuttable presumption. The water-effect ratio is assigned a value of 1.0 until a different water-effect ratio is derived from suitable tests representative of conditions in the affected waterbody. It is the responsibility of the State to determine whether to rebut the assumed value of 1.0 in the National Toxics Rule and apply another value of the water-effect ratio in order to establish a site-specific criterion. The site-specific criterion is then used to develop appropriate NPDES permit limits. The rule thus provides a State with the flexibility to derive an appropriate site-specific criterion for specific waterbodies.

As a point of emphasis, although a water-effect ratio affects permit limits for individual dischargers, it is the State in all cases that determines if derivation of a site-specific criterion based on the water-effect ratio is allowed and it is the State that ensures that the calculations and data analysis are done completely and correctly.

3.7.6 The Resident Species Procedure

The resident Species Procedure for the derivation of a site-specific criterion accounts for differences in resident species sensitivity and differences in biological availability and/or toxicity of a material due to variability in physical and chemical characteristics of a site water. Derivation of the site-specific criterion maximum concentration (CMC) and site-specific criterion continuous concentration (CCC) are accomplished after the complete acute toxicity minimum data set requirements have been met by conducting tests with resident species in site water. Chronic tests may also be necessary. This procedure is designed to compensate concurrently for any real differences between the sensitivity range of species represented in the national data set and for site water which may markedly affect the biological availability and/or toxicity of the material of interest.

Certain families of organisms have been specified in the National Guidelines acute toxicity minimum data set (e.g., Salmonidae in fresh water and Penaeidae or Mysidae in salt water); if this or any other requirement cannot be met because the family or other group (e.g., insect or benthic crustacean) in fresh water is not represented by resident species, select a substitute(s) from a sensitive family represented by one or more resident species and meet the 8 family minimum data set requirement. If all the families at the site have been tested and the minimum data set requirements have not been met, use the most sensitive resident family mean acute value as the site-specific Final Acute Value.

To derive the criterion maximum concentration divide the site-specific Final Acute Value by two. The site-specific Final Chronic Value can be obtained as described in the Appendix L. The lower of the site-specific Final Chronic Value (as described in the recalculation procedure - Appendix L, p. 90) and the recalculated site-specific Final Residue Value becomes the site-specific criterion continuous concentration unless plant or other data (including data obtained from the site-specific tests) indicates a lower value is appropriate. If a problem is identified, judgment should be used in establishing the site-specific criterion.

The frequency of testing (e.g., the need for seasonal testing) will be related to the variability of the physical and chemical characteristics of site water as it is expected to affect the biological availability and/or toxicity of the material of interest. As the variability increases, the frequency of testing will increase. Many of the limitations discussed for the previous two procedures would also apply to this procedure.

Endnotes

1. Proceedings in production.

   Contact: Ecological Risk Assessment Branch (4304)
   U.S. Environmental Protection Agency
   401 M Street, S.W.
   Washington, DC 20460
   Telephone (202) 260-1940

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Authorization to Discharge under the National Pollutant Discharge Elimination System (NPDES)

In compliance with the provisions of the Clean Water Act, 33 U.S.C. §1251 *et seq*., as amended by the Water Quality Act of 1987, P.L. 100-4, the "Act",

Federal Aquaculture Facilities and Aquaculture Facilities Located in Indian Country

Within the boundaries of the State of Washington

which are described in Part I of this general NPDES permit are authorized to discharge to Waters of the United States, in accordance with discharge points, effluent limitations, monitoring requirements and other conditions set forth herein.

A copy of this General Permit must be kept at all times at the facility where discharges occur, if feasible. Otherwise, it must be in the possession of staff whenever working at the facility.

This General Permit will become effective: **insert date.**

This General Permit and the authorization to discharge will expire: **insert date.**

Each Permittee must apply for reauthorization to discharge on or before **insert date.**
if it intends to continue operations and discharge from the facility beyond the term of this permit.

Signed this ______day of ___________, 2015

____
Daniel D. Opalski, Director
Office of Water and Watersheds

Preliminary Draft Permit – Not an authorization to discharge

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Appendices

I. SCHEDULE OF SUBMISSIONS

The following is a summary of some of the items the Permittee must complete and/or submit to EPA during the term of this permit:

Item	Due Date
1. Initial Notice of Intent (NOI)	Existing dischargers: no additional NOI submittal necessary at this time. New dischargers: at least 180 days before initiation of discharge. (§II.A.2) Authorization to discharge must be obtained from the EPA prior to commencement of a discharge.
2. Discharge Monitoring Reports (DMRs)	Facilities must submit DMRs monthly by the 20th day of the month. See §V for instructions on submitting DMRs.
3. Surface Water Monitoring Report	Due with the DMR for the month in which the monitoring is conducted. (§III.B.6.)
4. Monitoring Records	Monitoring records must be retained for a period of at least five years. (§V.)
5. Quality Assurance Plan (QA Plan)	New dischargers: Provide written notification to the EPA and to the Lummi or Spokane Tribes (as appropriate) that the QA Plan has been developed and implemented within 90 days after receiving authorization to discharge under this Permit (§III.B.7). Existing dischargers: Modify the QA Plan as necessary and submit written notice to the EPA and to the Lummi or Spokane Tribes (as appropriate) that the Plan has been modified and implemented within 90 days of the effective date of this General Permit. The QA Plan must be kept on-site and made available to the EPA upon request.

Item	Due Date
6. Best Management Practices (BMP) Plan	New dischargers: Provide written notification to the EPA and to the Lummi or Spokane Tribes (as appropriate) that the BMP Plan has been developed and implemented within 90 days after authorization to discharge under this Permit (§III.C.3). Existing dischargers: Modify the Plan as necessary and submit written notice to the EPA and to the Lummi or Spokane Tribes (as appropriate) that the Plan has been modified and implemented within 90 days of the effective date of this General Permit. The Plan must be kept on-site and made available to the EPA upon request.
7. Anticipated INAD Study Participation or Extralabel Drug Use	Written notification to the EPA within 7 days of signing up for an INAD study or receiving a prescription for extralabel drug use if the drug was not previously listed on an NOI or if the drug is being used at a higher dosage than previously approved by Food and Drug Administration (FDA) for this or a different species or disease. (§IV.A.2.a)
8. INAD Use, Extralabel Drug Use, or First Use of Low Regulatory Priority Drugs or Potassium Permanganate	Oral notification to the EPA within 7 days of beginning use and written notification to the EPA within 30 days of beginning use if the drug was not previously listed on an NOI or if the drug is being used at a higher dosage than previously approved by Food and Drug Administration (FDA) for this or a different species or disease. (§IV.A.2.a & b)
9. Structural failure or damage notification	Oral notification to the EPA within 24 hours of becoming aware of structural damage or failure that caused a release of pollutants to waters of the U.S. Written notification to the EPA within 5 days of becoming aware of such damage or failure. (§IV.B)
10. Notification of spills of feed, drugs, pesticides, or other chemicals notification	Oral notification to the EPA within 24 hours of becoming aware of a spill that caused a release of pollutants to waters of the U.S. Written notification to the EPA within 5 days of becoming aware of such a spill. (§IV.C.1)
11. Oil or hazardous materials	The Permittee must report immediately to the EPA at 1-800-424-8802 any spills of oil or hazardous materials to waters of the U.S. The Permittee must report any spills of oil or hazardous materials to waters of the State of Washington to Ecology at 1-800-258-5990 or 1-800-OILS-911 and to the appropriate Ecology regional office. (§IV.C.2)

Item	**Due Date**
12. Annual Report	By January 20 each year. (§IV.E)
13. Non-Compliance Report	Oral notification to the EPA within 24 hours of becoming aware of an unanticipated bypass of treatment facilities or an upset that result in exceedance of effluent limits, or any exceedance of an applicable maximum daily limit for total residual chlorine. Written notification to the EPA within 5 days. (§V.G.)
14. Submittal of subsequent NOI	The NOI to be covered under a subsequent General Permit must be submitted to the EPA at least 180 days before the expiration date of this permit. (§VII.B)
15. Notice of Termination of Discharge	Facilities must request permit termination from the EPA in writing. The EPA will respond with a written determination on the request, in accordance with 40 CFR 122.64. (§II.D.)

II. Permit Coverage

A. EPA Authorization Required

1. ***Authorization to discharge under this General Permit requires written notification from the U.S. Environmental Protection Agency (EPA) that coverage has been granted and that a specific permit number has been assigned to the facility.***

2. The EPA may notify a discharger that it is covered under the General Permit even if the discharger has not submitted a Notice of Intent (NOI) to be covered.

B. Eligible Facilities

1. Facilities eligible for coverage under this permit include the following, within the boundaries of the State of Washington:

a) Federally owned or operated fish hatcheries, fish farms, or other such facilities;

b) Fish hatcheries, fish farms, or other such facilities, regardless of type of ownership, that are located in Indian country, as defined in 18 U.S.C. 1151.

2. To be eligible for coverage under this General Permit, a fish hatchery, fish farm, or other such facility must contain, grow, or hold cold water species of fin-fish in ponds, raceways, or similar structures, which discharge to fresh or marine waters within the State of Washington from a federal facility or from such a facility located in Indian country.

3. The General Permit applies only to those upland facilities that discharge for at least 30 days per year except facilities which produce less than 9,000 harvest weight kilograms (approximately 20,000 pounds) of aquatic animals per year and facilities which feed less than 2,272 kilograms (approximately 5,000 pounds) of food during the calendar month of maximum feeding. The EPA may designate a smaller facility as a significant contributor of pollution to Waters of the United States based on the considerations, such as those listed below [40 CFR §122.24(c)]. Under such circumstances, the designated facility is subject to the limitations and conditions of this permit. Considerations include:

a. The location and quality of the receiving waters;

b. The holding, feeding, and production capacities of the facility;

c. The quantity and nature of the pollutants reaching waters of the United States; and

d. Any other relevant factors.

C. New Sources

Aquaculture facilities that produce 100,000 pounds or more of aquatic animals per year in flow-through or recirculating systems that are constructed after September 22, 2004, are *new sources*, as defined in 40 CFR §§122.2, and 122.29. A facility is a *new source* if (1) the facility is constructed at a site where no other facility is located, (2) the facility totally replaces the process or production equipment that causes the discharge of pollutants at the existing facility, or (3) the facility processes are substantially independent of an existing facility at the same site. See 40 CFR §122.29(b) and (c). A facility smaller than 100,000 pounds of annual production is not a *new source* for these purposes and is not subject to these *new source* requirements.

Pursuant to Section 511(c) of the Clean Water Act, 33 U.S.C. 1371(c), National Environmental Policy Act (NEPA) compliance is required for NPDES permits for the discharge of any pollutant by a "new source."

In accordance with 40 CFR §§ 6.300 and 6.301, the *new source* facility must prepare and submit to the EPA, along with its NOI, an Environmental Information Document or a draft Environmental Assessment (EA) and supporting documents.

New sources may be required to apply for an individual permit.

D. Authorized Discharges

The General Permit authorizes discharges to Waters of the United States as described in Section I.B, above. During the effective period of the permit, authorized discharges are subject to the requirements and conditions set forth in this permit. The General Permit does not authorize the discharge of any waste streams, including spills and other unintentional or non-routine discharges of pollutants, that are not part of the normal operation of the facility, as disclosed in the Permittee's NOI, or any pollutants that are not ordinarily present in such waste streams.

E. Discharges Not Authorized

1. The General Permit does not automatically apply to discharges from aquaculture facilities which produce less than 9,000 harvest weight kilograms (approximately 20,000 pounds) of aquatic animals per year or to facilities which feed less than 2,272 kilograms (approximately 5,000 pounds) of food during the calendar month of maximum feeding. Facilities below the thresholds for permit coverage may voluntarily submit the information required in a Notice of Intent with a request in a cover letter to be included or excluded from coverage.

2. The General Permit does not apply to net pens.

3. The General Permit does not automatically apply to discharges from facilities where an individual NPDES permit has been terminated or denied for cause nor where coverage has been denied under this or any other General Permit. The EPA will review such facilities for coverage on a case by case basis.

4. The General Permit does not apply to discharges that may contribute to a violation of an applicable water quality standard.

5. The General Permit does not apply to discharges to (a) *impaired waters*, designated pursuant to Section 303(d) of the Clean Water Act (CWA), which are water-quality limited for a pollutant of concern evaluated in the development of this permit (BOD_5, total suspended solids, settleable solids, nutrients, ammonia, chlorine), unless a wasteload allocation has been assigned to the discharge and is applied in this permit, or to (b) receiving waters that are one mile or less upstream from an impaired water that is designated as such pursuant to Section 303(d) of the CWA, unless a specific effluent limit based on a WLA has been applied in this permit.

If a waterbody to which an existing Permittee discharges becomes impaired during the next permit cycle, the Permittee may submit information to the EPA that demonstrates that the discharge is not expected to cause or contribute to an exceedance of water quality standards. Then, the EPA will determine 1) whether the discharge would cause or contribute to an exceedance or impairment, and 2) whether the facility may remain covered under this General Permit in future permit cycles or if an individual permit is needed. New dischargers to impaired waterbodies are not eligible under this General Permit, and must seek permit coverage under an individual permit.

6. The General Permit does not apply to any discharges that include copper or copper compounds.

7. The General Permit does not apply to discharges from processes not associated with fish hatcheries or farms nor to discharges from fish hatchery or farm processes where the EPA determines at the time a discharger seeks coverage that the General Permit does not adequately address the environmental concerns associated with the discharge.

8. The General Permit does not apply to discharges to land or to publicly owned treatment works.

9. The General Permit does not apply to facilities that discharge one mile or less upstream from waters that constitute an outstanding national resource.[1]

10. The General Permit does not apply to facilities that discharge to waters that constitute special resource tribal waters.

F. Permit Expiration

This General Permit will expire five years after its effective date, as specified on the cover page of the permit. In accordance with 40 CFR §122.6, if the permit is not reissued by the expiration date, the conditions of the General Permit will continue in force and effect until a

[1] As part of an antidegradation policy, Tier 3 maintains and protects water quality in outstanding national resource waters. Except for certain temporary changes, water quality cannot be lowered in such waters. States and authorized Indian Tribes decide which water bodies qualify for this type of protection. As of the date of this permit, no outstanding national resource waters have been designated within the boundaries of Washington State.

new General Permit is issued. Only those facilities authorized to discharge under the expiring General Permit and who submit an NOI at least 180 days prior to the expiration date of the General Permit will remain authorized to discharge under the administratively continued permit conditions.

III. Obtaining Authorization to Discharge under this General Permit

A. Submitting a Notice of Intent

Owners or operators seeking coverage under this General Permit must submit to the EPA Region 10 a timely and complete Notice of Intent (NOI) to be covered by the General Permit. The owner/operator must submit the information indicated in Appendix A (Notice of Intent Contents) of this General Permit. ***A copy of the NOI must be retained on-site***.

1. Submittal Address

a. To the EPA

The NOI must be submitted to the EPA at the following address:

USEPA Region 10
Washington Hatchery NOI, OWW-130
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

b. To the Lummi Nation

As per the Tribe's CWA Section 401 certification, the NOI for dischargers to waters of the Lummi Nation must also be submitted to the Lummi Nation at the following address:

Lummi Natural Resources Department
Water Resources Manager
Lummi Natural Resources Department
2665 Kwina Road
Bellingham, WA 98226-9298

c. To the Spokane Tribe

As per the Tribe's CWA Section 401 certification, the NOI for dischargers to waters of the Spokane Tribe must also be submitted to the Spokane Tribe Water Control Board at the following address:

Spokane Tribe
Brian Crossley
Water & Fish Program
PO Box 480
Wellpinit WA 99040

2. A Permittee authorized to discharge under this General Permit must submit to the EPA an updated and/or amended NOI when there is any material change in the information submitted within its original NOI. A material change may include, but is not limited to, changes in the operator/owner of the facility, a modification in the treatment train, the introduction of new pollutants not identified in the original NOI, or increases in pollutants above the presently authorized levels.

3. When an aquaculture facility is owned by one person or company, and is operated by another person or company, it is the operator's responsibility to apply for and obtain permit coverage. For owners/operators of multiple facilities, a separate NOI must be completed for each site or facility.

4. Deadlines for Submittal

a. Existing facilities with coverage under this permit are ***not*** required to reapply to be covered by this General Permit upon reissuance. In order to remain covered by the General Permit after this permit expires (i.e., five years from issuance), existing dischargers must submit an NOI at least 180 days before the expiration of this permit. See Appendix A of this General Permit for NOI requirements.

b. Existing facilities without permit coverage that increase their production levels and/or feed levels to exceed both the thresholds in §I.B.3, above, must submit an NOI within 30 days of knowing they will exceed or have exceeded both thresholds.

c. New dischargers must submit NOIs at least 180 days prior to initiation of new discharges.

5. Signatory Requirement

The NOI must be signed and certified in accordance with 40 CFR §122.22, as required by Section VII.E (Signatory Requirements) of this permit.

B. When the Permittee is Authorized to Discharge

A discharger will be authorized to discharge beginning on the date it receives written notification from the EPA that grants coverage under the General Permit and assigns an individual number under this General Permit.

C. Individual Permit Alternative

1. EPA Requirement for Individual Permit.

The Director may require any discharger requesting coverage under this General Permit to apply for and obtain an individual NPDES permit in accordance with 40 CFR 122.28(b)(3)(i). In this case, the Permittee will be notified in writing that an individual permit is required and be given a brief explanation of the reasons for the decision. Individual permits may be appropriate if:

a. Whenever the Permittee is not in compliance with the conditions of this General Permit;

b. Whenever a change has occurred in the availability of demonstrated technology or practices for the control or abatement of pollutants applicable to the point source, therefore causing limitations of the General Permit to not be appropriate for the control or abatement of pollutants from the point source(s);

c. If a water quality management plan, including a Total Maximum Daily Load (TMDL), containing requirements applicable to the point source is approved after the effective date of the General Permit;

d. If the discharge(s) is a significant contributor of pollution;

e. If circumstances have changed since the time of NOI submittal, so that the Permittee is no longer appropriately controlled under the General Permit, or either a temporary or permanent reduction or elimination of the discharge is necessary.

D. Permittee's Request to be Excluded from Coverage under the General Permit

Applying for an Individual Permit.

Any owner or operator authorized by this General Permit may request to be excluded from the coverage under the General Permit by applying for an individual permit. The Permittee must submit an individual permit application with reasons supporting the request to the Director no later than 90 days after the publication by EPA of the General Permit in the Federal Register. The request shall be granted by issuing of any individual permit if the reasons cited by the owner or operator are adequate to support the request. Coverage under this General Permit will be automatically terminated on the effective date of the individual permit. 40 CFR 122.28(b)(3)(ii-iii).

E. Notice of Termination of Discharge

The Permittee must notify the EPA and any affected tribe within 30 days of discharge termination. The Permittee is required to submit DMRs until the effective date of Permit termination.

1. Requests to terminate coverage under this Permit must be in writing and submitted to EPA at the following address:

United States Environmental Protection Agency, Region 10
Unit Manager, NPDES Permits Unit
1200 Sixth Avenue, Suite 900 OWW-130
Seattle, WA 98101

2. Coverage under this Permit may be terminated in accordance with 40 CFR 122.64 if the EPA determines in writing that the entire discharge is permanently terminated, either by elimination of the flow or by connection to a publicly owned treatment works (POTW). Termination of coverage will become effective 30 days after the written determination is sent to the Permittee by the EPA, unless the Permittee objects within that time.

3. Any Permittee whose production and/or feed levels drop below and are expected to remain below the thresholds in §I.B.3, above, may request termination of coverage under this permit in accordance with this Part. The Permittee must include information on projected levels of production and feed for the following five years.

4. Under all circumstances, a Permittee must be covered under this Permit until it has properly disposed of wastewater or solids that were generated at the facility or collected in a raceway or settling basin or held in storage, and until the facility is no longer discharging to waters of the U.S.

IV. Effluent Limitations and Monitoring Requirements

A. Effluent Limitations

1. Prohibited Discharges

a. The Permittee must not discharge to waters of the U.S. from the hatchery complex:

(1) Atlantic salmon *(Salmo salar).*

(2) Solids, including sludge and grit that accumulate in raceways or ponds, in off-line or full-flow settling basins, or in other components of the production facility in excess of the applicable limits in this permit.

(3) Hazardous substances, unless authorized by this permit.

(4) Untreated cleaning wastewater (e.g., obtained from a vacuum or standpipe bottom drain system or rearing/holding unit disinfection).

(5) Visible foam or floating, suspended or submerged matter, including fish mortalities, kill spawning, processing wastes, and leachate from these materials, in amounts causing, or contributing to, a nuisance or objectionable condition in the receiving water or that may impair designated beneficial uses in the receiving water.

(6) Disease control chemicals and drugs except those approved by the Food and Drug Administration and/or the EPA for hatchery use or those reported to the EPA in accordance with Section IV (Aquaculture specific reporting requirements).

(7) Toxic substances, including drugs, pesticides, or other chemicals, in toxic amounts that may impair designated uses or violate water quality standards of the receiving water.

2. Prohibited Practices

The Permittee is prohibited from engaging in any of the following practices or otherwise facilitating prohibited discharges described in §III.A.1, above:

a. Practices that allow accumulated solids in excess of the limits to be discharged to waters of the United States from the permitted facility (*e.g.*, the removal of dam boards in raceways or ponds, the cleaning of settling basins, etc.);

b. Sweeping, raking, or otherwise intentionally discharging accumulated solids from raceways, ponds, or settling basins to waters of the United States; and/or

c. Containing, growing or holding fish within an off-line or in-line settling basin.

3. Discharge Limits

a. Permitted Discharges. During the effective period of the Permittee's authorization to discharge, the Permittee is authorized to discharge pollutants from the outfall(s) specified in its NOI within the limits and subject to the conditions set forth in this permit. This permit authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the NOI, including non-production facilities, such as incubators, laboratories, tagging operations, etc. It does not authorize the discharge of any waste streams, including spills and other unintentional or non-routine discharges of pollutants, that are not part of the normal operation of the facility as disclosed in the Permittee's NOI nor does it authorize the discharge of any pollutants that are not ordinarily present in such waste streams.

b. Discharge Limits. The Permittee must limit discharges from all outfalls authorized under this permit as specified in Tables 1 and 2, below, as applicable. The limits in Table 1 apply to all hatchery discharges except those from separate off-line settling basin outfalls and rearing pond discharges during drawdown, limits for which are listed in Table 2. All limits represent maximum effluent limits, unless otherwise indicated. The Permittee must comply with the applicable effluent limits in the tables at all times, unless otherwise indicated, regardless of the frequency of monitoring or reporting.

Table 1 **Effluent Limitations for Hatchery Discharges**[1]			
Pollutant	**Average Monthly Limit**	**Maximum Daily Limit**	**Instantaneous Maximum**
Net **Total Suspended Solids**[2]	5 mg/L	---	15 mg/L
Net **Settleable Solids**[2]	0.1 ml/L	---	---
Total Residual Chlorine[3] – into fresh water	9.0 µg/L	18.0 µg/L	---
Total Residual Chlorine[3] – into marine water	6.1 µg/L	12.3 µg/L	---

[1] Excluding discharges from separate off-line settling basins (OLSBs) and from raceways or pond systems during drawdown; see Table 2 for limits on those discharges.
[2] Net concentration = effluent concentration – influent concentration. Net TSS and settleable solids determinations will require influent analysis in addition to effluent analysis unless the permittee chooses to assume that the pollutant concentration in the influent is zero. Influent samples must be collected prior to collection of effluent samples; and net TSS and settleable solids will be determined by subtracting the influent concentrations from the effluent concentrations: see Appendix B. The EPA may require additional sampling to prove substantial similarity between influent and effluent solids, where indicated. All influent and effluent samples and flow measurements must be taken on the same day.
[3] Chlorine limits only apply when chlorine or Chloramine-T is being used. The Permittee will be in compliance with the effluent limits for total residual chlorine, provided the total residual chlorine residual levels are at or below the compliance evaluation level of 50 µg/L. Chlorine monitoring is not required if chlorine is allowed to dry at the location of use.

c. Discharge Limits for Off-Line Settling Basins (OLSBs) and for Raceways or Rearing Ponds during drawdown for fish release. These limits apply to any discharge to waters of the U.S. from an OLSB in addition to limitations listed in Table 1, above, for the total hatchery flow. These limits apply to raceways or pond systems during drawdown for fish release in lieu of the TSS and settleable solids limits in Table 1, above. See Table 2, below. The total residual chlorine limits set forth in Table 1, above, still apply to raceways or pond systems during drawdown for fish release.

Table 2
Effluent Limits for Discharges from Off-line Settling Basins[1] and from Raceways or Rearing Ponds during Drawdown for Fish Release

Pollutant	Maximum Daily Limit
Total Suspended Solids	100 mg/L
Settleable Solids	1.0 ml/L

[1] These limits apply to only those OLSB effluents that discharge directly to waters of the U.S.

4. Rearing Vessel Disinfection Water

When rearing vessels are disinfected with chlorine, the total residual chlorine effluent limits in Table 1, above, apply.

B. Effluent Monitoring Requirements

1. Hatchery Monitoring

Discharges authorized by this permit from fish hatcheries must be monitored at each outfall described in the NOI. Monitoring in Table 3, below, must be performed before the effluent is discharged to the receiving water. Monitoring results must be submitted to the EPA as directed in §V.B.

Table 3

Hatchery Effluent Monitoring Requirements

Parameter	Units	Sample Type	Sample Frequency	Sample Location
Effluent Flow[1]	Gallons per day	Flow meter, calibrated weir, or other approved method	Monthly[2]	Effluent[3,4]
Net Total Suspended Solids[5]	mg/L	Composite[6]	Monthly[2]	Influent[5] & Effluent[6]
Net Settleable Solids[5]	ml/L	Grab	Monthly[2]	Influent[5] & Effluent[6]
Total Residual Chlorine (including when Chloramine-T is in use)[7]	µg/L	Grab	Monthly[2]	Effluent[6]
Formaldehyde (when Formalin is in use)[7]	mg/L	Grab	Quarterly[2, 8]	Effluent[6]
Temperature (facilities that discharge to waters impaired for temperature)	ºC	Meter	Continuous	Upstream & Effluent[6]

[1] All influent and effluent samples and flow measurements must be taken on the same day.

[2] Monthly monitoring must begin in the first full calendar month of permit coverage; quarterly monitoring must begin in the first full calendar quarter of permit coverage.

[3] Effluent samples must be collected from the effluent stream after the last unit prior to discharge into the receiving waters or to subsequent mixing with other water flows. If off-line settling basin effluent combines with raceway flows, at least one quarter of the grab samples that go into a composite sample must be collected when the OLSB is discharging.

[4] If the facility is operating in a steady state (no drawdown nor filling up), the flow may be monitored at the influent or the effluent.

[5] Net concentration = effluent concentration – influent concentration. Net TSS and settleable solids determinations will require influent analysis in addition to effluent analysis unless the permittee chooses to assume that the pollutant concentration in the influent is zero. Influent samples must be collected prior to collection of effluent samples; and net TSS and settleable solids will be determined by subtracting the influent concentrations from the effluent concentrations: see Appendix B. The EPA may require additional sampling to prove substantial similarity between influent and effluent solids, where indicated.

[6] Composite samples must consist of four or more discrete samples taken at one-half hour intervals or greater over a 24-hour period; for facilities that clean raceways periodically, at least one fourth of the samples must be taken during quiescent zone or raceway cleaning. Facilities with multiple effluent discharge points and/or influent points must composite samples from all points proportionally to their respective flows. Only the composite sample must be analyzed.

[7] Total residual chlorine and formaldehyde must be monitored only when being used, giving consideration to retention times in the facility. Monitoring for must be conducted during each calendar quarter if the chemical used at any time during the quarter but sampling does not need to occur more than once a quarter.

[8] Formaldehyde monitoring may cease after the first four quarters in which formalin is used if all monitoring results are below 10 mg/L formaldehyde.

Temperature

The following facilities covered by this General Permit discharge to water bodies impaired for temperature and are required to monitor for temperature:

1. Makah National Fish Hatchery (USFWS)
2. Quilcene National Fish Hatchery (USFWS)
3. House of Salmon (Lower Elwha Klallam Tribe)
4. Chief Joseph Hatchery on the Columbia (Confederated Tribes of the Colville Reservation).

Continuous temperature monitoring must begin within one year of the effective date of this Permit. Permittees must monitor for two (not necessarily consecutive) calendar years. Permittees must monitor their effluent, as well as the receiving water immediately upstream of the facility. Upstream and effluent temperature monitoring must occur simultaneously. If a facility has more than one outfall, the Permittee must perform temperature monitoring on the outfall that is most representative of the facility’s flow.

Temperature data must be recorded using a micro-recording temperature devices known as a thermistor. Set the recording device to record at one-hour intervals. Collect the following data: monthly instantaneous maximum, maximum daily average, and a seven-day running average of the daily instantaneous maximum.

Use the temperature device manufacturer’s software to generate (export) an Excel text or electronic ASCII text file. The text file and placement log must be submitted to the EPA with the annual report for the 2020 calendar year. The placement logs should include the following information for both thermistor deployment and retrieval: date, time, temperature device manufacturer ID, location, depth, whether it measured air or water temperature, and any other details that may explain data anomalies.

Formaldehyde

Sampling for formaldehyde must be conducted only during formalin use. Formaldehyde monitoring may cease after the first four quarters in which formalin is used if all monitoring results are below 10 mg/L formaldehyde. Sampling is not required if formalin is not used and “No Discharge” must be reported on the Discharge Monitoring Reports for that month. In order to capture the maximum concentration of formaldehyde, sampling for formaldehyde must occur as soon as possible after any application of formalin to the hatchery’s culture water, after accounting for its detention time through the raceways, tanks and piping networks to the outfall. The detention time calculation must take into account dosage, injection point, facility flow (both velocity and volume), etc. where possible. See Section IV.C.5.c of the General Permit).

Formaldehyde must be tested using EPA Method 8315A. The ML for formaldehyde is 50 µg/l. Alternate analytical method(s) must be approved by the EPA at the Permittee’s written request as long as the permittee utilizes method(s) that obtain MLs that are equal to or less than 50 µg/l. Such a request, if granted, will be considered a minor modification to the permit. Permittees should note that the holding time for formaldehyde is three days (i.e., laboratory analysis must begin within three days of taking the sample). See Method 8315A and/or consult with a qualified laboratory for details on logistical considerations.

2. Off-line Settling Basin Effluent Monitoring

Discharges to waters of the U.S. from OLSBs must be monitored as required in Table 4, below.

Table 4
Off-Line Settling Basin
Effluent Monitoring Requirements[1]

Parameter	Units	Sample Type	Sample Frequency	Sample Location
Effluent Flow[2]	Gallons per day	Flow meter, calibrated weir, or other approved method	Monthly[3]	Effluent[4]
Total Suspended Solids	mg/L	Grab[5]	Monthly[3]	Effluent[4]
Settleable Solids	ml/L	Grab[5]	Monthly[3]	Effluent[4]
Ammonia[6]	mg/L	Grab[5]	Quarterly[3]	Effluent[4]
Temperature[7]	º C.	Meter	Weekly when OLSB is discharging	Effluent[4]
pH[8]	Standard Units	Meter	Quarterly[3]	Effluent[4]

[1] Only direct discharges to waters of the U.S. need to be monitored; if the discharge combines with other process wastewaters, these additional OLSB monitoring requirements do not apply.

[2] All effluent samples and flow measurements must be taken on the same day.

[3] Monthly monitoring must begin in the first full calendar month of permit coverage; quarterly monitoring must begin in the first full calendar quarter of permit coverage.

[4] Effluent samples must be collected from the effluent stream after the last unit prior to discharge into the receiving waters or to subsequent mixing with other water flows.

[5] Facilities with multiple effluent discharge points must composite grab samples from all points proportionally to their respective flows. Only the composite sample must be analyzed.

[6] Ammonia monitoring is required only for those facilities with OLSBs discharging directly to receiving waters.

[7] Temperature monitoring must be taken concurrently with each grab sample for the composite ammonia sample and the results averaged and reported on the discharge monitoring report (DMR).

[8] pH monitoring must be taken concurrently with each grab sample for the composite ammonia sample and the range of results reported on the discharge monitoring report (DMR).

3. Monitoring Discharges of Rearing Pond and Raceway Drawdowns for Fish Release

Samples for rearing pond and raceway drawdowns for fish release must be collected regardless of amount of fish in the facility. See Table 5, below.

Table 5

Monitoring Requirements for Discharges from Rearing Pond or Raceway Drawdowns for Fish Release

Parameter	Sample Point	Sampling Frequency	Type of Sample
Settleable Solids (mL/L)	Effluent	1/Drawdown[1]	Grab
Total Suspended Solids (mg/L)	Effluent	1/Drawdown[1]	Grab

[1] Drawdown samples must be collected during the last quarter of each drawdown event. If the drawdown is a continuous event that involves more than one rearing pond or raceway discharging directly to waters of the US, the Permittee may composite grab samples from each rearing pond or raceway proportionally to their respective flows, each taken in the last quarter of its drawdown; the combined sample may be analyzed instead of separately analyzing grab samples from each of the rearing ponds or raceways. If the discharge is to a settling pond, the facility must estimate when the final ¼ of the discharge is being released to the settling pond, delay the monitoring by the residence time calculated for the pond, and then monitor as the effluent discharges from the pond to the receiving water. If multiple drawdown events are sequential or on different days, a separate grab sample must be analyzed for each event.

4. Monitoring Discharges of Rearing Vessel Disinfection Water

Rearing vessel disinfection water that has been treated with chlorine must be tested before it is allowed to be discharged to waters of the United States; see Table 6, below. Chlorine monitoring is not required if rearing vessels are allowed to dry completely and there is no discharge of chlorine.

Table 6 **Monitoring Requirement for Discharges of Rearing Vessel Disinfection Water**			
Parameter	**Sample Point**	**Sampling Frequency**	**Type of Sample**
Total Residual Chlorine (mg/L)	Effluent	1/Discharge	Grab

C. Surface Water Monitoring

a. Ammonia, Temperature, and pH Monitoring. All Permittees that have off-line settling basins that discharge **directly** to surface waters must conduct surface water monitoring quarterly for ammonia, pH, and temperature immediately upstream, outside the influence of the discharge.

b. Sample Collection. All surface water samples must be grab samples and must be collected at approximately the same time as the effluent samples.

c. Minimum Levels. All samples must be analyzed for the parameters listed in Table 7 to achieve minimum levels (MLs) that are equivalent to or less than those listed in Table 8. The Permittee may request different MLs if its results have consistently been above the required MLs. Such a request must be in writing and must be approved by the EPA before the Permittee may use the revised MLs.

d. Reporting Surface Water Monitoring Results. All surface water monitoring results must be submitted to the EPA with the DMRs for the month when the monitoring is conducted. The report must include all information required in §V.E, below, and a summary and evaluation of the analytical results.

Table 7 **Surface Water Monitoring Requirements**	
Parameter	**Units**
Ammonia Nitrogen as N[1]	mg/L
pH[21]	standard units
Temperature[1]	^{o}C

[1] Surface water monitoring is only required for Permittees that have off-line settling basins that discharge **directly** to surface waters.

D. PCB Monitoring for Facilities in the Spokane Watershed

All facilities that discharge to waters in WRIA 54 (Lower Spokane) and WRIA 57 (Middle Spokane) must monitor their effluent for PCB congeners. As of the date of permit issuance, these permit provision applies to two facilities that discharge within these WRIAs: Ford State Fish Hatchery and Spokane Tribal Hatchery.

The EPA is requiring the use of EPA Method 1668C. Permittees must report the total concentration of "dioxin-like" PCB congeners (see Table 8). A complete congener analysis must also be submitted as an attachment to the DMR. PCB monitoring must take place annually, during the calendar quarter of maximum feeding. For any analysis of PCB congeners using EPA Method 1668, the permittee must target MDLs no greater than the MDLs listed in Table 2 of EPA Method 1668 Revision C (EPA-820-R-10-005) and must analyze for each of the 209 individual congeners.

Permittees must follow the Spokane River Regional Toxics Task Force Quality Assurance Project Plan with respect to data validation and blank censoring. The Task Force QAPP addresses this issue in Section 4.2.2, on Pages 40 and 41. Analytes found in samples at concentrations less than 3 times the associated blank concentration will be flagged with a "B" qualifier. The Task Force QAPP states that "all qualified data will be reported with validation qualifiers, however B flagged data will not be used in congener summations for total PCB" (Page 41). See http://srrttf.org/wp-content/uploads/2013/05/QAPP_FINAL_081114.pdf.

Table 8. Dioxin-Like PCB Congeners

Dioxin-Like PCBs IUPAC #	Homolog Group	Substitution Group	IUPAC Name
non-*ortho* substituted PCBs			
77	tetra-CB	non-ortho	3,3',4,4'-tetra-CB
81	tetra-CB	non-ortho	3,4,4',5-tetra-CB
126	penta-CB	non-ortho	3,3',4,4',5-penta-CB
169	hexa-CB	non-ortho	3,3',4,4',5,5'-hexa-CB
mono-*ortho* substituted PCBs			
105	penta-CB	mono-ortho	2,3,3',4,4'-penta-CB
114	penta-CB	mono-ortho	2,3,4,4',5-penta-CB
118	penta-CB	mono-ortho	2,3',4,4',5-penta-CB
123	penta-CB	mono-ortho	2,3',4,4',5-penta-CB
156	hexa-CB	mono-ortho	2,3,3',4,4',5-hexa-CB
157	hexa-CB	mono-ortho	2,3,3',4,4',5'-hexa-CB
167	hexa-CB	mono-ortho	2,3',4,4',5,5'-hexa-CB
189	hepta-CB	mono-ortho	2,3,3',4,4',5,5'-hepta-

In addition to the BMP requirements at section IV.C.5.e.(12) of the General Permit, Permittees in WRIAs 54 and 57 must use any available product testing data to preferentially purchase paint and caulk with the lowest practicable total PCB concentrations.

E. Minimum Levels (MLs)

For all effluent monitoring, the Permittee must use a sufficiently sensitive analytical method which meets the following:

a) Parameters with an effluent limit: The method must achieve a minimum level (ML) less than the effluent limitation unless otherwise specified in Table 1 Effluent Limitations and Monitoring Requirements.
b) Parameters that do not have effluent limitations: The Permittee must use a method that detects and quantifies the level of the pollutant, or the Permittee must use a method that can achieve a maximum ML less than or equal to those specified in Table 8.
c) Minimum Levels: For parameters that do not have an effluent limit, the Permittee may request different MLs. The request must be in writing and must be approved by the EPA. See also Part VI.B. Monitoring Procedures.

For purposes of reporting on the DMR for a single sample, if a value is less than the Method Detection Limit (MDL), the Permittee must report "less than {numeric value of the MDL}" and if a value is less than the ML, the Permittee must report "less than {numeric value of the ML}."

For purposes of calculating monthly averages, zero may be assigned for values less than the MDL, and the {numeric value of the MDL} may be assigned for values between the MDL and the ML. If the average value is less than the MDL, the Permittee must report "less than {numeric value of the MDL}" and if the average value is less than the ML, the Permittee must report "less than {numeric value of the ML}." If a value is equal to or greater than the ML, the Permittee must report and use the actual value. The resulting average value must be compared to the compliance level, the ML, in assessing compliance.

Table 9
Minimum Levels

Parameter	Minimum Level (ML)
Total Suspended Solids	5 mg/L
Ammonia Nitrogen as N	50 µg/L
pH	NA
Temperature	0.2^{o} C
Total Residual Chlorine	50 µg/L
Formaldehyde	50 µg/L

F. Quality Assurance (QA) Plan

a. Plan Development.

The Permittee must develop a quality assurance plan (QA Plan) for all monitoring required by this permit to assist in planning for the collection and analysis of effluent and receiving water samples in support of the permit and in explaining data anomalies when they occur. The plan must be developed and implemented within 60 days after receiving authorization to discharge under this permit. Any existing QA Plans may be modified to meet this requirement.

Existing Permittees must review and update their QA Plans within 60 days of the reissuance of this General Permit.

b. Required Submittal

(1) To the EPA

A Permittee must certify that a QA Plan has been developed and is being implemented and must submit the certification, which includes the information specified in Appendix C, to EPA within 90 days after receiving authorization to discharge under this permit. The submittal address for the EPA is set forth in §II.A.1, above. A new Permittee must submit the certification with the NOI to be covered under this permit.

(2) To the Lummi Nation

As a requirement of the Tribe's 401 Certification, any Permittee that discharges to waters of the Lummi Nation must submit its QA Plan to the Lummi Nation address listed in § V.B, below, for review and approval prior to submitting certification to the EPA that the QA Plan has been developed and implemented. It also must submit that certification to the same Lummi Nation address within 90 days after receiving authorization to discharge under this permit.

(3) To the Spokane Tribe

As a requirement of the Tribe's 401 Certification, any Permittee that discharges to waters of the Spokane Tribe must submit its QA Plan to the Spokane Tribe address listed in § V.B, below, within 90 days after receiving authorization to discharge under this permit.

c. Conformity with EPA procedures

Throughout all sample collection and analysis activities, the Permittee must use the EPA-approved quality assurance and quality control (QA/QC) and chain-of-custody procedures described in Requirements for Quality Assurance Project Plans

(EPA/QA/R-5)[2] and Guidance for Quality Assurance Project Plans (EPA/QA/G-5)[3]. The QA Plan must be prepared in the format that is specified in these documents.

d. Plan contents

At a minimum, the QA Plan must include the following:

(1) Details on the number of samples, type of sample containers, preservation of samples, holding times, analytical methods, analytical detection and quantification limits for each parameter, type and number of quality assurance field samples, precision and accuracy requirements, sample preparation requirements, and sample shipping methods. See § V.A.-F for additional requirements regarding monitoring.

(2) Description of flow measuring devices used to measure influent and/or effluent flow at each point, calibration procedures, and calculations used to convert to flow units. Facilities with multiple effluent discharge points and/or influent points must describe their method of compositing samples from all points proportionally to their respective flows;

(3) Maps indicating the location of each sampling point;

(4) Qualification and training of personnel; and

(5) Name, address and telephone number of the laboratory used by or proposed to be used by the Permittee.

e. Modifications required

The Permittee must amend the QA Plan whenever there is a modification in sample collection, sample analysis, or other procedure addressed by the QA Plan and must update it whenever there is a change in ownership or operator.

f. Copies required on-site

Copies of the QA Plan must be kept on site and made available to the EPA upon request. If lack of suitable storage area makes on-site storage impossible, the QA Plan must be in the possession of staff whenever they are working on-site.

G. Best Management Practices Plan

1. Purpose

Through implementation of the best management practices (BMP) plan, the Permittee must prevent or minimize the generation and discharge of wastes and pollutants from the facility to waters of the United States to meet water quality standards and permit requirements; the Permittee must also ensure that disposal or land application of wastes is carried out in such a way as to minimize negative environmental impact and, if applicable, to comply with Washington State solid waste disposal regulations.

[2] http://www.epa.gov/quality/qs-docs/r5-final.pdf
[3] http://www.epa.gov/quality/qs-docs/g5-final.pdf

2. Development and Implementation Deadline

The Permittee must develop and implement a BMP Plan that meets the specific requirements listed in Part III.C.5, below. An existing BMP Plan may be modified for use under this section. The Permittee must implement the provisions of the BMP Plan as conditions of this permit within 90 days of receiving authorization to discharge under this permit.

Existing Permittees must review and update their BMP Plans within 90 days of the reissuance of this General Permit.

3. Required Submittal

a. To the EPA:

A Permittee must certify that a BMP Plan has been developed and is being implemented. The certification must be submitted to the EPA and must include the information specified in Appendix C. An existing discharger must submit the certification within 90 days after receiving the authorization to discharge under this permit. A new Permittee must submit the certification with the written NOI to be covered under this permit.

b. To the Lummi Nation

As a requirement of the Tribe's 401 Certification, any Permittee that discharges to waters of the Lummi Nation must submit its BMP Plan to the Lummi Nation address listed in § V.B, below, for review and approval prior to submitting certification to the EPA that the BMP Plan has been developed and implemented. It also must submit that certification to the same Lummi Nation address by 90 days after it receives authorization to discharge.

c. To the Spokane Tribe

As a requirement of the Tribe's 401 Certification, any Permittee that discharges to waters of the Spokane Tribe must submit its BMP Plan to the Spokane Tribe address listed in § V.B, below, within 90 days after receiving authorization to discharge under this permit.

4. Annual Review

a. The Permittee must review the BMP Plan annually.

b. A certified statement that the annual review has been completed and that the BMP Plan fulfills the requirements set forth in this permit must be submitted to the EPA in the Annual Report of Operations, due by January 20 each year. See Appendix E.

5. Requirements of the BMP Plan

The BMP Plan must include, at a minimum, the following BMPs. Where a particular practice below is infeasible, the Permittee will substitute another practice to achieve the same end.

a. Materials Storage

(1) Ensure proper storage of drugs and other chemicals to prevent spills that may result in the discharge to waters of the United States.

(2) Implement procedures for properly containing, cleaning, and disposing of any spilled materials.

b. Structural Maintenance

(1) Routinely inspect rearing and holding units and waste collection and containment systems to identify and promptly repair damage.

(2) Regularly conduct maintenance of rearing and holding units and waste collection and containment systems to ensure their proper function.

c. Record keeping

(1) Document feed amounts and numbers and weights of aquatic animals to calculate feed conversion ratios.

(2) Document the frequency of cleanings, inspections, maintenance, and repairs.

(3) Maintain records of all medicinal and therapeutic chemical usage for each treatment at the facility. Include the information required in the Chemical Log Sheet in Appendix D and in the Annual Reports in Appendix E.

(4) A copy of the label (with treatment application requirements) and the Material Safety Data Sheet (MSDS) must be maintained in the facility's records for each drug or chemical used at the facility.

(5) In order to show how the maximum concentrations of chlorine and formalin were derived (see Table 3 for monitoring requirements), facilities must maintain records by chemical and by outfall of the approach/analyses used to determine the elapsed time from its application to its maximum (peak) effluent concentration, giving consideration to retention times within the facility.

(6) Permittees must keep the records necessary to provide the water-borne treatment/calculations information required on page 7 of the revised Annual Report (see Appendix E).

d. Training Requirements

(1) Train all relevant personnel in spill prevention and how to respond in the event of a spill to ensure proper clean-up and disposal of spilled materials.

(2) Train personnel on proper structural inspection and maintenance of rearing and holding units and waste collection and containment systems.

e. Operational Requirements

(1) Raceways and ponds must be cleaned at such a frequency and in such a manner that minimizes accumulated solids discharged to waters of the U.S.

(2) Fish feeding must be conducted in such a manner as to minimize the discharge of unconsumed food.

(3) Fish grading, harvesting and other activities within ponds or raceways must be conducted in such a way as to minimize the discharge of accumulated solids and blood wastes.

(4) Animal mortalities must be removed and disposed of on a regular basis to the greatest extent feasible.

(5) Water used in the rearing and holding units or hauling trucks that is disinfected with chlorine or other chemicals must be treated before it is discharged to waters of the U.S.

(6) Treatment equipment used to control the discharge of floating, suspended or submerged matter must be cleaned and maintained at a frequency sufficient to minimize overflow or bypass of the treatment unit by floating, suspended, or submerged matter; turbulent flow must be minimized to avoid entrainment of solids.

(7) Procedures must be implemented to prevent fish from entering quiescent zones, full-flow, and off-line settling basins. Fish that have entered quiescent zones or basins must be removed as soon as practicable.

(8) Procedures must be implemented to minimize the release of diseased fish from the facility.

(9) All drugs and pesticides must be used in accordance with applicable label directions (FIFRA or FDA), except under the following conditions, both of which must be reported to the EPA in accordance with § V.A, below:

(a) Participation in Investigational New Animal Drug (INAD) studies, using established protocols; or

(b) Extralabel drug use, as prescribed by a veterinarian.

(10) Procedures must be identified and implemented to collect, store, and dispose of wastes, such as biological wastes. Such wastes include fish mortalities and other processing solid wastes from aquaculture operations.

(11) Facilities must dispose of excess/unused disinfectants in a way that does not allow them to enter waters of the U.S.

(12) Facilities must implement procedures to eliminate the release of Polychlorinated Biphenyls (PCBs) from any known sources in the facility-including paint, caulk, or feed. If removing paint or caulk that was applied prior

to 1980, refer to the EPA guidance (abatement steps 1-4) at http://www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/caulk/guide/guide-sect4a.htm. Any future application of paint or caulk must be below the allowable TSCA level of 50 ppm. Facilities must implement purchasing procedures that give preference for fish food that contains the lowest amount of PCBs that is economically and practically feasible.

6. Documentation

The Permittee must maintain a copy of the BMP Plan at the facility and make it available to the EPA or an authorized representative upon request. If lack of a suitable storage area makes on-site storage impossible, the BMP Plan must be in the possession of staff whenever they are working on-site.

7. BMP Plan Modification

The Permittee must amend the BMP Plan whenever there is a change in the facility or in the operation of the facility which materially increases the generation of pollutants or their release or potential release to surface waters. With any change in operator, the BMP Plan must be reviewed and modified, if necessary. The new operator must submit a certification in accordance with Part III.C.3, above.

V. Aquaculture Specific Reporting Requirements

A. Drug and Other Chemical Use and Reporting Requirements

The following requirements apply to chemicals that are used in such a way that they will be or may be discharged to waters of the United States, regardless of whether or not they were listed in the NOI.

B. Use of Drugs, Pesticides, and Other Chemicals

a. Only disease control chemicals and drugs approved for hatchery use by the U.S. Food and Drug Administration or by the EPA may be used, except

(1) Investigational New Animal Drugs (INADs) and extralabel drug use, as provided in §IV.A.2, below.

(2) Low Regulatory Priority (LRP) compounds in accordance with conditions included on the list in the FDA policy 1240.4200: *Enforcement Priorities for Drug Use in Aquaculture* (08/09/2002; 4/26/07 minor revisions)[4] p.13--15. (See Appendix F of this permit.) These compounds must be reported in the Notice of Intent and in annual reports. If they have not previously been reported on an NOI, the Permittee must report its first use in accordance with the requirements in § IV.A.2.b, below.

[4] http://www.fda.gov/cvm/Policy_Procedures/4200.pdf

(3) Potassium permanganate, a deferred regulatory priority drug, also needs to be reported on the NOI, the annual report, and upon first use in accordance with the requirements in § IV.A.2.b, below.

b. All drugs, pesticides and other chemicals must be applied in accordance with label directions.

c. Records required

Records of all applications of drugs, pesticides, and other chemicals must be maintained and must, at a minimum, include information specified in Appendix D. This information must also be summarized in the annual report as required in Part IV.D, below.

C. Reporting Drug Usage

a. INADs and Extralabel Drug Use

The following written and oral reports must be provided to the EPA when an INAD or extralabel drug is used for the first time at a facility (not previously listed on a Notice of Intent) and when an INAD or extralabel drug is used at a higher dosage than previously approved by the FDA for this or a different animal species or disease:

(1) Anticipated INAD Study Participation and Extralabel Drug Usage

Written Report: A Permittee must provide a written report to the EPA within seven days of agreeing or signing up to participate in an INAD drug study or receiving a prescription for extralabel drug use. The report must include the information specified in Appendix D.

(2) Actual Use of INADs or Extralabel Drug Use

(a) **Oral Report:**

For INAD and extralabel drug uses, the Permittee must provide an oral report to the EPA (206-553-1846) as soon as possible during business hours, preferably in advance of use, but no later than 7 days after initiating use of the drug. The report must include the information specified in Appendix D.

(b) **Written Report:**

For INADs and extralabel drug uses, the Permittee must provide to the EPA a written report within 30 days after initiating use of the drug. The report must include the information specified in Appendix D.

b. First Use of Low Regulatory Priority (LRP) Drugs or Potassium Permanganate

(1) Oral Report:

For first use of an LRP drug or potassium permanganate if it was not listed in the NOI, the Permittee must provide an oral report to the EPA (206-553-1846) as soon as possible during business hours, preferably in advance of use, but no later than 7 days after initiating use of the drug. The report must include the information specified in Appendix D.

(2) Written Report:

For first use of an LRP drug or potassium permanganate if it was not listed in the NOI, the Permittee must provide to the EPA a written report within 30 days after initiating use of the drug. The report must include the information specified in Appendix D.

D. Structural Failure or Damage to the Facility

Structural failure or damage to the facility must be reported to the EPA orally within 24 hours and in writing within five days when there is a resulting discharge of pollutants to waters of the U.S. Reports must include the identity and quantity of pollutants released. (See Representative Sampling and Noncompliance Reporting in § VI.A. and § VI. H-I.)

E. Spills of Drugs, Pesticides or Other Chemicals

1. Drugs, Pesticides or Other Chemicals

The Permittee must monitor and report to the EPA any spills of drugs, pesticides, or other chemicals that result in a discharge to waters of the United States; these must be reported orally within 24 hours and in writing within five days. Reports must include the identity and quantity of pollutants released. (See Representative Sampling and Noncompliance Reporting in § VI.A. and § VI. H-I.).

2. Oil or Hazardous Materials

a. <u>To the EPA</u>

The Permittee must report immediately to the EPA at 1-800-424-8802 any spills of oil or hazardous materials to waters of the U.S.

b. <u>To Washington Department of Ecology</u>

The Permittee must report any spills of oil or hazardous materials to waters of the State of Washington to Ecology at 1-800-258-5990 or 1-800-OILS-911 and to the appropriate Ecology regional office:

Northwest Region	Island, King, Kitsap, San Juan, Skagit, Snohomish, & Whatcom counties	425-649-7000
Southwest Region	Clallum, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, & Wahkiakum counties	360-407-6300

Central Region	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, & Yakima counties	509-575-2490
Eastern Region	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, & Whitman counties	509-329-3400

c. To the Lummi Nation

As a requirement of the Tribe's 401 Certification, any operator of a facility must report immediately any spills of oil or hazardous materials to waters of the Lummi Nation to the Lummi Natural Resources Department Director at 360-410-1706.

d. To the Spokane Tribe

As a requirement of the Tribe's 401 Certification, any operator of a facility must report immediately any spills of hazardous materials to waters of the Spokane Tribe to the Spokane Tribe Water Control Board at 509-626-4409.

F. Records of Fish Mortalities

1. Maintenance of Records. Records of routine and mass mortalities must be maintained on site for at least three years.

2. Annual Reporting. Summaries of mortality data must be included in annual reports.

G. Annual Report of Operations

During the term of this permit, the Permittee must prepare and submit an annual report of the previous year's operations by January 20th of each year. A copy of the annual report and the data used to compile it must be available to the EPA upon request and during inspections. The report must include the information specified in Appendix E.

1. To the EPA:

A Permittee must submit the annual report to the EPA at the address in § V.B.1.a, below.

2. To the Lummi Nation:

A Permittee that discharges to waters of the Lummi Nation must submit the annual report to the Lummi Nation at the address in § V.B, below.

3. To the Spokane Tribe:

A Permittee that discharges to waters of the Spokane Tribe must submit the annual report to the Spokane Tribe at the address in § V.B, below.

VI. Standard Monitoring, Recordkeeping, and Reporting Requirements

A. Representative Sampling (Routine and Non-Routine Discharges)

Samples and measurements must be representative of the volume and nature of the monitored discharge or source water.

In order to ensure that the effluent limits set forth in this permit are not violated at times other than when routine samples are taken, the Permittee must collect additional samples at the appropriate outfall whenever any discharge occurs that may reasonably be expected to cause or contribute to a violation that is unlikely to be detected by a routine sample. The Permittee must analyze the additional samples for those parameters limited in §III.A.3 (“Effluent Limitations”) that are likely to be affected by the discharge.

The Permittee must collect such additional samples as soon as the spill, discharge, or bypassed effluent reaches the outfall. The samples must be analyzed in accordance with §VI.B (“Monitoring Procedures”). The Permittee must report all additional monitoring in accordance with §V.D (“Additional Monitoring by Permittee”).

B. Monitoring Procedures

The Permittee must conduct monitoring according to test procedures approved under 40 CFR 136, unless another method is required under 40 CFR subchapters N or O, or other test procedures have been specified in this Permit or approved by the EPA as an alternative test procedure under 40 CFR 136.5.

C. Reporting of Monitoring Results

The Permittee must summarize monthly monitoring results on the DMR. Monitoring data must be submitted electronically using NetDMR. NetDMR is described in more detail below. If additional monitoring of any pollutant is performed more frequently than required by the permit, the results must be included in the DMR.

The Permittee is not required to monitor when the facility is not discharging. However, the DMR must indicate the facility is not discharging and must be submitted as described below. The Permittee must submit a monthly DMR even if a discharge has not occurred, unless permit coverage has been terminated in accordance with Section II. D. of this permit.

An annual report of raw monitoring data in a spreadsheet or text-format electronic file must be submitted to the EPA and to the Lummi or Spokane Tribes (as appropriate) with the January DMR each year.

During the period between the effective date of the Permit and six months from the effective date, the Permittee must either submit monitoring data and other reports in paper form, or must report electronically using NetDMR.

1. Paper Copy Submissions

Prior to switching to NetDMR, all required monitoring data must be submitted using the DMR form (EPA No. 3320-1) or the equivalent and must be postmarked by the 20th day of the month following the end of the reporting period.

The Permittee must submit the legible originals of required documents as follows:

a. To the EPA:

The Permittee must submit the legible originals of these documents to the EPA Region 10 Director, Office of Compliance and Enforcement, at the address below:

USEPA Region 10
Attn: ICIS Data Entry Team
1200 Sixth Avenue, Suite 900, OCE-133
Seattle, Washington 98101-3140

b. To the Lummi Nation:

As a requirement of the Tribe’s 401 Certification, any operator of a facility that discharges to Lummi Nation Waters must submit copies of DMRs, surface water monitoring reports, annual reports, notices of intent, BMP and QA Plans and certifications, spill reports, and any Non-compliance reports to the address below:

Lummi Natural Resources Department
ATTN: Water Resources Manager
2616 Kwina Road
Bellingham, WA 98226

c. To the Spokane Tribe

As a requirement of the Tribe’s 401 Certification, any Permittee that discharges to Spokane Tribe waters must submit copies of DMRs, surface water monitoring reports, annual reports, notices of intent, BMP and QA Plans and certifications, spill reports, and any Non-compliance reports to the address below:

Water Control Board

c/o Brian Crossley
PO Box 480
Wellpinit, WA 99040

2. Electronic submissions

All required monitoring data must be submitted electronically to EPA no later than the 20th day of the month following the end of the reporting period.

All reports required under this Permit must be submitted to EPA as a legible electronic attachment to the DMR.

Once a Permittee begins submitting reports using NetDMR, it will no longer be required to submit paper copies of DMRs to EPA and to the Lummi and/or Spokane Tribes, as appropriate.

1. After the first six (6) months of the effective date of the Permit, the Permittee must submit monitoring data and other reports electronically using NetDMR. The Permittee may use NetDMR after requesting and receiving permission from U.S. EPA Region 10. NetDMR is accessed from http://www.epa.gov/netdmr.

D. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR §136 or as specified in this permit or approved by the Regional Administrator, the results of this monitoring must be included in the calculation and reporting of the data submitted in DMRs.

Upon request by the EPA, the Permittee must submit results of any other sampling, regardless of the test method used.

E. Records Contents

Records of monitoring information must include:

1. The date, exact place, and time of sampling or measurements,

2. Names of the individual(s) who performed the sampling or measurements,

3. The date(s) analyses were performed,

4. Name of the individual(s) who performed the analyses**,**

5. The analytical techniques or methods used, and

6. The results of such analyses.

F. Retention of Records

The Permittee must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Permit, and records of all data used to complete the NOI to become authorized to discharge under this permit, for a period of at least five years from the date of the sample, measurement, report, or NOI. This period may be extended by request of the EPA at any time. Data collected on-site, copies of DMRs and Annual Reports, and a copy of this NPDES permit and the NOI must be maintained on site during the duration of activity at the permitted location or in the possession of staff when working on-site.

G. Twenty-four Hour Notice of Noncompliance Reporting

1. The Permittee must report the following occurrences of noncompliance by telephone to the EPA (206-553-1846). For Lummi Nation dischargers, Permittees must also report to the Lummi Natural Resources Department Director (360-410-1706), and, for Spokane Tribe dischargers, to the Water Control Board (509-626-4409), as soon as possible, but no later than 24 hours from the time the Permittee becomes aware of the circumstances:

a. Any unanticipated bypass that exceeds an effluent limitation in the Permit;

b. Any upset that exceeds an effluent limitation in the permit;

c. Violation of an applicable maximum daily discharge limitation for total residual chlorine.

2. A written report must also be submitted within 5 days after the Permittee becomes aware of the circumstances. The written submission must contain:

a. Description of the noncompliance and its cause;

b. The period of noncompliance, including exact dates and times;

c. If the noncompliance has not been corrected, the anticipated time it is expected to continue; and

d. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

3. The written report must be submitted, as follows:

a. to the EPA at the address in §V.B.1.a, above;

b. for Lummi Nation dischargers, the report must also be submitted to the address in §V.B.1.b, above.

c. for Spokane Tribe dischargers, the report must also be submitted to the address in §V.B.1.c, above.

4. The EPA may waive the requirement for a written report of non-compliance on a case-by-case basis, if an oral report has been received within 24 hours by telephone at 206-553-1846.

H. Other Noncompliance Reporting

The Permittee must report all instances of noncompliance, not required to be reported within 24 hours, at the time that monitoring reports for §V.B ("Reporting of Monitoring Results") are submitted. The report must contain the information listed in §V.G.3 of this permit ("Twenty-four Hour Notice of Noncompliance Reporting").

VII. Compliance Responsibilities

A. Duty to Comply

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (the Act) and is grounds for enforcement action, for termination of the authorization to discharge, or for denial of coverage after submittal of a Notice of Intent.

B. Penalties for Violations of Permit Conditions

1. **Civil Penalties.** Pursuant to 40 CFR §19 and the Act, any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed the maximum amounts authorized by Section 309(d) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. §2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. §3701 note) (currently $37,500 per day for each violation).

2. **Administrative Penalties.** Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Pursuant to 40 CFR §19 and the Act, administrative penalties for Class I violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(A) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. §2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. §3701 note) (currently $16,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $37,500). Pursuant to 40 CFR §19 and the Act, penalties for Class II violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(B) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. §2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. §3701 note) (currently $16,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $177,500).

1. Criminal Penalties:

a. Negligent Violations. The Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both.

b. Knowing Violations. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

c. Knowing Endangerment. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

d. False Statements. The Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. The Act further provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

C. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate

The Permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The Permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

F. Bypass of Treatment Facilities

2. **Bypass not exceeding limitations.** The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs b and c of this section.

   Notice:

   a. <u>Anticipated bypass</u>. If the Permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.

   b. <u>Unanticipated bypass</u>. The Permittee shall submit notice of an unanticipated bypass as required under permit §V.G (Twenty-four Hour Notice of Noncompliance Reporting).

3. **Prohibition of bypass.** Bypass is prohibited and the EPA may take enforcement action against the Permittee for a bypass, unless:

   a. The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

   c. The Permittee submitted notices as required under §VI.F.2, above.

4. The Director of the Office of Compliance and Enforcement may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in §VI.F.3.

G. Upset Conditions

1. **Effect of an upset.** An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations, if the requirements of §VI.G.2, below, are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

2. **Conditions necessary to demonstrate an upset.** To establish the affirmative defense of upset, the Permittee shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence, that:

   a. An upset occurred and that the Permittee can identify the cause(s) of the upset;

   b. The permitted facility was at the time being properly operated;

   c. The Permittee submitted notice of the upset as required under §V.G (Twenty-four Hour Notice of Noncompliance Reporting); and

   d. The Permittee complied with any remedial measures required under §VI.D (Duty to Mitigate).

3. **Burden of proof.** In any enforcement proceeding, the Permittee seeking to establish the occurrence of an upset has the burden of proof.

H. Toxic Pollutants

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

I. Planned Changes

The Permittee must give notice to the EPA as soon as possible of any planned physical alterations or additions to the permitted facility whenever:

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source as determined in 40 CFR §122.29 (b); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in the permit.

J. Anticipated Noncompliance

The Permittee must give advance notice to the EPA of any planned changes in the permitted facility or activity that may result in noncompliance with this permit.

VIII. General Provisions

A. Permit Actions.

This permit or coverage under this permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR §§ 122.62, 122.64, or 124.5. The filing of a request by the Permittee for a permit modification, revocation and reissuance, termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

B. Duty to Reapply

If the Permittee intends to continue an activity regulated by this permit after the expiration date of this permit, the Permittee must submit a Notice of Intent. In accordance with 40 CFR §122.28(b)(2)(iii), the Permittee must submit a new Notice of Intent at least 180 days before the expiration date of this permit, unless the Regional Administrator has granted permission to submit the Notice of Intent at a later date in accordance with 40 CFR §122.21(d). If the NOI is received by the applicable deadline, even if the permit is not reissued before the expiration date, the conditions of the permit will continue in force until the effective date of the subsequently reissued permit. If the facility is no longer operating but still has a potential to discharge when the permit is due to expire, the Permittee must reapply for coverage.

C. Duty to Provide Information

The Permittee must furnish to the EPA and, within the time specified in the request, any information that the EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee must also furnish to the EPA, upon request, copies of records required to be kept by this permit.

D. Other Information

When the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or that it submitted incorrect information in a notice of intent or any report to the EPA, it must promptly submit the omitted facts or corrected information.

E. Signatory Requirements

All Notices of Intent, reports, or information submitted to the EPA must be signed and certified as follows.

1. All Notices of Intent must be signed as follows:

   a. For a corporation: by a responsible corporate officer.

   b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.

   c. For a municipality, state, federal, Indian tribe, or other public agency: by either a principal executive officer or ranking elected official.

2. All reports required by the permit and other information requested by the EPA must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described above;

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company; and

   c. The written authorization is submitted to the EPA.

3. **Changes to authorization.** If an authorization under §VII.E.2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of §VII.E.2 must be submitted to the EPA prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. **Certification.** Any person signing a document under this Part must make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

F. Availability of Reports

In accordance with 40 CFR §2, information submitted to the EPA pursuant to this permit may be claimed as confidential by the Permittee. In accordance with the Act, permit applications, permits and effluent data are not considered confidential. Any confidentiality claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, the EPA may make the information available to the public without further notice to the Permittee. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR §2, Subpart B (Public Information) and 41 Fed. Reg. 36902 through 36924 (September 1, 1976), as amended.

G. Inspection and Entry

The Permittee must allow the EPA, an authorized EPA representative (including an authorized contractor acting as a representative of the Administrator), and, in the case of Permittees discharging to waters of the Spokane Tribe, an authorized representative of the Tribal Water Control Board or its designee, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

H. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to persons or property or invasion of other private rights, nor any infringement of federal, tribal, state or local laws or regulations.

I. Transfer

Authorization to discharge under this permit may be automatically transferred to a new Permittee on the date specified in the agreement only if:

1. The current Permittee notifies the Director of the Office of Water and Watersheds at least 30 days in advance of the proposed transfer date;

2. The notice includes a written agreement between the existing and new Permittees containing a specific date for transfer of permit responsibility and liability between them; and

3. The Director does not notify the existing and new permittees of the intent to revoke and reissue the authorization to discharge.

J. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Act.

IX. Definitions and Acronyms

the Act ... the Clean Water Act, codified at 33 U.S.C. §1251 et seq.

Aquaculture facility … a hatchery, fish farm, or other facility which contains, grows, or holds fish for later harvest (or process) and sale or for release.

Background ... the biological, physical, or chemical condition of waters measured at a point immediately upstream of the influence of the discharge.

Best Management Practices (BMPs) ... schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of Waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. (40 CFR §122.2)

Bypass ... the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR §122.41 (m))

CAAP … concentrated aquatic animal production; At 40 CFR §122.24, the EPA defines concentrated aquatic animal production (CAAP) facilities as point sources subject to the National Pollutant Discharge Elimination System (NPDES) permit program including those upland facilities that discharge for at least 30 days per year and contain, grow, or hold cold water fish species or other cold water aquatic animals except in facilities which produce less than 9,0000 harvest weight kilograms (approximately 20,000 pounds) of aquatic animals per year and facilities which feed less than 2,272 kilograms (approximately 5,000 pounds) of food during the calendar month of maximum feeding.

CFR ... Code of Federal Regulations, the body of federal regulations. Title 40 of the Code of Federal Regulations, Parts 1 - 1499 contains regulations of the Environmental Protection Agency.

Chemical ... any substance that is added to the facility to maintain or restore water quality for aquatic animal production and that may be discharged to Waters of the United States.

Clean Water Act ... formerly referred to as the Federal Water Pollution Control Act of 1972, codified at 33 U.S.C. §1251 et seq.

Cold water species … Cold water aquatic animals include, but are not limited to, the Salmonidae family of fish, e.g. trout and salmon.

*Composite …*a combination of four or more discrete samples taken at on-half hour intervals or greater over a 24-hour period; at least one fourth of the samples must be taken while cleaning. Facilities with multiple effluent discharge points and/or influent points must composite samples from all points proportionally to their respective flows.

Critical Habitat ...the geographical area occupied by a threatened or endangered species. See 16 U.S.C. §1532 (the Endangered Species Act of 1973) for a complete definition.

CWA ... the Clean Water Act.

DMR ... discharge monitoring report

Discharge . . . any addition of any pollutant or combination of pollutants from any point source to waters of the U.S. (40 CFR §122.2)

Ecology … the Washington Department of Ecology.

Effluent Limitations Guidelines ... regulations published by EPA pursuant to CWA Section 304 (b).

EPA ... the United States Environmental Protection Agency. The State of Washington is located in Region 10 of the EPA.

Extralabel Drug Use . . . a drug approved under the Federal Food, Drug, and Cosmetic Act that is not used in accordance with the approved label directions; see 21 CFR 530. (40 CFR §451.2(f))

Flow-through System ... a system designed for continuous water flow to waters of the United States through chambers used to produce aquatic animals. Flow-through systems typically use either raceways or tank systems. Water is transported from nearby rivers or springs to raceways which are typically long, rectangular chambers at or below grade, constructed of earth, concrete, plastic, or metal. Tanks systems are similarly supplied with water and concentrate aquatic animals in circular or rectangular tanks above grade. The term “flow through system” does not include net pens.

General Permit ... an NPDES permit issued in accordance with 40 CFR §122.28, authorizing a category of discharges under the CWA within a geographical area. (40 CFR §122.2)

Grab Samples ... a discrete volume of water collected, by hand or machine, during one short sampling period (less than 15 minutes).

*Hatchery …*culture or rearing unit such as a raceway, pond, tank, net or other structure used to contain, hold or produce aquatic animals. The containment system includes structures designed to hold sediments and other materials that are part of a wastewater treatment system.(40 CFR §451.2 (c))

Hazardous Substance … any substance designated under 40 CFR part 116, pursuant to Section 311 of the CWA.

Impaired Waters ... waters identified by Ecology pursuant to Section 303(d) of the Clean Water Act for which effluent limitations guidelines are not stringent enough to implement all applicable water quality standards.

INAD . . . Investigational New Animal Drug, a drug for which there is a valid exemption in effect under section 512(j) of the Federal Food, Drug, and Cosmetic Act, 21 U.S.C.360b(j), to conduct experiments. (40 CFR §451.2(h))

Indian Country . . . “all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation, (b) all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a state, and (c) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.” (18 USC §1151)

Listed Endangered or Threatened Species ... species that are in danger of extinction throughout all or a significant portion of their range or that are likely to become endangered species within the foreseeable future. See 16 U.S.C. §1532 (the Endangered Species Act of 1973) for a complete definition.

Minimum level (ML) means the concentration at which the entire analytical system must give a recognizable signal and an acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed (40 CFR §136).

Net Pen ... a stationary, suspended, or floating system of nets or screens in open marine, lake, or estuarine waters of the United States. Net pen systems are typically located along a shore or pier or may be anchored and floating offshore. Net pens and cages rely on tides or currents to provide a continual supply of high quality water.

New Source ... any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced:

(a) After promulgation of standards of performance under Section 306 of the CWA, which are applicable to such source, or
(b) After proposal of standards of performance in accordance with Section 306 of the CWA, which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal. (40 CFR §122.2)

NOI (Notice of Intent) ... a written application form submitted to the permitting authority (i.e. EPA) seeking authorization to discharge under a General Permit.

NPDES ... the National Pollutant Discharge Elimination System, the national program for issuing, modifying, revoking and reissuing, terminating, monitoring, and enforcing [wastewater discharge] permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the CWA. (40 CFR §122.2)

Off-line Settling Basin ... a constructed retention basin that receives wastewater from cleaning of aquaculture facility rearing or holding units and/or quiescent zones for the retention and treatment of the wastewater through settling of solids.

Outfall ... a discrete point or outlet where the discharge is released to the receiving water.

Outstanding National Resource … a state park, game sanctuary or refuge; a national park, preserve, or monument; a national wildlife refuge; a national wilderness area; or a river designated as *wild* or *scenic* under the Wild and Scenic Rivers Act.

Permittee ... an individual, association, partnership, corporation, municipality, Indian Tribe or authorized Indian tribal organization, State or Federal agency, or an agent or employee thereof, who is authorized by the EPA to discharge in accordance with the requirements of the General Permit.

Point Source ... any discernible, confined, and discrete conveyance from which pollutants are or may be discharged.

Pollutant . . . chemical wastes, biological materials, … industrial waste discharge into water. (40 CFR §122.2)

Production … the act of harvesting, processing or releasing fish, or the harvest weight of fish contained, grown, or held in a CAAP facility. (40 CFR §122, Appx. C)

Publicly Owned Treatment Works (POTW) ... devices and systems, owned by a state or municipality, used in storage, treatment, recycling, and reclamation of municipal sewage or liquid industrial wastes, including sewers that convey wastewater to a POTW treatment plant. (40 CFR §403.3)

QA … quality assurance, an integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed to meet the performance criteria.

Recirculating System ... a system that filters and reuses water in which the aquatic animals are produced prior to discharge; recirculating systems typically use tanks, biological or mechanical filtration, and mechanical support equipment to maintain high quality water to produce aquatic animals.

Regional Administrator ... the Administrator of Region 10 of the United States Environmental Protection Agency, or an authorized representative.

Severe property damage … substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR § 122.41(m)(ii))

Special Resource Tribal Waters … waters that comprise a special and/or a unique resource to the Tribe, as determined by the appropriate tribal authority at the time a discharger seeks coverage under this General Permit

TSS ... Total Suspended Solids

Tier II water … waters of a higher quality than the criteria assigned that may not be degraded unless such lowering of water quality is necessary and in the overriding public interest.

Toxic pollutants … those pollutants, or combinations of pollutants, including disease-causing agents, which, after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of information available to the Administrator, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformation in such organisms or their offspring. (CWA §502(13))

Toxic substances ... substances that when discharged above natural background levels in waters of the state have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the Department of Ecology.

Upland hatchery ... a hatchery not located within the waters of the State (or, by extension, the U.S.) where fish are hatched, fed, nurtured, held, maintained, or reared to reach the size of release or for market sale. (WAC 173-221A-030)

Upset ... an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation. (40 CFR §122.41(n)(1)).

Waters of the United States ... (40 CFR §122.2)

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(b) All interstate waters, including interstate wetlands;

(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(1) Which are or could be used by interstate or foreign travelers for recreational or other purposes;

(2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(3) Which are or could be used for industrial purposes by industries in interstate commerce;

(d) All impoundments of waters otherwise defined as Waters of the United States under this definition;

(e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;

(f) The territorial sea; and

(g) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition

Appendix A

Notice of Intent Contents

A Notice of Intent (NOI) to discharge under the General Permit,
supplying the information indicated in this appendix,
and must be submitted to the EPA Region 10
in order to obtain authorization for the discharge(s).
See §II.A of this permit.

NOI

Notice of Intent to be Covered Under EPA's NPDES Permit for Federal Aquaculture Facilities and Aquaculture Facilities Located in Indian Country within the Boundaries of the State of Washington

General Permit WAG130000

In addition to the requirements in the following pages, a complete application must also include the following:

☐ 1) An area map showing regional context

☐ 2) A sketch, aerial photograph, or map of the existing or proposed facility with the following clearly marked (include scale):

- ☐ Approximate overall dimensions of the facility
- ☐ All raceways and rearing ponds
- ☐ All water sources and water flow rates
- ☐ Any settling ponds, including dimensions and volume
- ☐ All discharge points and receiving waters
- ☐ All water flow paths
- ☐ Sludge disposal areas
- ☐ Water conditioning units
- ☐ Water treatment units (such as off-line settling basins)
- ☐ Holding tanks
- ☐ Locations where flows are measured
- ☐ Points of chemical and therapeutic drug addition
- ☐ Points of feed addition
- ☐ Painted or caulked surfaces in contact with water

☐ 3) A sketch, aerial photograph, or map of all satellite facilities that are part of your hatchery program, in relation to the facility for which you are seeking NPDES permit coverage

☐ 4) A map to accompany driving directions to the facility (if address is not posted or visible on-site)

☐ 5) A completed signature page

Notice of Intent

To comply with NPDES General Permit No. WAG130000 for Federal Aquaculture Facilities and Aquaculture Facilities Located in Indian Country within the Boundaries of the State of Washington

Permit Number for your facility (if already enrolled in this permit):
Other permit number(s), date, and issuing agency:

Section 1. Owner/Operator Information

Owner Name:	Title:
Phone:	Fax:
Email:	

Owner Mailing Address

Line 1:		
Line 2:		
City:	State:	Zip:

Operator Information

Owner Name:	Title:
Phone:	Fax:
Email:	

Operator Mailing Address

Line 1:		
Line 2:		
City:	State:	Zip:

Section 2. Facility Information

Facility Name:
Tribal or Federal Facility? ☐ Tribal ☐ Federal ☐ Other __________________
Is the facility located in Indian Country? ☐ Yes ☐ No Notes:

Facility Mailing Address

Line 1:		
Line 2:		
City:	State:	Zip:

Facility Physical Address

Line 1:		
Line 2:		
City:	State:	Zip:
County/Reservation:		

Please provide driving directions to the facility from the nearest town or city. Attach a separate page if needed. Include a map to accompany these directions if the address is not posted or visible on-site.

Is there a locked gate or barrier that prevents access via car to the facility? ☐ Yes ☐ No

Notes:

Section 2. Facility Information (cont'd)

Is this an existing facility? ☐ Yes ☐ No	Date of first discharge:
Is this a planned/proposed facility? ☐ Yes ☐ No	
If yes, estimated construction start date:	Estimated construction end date:
Date(s) facility remodeled, expanded, or upgraded (MM/DD/YYYY):	
Have there been any changes or additions to the facility that will increase it to more than 100,000 lbs of annual production since the last permit application? ☐ Yes ☐ No Describe:	
Are there any planned remodels, additions, or expansions that will increase annual production to over 100,000 lbs during the next 5 years? ☐ Yes ☐ No Describe:	

Section 2. Facility Information (cont'd) Satellite Facilities

Please describe any satellite facilities that operate in tandem with the NPDES-permitted facility as part of the hatchery program. This may include off-site acclimation ponds, net pens, other hatcheries that fish are transported to or from, facilities from which eggs are delivered, etc.

Attach a sketch, aerial photograph, or map to show where any satellite facilities are located in relation to the facility for which you are seeking NPDES coverage in this application.

Submit additional pages as necessary to cover all additional facilities.
Label additional pages: Satellite Facilities/Hatchery Program

Name of facility:
Describe the function of satellite facility and how it relates to the facility for which this NOI is requesting NPDES coverage. Include the species raised and life stage for each facility that is part of the hatchery program.

Satellite Facility Physical Address

Line 1:		
Line 2:		
City:	State:	Zip:
County/Reservation:		

Satellite Facility Operator Information

Agency/Tribe/Entity:	Name of Facility Manager:
Phone:	
Email:	

Satellite Facility Operator Mailing Address

Line 1:		
Line 2:		
City:	State:	Zip:

Section 3. Operations and Production

Is the production system best described as:

☐ Flow through ☐ Recirculating ☐ Pond system ☐ Other_______________________________________

Does the facility operate year-round? ☐ Yes ☐ No
If not, please indicate which months the facility holds fish or eggs:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

List the species grown or held at your facility and estimate the annual production of each in gross harvestable weight. If fish are released rather than harvested, list the estimated weight at time of release. The estimate can be a range over the next 5 years, if appropriate.

Species	Fish Produced (lbs)	Receiving Water to which Fish are Released	Month Released/ Spawned

Fill in the table below with the highest production numbers expected for the next 5 years. List the maximum amount of fish on-site and the maximum amount of food **per month** for the year of maximum production. For **new facilities**, provide information for the year of highest anticipated production within the next 5 years.

Month	Total Fish (lbs)	Fish Feed (lbs)	Month	Total Fish (lbs)	Fish Feed (lbs)
January			July		
February			August		
March			September		
April			October		
May			November		
June			December		

From what year are these data? _________________________

Note: If you operate for 30 or more days per year and exceed the production (20,000 lbs) and feed thresholds (5,000 lbs of food during the month of maximum feeding) for even a brief period of time, your facility is required to apply for NPDES permit coverage.

Section 3. Operations and Production (cont'd)

Does this facility process fish for market at this location? ☐ Yes ☐ No
Are fish spawned on-site? ☐ Yes ☐ No During which months are fish spawned on-site?
Describe wastes generated as a result of on-site spawning (e.g., blood, anesthetics, disinfectants, carcasses):
Describe how spawning wastes are disposed of and to which outfall (if any):

Provide the percentage of fish released from the facility <u>directly</u> to a lake, river, or other location.		
☐ Lake _____ % Approximate lbs fish: Location/Receiving water name:	☐ River _____ % Approximate lbs fish: Location/Receiving water name:	☐ Other _____ % Approximate lbs fish: Location/Receiving water name:
Provide the percentage of fish <u>hauled off-site</u> to a lake, river, or other location.		
☐ Lake _____ % Approximate lbs fish: Location/Receiving water name:	☐ River _____ % Approximate lbs fish: Location/Receiving water name:	☐ Other _____ % Approximate lbs fish: Location/Receiving water name:

Are fish held on-site for broodstock? ☐ Yes ☐ No Describe the species, where obtained, quantity, and where held (i.e., raceway or pond):

Section 4. Source Waters (Intakes)

Describe the facility's water sources. Attach additional pages as necessary.

Source No. 1	Source Water Name:	Max Flow	Min Flow	Avg Flow	Units (cfs or gpm)
Source Water Treatment:					
Are solids removed from influent water? ☐ Yes ☐ No Describe:					
Source No. 2	Source Water Name:	Max Flow	Min Flow	Avg Flow	Units (cfs or gpm)
Source Water Treatment:					
Are solids removed from influent water? ☐ Yes ☐ No Describe:					
Source No. 3	Source Water Name:	Max Flow	Min Flow	Avg Flow	Units (cfs or gpm)
Source Water Treatment:					
Are solids removed from influent water? ☐ Yes ☐ No Describe:					
Source No. 4	Source Water Name:	Max Flow	Min Flow	Avg Flow	Units (cfs or gpm)
Source Water Treatment:					
Are solids removed from influent water? ☐ Yes ☐ No Describe:					
Source No. 5	Source Water Name:	Max Flow	Min Flow	Avg Flow	Units (cfs or gpm)
Source Water Treatment:					
Are solids removed from influent water? ☐ Yes ☐ No Describe:					

Section 5. Receiving Waters

Do the receiving waters primarily consist of: ☐ Fresh water ☐ Salt/Brackish water ☐ Other (Describe below)
Notes:

- Indicate if a receiving water is listed as impaired, in accordance with Section 303(d) of the Clean Water Act.
- Indicate the pollutants for which the water body is impaired and any wasteload allocations that have been assigned to the facility.
- Indicate if the discharge is to waters in Indian Country located within one mile upstream of a waterbody listed as impaired.
- Refer to the 303(d) list of impaired waters at http://www.ecy.wa.gov/programs/Wq/303d/index.html.
- If there is an applicable Total Maximum Daily Load (TMDL) with a Wasteload Allocation assigned to the facility, include that information here.

Receiving Water			
Receiving Water	Pollutant for which impaired	Wasteload Allocations	TMDL document the WLA
Additional Notes:			

Section 6. Wastewater

Wastewater Discharges						
Outfall	Location of Outfall				Notes: Include source (where in the facility the wastewater is generated), frequency, duration & volume (cfs or gpm) of discharge)	Name of Receiving Water
		Degrees	Minutes	Seconds		
001	Latitude					
	Longitude					
002	Latitude					
	Longitude					
003	Latitude					
	Longitude					
004	Latitude					
	Longitude					
005	Latitude					
	Longitude					
006	Latitude					
	Longitude					
007	Latitude					
	Longitude					
008	Latitude					
	Longitude					
009	Latitude					
	Longitude					
010	Latitude					
	Longitude					

Section 6. Wastewater (cont'd)

Indicate the type(s) of wastewater treatment provided at this facility.

In-line Settling Basin

Do any rearing units discharge through an in-line settling basin? ☐ Yes ☐ No Describe in-line settling basin (length, volume, retention time, etc.): Which rearing units discharge to the in-line settling basin, and when?

Off-line Settling Basin

Does the facility use an off-line settling basin? ☐ Yes ☐ No Number of off-line settling basins:	
Which rearing units discharge to the off-line settling basin, and when/under what circumstances?	
Does the off-line settling basin discharge directly to surface water? ☐ Yes ☐ No Describe:	
Basin size:	Retention time:
Water volume of off-line settling basin:	
Estimate the number of discharges from the off-line settling basin per year:	
How often is the off-line settling basin cleaned/excavated?	
If an off-line settling basin is used for cleaning wastes, is there a quiescent zone at the end of the last raceway or rearing pond in each series? ☐ Yes ☐ No Describe:	
Is there a mechanism to block discharges of floating material? ☐ Yes ☐ No Describe:	
Does the facility discharge to the ground? ☐ Yes ☐ No Describe:	
Does the facility have unlined structures? ☐ Yes ☐ No	
Material:	Quantity:
Describe:	

Section 6. Wastewater (cont'd)

Construction of Off-line Settling Basin (if known)	
Liner Material	Thickness
Concrete	Inches
Asphalt	Inches
Clay or earthen	Inches
Plastic PVC/HDPE/other Describe:	mils

Pond and Raceway Cleaning
How frequently are the ponds and/or raceways cleaned (specify which)? Notes:
Methods of cleaning: ☐ Vacuum ☐ Manually ☐ Other ____
What is done with the removed solids?
Are ponds cleaned prior to fish release? ☐ Yes ☐ No
Are any liquid or solid wastes discharged to the ground? ☐ Yes ☐ No If yes, describe:
Are any wastes (other than domestic sewage) discharged to a septic system? ☐ Yes ☐ No If yes, describe:
Are any solids or wastes (other than domestic waste) discharged to a publicly owned treatment works? ☐ Yes ☐ No If yes, name of facility: Describe waste:
Are wastes discharged to any other waste treatment system? ☐ Yes ☐ No If yes, describe:

Section 7. Solid Waste Disposal

Describe annual quantities of solids (including fish mortalities) disposed and location of disposal.

Type of Solid Disposed	Quantity Disposed	Date Disposed	Location Disposed
Notes:			

Section 8. Aquaculture Drugs and Chemicals

Please indicate which drugs or chemicals you plan to use at the facility during the next 5 years.

Plan to use in the next 5 years?	Investigational New Animal Drug (INAD)?	Drug or Chemical
☐ Yes ☐ No	☐ Yes ☐ No	Azithromyicin
☐ Yes ☐ No	☐ Yes ☐ No	Chloramine-T
☐ Yes ☐ No	☐ Yes ☐ No	Chlorine
☐ Yes ☐ No	☐ Yes ☐ No	Draxxin
☐ Yes ☐ No	☐ Yes ☐ No	Erythromycin - injectable
☐ Yes ☐ No	☐ Yes ☐ No	Erythromycin - medicated feed
☐ Yes ☐ No	☐ Yes ☐ No	Florfenicol (Aquaflor)
☐ Yes ☐ No	☐ Yes ☐ No	Formalin - 37% formaldehyde
☐ Yes ☐ No	☐ Yes ☐ No	Herbicide - describe:
☐ Yes ☐ No	☐ Yes ☐ No	Hormone - describe:
☐ Yes ☐ No	☐ Yes ☐ No	Hydrogen Peroxide
☐ Yes ☐ No	☐ Yes ☐ No	Iodine
☐ Yes ☐ No	☐ Yes ☐ No	Oxytetracycline
☐ Yes ☐ No	☐ Yes ☐ No	Potassium Permanganate
☐ Yes ☐ No	☐ Yes ☐ No	Romet
☐ Yes ☐ No	☐ Yes ☐ No	SLICE (emamectin benzoate)
☐ Yes ☐ No	☐ Yes ☐ No	Sodium Chloride - salt
☐ Yes ☐ No	☐ Yes ☐ No	Vibrio vaccine
☐ Yes ☐ No	☐ Yes ☐ No	Other:
☐ Yes ☐ No	☐ Yes ☐ No	Other:
☐ Yes ☐ No	☐ Yes ☐ No	Other:

Section 9. Painted or Caulked Surfaces

Describe all painted and caulked surfaces that are in regular contact with water that is discharged to waters of the U.S.

Location of such surfaces should appear in the drawing required as part of the checklist on page 1.

Type of Paint/Caulk	Where applied (including area)	Amount applied	Date applied	Reason for application
Notes:				

Section 10. Other Information/Changes

Describe any changes to the facility or operations since the last permit application. Disregard this section if this is a new or proposed facility.

Section 11. Signature and Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly evaluate and gather the information submitted. Based on my inquiry of the person or persons, who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed name of person signing	Title
Applicant Signature	Date Signed

All permit applications must be signed as follows:

a. For a corporation: by a responsible corporate officer.

b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.

c. For a municipality, state, federal, Indian tribe, or other public agency: by either a principal executive officer or ranking elected official.

Section 12. Submittal Information

Send the complete, signed information, along with required attachments, to the following address:

U.S. EPA Region 10, OWW-130

Washington Hatchery NOI

1200 Sixth Avenue, Suite 900

Seattle, WA 98101-3140

Appendix B

Effluent Calculations

<u>Guidance on Calculating Effluent Values</u>

Calculating "Net" Effluent Values

Pollutant Concentrations for Total Suspended Solids and Settleable Solids are measured at <u>both</u> influent and effluent monitoring locations. The <u>net</u> concentration is the difference between the two measurements and can either be positive or negative since the pollutant concentration may either increase or decrease as the water passes through the facility. It is calculated as follows:

Effluent concentration (mg/L) -- influent concentration (mg/L) =

Net concentration (mg/L)

Appendix C

Quality Assurance Plan & Best Management Practices Plan Certification

Quality Assurance Plan
(QA Plan)
Certification

Facility Name:____

NPDES Permit Number:______________________

The QA Plan is complete and is available upon request to the EPA.

The QA Plan is being implemented by trained employees.

The QA Plan has been reviewed and endorsed by the facility manager.

The individuals responsible for implementation of the QA Plan have been properly trained.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature:	**Title/Company:**
Print Name:	**Date:**

An existing discharger must submit this certification within 90 days of the effective date of this permit. For a new Permittee, this certification must be submitted no later than the written Notice of Intent to be covered under this permit. The certification must be submitted to the EPA (§III.B.7 of the permit).

Best Management Practices Plan
(BMP Plan)
Certification

Facility Name:____

NPDES Permit Number:_______________________

The BMP Plan is complete and is available upon request to the EPA.

The BMP Plan is being implemented by trained employees.

The BMP Plan has been reviewed and endorsed by the facility manager.

The individuals responsible for implementation of the BMP Plan have been properly trained.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature:	**Title/Company:**
Print Name:	**Date:**

An existing discharger must submit this certification within 90 days of the effective date of this permit. For a new Permittee, this certification must be submitted no later than the written Notice of Intent to be covered under this permit. The certification must be submitted to the EPA (§III.C.3 of the permit).

Appendix D

Drug and Chemical Use Report Contents

CHECKLIST FOR ORAL REPORT FOR INVESTIGATIONAL NEW ANIMAL DRUG (INAD) USE, EXTRALABEL DRUG USE, AND FIRST USE OF LOW REGULATORY PRIORITY DRUGS AND POTASSIUM PERMANGANATE

(Provide an oral report to the EPA: 206-553-1846 and to Ecology (where applicable) within 7 days after initiating use of the drug)

(First row is an example.)

Name of Drug (INAD & Extralabel) Used & Reason for Use	Method of Application	First Date of Drug Use	Date Oral Report to EPA	Person reporting
Extralabel: Erythromycin Treat bacterial infections	*Injection*	*09/09/04*	*09/10/04*	*MJ*

WRITTEN REPORT FOR AGREEING TO PARTICIPATE IN AN INAD STUDY

(Submit a written report to the EPA and Ecology within 7 days of agreeing or signing up to participate in an INAD study)

Facility Name:______________________NPDES Permit Number:_____________

Name of person submitting this report:________________________________

Date of agreement to participate in INAD study: ___________________________

Date this written report will be submitted:__________________________________

The first row is an example.

Expected Dates of Use	Name of INAD Used	Disease or Condition Intended to Treat	Method of Application	Dosage
09/09/04	*Oxytetracycline*	*For controlling columnaris in trout*	☑ *Medicated feed* ❑ *Injection* ❑ *Bath treatment* ❑ *Other:* ________	
			❑ Medicated feed ❑ Injection ❑ Bath treatment ❑ Other: ________	
			❑ Medicated feed ❑ Injection ❑ Bath treatment ❑ Other: ________	
			❑ Medicated feed ❑ Injection ❑ Bath treatment ❑ Other: ________	

WRITTEN REPORT FOR INAD AND EXTRALABEL DRUG USE AND FIRST USE OF LOW REGULATORY PRIORITY DRUGS AND POTASSIUM PERMANGANATE

(Submit a written report to the EPA and Ecology within 30 days after initiating use of the drug)

Facility Name:___________________NPDES Permit Number:_________________

Name of person submitting this report:____

Date this written report will be submitted to the EPA:_________________

For Extralabel Drug Use, include the **name of the prescribing veterinarian** and **date of the prescription** in a footnote.

The first row is an example.

Name of Drug & Reason for Use	Date and Time of Application (start & end)	Duration	Method of Application	Total Amount of Active Ingredient Added	Total Amount of Medicated Feed Added*
Oxytetracycline *For control of columnaris in walleye*	*09/09/04 10:00 AM* *09/13/04 10:00 AM*	*5 consecutive days*	☑ *Medicated feed* ☐ *Injection* ☐ *Bath treatment* ☐ *Other: ______*	*1 g/lb as sole ration*	*50 lbs*
			☐ Medicated feed ☐ Injection ☐ Bath treatment ☐ Other: ______		
			☐ Medicated feed ☐ Injection ☐ Bath treatment ☐ Other: ______		
			☐ Medicated feed ☐ Injection ☐ Bath treatment ☐ Other: ______		

* Applies only to drugs applied through medicated feed.

CHEMICAL LOG SHEET

(SEE ALSO THE REQUIREMENTS IN THE ANNUAL REPORT)

Facility Name:________________________________ NPDES Permit Number:__________________

Date	Raceway Treated	Chemical Name[1]	Active Ingredient	Amount Applied	Units	Duration of Treatment	Treatment Type[2]	Flow Treated (cfs)	Total Effluent Flow (cfs)	Effluent Conc. (ppb)	Person reporting

[1] Both a copy of the label with application requirements and the Material Safety Data Sheet (MSDS) must be kept in your records.

[2] Treatment type means, for example, static or flush bath, injection or feed.

Appendix E

Annual Report Contents

Annual Report of Operations for Year ________________

To comply with NPDES General Permit No. WAG130000 for Federal Aquaculture Facilities and Aquaculture Facilities Located in Indian Country within the Boundaries of the State of Washington

NPDES # for your Facility:

Facility & Owner Information

Facility Name:	
Operator Name (Permittee):	
Address:	
Email:	Phone:
Owner Name (if different from operator):	
Email:	Phone:

Best Management Practices (BMP) Plan

Has the BMP Plan been reviewed this year? ☐ Yes ☐ No

Does the BMP Plan fulfill the requirements of the General Permit? ☐ Yes ☐ No

Summarize any changes to the BMP Plan since the last annual report. Attach additional pages if necessary.

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Operations and Production

Total harvestable weight produced in the past calendar year in pounds (lbs):

Pounds of food fed to fish during the maximum month:

List the species grown or held at your facility and the annual production of each in gross harvestable weight. If fish were released rather than harvested, list the weight at time of release.

Species	Fish Produced	Receiving Water(s) to which Fish were Released	Month Released/ Spawned

Fill in the table below with production numbers from the past year. List the **maximum** amount of fish on-site and the maximum amount of food fed **per month**.

Month	Total Fish (lbs)	Fish Feed (lbs)	Month	Total Fish (lbs)	Fish Feed (lbs)
January			July		
February			August		
March			September		
April			October		
May			November		
June			December		

Additional Comments:

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Solid Waste Disposal

Describe annual quantities of solids (including fish mortalities) disposed and location of disposal.

Type of Solid Disposed	Quantity Disposed	Date Disposed	Location Disposed
Additional Comments:			

Fish Mortalities

Include a description and the dates of mass mortalities in the past year (more than 5% per week). Attach additional pages, if necessary. Include total mortalities from all causes.

Date	Cause of Deaths	Steps Taken to Correct Problem	Pounds of Fish
Additional Comments:			

Noncompliance Summary

Include a description and the dates of noncompliance events (including spills), the reasons for the incidents, and the steps taken to correct the problems. Attach additional pages, if necessary.

Inspections & Repairs for Production & Wastewater Treatment Systems

Date Inspected	Date Repaired	Description of System Inspected and/or Repaired

Aquaculture Drugs and Chemicals

Please indicate whether you used each drug/chemical **during the past calendar year**.
Describe the use of each drug/chemical in more detail on the following pages.

Used in the past year?	Drug or Chemical
☐ Yes ☐ No	Azithromycin
☐ Yes ☐ No	Chloramine-T: ***See additional reporting requirements on page 7***
☐ Yes ☐ No	Chlorine
☐ Yes ☐ No	Draxxin
☐ Yes ☐ No	Erythromycin - injectable
☐ Yes ☐ No	Erythromycin - medicated feed
☐ Yes ☐ No	Florfenicol (Aquaflor)
☐ Yes ☐ No	Formalin - 37% formaldehyde: ***See additional reporting requirements on page 7***
☐ Yes ☐ No	Herbicide - describe:
☐ Yes ☐ No	Hormone - describe:
☐ Yes ☐ No	Hydrogen Peroxide: ***See additional reporting requirements on page 7***
☐ Yes ☐ No	Iodine: ***See additional reporting requirements on page 7***
☐ Yes ☐ No	Oxytetracycline
☐ Yes ☐ No	Potassium Permanganate: ***See additional reporting requirements on page 7***
☐ Yes ☐ No	Romet
☐ Yes ☐ No	SLICE (emamectin benzoate)
☐ Yes ☐ No	Sodium Chloride - salt
☐ Yes ☐ No	Vibrio vaccine
☐ Yes ☐ No	Other:
☐ Yes ☐ No	Other:

Aquaculture Drugs and Chemicals (cont'd)

Describe all drug and/or chemical treatments that occurred during the year. Fill out the information below for each drug or chemical, plus page 7 for water-borne treatments. Attach additional pages as necessary.

Brand Name:		Generic Name:	
Reason for use:			
☐ Preventative/Prophylactic ☐ As-needed	Total quantity of formulated product per treatment:	Total quantity of formulated product used in past year (specify units):	
Date(s) of treatment:			Total number of treatments in past year:
Maximum daily volume of treated water:	Treatment concentration (specify units):	Duration and frequency of treatment(s):	
Method of application:	☐ Static Bath ☐ Flow-through	☐ Medicated Feed ☐ Other (describe):	
Location in facility chemical was used (check all that apply):	☐ Raceways ☐ Incubation building	☐ Ponds ☐ Off-line settling basin	☐ Other (describe):
Where did water treated with this chemical go? (check all that apply):	☐ Discharged w/o treatment ☐ Settling basin	☐ Septic System ☐ Publicly owned treatment works	☐ Other (describe):
Provide any additional information about how this chemical was used and/or special pollution prevention practices during use:			

Brand Name:		Generic Name:	
Reason for use:			
☐ Preventative/Prophylactic ☐ As-needed	Total quantity of formulated product per treatment:	Total quantity of formulated product used in past year (specify units):	
Date(s) of treatment:			Total number of treatments in past year:
Maximum daily volume of treated water:	Treatment concentration (specify units):	Duration and frequency of treatment(s):	
Method of application:	☐ Static Bath ☐ Flow-through	☐ Medicated Feed ☐ Other (describe):	
Location in facility chemical was used (check all that apply):	☐ Raceways ☐ Incubation building	☐ Ponds ☐ Off-line settling basin	☐ Other (describe):
Where did water treated with this chemical go? (check all that apply):	☐ Discharged w/o treatment ☐ Settling basin	☐ Septic System ☐ Publicly owned treatment works	☐ Other (describe):
Provide any additional information about how this chemical was used and/or special pollution prevention practices during use:			

Aquaculture Drugs and Chemicals (cont'd)
Additional Reporting Requirements for Water-Borne Treatments

- **If a water-borne treatment was used during the calendar year, Permittees must include detailed records/calculations as an attachment to this Annual Report in order to demonstrate how the maximum effluent concentrations of solution and active ingredient were calculated.**
- At a minimum, Permittees must include the information listed in the following tables - either for each treatment, or for a reasonable worst case (i.e., maximum effluent concentration) scenario. See also Appendix D for the Chemical Log Sheet.
- Specify whether static bath or flow-through treatment.
- For assistance with these calculations, Permittees may refer to the USFWS treatment calculator tool at:
  http://www.fws.gov/fisheries/aadap/AFS-FCS%20documents/GUIDE_TRT_CALC_FEB_2011.xlsx

Static Bath Treatments	
Tank Volume	Liters
Desired Static Bath Treatment Concentration	μg/L
Volume of Product Needed	Liters Product
Maximum Effluent Concentration of: 1) Solution and 2) Active Ingredient	Solution: Active Ingredient: Specify Units
Maximum % of Facility Discharge Treated	% of Total Discharge

Flow-Through Treatments	
Tank Volume	Liters
Calculated Flow Rate	Liters/Minute
Duration of Treatment	Minutes
Desired Flow-Through Treatment Concentration of Product	μg/L
Amount of Product to Add Initially	Liters Product
Amount of Product to Add During Treatment	mL/Minute
Total Volume of Product Needed	Liters Product
Maximum Effluent Concentration of: 1) Solution and 2) Active Ingredient	Solution: Active Ingredient: Specify Units
Maximum % of Facility Discharge Treated	% of Total Discharge

Changes to the Facility or Operations

Describe any changes to the facility or operations since the last annual report.

Signature and Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly evaluate and gather the information submitted. Based on my inquiry of the person or persons, who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed name of person signing	Title
Applicant Signature	Date Signed

Submittal Information

Send the complete, signed information, along with any attachments, to the following address:

U.S. EPA Region 10, OWW-130

Washington Hatchery Annual Report

1200 Sixth Avenue, Suite 900

Seattle, WA 98101-3140

06303

Appendix F

Food and Drug Administration Policy:

Enforcement Priorities for Drug Use in Aquaculture

SUPPLEMENTAL POLICIES

ENFORCEMENT PRIORITIES FOR DRUG USE IN AQUACULTURE

PART A

ENFORCEMENT PRIORITIES FOR DRUG USE IN NON-FOOD FISH

I. Purpose

This document describes enforcement priorities that apply to drugs for use in aquaculture nonfood species/populations.

II. Definitions

Non-food fish - An aquaculture species is presumed to be a non-food species if it is reasonably likely that a) no significant percentage of the species population will be consumed directly or indirectly by humans for food, or b) the fish species is not known to be consumed by an identifiable human population. The following definitions are provided for categories of non-food fish.

Ornamental and aquarium fish - In general, ornamental and aquarium species are nonfood species. Ornamental and aquarium fish are defined as: fish that are produced and maintained solely for exhibit purposes in home or public aquaria, or in ornamental garden ponds. (Policy and Procedures (P&P) PPM 1240.4260).

Baitfish – Fish commercially raised to be used as bait in sport or commercial fishing e.g., fathead minnows, golden shiners and goldfish. A baitfish species will be considered a food fish if humans will consume any significant part of the species directly or indirectly.

Home aquarium - An aquarium in a private residence or exhibited in a business for hobby or decorative purposes.

Ornamental garden pond - Pond on the property of a private residence or for display in a business for hobby or decorative purposes.

Commercial pond – Pond/ raceway where the fish are grown ultimately to be sold to individuals at pet stores or for some other commercial use.

III. Regulation of Drug Use in Non-Food Species

When CVM personnel in Division of Compliance are asked questions or receive inquiries regarding the use of compounds in non-food fish they need to:

A. Determine which Agency or Food and Drug Administration (FDA) Center has jurisdiction for the regulation of the product based on the following categories:

1. The compound is intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease in man or other animal; and intended to affect the structure or any function of the body of man or other animals. The compound is a drug and is under the jurisdiction of FDA, Center for Veterinary Medicine (CVM). [Federal Food, Drug and Cosmetic Act (FFDCA), 201(g).] [Go to Section III B]. If the compound is determined to be a drug under FFDCA it is a drug even if it has pesticide, biologic, food or color additive properties or claims.

2. The compound is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant. [Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)] The compound is a **pesticide** and is under the jurisdiction of the Environmental Protection Agency (EPA). Contact EPA, Office of Pesticides.

3. The compound is a virus, serum, toxin (excluding substances that are selectively toxic to microorganisms, e.g., antibiotics), or analogous product at any stage of production, shipment, distribution, or sale, which is intended for use in the treatment of animals and which acts primarily through the direct stimulation, supplementation, enhancement, or modulation of the immune system or immune response. (9 CFR 101.2) The compound is a **biologic** and is under the jurisdiction of USDA, Animal and Plant Health Inspection Service (APHIS), Center for Veterinary Biologics (CVB). Contact USDA APHIS CVB.

4. The compound is a substance with the intended use of which results or may reasonably be expected to result, directly or indirectly, in its becoming a component of, or otherwise affecting the characteristics of any food for man or animals. (FFDCA 201 (s)) The compound is a **food additive** and is under the jurisdiction of the FDA CVM. Contact FDA, CVM, Division of Animal Feeds.

5. The compound is a substance which is capable of coloring food, and its use or intended use is not for a purpose other than coloring. (FFDCA

201 (t)) The compound is a **color additive** and is under the jurisdiction of the FDA Center for Food Safety and Applied Nutrition (CFSAN). Contact FDA CFSAN.

B. Decide the regulatory status. CVM will use the following categories to determine the regulatory status of a drug:

1. **Approved new animal drug** - An approved New Animal Drug Application (NADA) exists for this indication. Refer to 21 Code of Federal Regulations (CFR) Part 514. Product is used according to label directions.
2. **Investigational New Animal Drug (INAD)** - A potential sponsor may request an INAD exemption for collecting data to support a new animal drug approval. Contact the CVM Aquaculture Drugs Team, HFV-131.
3. **Extra-label use drug - Use of an FDA** - approved drug under the provisions of Animal Medicinal Drug Use Clarification Act (AMDUCA). See 21 CFR 530.
4. **Extra-label use of medicated feeds** -Provisions for the use of approved medicated feeds for minor species are explained in the Compliance Policy Guide (CPG) for Extra-label Use of Medicated Feeds for Minor Species. Compliance Policy Guide, Chapter 6, Section 615.115.
5. **Regulatory discretion** - Drugs that have been evaluated for regulatory discretion as low priority for enforcement action (INADs/NADAs will not be required). See Low Regulatory Priority (LRP) list in Part C of this document. For others not on the list go to Part A, Section IV of this document.

IV. Factors to Consider for Regulatory Discretion

Division of Compliance evaluates the potential for regulatory discretion. Drugs will be categorized at CVM's initiative or on request of an interested party. In the latter case, the requestor will be asked to provide available data and information that the Center can use to determine enforcement priority. The criteria used in this determination are as follows:

A. The safety status of the compound including:

1. User safety – Contact the Division of Human Food Safety, HFV-150.

   High priorities are:

   a. known or suspected carcinogens;

b. known serious toxicological hazards;

c. and suspected serious toxicological hazards believed to have substantial use in aquaculture.

2. Environmental safety – Contact the Environmental Assessment Team, HFV-145. Considerations include:

a. potential public or ecological safety issues including:

(1) potential for surface or groundwater contamination;
(2) known serious human toxicological hazard; and
(3) known serious toxicological hazard to aquatic organisms including fish, insects, and birds.

b. compliance with applicable Federal, State, and local environmental laws.

B. Extent of data available for enforcement priority determinations

In general, only published peer-reviewed studies or literature will be reviewed for the purpose of making enforcement priority determinations. However, unpublished data may be reviewed for enforcement priority determinations on a case-by-case basis. Areas to be reviewed include:

1. Human Food Safety;
2. Target animal safety and effectiveness;
3. Environmental safety; and
4. Human user and occupational safety.

V. Factors to Consider for Enforcement Priorities

A. In general, regulatory action may be considered in any case where a high enforcement priority drug (see section V.C.) is found. In addition, high enforcement priority drugs may be the subjects of special assignments to the Field. Other drugs will be subject to regulatory action on a case-by-case basis, based on the factors listed below.

1. Jurisdiction – (see Part A, Section III A of this document)

2. Approval status of the active ingredient

a. If FDA has withdrawn the approval of the active ingredient for reasons other than human food safety, priority will be determined on a case-by-case basis.

b. If an approved animal drug product containing the same active ingredient is available, the drug will ordinarily not be considered a low enforcement priority to protect the marketing of the approved product.

3. Approval or LRP status of drugs with different active ingredients but similar uses

   a. If an approved animal drug product containing a different active ingredient but for a similar use is available, then the drug will ordinarily not be considered a low enforcement priority to protect the marketing of the approved product.

   b. If an animal drug product containing a different active ingredient but for a similar use as a drug is included on the LRP list (see Part C of this guide), then the drug under consideration will ordinarily not be considered a low enforcement priority.

4. The presence or absence of any significant safety or effectiveness concern as established by the available data will determine the enforcement priority. These data will include information about the active ingredient, formulation, and proposed conditions of use.

5. Products with a known potential for diversion, either directly to humans (e.g., anabolic steroids) or to food-producing species should be considered for high priority.

6. Regulatory considerations include:

   a. potential effect on public health;
   b. availability of expert support for a court case;
   c. availability of agency resources to support a regulatory action;
   d. egregiousness of the violative action; and
   e. availability of the required evidence.

B. Enforcement Priorities by Segment of Industry

II. <u>Priorities for Regulation of Drug Use in Food Species/Populations</u>:

A. Enforcement Priorities by Segment of Industry.

1. Drug Manufacturers:

   a Primary focus among drug manufacturers and distributors will be on firms that specialize in manufacturing for, and distributing to, the aquaculture industry. Special attention should be given to:

   (1) distribution of high priority drugs;

(2) possible diversion and abuse situations, e.g., promotion for food species use of drugs labeled for nonfood species; and packaging of "nonfood fish" drugs in commercial pond-size containers.

b. If intended drug use of a multi-purpose chemical is not established by labeling, or by overt acts by the vendor (e.g., promotion), enforcement actions against the vendor would have to be based on case-by-case analysis. See 21 CFR 201.128.

c. All products granted low enforcement priority must:

(1) be labeled “For Non-food Fish Only” in a prominent place on the label;
(2) have adequate directions for use: and
(3) be drug listed per 21 CFR 207.

d. Manufacturers must:

(1) be registered: and
(2) follow Current Good Manufacturing Practices (CGMPs) per 21 CFR 210 & 211.

2. Feed Manufacturers:

Priorities will be determined on a case-by-case basis. For firms required to be licensed to manufacture medicated feeds and veterinary feed directive drugs, inspections and enforcement actions will be handled according to relevant compliance guidelines.

Extra-label use of medicated feeds is prohibited under the Animal Medicinal Drug Use Clarification Act. See 21 CFR 530. However, regulatory discretion is allowed for extra-label use of medicated feeds in minor species, including fish, under a Compliance Policy Guide. See CPG 615-115. Note that for extra-label use in aquatic species, the medicated feed must already be approved for use in another aquatic species and may not be reformulated.

3. Producers:

Primary objective with producers will be on education with emphasis on proper drug usage, e.g., which drugs are permitted and under what conditions. There will be no routine inspections for enforcement purposes. This will not preclude "for-cause" inspections or surveys to determine usage patterns for drugs, sources of the drugs, etc.

"For cause" inspection assignments will encompass either individual producers, or could be more broadly based. Such inspections might include, for example, a situation in which there is reason to believe that producers might be holding significant quantities of a drug of high enforcement priority (such as malachite green) and regulation at the manufacturer/distributor level is not feasible.

PART B

ENFORCEMENT PRIORITIES FOR DRUG USE IN FOOD, FISH AND SHELLFISH

I. Purpose

This part of this document describes enforcement priorities that apply to drugs for use in aquaculture food species, fin fish or shellfish.

II. Definitions

Food fish and shellfish for human consumption - An aquaculture species is presumed to be a food species if it is reasonably likely that a) a significant percentage of the species population will be consumed directly or indirectly by humans for food, or b) the species is consumed by an identifiable human population.

Food fish and shellfish for animal feed - fish used in whole or in part as a component of any animal feed will be considered a food fish species.

III. Regulation of Drug Use in Food Species, both fin fish and shellfish

When CVM personnel in Division of Compliance are faced with inquiries regarding the use of compounds in food fish (fin fish and shellfish) they need to:

A. Determine which Agency or Food and Drug Administration (FDA) Center has jurisdiction for the regulation of the product based on the following categories:

1. The compound is intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease in man or other animal; and intended to affect the structure or any function of the body of man or other animals. The compound is a **drug** and is under the jurisdiction of FDA, CVM. [Federal Food, Drug and Cosmetic Act (FFDCA), 201(g).] [Go to Section III B]. If the compound is determined to be a drug under FFDCA it is a drug even if it has pesticide, biologic, food or color additive properties or claims.

2. The compound is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or any substance or mixture of substances intended for use as a plant regulator, defoliant, or

3. Desiccant. [Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)] The compound is a **pesticide** and is under the jurisdiction of the Environmental Protection Agency (EPA). Contact EPA, Office of Pesticides.

4. The compound is a virus, serum, toxin (excluding substances that are selectively toxic to microorganisms, e.g., antibiotics), or analogous product at any stage of production, shipment, distribution, or sale, which is intended for use in the treatment of animals and which acts primarily through the direct stimulation, supplementation, enhancement, or modulation of the immune system or immune response. (9 CFR 101.2) The compound is a **biologic** and is under the jurisdiction of USDA, Animal and Plant Health Inspection Service (APHIS), Center for Veterinary Biologics (CVB). Contact USDA APHIS CVB.

5. The compound is a substance with the intended use of which results or may reasonably be expected to result, directly or indirectly, in its becoming a component of, or otherwise affecting the characteristics of any food for humans or animals. (FFDCA 201 (s)) The compound is a **food additive** and is under the jurisdiction of the FDA, CVM. Contact FDA CVM, Division of Animal Feeds.

6. The compound is a substance which is capable of coloring food, and its use or intended use is not for a purpose other than coloring. (FFDCA 201 (t)) The compound is a **color additive** and is under the jurisdiction of the FDA Center for Food Safety and Applied Nutrition (CFSAN). Contact FDA CFSAN.

B. Decide the regulatory status. CVM will use the following categories to determine the regulatory status of a drug:

1. **Approved new animal drug** - An approved New Animal Drug Application (NADA) exists for this indication. Refer to 21 Code of Federal Regulations (CFR) Part 514. Product is used according to label directions.

2. **Investigational New Animal Drug (INAD)** - A potential sponsor may request an INAD exemption for collecting data to support a new animal drug approval. Contact the CVM Aquaculture Drugs Team, HFV-131.

3. **Extra-label use drug -**Use of an FDA-approved drug under the provisions of Animal Medicinal Drug Use Clarification Act (AMDUCA). See 21 CFR 530.

4. **Extra-label use of medicated feeds** - Provisions for the use of

approved medicated feeds for minor species are explained in the Compliance Policy Guide (CPG) for Extra-label Use of Medicated Feeds for Minor Species. Compliance Policy Guide, Chapter 6, Section 615.115.

5. **Regulatory discretion** - Drugs that have been evaluated for regulatory discretion as low priority for enforcement action (INADs/NADAs will not be required). See Low Regulatory Priority (LRP) list in Part C of this document. For others not on the list, go to Part A, Section IV of this document.

IV. Factors to Consider for Regulatory Discretion

Division of Compliance evaluates the potential for regulatory discretion. Drugs will be categorized at CVM's initiative or on request of an interested party. In the latter case, the requestor will be asked to provide available data and information that the Center can use to determine enforcement priority. The criteria used in this determination are as follows:

A. The safety status of the compound including:

1. Human Food Safety – Contact the Division of Human Food Safety, HFV-150. High priority are:

   a. known or suspected carcinogens;
   b. known serious toxicological hazards;
   c. suspected serious toxicological hazards believed to have substantial use in aquaculture; and
   d. antimicrobials likely to confer bacterial resistance to drugs used in human medicine.

2. User safety – Contact the Division of Human Food Safety, HFV-150. High priority are:

   a. known or suspected carcinogens;
   b. known serious toxicological hazards; and
   c. suspected serious toxicological hazards believed to have substantial use in aquaculture.

3. Environmental safety – Contact the Environmental Assessment Team, HFV-145. Considerations include:

   a. potential public or ecological safety issues including:

      (1) potential for surface or groundwater contamination;
      (2) known serious human toxicological hazard; and
      (3) known serious toxicological hazard to aquatic organisms

including fish, insects, and birds.

b. compliance with applicable Federal, State, and local environmental laws.

B. Extent of data available for enforcement priority determinations

In general, only published peer-reviewed studies or literature will be reviewed for the purpose of making enforcement priority determinations. However, unpublished data may be reviewed for enforcement priority determinations on a case-by-case basis. Areas to be reviewed include:

1. Human food safety;
2. Target animal safety and effectiveness;
3. Environmental safety; and
4. Human user and occupational safety.

V. Factors to Consider for Enforcement Priorities

A. In general, regulatory action may be considered in any case where a high enforcement priority drug (see section V.C.) is found. In addition, high enforcement priority drugs may be the subjects of special assignments to the Field. Other drugs will be subject to regulatory action on a case-by-case basis, based on the factors listed below.

1. Jurisdiction – (see Part A, Section III A of this document)
2. Approval status of the active ingredient -
   a. If FDA has withdrawn the approval of the active ingredient for human food safety reasons regulatory discretion will not normally be granted.

   b. If FDA has withdrawn the approval of the active ingredient for reasons other than food safety reasons regulatory discretion will be determined on a case-by-case basis.

   c. If an approved animal drug product containing the same active ingredient is available, the drug will ordinarily not be considered a low enforcement priority to protect the marketing of the approved product.

3. Approval or LRP status of drugs with different active ingredients but similar uses

   a. If an approved animal drug product containing a different active ingredient but for a similar use is available, then the drug will ordinarily not be considered a low enforcement priority to protect the marketing of the approved product.

b. If an animal drug product containing a different active ingredient but for a similar use as a drug is included on the LRP list (see Part C of this document), then the drug under consideration will ordinarily not be considered a low enforcement priority.

4. If the treated fish are intended for use in animal feed, then there is a higher concern if the feed is to be used for food-producing animals. The method of feed preparation should also be considered, e.g., rendering vs. fish or fish parts.

5. The presence or absence of any significant safety or effectiveness concern as established by the available data will determine the enforcement priority. These data will include information about the active ingredient, formulation, and proposed conditions of use.

6. Regulatory considerations include:

   a. potential effect on public health;
   b. availability of expert support for a court case;
   c. availability of agency resources to support a regulatory action;
   d. egregiousness of the violative action; and
   e. availability of the required evidence.

B. Enforcement Priorities by Segment of Industry

1. Drug Manufacturers

   a. Primary focus among drug manufacturers and distributors will be on firms that specialize in manufacturing for, and distributing to, the aquaculture industry. Special attention should be given to:
      (1) distribution of high priority drugs; and
      (2) abuse situations, e.g., promotion for food species use of drugs labeled for nonfood species and packaging of "non-food fish" drugs in commercial pond-size containers.

   b. If intended drug use of a multi-purpose chemical is not established by labeling, or by overt acts by the vendor (e.g., promotion), enforcement actions against the vendor should be based on case-by-case analysis. See 21 CFR 201.128.

   c. All products granted low enforcement priority must:

      (1) have adequate directions for use; and
      (2) be drug listed per 21 CFR 207.

   d. Manufacturers must:

(1) be registered;
(2) be drug listed per 21 CFR 207; and
(3) follow Current Good Manufacturing Practices (CGMPs) per 21 CFR 210 & 211.

2. Feed Manufacturers

For firms required to be licensed to manufacture medicated feeds and veterinary feed directive drugs, inspections and enforcement actions will be handled according to relevant compliance guides.

Extra-label use of medicated feeds is prohibited under the Animal Medicinal Drug Use Clarification Act. See 21 CFR 530. However, regulatory discretion is allowed for extra-label use of medicated feeds in minor species, including fish, under a Compliance Policy Guide. See CPG 615-115. Note that for extra-label use in an aquatic species, the medicated feed must already be approved for use in another aquatic species and may not be reformulated.

3. Producers

Primary emphasis with producers will be on education with emphasis on proper drug usage, e.g., which drugs are permitted and under what conditions. There will be no routine inspections for enforcement purposes. This will not preclude "for-cause" inspections or surveys to determine usage patterns for drugs, sources of the drugs, etc.

"For cause" inspection assignments will encompass either individual producers, or could be more broadly based. Such inspections might include, for example, a situation in which there is reason to believe that producers might be holding significant quantities of a drug of high enforcement priority (such as malachite green) and regulation at the manufacturer/distributor level is not feasible.

PART C

ENFORCEMENT PRIORITIES

I. LOW REGULATORY PRIORITY AQUACULTURE DRUGS

The following compounds have undergone review by the Food and Drug Administration and have been determined to be new animal drugs of low regulatory priority.

ACETIC ACID - 1000 to 2000 ppm dip for 1 to 10 minutes as a parasiticide for fish.

CALCIUM CHLORIDE - Used to increase water calcium concentration to ensure proper egg hardening. Dosages used would be those necessary to raise calcium concentration to 10-20 ppm CaC03.

- Used up to 150 ppm indefinitely to increase the hardness of water for holding and transporting fish in order to enable fish to maintain osmotic balance.

CALCIUM OXIDE - Used as an external protozoacide for fingerlings to adult fish at a concentration of 2000 mg/L for 5 seconds.

CARBON DIOXIDE GAS - For anesthetic purposes in cold, cool, and warm water fish.

FULLER'S EARTH - Used to reduce the adhesiveness of fish eggs to improve hatchability.

GARLIC (Whole Form) - Used for control of helminth and sea lice infestations of marine salmonids at all life stages.

ICE - Used to reduce metabolic rate of fish during transport.

MAGNESIUM SULFATE - Used to treat external monogenic trematode infestations and external crustacean infestations in fish at all life stages. Used in all freshwater species. Fish are immersed in a 30,000 mg $MgS0_4$/L and 7000 mg NaCl/L solutions for 5 to 10 minutes.

ONION (Whole Form) - Used to treat external crustacean parasites, and to deter sea lice from infesting external surface of salmonids at all life stages.

PAPAIN - Use of a 0.2% solution in removing the gelatinous matrix of fish egg masses in order to improve hatchability and decrease the incidence of disease.

POTASSIUM CHLORIDE - Used as an aid in osmoregulation; relieves stress and prevents shock. Dosages used would be those necessary to increase chloride ion concentration to 10-2000 mg/L.

POVIDONE IODINE - 100 ppm solution for 10 minutes as an egg surface disinfectant during and after water hardening.

SODIUM BICARBONATE - 142-642 ppm for 5 minutes as a means of introducing carbon dioxide into the water to anesthetize fish.

SODIUM CHLORIDE - 0.5% to 1.0% solution for an indefinite period as an osmoregulatory aid for the relief of stress and prevention of shock; and 3% solution for 10 to 30 minutes as a parasiticide.

SODIUM SULFITE – 1.5% solution for 5 to 8 minutes to treat eggs in order to improve their hatchability.

THIAMINE HYDROCHLORIDE - Used to prevent or treat thiamine deficiency in salmonids. Eggs are immersed in an aqueous solution of up to 100 ppm for up to four hours during water hardening. Sac fry are immersed in an aqueous solution of up to 1,000 ppm for up to one hour.

UREA and TANNIC ACID - Used to denature the adhesive component of fish eggs at concentrations of 15g urea and 20g NaCl/5 liters of water for approximately 6 minutes, followed by a separate solution of 0.75g tannic acid/5 liters of water for an additional 6 minutes. These amounts will treat approximately 400,000 eggs.

The Agency is unlikely to object to the use of these substances if the following conditions are met:

(1) The substances are used for these indications;
(2) The substances are used at the prescribed levels;
(3) The substances are used according to good management practices;
(4) The product is of an appropriate grade for use in food animals, and
(5) There is not likely to be an adverse effect on the environment.

The Agency's enforcement position on the use of these substances should not be considered an approval nor an affirmation of their safety and effectiveness. Based on the information available at some time in the future, the Agency may take a different position on the use of any or all of these substances.

Classification of these substances as new animal drugs of low regulatory priority does not exempt facilities from complying with other Federal, State, and local environmental requirements. For example, facilities using these substances would still be required to comply with National Pollutant Discharge Elimination System (NPDES) requirements.

NOTE: The primary long range goals in enforcement prioritization will be to protect public health and encourage submission of INADs and NADAs with a view toward obtaining approvals to meet therapeutic and production needs in aquaculture.

(6) Labeling and GMPs for Low Priority Drugs.

a. Labeling for low priority use will not be required for a chemical that is commonly used for nondrug purposes even if the manufacturer or distributor promotes the chemical for the permitted low priority use.

b. However, a chemical that has significant animal or human drug uses in addition to the low priority aquaculture use will be required to be labeled for the low priority uses if the manufacturer or distributor establishes the intended low priority use for its product by promotion or other means.

c. Where labeling is required, all other provisions of the Act pertaining to drugs except the approval requirement will apply. This includes registration, drug listing and Current Good Manufacturing Practices (CGMPs), etc.

d. Low regulatory priority compounds may be marketed for aquaculture use with drug claims (the claims permitted for such compounds) but must be of an appropriate quality for use in food animals.

e. If drug claims appear on the product label, in product catalogs, or in promotional material, the following conditions must be met:

The product must have been manufactured according to CGMPs as defined in 21 CFR 210 & 211;

The product manufacturer must be registered with the FDA; and

The product must be drug-listed with FDA.

Material deviations in labeling or promotion from the permitted low priority claims might cause a particular product to be removed from the low priority category.

II. SPECIAL CATEGORY

Products found not to be low regulatory priority but regulatory action deferred pending further study:

Copper sulfate

Potassium permanganate

III. EXAMPLES OF DRUGS WITH HIGH ENFORCEMENT PRIORITY

Chloramphenicol Nitrofurans Fluoroquinolones and Quinolones Malachite Green Steroid Hormones

HISTORY

July 26, 2011 – Typo was found on page 15, under compounds - SODIUM SULFITE. Changed from 15% to 1.5% solution

EPA's Plan for Addressing PCBs in the Spokane River

July 14, 2015

This document sets out EPA's schedule, detailed more fully below, in response to the Order issued on March 16, 2015, by the U.S. District Court in Sierra Club, et al. v. McLerran, No. 11-CV-1759-BJR (March 16, 2015). In its Order, the Court directed EPA to:

> [C]onsult with Ecology and file herein, within 120 days of the date of this order, a complete and duly adopted reasonable schedule for the measuring and completion of the work of the Task Force, including quantifiable benchmarks, plans for acquiring missing scientific information, deadlines for completed scientific studies, concrete permitting recommendations for the interim, specific standards upon which to judge the Task Force's effectiveness, and a definite endpoint at which time Ecology must pursue and finalize its TMDL.

EPA sets out its schedule below, following a more general presentation of the variety of regulatory and non-regulatory considerations informing EPA's plan for addressing PCBs in the Spokane River.

SUMMARY

The goal of this plan is the attainment of applicable water quality standards for PCBs in the Spokane River. The plan describes significant ongoing regulatory and non-regulatory actions to identify and address sources of PCB pollution in the river. The plan provides that if the Spokane River remains impaired[1] for PCBs, the Washington Department of Ecology (Ecology) will initiate a TMDL to address the impairments by no later than July 15, 2028, and will finalize that TMDL by no later than July 1, 2030. Such a TMDL would establish PCB loads for point sources and nonpoint sources that would achieve the applicable water quality standards for PCBs. For the time period leading up to July 15, 2028, EPA's plan provides "benchmarks"—specified instream concentrations of PCBs that decrease incrementally over time. If the quantifiable benchmarks are not attained by specified dates certain (identified in the schedule in this document), then the trigger to initiate development of a TMDL would be accelerated. Under this schedule, a TMDL could be completed as early as July 2019 or as late as July 2030.

As described in greater detail below, all individually permitted dischargers to the Spokane River will be installing advanced treatment technologies that will significantly reduce their discharge of PCBs. As a result of those reductions and others, as well as uncertain but likely advances in analytical technologies to measure PCBs, a PCB TMDL developed pursuant to EPA's schedule will be more scientifically and technically defensible than any TMDL for PCBs that could be developed in the interim. This schedule reflects EPA's judgment that the actions being taken now to reduce PCBs are critical to the development of a TMDL in the future and are intended to maximize the

[1] For purposes of this document, "impaired" means that segments of the Spokane River and/or its tributaries remain listed by the State of Washington as impaired for non-attainment of applicable water quality standards for PCBs as of the relevant benchmark date.

resources that Ecology and the Task Force can devote to the ongoing efforts to reduce PCBs in the Spokane River.

CONTEXT REGARDING PCBs CONTAMINATION IN THE SPOKANE RIVER

By letter to Plaintiff's counsel dated April 2013, EPA determined that a constructive submission regarding a TMDL for PCBs in the Spokane River had not occurred and that an alleged non-discretionary duty under the CWA was not triggered. That determination was upheld by the Court in its March 2015 decision. In describing factors and circumstances EPA considered in the course of reaching that determination, EPA noted that work by the Task Force was ongoing. Neither EPA nor Ecology has previously described the Task Force and its ongoing work in detail in the briefing. Accordingly, EPA, in explaining the reasons for its schedule, also provides additional context regarding PCBs, water quality standards for PCBs, anticipated reductions in PCBs due to ongoing activities, as well as the ongoing work of the Task Force.

1. <u>PCBs: Historic Uses and Health Effects</u>

A polychlorinated biphenyl (PCB) is a synthetic organic chemical compound with one or more chlorine molecules attached to biphenyl, which is a molecule composed of two benzene rings. A congener is any single, unique well-defined chemical compound in the PCB category. There are 209 individual PCB congeners, and they differ from one another in the number and placement of the chlorine atoms. Most commercial PCBs are mixtures of different congeners and are generally known in the United States by their industrial trade names. The most common trade name is Aroclor. PCBs are human-made; there are no known natural sources.

PCBs were produced in large quantities within the United States from 1929 to 1979. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications.

As a result of this widespread use for 50 years and because they do not break down readily after they are released, PCBs are ubiquitous, found throughout the natural environment in air, water, soils, and sediments. PCBs are found in plants and animals throughout the food chain. PCBs bioaccumulate in plants and animals and can reach levels in fish tissue that are hundreds of thousands of times higher than the levels in water. PCBs are also transported readily through the air, and have been found in remote locations, far from where they were initially released (ATSDR, 2000).

PCBs have a limited solubility in water. Because PCBs are hydrophobic compounds, they tend to bind to sediments and organic particulate matter, which in turn may enter the food chain rather than remain in the water column. Although background levels for water column measurements can be in the parts per quadrillion range[2], the sediments in which PCBs tend to accumulate can often have levels two to three orders of magnitude higher.

PCBs have been shown to cause cancer in animals and are a probable human carcinogen. PCBs also cause a number of serious non-cancer health effects in animals, including effects on the immune system, reproductive system, nervous system, and endocrine system (ATSDR, 2000). Concerns about the toxicity of PCBs are largely based on twelve of the more highly chlorinated PCB congeners that share a structural similarity to, and toxic mode of action with, dioxin (van den Berg et. al, 2006).

Because of these adverse health effects, the Toxics Substances Control Act (TSCA) in 1976 prohibited the majority of manufacturing, processing, and distribution of PCBs. 15 U.S.C. § 2605(e)(3). Regulations implementing TSCA exclude from the prohibition products containing PCBs in concentrations less than 50 ppm, as well as manufacturing processes that inadvertently generate and release PCBs to products, air, and water in excess of specific regulatory thresholds.[3] EPA has identified 70 chemical processes with high potential to inadvertently generate PCBs (Fed. Register, 1983) and estimates an annual production of 100,000 pounds of inadvertently generated PCBs. Examples of products included in this calculation include some pigments and dyes that are commonly used in consumer products. Ecology has identified non-point releases, such as those from consumer products, as being increasingly important to control in order to reduce overall PCB delivery to humans and the environment (Ecology and Health, 2015). In a recent study, the City of Spokane detected PCBs in all but two of almost 50 consumer product samples, including yellow pigmented road paint, hydroseed and laundry soap (City of Spokane, 2015). A recent Ecology analysis identified the congener PCB-11 in 49 consumer products, including food packaging and yellow spray paint (Ecology 2014). Because these PCBs are found legally in new consumer products, this may make it more difficult to attain water quality standards for PCBs.

2. <u>Water Quality Standards for PCBs in the Spokane River</u>

Standards for PCBs in surface water are set at levels to protect human health. Because the primary way by which people are exposed to PCBs is through the consumption of contaminated fish and/or shellfish (in which PCBs may have

[2] In 2015, background water column measurements at the outlet of Lake Coeur d'Alene were largely below 50 pg/L (or 50 parts per quadrillion) (LimnoTech, 2014).

[3] The concentration of inadvertently generated PCBs in products leaving any manufacturing site or imported into the United States must have an annual average of less than 25 ppm, with a 50 ppm maximum. The concentration of inadvertently generated PCBs in the components of detergent bars leaving the manufacturing site or imported into the United States must be less than 5 ppm. The release of inadvertently generated PCBs at the point at which emissions are vented to ambient air must be less than 10 ppm. The amount of inadvertently generated PCBs added to water discharged from a manufacturing site must be less than 100 micrograms per resolvable gas chromatographic peak per liter of water discharged. 40 C.F.R. 761.3 (definition of excluded manufacturing process).

bioaccumulated in tissue), assumptions about average fish consumption rates affect the derivation of concentrations in water quality standards. In Washington, the water quality criterion for total PCBs is 170 picograms per liter (pg/L). 40 C.F.R. 131.36(b)(1) & (d)(14). Washington's criterion, which was promulgated by EPA as part of the National Toxics Rule, was based on an assumed daily fish consumption rate of 6.5 grams per day.[4] In 1996, Ecology began listing the various segments of the Spokane River and adjacent water bodies (see map in Appendix A) as impaired due to PCBs based on levels of PCBs in edible fish tissue[5] (specifically, fish tissue levels projected to represent an exceedance of the water column concentrations in the water quality standards). The listings were not directly based on non-attainment of the numeric water criteria, which are water column concentrations.

In January of 2015, Ecology proposed revisions to its water quality criteria established to protect human health. Specifically, Ecology proposed to adopt a numeric water quality criterion in its standards to incorporate the 170 pg/L value for total PCBs as State regulations.[6] Ecology also proposed a generally-applicable narrative water quality criterion that "[a]ll waters shall maintain a level of water quality when entering downstream waters that provides for the attainment and maintenance of the water quality standards of those downstream waters, including the waters of another state." Ecology completed the public process on the draft rule on March 23, 2015, and is proceeding to take final action on its proposed revisions. Depending on the scope of Ecology's final action, EPA anticipates that the revised water quality criteria will (after EPA approval) provide for greater protections for downstream waters, including the Spokane Tribe tribal waters.

The waters of the Spokane Tribe are downstream from the segments of the Spokane River and adjacent water bodies that Ecology listed as impaired. On December 19, 2013, EPA approved water quality criteria for PCBs established by the Spokane Tribe. The Tribe's water quality criteria for PCBs are based on a fish consumption rate that is protective of human health and designed to support traditional subsistence practices. In the absence of site-specific fish consumption data, EPA's recommended criteria for PCBs are based on an assumed national fish consumption rate of 17.5 grams per day for the general population, and/or 142 g/day for high fish consumers; the EPA-approved Tribal standards are based on an assumed fish consumption rate of 865 grams per day. The Tribe's water quality criterion for total PCBs is 1.3 pg/L. This criterion is more than two orders of magnitude lower than the current Washington criterion and is probably the lowest PCB criterion in the country.

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[4] Since then, EPA updated the fish consumption rate assumption to 17.5 grams per day for PCBs. Based on the revised fish consumption rate, EPA now recommends water quality criteria for total PCBs at 64 picograms per liter for PCBs.

[5] Sampled fish include rainbow trout, brown trout, mountain whitefish, white crappie, walleye, yellow perch, smallmouth bass, largemouth bass, and kokanee and, for more recent listings, also largescale sucker.

[6] The proposed criterion of 170 pg/L, while identical to the current criterion, was derived differently, using a higher fish consumption rate but also a higher cancer risk level. In public comments provided to Ecology, EPA expressed concern about the cancer risk level used.

PCB levels this low pose analytic difficulties. The method approved by EPA for detecting total PCBs for Clean Water Act permits can quantify PCBs at concentrations of about 500,000 pg/L or greater, which is about 3,000 times Washington's PCB criterion and about 385,000 times the Spokane Tribe's PCB criterion. The most sensitive method currently available, which has not been approved by EPA for use with Clean Water Act permits, can quantify PCBs at 10 to 30 pg/L or higher, which is still approximately 10 times the Spokane Tribe criterion.

3. Sources of PCBs in the Spokane Watershed and PCB Control Measures

The PCB sources in the Spokane Watershed are numerous and diffuse, and therefore difficult to identify in their entirety. PCB sources include legacy contamination of soil and groundwater; some building caulks and paints; and inadvertently generated PCBs that remain in today's consumer products. The PCBs in these diffuse sources are mobilized by a variety of mechanisms that include volatilization into the air (e.g. from building materials); and transport of PCBs that adhere to surface particulate matter by rainwater, stormwater, sanitary sewage, and groundwater. When PCBs have mobilized, they enter the Spokane River through a variety of pathways that include air deposition, stormwater, groundwater and municipal and industrial wastewater discharges.

Numerous commercial and industrial sources discharge effluent containing PCBs (both legacy PCBs and those found in modern consumer products) to the Spokane River and its tributaries in Idaho and Washington and from Spokane Tribal lands. The largest of these types of discharges include municipal wastewater treatment facilities (three in Idaho, three in Washington); industrial facilities (Kaiser Aluminum and Inland Empire Paper) and three fish hatcheries (in Washington and on the Spokane Tribal lands). Municipal separate storm sewer systems and other sources of stormwater discharges in Washington and Idaho also contribute to PCB loadings in the Spokane River. Nonpoint sources of pollution that contribute PCB loads include groundwater and air deposition. Other potential sources of PCB loading include unregulated stormwater discharges, and point and nonpoint source discharges in tributaries to the Spokane River.

A. Advanced Solids Removal Will Reduce PCB Loading to the Spokane River

Point-source dischargers to the Spokane River[7] will be responsible for the most significant expected reductions in PCB loading to the river. All of these facilities are subject to NPDES permit requirements to install advanced solids-removal treatment technology that will remove substantial quantities of PCBs. The permit requirements are the result of an EPA-approved Ecology TMDL to restore dissolved oxygen (DO) levels in the Spokane River and adjacent water bodies. DO levels are dependent, in part, on phosphorous levels, and the permits therefore require phosphorous removal. Upstream

[7] These dischargers include municipal wastewater treatment plants for the cities of Spokane, Liberty Lake, Coeur d'Alene, Post Falls, and Hayden, as well as the industrial discharges from Inland Empire Paper Company and Kaiser Aluminum Fabricated Products.

facilities in Idaho discharging to the Spokane River are also required to install this advanced treatment technology to meet the downstream state water quality standard for DO as required under NPDES regulations.[8] In order to achieve the lower phosphorus limits in the permits, advanced solids-removal technology is required; this technology will also remove PCBs, which are generally found adhering to solids. With the exception of the permit for the municipal wastewater treatment plant serving Spokane County (which was constructed using this technology), each of the permits includes a compliance schedule ranging between eight to ten years. The compliance schedules in the permits are based on the need for time to provide for capitalization (funding), installation, and optimization. By the end of 2024, all permittees must be in compliance with the new permit requirements.

The advanced treatment technology to meet the phosphorus limits is projected to result in significant reductions of PCBs entering the Spokane River. Installation and optimization of the advanced treatment necessary to restore dissolved oxygen levels may result in very significant PCB load reductions from each source. The Task Force reports that membrane filters in use at the Spokane County facility have demonstrated the capability to remove "up to 99% of PCBs from municipal wastewater facilities." (Task Force, 2015). Until the treatment is installed and optimized, however, the achievable concentrations remain uncertain.

In addition to the PCB reductions expected based on solids removal, the individual permits for discharges to the Spokane River in both Washington and Idaho include requirements specifically intended to reduce PCBs through further "upsource" controls on PCBs in solids. All of the permits for municipal sewage treatment plants include requirements that the permittee develop and implement toxics management plans addressing source control of PCBs from the following: contaminated soils and sediments; storm water entering the wastewater collection system; industrial and commercial sources, including paint, caulking, soaps and cleaners. The permits also require public education regarding the difference between products that are demonstrably "free" of PCBs and those products that are labeled "non-PCB," but which likely contain PCBs at concentrations below the federal regulatory thresholds. The permit for Kaiser Aluminum includes a requirement to continue PCB source identification and cleanup actions initiated under the State's Model Toxics Control Act (MTCA) cleanup order, including a "scope of work for additional source identification efforts."

In response to the Court's Order of March 2015, EPA has prepared detailed permitting recommendations that provide guidance for the issuance of new permits for the Spokane River municipal wastewater treatment plants, the industrial facilities, three fish hatcheries in the watershed, and all municipal and general stormwater permits associated with the Spokane River and its adjacent waters. EPA issues some of the relevant hatchery and stormwater permits, as well as the Idaho municipal wastewater treatment plant permits. The recommendations have been transmitted to Ecology for

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[8] Ecology's TMDL to restore dissolved oxygen could not set wasteload allocations for Idaho dischargers, but the TMDL assumed that Idaho dischargers would also be required to reduce their phosphorous loads. EPA subsequently used these assumptions in developing the permits for the Idaho dischargers.

their use in municipal, industrial, hatchery, and stormwater permits, and are attached to this document in Appendix B.

In a real and meaningful way, the requirements of the municipal and industrial wastewater permits for discharges to the Spokane River are already poised to make significant reductions to discharges of PCBs. Implementation of the existing permit requirements and EPA's new permitting recommendations may well achieve all the PCB reductions possible using current technologies and toxics reduction strategies. EPA's schedule is intended to provide adequate time for those measures to be implemented, for water column concentrations to come into equilibrium, and for the impacts of these reductions on fish tissue to be assessed.

B. Remediation at Kaiser Aluminum Facility

In the past, the Kaiser Aluminum Fabricated Products facility used hydraulic oils containing high concentrations of PCBs for aluminum casting operations. Kaiser's long-term use and storage of PCB-contaminated oils have contaminated the soil and underlying groundwater with PCBs. Since 2005, Kaiser has conducted a series of investigation and cleanup activities for soil and groundwater under the authority and requirements of Ecology's cleanup regulations, the state's MTCA. The investigation and cleanup required by MTCA is separate from Kaiser's participation on the Task Force.

In 2012, Ecology issued an Amended Agreed Order requiring soil excavation and capping of deeper soil to address PCB contamination; these actions have been completed, resulting in the removal of 540 tons of soil that contained elevated levels of PCBs. The 2012 order also requires Kaiser to initiate a PCB groundwater treatment pilot study by October 30, 2015. The contamination of groundwater underlying the Kaiser facility is widespread, with PCB levels exceeding 500,000 pg/L (Hart Crowser 2012). After completion of this pilot study, Ecology will issue a cleanup action plan that will specify the actions that Kaiser must take to remediate the PCB-contaminated groundwater. Ecology estimates that this groundwater treatment system will be operational by 2020. Groundwater from the Kaiser facility discharges to the Spokane River, but the extent to which the contaminated groundwater affects the PCB concentrations in the Spokane River is unknown.

C. Local Electric Utility Is Removing PCB-Containing Transformers

Avista Utilities, the company that provides electric service to large parts of eastern Washington, including the Spokane area and northern Idaho, initiated a three-year program to remove all of its overhead electrical distribution transformers containing PCBs. Although transformers with higher PCB concentrations were removed years ago, thousands of transformers containing PCBs at concentrations less than 50 ppm remained in service. As of 2015, Avista has retired most of the remaining PCB-containing transformers and plans to eliminate all PCB-containing transformers by 2018. Electric transformers represent significant and historically high sources of intentionally manufactured PCBs, including the dioxin-like congeners. Removal of these PCB sources will ensure that these pollutants do not end up in the Spokane River.

D. NPDES Permits for Discharges from Municipal Separate Storm Sewers

A comparatively recent expansion of the NPDES permitting program to apply to discharges from municipal separate storm sewer systems (commonly referred to as "MS4s") will reduce the discharge of particulate solids from diffuse sources that contaminate stormwater runoff, which in turn will further reduce the loading of PCBs into the Spokane River and adjacent waterbodies. Contaminated stormwater runoff is commonly transported and discharged through MS4s to nearby waterbodies through hundreds, if not thousands of outfalls within the MS4. Under federal rules, the MS4s discharging to the Spokane River watershed[9] were required to apply for discharge authorization under the NPDES permitting program.

Discharges from the Washington MS4s are authorized under an Ecology general permit issued in 2012 and expiring in 2019. Discharges from the Idaho MS4s are currently regulated by individual NPDES permits[10]; EPA is preparing to propose issuance of a state-wide MS4 general permit (during the current calendar year) that would replace the individual MS4 permits in Idaho. Under MS4 stormwater permits, each regulated MS4 is required to develop and implement a comprehensive stormwater program as defined by federal regulations at 40 CFR §122.34.

The current MS4 permits are reducing the loads of particulate solids to the Spokane River and are therefore reducing PCB loads. Reissuance of these permits provides opportunities for more targeted reductions. EPA's permitting recommendations, discussed above and included in Appendix B, contain several specific recommendations for MS4 permits, as well as recommendations for other types of stormwater general permits.

E. The Spokane River Regional Toxics Task Force

In recognition that nonpoint sources of PCBs in the Spokane watershed present a persistent and diffuse problem that cannot be easily addressed by direct regulatory authority, in 2011 Ecology made a significant change in reissued NPDES permits for facilities discharging into the Spokane River. The new permits required permittees to participate in the Task Force (Task Force, 2012).[11] Although participation is required by Ecology, the Task Force exists independent of and therefore is not legally required to account to Ecology. The Task Force includes voting members (representing NPDES permittees, state and local agencies other than Ecology, environmental groups and

[9] Regulated MS4s discharging to the Spokane River watershed are located in the Washington cities of Spokane and Spokane Valley; Spokane County, Washington; Washington State University, Spokane campus; the Washington State Department of Transportation (areas located within the Spokane urbanized area); the Idaho cities of Coeur d'Alene and Post Falls; the Post Falls (Idaho) Highway District; Lakes (Idaho) Highway District; and the Idaho Transportation Department District 1.

[10] The EPA-issued individual permits for MS4s in the Spokane River watershed in Idaho expired in 2014.

[11] NPDES permittees who discharge to the Spokane River and are located in Idaho agreed to participate in the Task Force as well, and participation is similarly required in their NPDES permits, which EPA issued in September 2014.

other stakeholders) and advisory members (Ecology, tribal sovereigns, and EPA) (Task Force, 2014). The proceedings of the Task Force are facilitated by the William D. Ruckelshaus Center at Washington State University. The Task Force has convened approximately monthly since September 2011.[12] The goal of the Task Force is to "develop a comprehensive plan to bring the Spokane River into compliance with applicable water quality standards for PCBs" (Task Force, 2012, p. 7). This is to be accomplished through actions funded[13], designed, and implemented by members of the Task Force to identify and eliminate diffuse nonpoint sources of PCBs. Although the Task Force's work will be used if development of a TMDL is necessary, the Task Force was not convened for that purpose.

i. Task Force Accomplishments to Date

The Task Force has undertaken several projects and activities designed to identify sources and reduce PCBs in the Spokane River since it was created in 2011. In its June, 2015 "Coordinated Response," the Task Force describes its operations, accomplishments, and future plans. A major project, currently underway, is the Task Force's efforts to consolidate existing data about sources, fate, and transport of PCBs in the Spokane River and to address significant data gaps and inconsistencies. In November of 2013, a Task Force report identified the primary data gaps (in their decreasing order of importance): (1) determining magnitude of sources contributing to stormwater loads; (2) determining PCB sources upstream of the Idaho/Washington border; and (3) determining the significance of loading from atmospheric and groundwater sources. (LimnoTech, 2013). In August of 2014, the Task Force initiated a comprehensive, simultaneous data collection effort in Washington and Idaho. This data, collected during dry weather,[14] provided the first contemporaneous "snapshot" of PCBs in the Spokane River from Lake Coeur d'Alene to Nine Mile Dam. The Task Force will continue to collect additional data to complete the source characterization and quantification throughout 2015 and 2016 (Task Force, 2015).

In addition to data collection and analysis, the Task Force and its members individually have taken actions to identify and reduce diffuse sources of PCBs that impact stormwater. They are currently engaged in product testing to identify current consumer products with high levels of PCBs that have the potential to be released to the river. Task Force-sponsored analysis demonstrated that specific "hydroseed" products, used to manage stormwater erosion for many types of construction activities, contain elevated levels of PCBs. Because hydroseed is used to manage stormwater,

[12] The Memorandum of Agreement that governs the formation and activities of the Task Force provides that the Task Force shall continue in effect for the duration of the Ecology 2011 through 2016 NPDES wastewater permit cycle. The Task Force is expected to continue thereafter if future NPDES wastewater permits require participation in the Task Force (Task Force, 2012, p. 1). Organizational documents, meeting notes, meeting schedules, and an annual reports of Task Force activities are maintained at a website. See www.srrttf.org.

[13] Task Force funding comes from NPDES permittee Task Force members and from Ecology. To date, the Task Force has spent approximately $1 million. Recently the Washington legislature appropriated $310K over two years to support continuation of the Task Force's work.

[14] The Task Force intends to conduct a similar data collection effort for wet weather conditions, but the high water necessary to collect such data did not occur in the 2014-2015 winter.

any PCBs in hydroseed will end up in the river. The Task Force is working collaboratively with manufacturers and State agencies to define construction specifications for hydroseed products and to inform the State purchasing process (Ecology, 2015). Hatchery fish food has also been identified as a potential source that readily enters the river. The Task Force's product testing efforts will continue to investigate this, as well as other potential sources of PCBs.

The Task Force has been active in political and policy arenas to encourage PCB restrictions, to address and reduce inadvertently generated PCBs, and to encourage preferential purchase of low- and no-PCB products for public use. The Task Force has also collaborated on public outreach activities to educate and engage the Spokane community on the risks of PCBs and the need to avoid activities that may release PCBs.

Washington enacted State legislation in 2014 that directed the Washington Department of Enterprise Services to "establish purchasing and procurement policies that provide a preference for products and products in packaging that does not contain polychlorinated biphenyls." RCW 39.26.280. The legislation also precluded other State agencies from knowingly purchasing "products or products in packaging containing polychlorinated biphenyls above the practical quantification limit except when it is not cost-effective or technically feasible to do so." Id. This legislation was adopted, in part, as a result of Task Force efforts to discourage use of products containing PCBs.

In June of 2014, the City of Spokane enacted a similar municipal ordinance providing a preference in City purchases for products and products in packaging that do not contain PCBs.[15] Implementation of the municipal ordinance should not only reduce the introduction materials containing PCBs, but also facilitate the development of an economic market with reduced amounts of PCBs.

ii. Further Work of the Task Force

The Task Force is into its third year of a phased five-year workplan (Task Force, 2013). Under the work plan, Phase 3 (analysis of data and characterization / quantification of PCB sources) and Phase 4 (assessment of potential BMPs) are scheduled for completion by December 2016. The Task Force anticipates a delay in completion of Phase 3 because this past winter wasn't wet enough to allow it to complete wet weather sampling. Completion of Phase 3, including the identification of locations with the highest PCB concentrations, should enable closure of one of the data gaps previously identified as the highest priority--source identification.

[15] The ordinance provides as follows: Specifically, the ordinance provides that:

> No department may knowingly purchase products or products in packaging containing polychlorinated biphenyls above the practical quantification limit except when it is not cost-effective or technically feasible to do so. "Practical quantification limit" means the lowest concentration that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability during routine laboratory operating conditions, or using EPA Method 1668. "Not cost effective" means compliance with this requirement would increase the purchase price of the product by at least twenty-five percent.

Remaining phases under the workplan will address developing an inventory of sources and sinks of PCBs and developing a comprehensive plan for reducing PCBs.

SCHEDULE

In response to the Court's March 16, 2015 Order, and following consultation with Ecology, EPA sets out below its schedule for achievement of benchmarks and triggers for TMDL initiation and completion. In submitting this schedule, EPA clarifies that it does not interpret its regulations at 40 C.F.R. 130.7(d)(1), which are referenced in the Court's order, to give EPA the authority to establish a legally enforceable schedule for either the Task Force or the State. EPA's regulation states in relevant part that "[s]chedules for submission of TMDLs shall be determined by the Regional Administrator and the State." The regulation speaks to the collaborative nature of the development of such schedules. However, it does not authorize EPA to establish a legally enforceable schedule for State submissions of TMDLs or for work by an independent task force. This interpretation is consistent with past EPA guidance that "EPA *will not take any action* on the [State] schedule …," and that "the schedule is intended *to help* the public and EPA to understand the state's priorities and *assist* in work planning."(EPA, 2005, p. 63 (emphasis added)). EPA has not relied on the referenced regulation as the basis for this schedule, but rather has developed this schedule for the State's initiation and completion of a PCB TMDL in response to the Court's remand instructions.

1. December 31, 2016: The Task Force completes a Comprehensive Plan to bring the Spokane River into compliance with applicable water quality standards for PCBs. The comprehensive plan should include the following:

    a. A summary of the available data for PCBs in Spokane River water, fish tissue, and sediments.
    b. A list of the identified sources of PCBs in the Spokane River with estimates of current loadings.
    c. A range of BMPs expected to reduce or eliminate PCBs for each source or category of sources.
    d. Recommendations for BMP implementation.
    e. Recommendations for future studies to address remaining data gaps.

    If the Task Force does not submit a final Comprehensive Plan or if in EPA's determination the Comprehensive Plan does not adequately address the items listed above, then Ecology would immediately initiate development of a PCB TMDL for impaired segments of the Spokane River, and such TMDL would be submitted for EPA's approval by July 15, 2019.

2. December 15, 2020: Instream concentration of PCBs meets 200 pg/L based on the annual central tendency of the preceding year. EPA issues a determination by July 15, 2021, after conferring with Ecology and the Spokane Tribe, whether the instream concentration of PCBs meets 200 pg/L. If EPA determines that instream concentrations exceed 200 pg/L, then Ecology would immediately initiate development of a PCB TMDL for impaired

segments of the Spokane River, and such TMDL would be submitted for EPA's approval by July 15, 2023.

3. December 15, 2024: Instream concentration of PCBs meets 170 pg/L based on the annual central tendency of the preceding year. EPA issues a determination by July 15, 2025, after conferring with Ecology and the Spokane Tribe, whether the instream concentration of PCBs meets 170 pg/L. If EPA determines that instream concentrations exceed 170 pg/L, then Ecology would immediately initiate development of a PCB TMDL for impaired segments of the Spokane River, and such TMDL would be submitted for EPA's approval by July 15, 2027.

4. December 15, 2027: The applicable water quality standards for PCBs are met and the Spokane River and adjacent segments are no longer included on Washington's 303(d) list of impaired waters. EPA issues a determination by July 15, 2028, after conferring with Ecology and the Spokane Tribe, whether the waters meet the applicable water quality standards. If EPA determines that applicable water quality standards are not met or if the Spokane River and adjacent segments remain on Washington's 303(d) list of impaired waters, then Ecology would immediately initiate development of a PCB TMDL for impaired segments of the Spokane River, and such TMDL would be submitted for EPA's approval by July 15, 2030.

Under this schedule, a TMDL could be completed as early as July 2019 or as late as July 2030. Initiation of a TMDL can only be delayed as long as successive reductions of instream concentrations of PCBs are occurring consistent with the schedule.

In this Plan for Addressing PCBs in the Spokane River, EPA has described a complex array of factors that will affect PCB concentrations. The schedule does not contemplate immediate initiation of a TMDL because, in EPA's judgment, developing the TMDL at a later date is justified by the reductions that will occur and the data that will be gathered, as well as the likely changes to relevant water quality standards.

Perhaps most importantly, this schedule allows time to implement the advanced solids removal that is already required of the municipal wastewater treatment plants and the industrial dischargers to the Spokane. This treatment technology will reduce both phosphorus and PCBs discharged to the river. The permits contain compliance schedules, and all the facilities must be in compliance with their permit limits by the end of 2024. However, it takes time for instream and fish tissue concentrations to respond to decreases in loading, and it takes time for Ecology and the Task Force to conduct and analyze the monitoring data that is expected to describe the new share of the load attributable to point sources. Because this data is extremely relevant to the development of a TMDL, EPA has allowed three additional years beyond the conclusion of the last of the compliance schedules before making a determination about attainment of applicable standards. This will ensure that the water quality data reflect the dischargers' use of the new treatment technology.

In addition to providing time for the benefits of advanced treatment to be realized, the schedule also recognizes that it is very likely that applicable water quality standards will change. Although changes are expected, at this juncture it is very difficult to predict what the new standards will be or when they will be adopted. Washington has not proposed to modify its PCB criterion, but it has proposed to adopt a narrative water quality standard that would require that water quality in Washington will not contribute to violations of downstream water quality standards. Should this proposal be adopted, the Spokane tribal standard is a downstream standard that Washington would be required to protect. Such a change in standards would have significant implications for any TMDL that would be developed for PCBs in the Spokane watershed. The uncertainty about the relevant future standards, especially since they may be more protective than the current standards, provides another reason for not initiating a TMDL immediately.

EPA is also mindful that the work currently being performed by the Task Force provides immediate significant benefits that would not be realized should the Task Force cease functioning. Participation in the Task Force is required by current NPDES permits, but neither EPA nor Ecology can require particular work products. The Task Force, on its own initiative, is providing extensive data collection and analysis, conducting product testing, pushing for progress on preferential purchasing and reduction of inadvertently generated PCBs, and identifying and addressing nonpoint sources. This last element is especially important because this is work that will likely not be done by any other party, public or private, if not done by the Task Force. The benefits from voluntary Task Force activities are worth preserving.

Not only would deferring the initiation of a PCB TMDL according to EPA's schedule ensure a better and more defensible TMDL that provides greater environment benefit, requiring such a PCB TMDL now will likely disrupt important progress now underway. Once a TMDL is completed, each affected point source will be responsible for achieving its own individual wasteload allocation. This will likely eliminate the incentive for Task Force members to continue to work together to address sources for which they are not responsible. Prior to TMDL development, however, the Task Force is making progress to seek out and remove diffuse sources of PCBs. The Task Force is also collecting and analyzing data that will be crucial to the development of a TMDL, such as the dry weather synoptic sampling that occurred in August 2014. It is unlikely that Ecology would have the resources to conduct similar data collection projects. This data is useful to the Task Force now, and it will be useful to Ecology should development of a TMDL be necessary.

In EPA's judgment, there are substantial benefits to be gained from postponing development of the TMDL as long as sufficient progress is being made during the interim. EPA believes that its schedule strikes an appropriate balance between achieving instream reductions in the short-term and providing time to allow a number of ongoing activities to conclude.

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EPA's Plan for Addressing PCBs in the Spokane River

July 14, 2015

Appendix A

Map of the Spokane River Watershed from Lake Coeur d'Alene to the Nine Mile Dam

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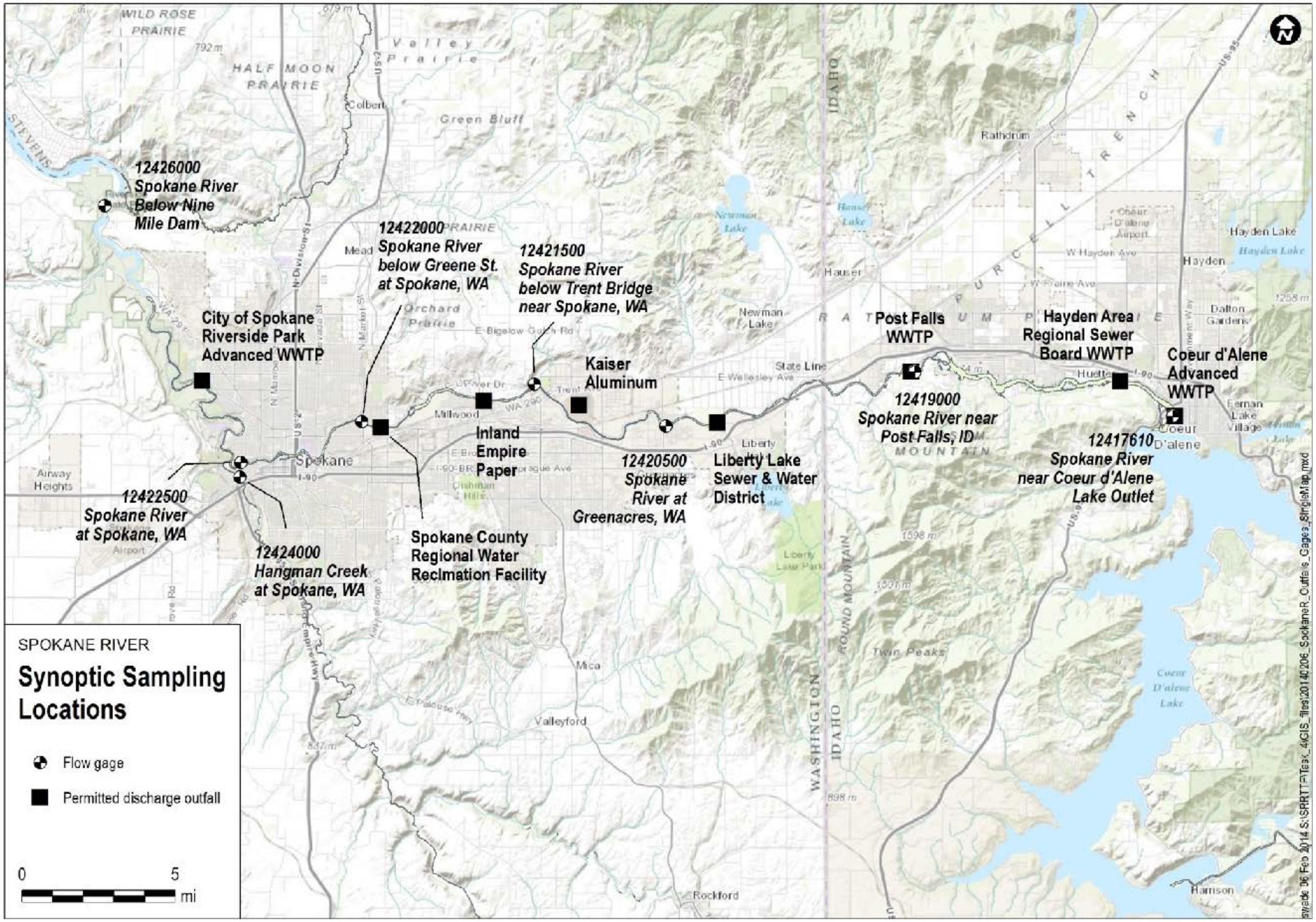
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below Trent Bridge
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City of Spokane
Riverside Park
Advanced WWTP
Kaiser
Aluminum
Inland
Empire
Paper
12420500
Spokane
River at
Greenacres, WA
Liberty Lake
Sewer & Water
District
Post Falls
WWTP
12419000
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Post Falls, ID
Hayden Area
Regional Sewer
Board WWTP
Coeur d'Alene
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12417610
Spokane River
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Lake Outlet
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Spokane River
at Spokane, WA
12424000
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EPA's Plan for Addressing PCBs in the Spokane River

July 14, 2015

Appendix B

July 13, 2015, Letter from EPA to Ecology, re: NPDES Permitting Recommendations for the Spokane River

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
WATER AND
WATERSHEDS

JUL 1 3 2015

Reply to
Attn of: OWW-191

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Jim Bellatty
Washington State Department of Ecology
4601 North Monroe Street
Spokane, WA 99205-1295

Re: NPDES Permitting Recommendations for the Spokane River Watershed

Dear Mr. Bellatty:

In response to the U.S. District Court order in *Sierra Club et al. v. McLerran*, No. 11-CV-1759-BJR, the EPA is making the enclosed permitting recommendations to the Washington State Department of Ecology (Ecology). These recommendations are specific to National Pollutant Discharge Elimination System (NPDES) permits for point sources discharging to the Spokane River in Washington (water resource inventory areas—WRIAs—54 and 57), the Little Spokane River (WRIA 55). Except for recommendations specific to certain dischargers in the State of Washington, these recommendations are also applicable to EPA Region 10's direct implementation NPDES permitting for discharges to the Spokane River in Idaho (hydrologic unit code 17010305) and on the Spokane Indian Reservation.

Although the EPA encourages Ecology to consider and as appropriate accept the enclosed recommendations, they are not binding. The goal of these recommendations is to help Ecology establish enforceable and defensible permit conditions that can reasonably be expected to result in reductions in polychlorinated biphenyl (PCB) loading to the Spokane River and the Little Spokane River from regulated point sources. The EPA encourages Ecology to establish permit conditions to further that goal, even if they are different from the enclosed recommendations.

If you have any questions about the enclosed recommendations, please contact Brian Nickel of my staff at 206-553-6251 or Nickel.Brian@epa.gov.

Sincerely,

Michael J. Lidgard
Manager, NPDES Permits Unit

cc: Mr. Daniel Redline, Regional Administrator, Idaho Department of Environmental Quality Coeur d'Alene Regional Office

July 13, 2015

Permitting Recommendations for the Spokane River Watershed

Introduction

In response to the U.S. District Court order in Sierra Club et al. v. McLerran, No. 11-CV-1759-BJR, the EPA is making the following permitting recommendations. These recommendations are specific to National Pollutant Discharge Elimination System (NPDES) permits for point sources discharging to the Spokane River in Idaho (hydrologic unit code 17010305) and Washington (water resource inventory areas—WRIAs—54 and 57, including waters of the Spokane Tribe of Indians) and the Little Spokane River in Washington (WRIA 55).

Although the EPA encourages Ecology and the permitting authority for Idaho and the Spokane Tribe of Indians (currently EPA Region 10) to consider and as appropriate accept these recommendations, these recommendations are not binding. The goal of these recommendations is to help the permitting authorities establish enforceable and defensible permit conditions that can reasonably be expected to result in reductions in polychlorinated biphenyl (PCB) loading to the Spokane River and the Little Spokane River from regulated point sources. The EPA encourages permitting authorities to establish permit conditions to further that goal, even if they are different from the conditions recommended herein. This document is not legally enforceable; it does not confer rights or impose obligations on any party, including EPA, States or the regulated community.

Rationale for Recommending a BMP Approach to PCB Control

In general, the EPA is currently recommending a best management practices (BMP) approach to controlling and abating discharges of PCBs from point sources in the Spokane watershed. As explained below, the EPA believes this approach will be more effective in reducing discharges of PCBs than numeric effluent limits. The authority to establish BMP conditions in NPDES permits is provided in 40 CFR 122.44(k).

Limitations of Approved Analytical Methods for PCBs

Federal regulations require NPDES permits to include requirements to monitor discharges according to procedures approved under 40 CFR Part 136, unless another method is required by 40 CFR subchapters N or O (i.e. pretreatment requirements, effluent limit guidelines, or sewage sludge requirements).[1] For pollutants without approved analytical methods, the permitting authority shall specify in the permits the test procedure(s) to be used.[2]

The PCB water quality criteria for the States of Idaho and Washington and the Spokane Tribe of Indians are expressed as total PCBs, which is the sum of all congener, isomer, homolog, or aroclor analyses.[3]

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[1] 40 CFR 122.41(j)(4), 122.44(i)(1)(iv)

[2] 40 CFR 122.44(i)(1)(iv)

[3] See footnote q to 40 CFR 131.36(b)(1) and footnote o to IDAPA 58.01.02.210.01. See also: http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm#hhtable

Thus, any water quality-based effluent limit (WQBEL) for PCBs must also be expressed as total PCBs.[4] The approved analytical methods for PCBs can only measure PCB aroclors (i.e., the mixtures of PCBs that were sold commercially[5]). Because total PCBs may be measured as the sum of aroclor analyses, the approved methods can be used for total PCBs and therefore must be used to determine compliance with WQBELs for total PCBs.[6]

Of the methods approved for national use under 40 CFR 136, the most sensitive (EPA Method 608) can quantify PCB aroclors at concentrations of about 0.5 µg/L (500,000 pg/L) or greater, which is about 3,000 times Washington's PCB criterion (170 pg/L) and about 385,000 times the Spokane Tribe's PCB criterion (1.3 pg/L). Thus, any numeric WQBEL for PCBs for a point source to the Spokane River is likely to be orders of magnitude lower than the concentrations quantifiable by approved analytical methods.

If a WQBEL is below the detection limit, EPA guidance recommends that the permit include the actual limit and a requirement for the specific method to be used for monitoring. The permit should also state that any sample analyzed using the specified method and found to be below the minimum level will be deemed compliant with the limit.[7,8] Thus, WQBELs for total PCBs, which would need to be enforced using the approved methods, would, in effect, allow discharges of total PCBs many thousands of times greater than criteria. Because actual discharges from Spokane River point sources have been orders of magnitude below the quantification limits of the approved methods, such methods would provide no quantitative data on the actual loading of PCBs from point sources, no incentive for point sources to reduce discharges, nor any means to determine whether the discharges are increasing or decreasing.

Basis for Requirements to Analyze PCB Congeners in Support of BMPs

When establishing monitoring requirements for PCBs in order to assess the effectiveness of BMPs, EPA recommends that the permit authority require analysis of PCB congeners, because this aids in source identification, which will, in turn, aid in source control.[9] There are no approved methods for PCB congeners (as distinct from aroclors). As explained above, for pollutants without approved methods, such as PCB congeners, the permitting authority shall specify the test procedure(s) to be used; thus, permitting authorities have the flexibility to require the use of EPA Method 1668C for monitoring of PCB congeners.

Monitoring requirements for PCB congeners using Method 1668C can provide quantitative data about the actual PCB loading from point sources. This represents a significant advantage over numeric WQBELs for total PCBs, which, as explained above, currently must be enforced using the far less sensitive approved analytical methods. Therefore, the EPA is recommending that the permits continue to use a BMP approach to PCB control and require the use of EPA method 1668C for monitoring of final effluents for PCB congeners, instead of establishing numeric WQBELs enforced using methods approved under 40 CFR Part 136.

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[4] 40 CFR 122.44(d)(1)(iii)
[5] http://www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/aroclor.htm
[6] 40 CFR 122.44(i)(1)(iv)
[7] *Technical Support Document for Water Quality-based Toxics Control* (EPA/505/2-90-001, March 1991) Section 5.7.3.
[8] 40 CFR 136 Appendix A
[9] http://srrttf.org/wp-content/uploads/2014/10/2015-Spokane-PCBs-1.pdf

Even if the permitting authority determines that it is appropriate to include numeric WQBELs for PCBs to be enforced using methods approved under 40 CFR 136 in one or more of the subject permits, the EPA nonetheless recommends that the permitting authority include the following BMP requirements and monitoring for PCB congeners using EPA method 1668C in addition to any such numeric WQBELs.

1 General Recommendations for All POTWs Discharging to the Spokane River in Idaho and Washington, Kaiser Aluminum (permit #WA0000892), and Inland Empire Paper (permit #WA0000825)

The EPA recommends that:

- The permits should require monitoring of final effluents for PCB congeners using EPA Method 1668C at least quarterly.
- When establishing requirements for toxics management plans (TMP) or best management practices (BMP) plans, the permitting authority should consider the assessment by the Spokane River Regional Toxics Task Force ("Task Force") of the optimal mix of BMPs applicable to the permitted source.[10]
- The permits should require an annual report of PCB monitoring results and activities that have been completed or that have been ongoing in the past twelve months, pursuant to the TMP or BMP plan. The annual report should include:
    - A summary of effluent PCB data and any other PCB data relevant to the discharge (e.g., raw sewage, biosolids, pretreatment, or internal monitoring locations) collected over the previous twelve months.
    - A comparison of effluent PCB data collected over the previous twelve months to older effluent data.
    - An estimate of the reduction in PCB loading or concentration achieved through TMP or BMP plan activities during the previous twelve months.
    - Additional TMP or BMP plan activities planned for the following twelve months.
- The permits should require an update to the TMP or BMP plan if the permitting authority determines, based on the annual reports and other available information, that the TMP or BMP plan will not likely reduce PCB discharges to the maximum extent practicable.
- The permits should require reporting of total concentration of "dioxin-like" PCB congeners on DMRs.[11]
- The permits should require the complete congener analyses to be submitted as attachments to the DMRs.
- The permits should require receiving water monitoring for PCB congeners upstream and downstream of the outfalls using EPA Method 1668C at a frequency adequate to assess both high and low river flow conditions.

[10] The assessment of BMPs is Task 2 of Phase 4 of the Task Force's Technical Consultant Work Plan and is scheduled to be completed by September 2016.
[11] The dioxin-like PCB congeners are IUPAC numbers 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169, and 189.

1.1 Specific Recommendations for POTWs

1.1.1 All POTWs

The EPA recommends that:

- The permits should require operation of tertiary filtration (once completed) year-round.[12]
- Prior to completion and optimization of tertiary filtration, the permits should include BMP requirement(s) to minimize discharges of TSS.[13]
- The permits should prohibit the POTW from authorizing discharges of PCBs to the treatment works unless the PCB concentration is <3 µg/L or unless the discharge is in accordance with a PCB discharge limit included in a pretreatment permit issued under §307(b) of the Clean Water Act.[14]

1.1.2 Pretreatment POTWs Only

The EPA recommends that:

- The permits should require sampling of all significant industrial users' (SIU) discharges for PCB aroclors using the most sensitive method approved under 40 CFR Part 136. All PCB aroclor results above the method detection limit (MDL) should be reported to the POTW and to the approval authority.
    - For any SIU where PCB aroclors are detected using approved methods, follow-up monitoring for PCB congeners using EPA Method 1668C should be performed at least once.
    - The POTW should use the results of the required monitoring of SIUs and any other available information to estimate the combined loading of total PCBs to the POTW from all SIUs.
    - If the POTW estimates that the combined loading of total PCBs to the POTW from all SIUs is at least ten percent of the influent total PCB loading to the POTW, the POTW should either develop numeric local limits for total PCBs or require SIUs to implement BMPs[15] to reduce discharges of total PCBs to the POTW.

1.2 Specific Recommendations for Industrial Individual Permits (Kaiser Aluminum and Inland Empire Paper)

The EPA recommends that:

- Ecology should analyze available effluent TSS and PCB data to determine if effluent TSS and PCB concentrations are positively correlated.

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[12] Phosphorus limits necessary to meet dissolved oxygen criteria will require operation of tertiary filtration (i.e., advanced solids removal) to meet effluent limits for phosphorus for eight to nine months of the year. This will reduce total suspended solids (TSS) loading, and, in turn, PCBs. Operating this kind of treatment year-round (even when not necessary to meet phosphorus limits) will further reduce TSS and PCBs on an annual basis. BMPs can include "treatment requirements" (40 CFR 122.2).

[13] PCB removal in POTWs is correlated with TSS removal. BMPs may be required when "the practices are reasonably necessary…to carry out the purposes and intent of the CWA" (40 CFR 122.44(k)(4).

[14] 40 CFR 761.50(a)(3)

[15] Local limits may be BMPs instead of numeric limits (40 CFR 403.5(c)(4)).

- If effluent TSS and PCB concentrations are determined to be positively correlated, Ecology should establish all known, available and reasonable treatment (AKART) or performance-based effluent limits for TSS. AKART or performance-based TSS limits should be re-evaluated following completion and optimization of tertiary filtration.
- The permits should require the permittee to address water conservation in its BMP plan.

1.2.1 Specific Recommendations Kaiser Aluminum

- The permit should require separate monitoring of the groundwater remediation discharge (if any) and the effluent from the black walnut shell filters for PCB congeners using EPA Method 1668C.

2 Recommendations for Fish Hatcheries in WRIAs 54, 55, and 57

The EPA recommends that:

- The permits should require monitoring of effluents for PCB congeners using EPA Method 1668C at a frequency adequate to assess sources of PCBs within the facility.
- The permits should require reporting of the total concentration of "dioxin-like" PCB congeners on DMRs.
- The permits should require the complete congener analysis to be submitted as an attachment to the DMR.
- The permits should require that the facilities' pollution prevention plans or BMP plans address PCBs from caulk, paint, and feed.
    - The permits should require removal of paint or caulk that contacts process water and that was applied prior to January 1, 1980.
        - During removal, permittees should implement PCB abatement and disposal consistent with EPA guidance.[16]
        - Permits should require BMPs to prevent removed PCB-containing paint or caulk from reaching waters of the United States and to ensure that disposal of such materials is performed in compliance with applicable state, federal, and local laws.
    - The permits should require the permittee to use any available product testing data to preferentially purchase paint and caulk with the lowest practicable total PCB concentrations.
- Recommendations for general NPDES permits may be incorporated into the permits themselves or into administrative orders, as appropriate.

3 General Recommendations for Stormwater Permits

The EPA recommends that:

- The permits, except construction stormwater permits, should require monitoring for PCBs at frequencies and locations adequate to assess and identify sources of PCBs to stormwater.
    - In general, for water sampling, the permits should require monitoring for PCB congeners using EPA Method 1668C. For monitoring of locations or waste streams that the

[16] http://www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/caulk/guide/guide-sect4.htm

permitting authority determines can be adequately characterized using less sensitive methods (e.g., EPA Method 608 or 8082), such methods may be used at such locations.

- For any monitoring of PCB congeners in final effluent, the permits should require reporting of the total concentration of "dioxin-like" PCB congeners on DMRs.
- For any monitoring of PCB congeners in final effluent, the permits should require the complete congener analysis to be submitted as an attachment to the DMR.
- When updating stormwater pollution prevention plan or stormwater management plan (SWPPP or SWMP) requirements in permits, the permitting authority should consider the Task Force's assessment of the optimal mix of BMPs applicable to the permitted sources.
- Recommendations for general NPDES permits may be incorporated into the permits themselves or into administrative orders, as appropriate.

3.1 Specific Recommendations for Areas of Permitted MS4s Contributing to Surface Water Discharges to the Spokane River or the Little Spokane River'

The EPA recommends that:

- In addition to the general stormwater monitoring recommendations above, the permits should require monitoring for PCBs in sediment traps, catch basins, and in stormwater suspended particulate matter (SSPM) at frequencies and locations adequate to assess and identify sources of PCBs to municipal stormwater.
  - For monitoring of PCBs in solids, the permits should require a quantitation level for total PCBs no greater than 10 µg/kg dry weight.
- The permits should require all BMPs related to reducing or eliminating PCBs in stormwater to be prioritized in areas of the MS4 more likely to contribute PCBs to surface waters, based on any available information, including but not limited to the following:
  - Previous and ongoing PCB monitoring.
  - Nearby toxics cleanup sites with PCBs as a known contaminant.
  - Business inspections and compliance records.
- The permits should require removal of accumulated solids from drain lines (including inlets, catch basins, sumps, conveyance lines, and oil/water separators) in priority areas of the MS4 at least once during the permit cycle, unless the permittee can demonstrate that such removal is not necessary to reduce discharges of PCBs from stormwater.
- The permits should require removal of any identified legacy PCB sources within the MS4 (e.g., PCB-containing sealant) as soon as practicable.
- The permits should require preferential purchasing by the permittee of products with the lowest practicable PCB concentrations for products likely to contain inadvertently generated PCBs and to contact municipal stormwater, including but not limited to the following:
  - Hydroseed
  - Dust suppressants
  - Traffic marking paint
  - Deicer
- The permits should allow permittees to comply with PCB source control requirements through a collaborative effort.

- The permits should include the following requirements for new development and redevelopment disturbing one acre or more:
  - Site design to minimize impervious areas, preserve vegetation, and preserve natural drainage systems.
  - On-site stormwater management.

3.1.1 Specific Recommendations for Cities and Counties with MS4 Permits

The EPA recommends that:

- The permits should require the following, for construction projects requiring a building permit from the permittee that do **not** require an NPDES permit for construction stormwater:
  - During demolition of any structure with at least 10,000 square feet of floor space and built before January 1, 1980, the permittee should require the building permit applicant to implement BMPs to achieve the following:
    - Prevent removed PCB-containing building materials, including paint, caulk, and pre-1980 fluorescent lighting fixtures,[17] from contacting municipal stormwater or otherwise reaching waters of the United States; and
    - Ensure that disposal of such materials is performed in compliance with applicable state, federal, and local laws.
- The permits should address possible contributions of PCBs to the MS4 from businesses within the areas served by the MS4 as follows:
  - The permits should require the establishment and maintenance of a database of inspections and status of compliance with applicable State and federal laws and local ordinance related to PCBs in stormwater, for businesses within the area served by the MS4.
  - Based on the information in the database and other available information, the permits should require the permittees to identify businesses that are likely to contribute PCBs to the MS4 and to follow up with such businesses and appropriate regulatory agencies to develop and implement BMPs to reduce contributions of PCBs to the MS4 from such businesses.

3.1.2 Specific Recommendations for Idaho MS4 Permits

The EPA recommends that:

- The permitting authority should issue a Clean Water Act §308 letter requiring monitoring for PCBs at frequencies and locations adequate to assess and identify sources of PCBs to stormwater, unless final permits including such monitoring requirements are issued by July 1, 2016.
  - In general, the permits should require monitoring for PCB congeners using EPA Method 1668C. For monitoring of locations or waste streams that the permitting authority determines can be adequately characterized using less sensitive methods (e.g., EPA Method 608 or 8082), such methods may be used at such locations.

[17] http://www.epa.gov/solidwaste/hazard/tsd/pcbs/pubs/ballasts.htm

3.2 Specific Recommendations for Industrial Stormwater Permits

The EPA recommends that:

- The permits should require removal of accumulated solids from storm drain lines (including inlets, catch basins, sumps, conveyance lines, and oil/water separators) within the facility at least once during the permit cycle, unless the permittee can demonstrate that such removal is not necessary to reduce discharges of PCBs from stormwater.
- The permits should require removal of any identified legacy PCB sources within the facility's storm drain lines (e.g. PCB-containing sealant) as soon as practicable.
- If hydroseed is used for erosion and sediment control, the permittee should use any available product testing data to preferentially purchase hydroseed with the lowest practicable total PCB concentration.[18]
- If dust suppressants other than water are used (e.g., on unimproved roads), the permittee should use any available product testing data to preferentially purchase dust suppressants with the lowest practicable total PCB concentration.[19]

3.3 Specific Recommendations for Construction Stormwater Permits

The EPA recommends that:

- During demolition of any structure with at least 10,000 square feet of floor space and built before January 1, 1980, the permits should require the permittee to implement BMPs to achieve the following:
    - Prevent PCB-containing building materials, including paint, caulk, and pre-1980 fluorescent lighting fixtures, from contacting stormwater or otherwise reaching waters of the United States; and
    - Ensure that disposal of such materials is performed in compliance with applicable state, federal and local laws.
- If dust suppressants other than water are used, the permittee should use any available product testing data to preferentially purchase dust suppressants with the lowest practicable total PCB concentration.
- If hydroseed is used, the permittee should use any available product testing data to preferentially purchase hydroseed with the lowest practicable total PCB concentration.

[18] The Task Force is investigating PCBs in hydroseed. Product testing by the City of Spokane showed PCB concentrations of about 2.5 ppm in hydroseed.

[19] The City of Spokane's product testing found concentrations ranging from 0.09 – 3.6 ppb (i.e., a two-order-of-magnitude range).

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Part V

The President

Executive Order 13610—Identifying and Reducing Regulatory Burdens

Federal Register
Vol. 77, No. 93
Monday, May 14, 2012

Presidential Documents

Title 3—

The President

Executive Order 13610 of May 10, 2012

Identifying and Reducing Regulatory Burdens

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to modernize our regulatory system and to reduce unjustified regulatory burdens and costs, it is hereby ordered as follows:

Section 1. *Policy.* Regulations play an indispensable role in protecting public health, welfare, safety, and our environment, but they can also impose significant burdens and costs. During challenging economic times, we should be especially careful not to impose unjustified regulatory requirements. For this reason, it is particularly important for agencies to conduct retrospective analyses of existing rules to examine whether they remain justified and whether they should be modified or streamlined in light of changed circumstances, including the rise of new technologies.

Executive Order 13563 of January 18, 2011 (Improving Regulation and Regulatory Review), states that our regulatory system ''must measure, and seek to improve, the actual results of regulatory requirements.'' To promote this goal, that Executive Order requires agencies not merely to conduct a single exercise, but to engage in ''periodic review of existing significant regulations.'' Pursuant to section 6(b) of that Executive Order, agencies are required to develop retrospective review plans to review existing significant regulations in order to ''determine whether any such regulations should be modified, streamlined, expanded, or repealed.'' The purpose of this requirement is to ''make the agency's regulatory program more effective or less burdensome in achieving the regulatory objectives.''

In response to Executive Order 13563, agencies have developed and made available for public comment retrospective review plans that identify over five hundred initiatives. A small fraction of those initiatives, already finalized or formally proposed to the public, are anticipated to eliminate billions of dollars in regulatory costs and tens of millions of hours in annual paperwork burdens. Significantly larger savings are anticipated as the plans are implemented and as action is taken on additional initiatives.

As a matter of longstanding practice and to satisfy statutory obligations, many agencies engaged in periodic review of existing regulations prior to the issuance of Executive Order 13563. But further steps should be taken, consistent with law, agency resources, and regulatory priorities, to promote public participation in retrospective review, to modernize our regulatory system, and to institutionalize regular assessment of significant regulations.

Sec. 2. *Public Participation in Retrospective Review.* Members of the public, including those directly and indirectly affected by regulations, as well as State, local, and tribal governments, have important information about the actual effects of existing regulations. For this reason, and consistent with Executive Order 13563, agencies shall invite, on a regular basis (to be determined by the agency head in consultation with the Office of Information and Regulatory Affairs (OIRA)), public suggestions about regulations in need of retrospective review and about appropriate modifications to such regulations. To promote an open exchange of information, retrospective analyses of regulations, including supporting data, shall be released to the public online wherever practicable.

Sec. 3. *Setting Priorities.* In implementing and improving their retrospective review plans, and in considering retrospective review suggestions from the public, agencies shall give priority, consistent with law, to those initiatives that will produce significant quantifiable monetary savings or significant quantifiable reductions in paperwork burdens while protecting public health, welfare, safety, and our environment. To the extent practicable and permitted by law, agencies shall also give special consideration to initiatives that would reduce unjustified regulatory burdens or simplify or harmonize regulatory requirements imposed on small businesses. Consistent with Executive Order 13563 and Executive Order 12866 of September 30, 1993 (Regulatory Planning and Review), agencies shall give consideration to the cumulative effects of their own regulations, including cumulative burdens, and shall to the extent practicable and consistent with law give priority to reforms that would make significant progress in reducing those burdens while protecting public health, welfare, safety, and our environment.

Sec. 4. *Accountability.* Agencies shall regularly report on the status of their retrospective review efforts to OIRA. Agency reports should describe progress, anticipated accomplishments, and proposed timelines for relevant actions, with an emphasis on the priorities described in section 3 of this order. Agencies shall submit draft reports to OIRA on September 10, 2012, and on the second Monday of January and July for each year thereafter, unless directed otherwise through subsequent guidance from OIRA. Agencies shall make final reports available to the public within a reasonable period (not to exceed three weeks from the date of submission of draft reports to OIRA).

Sec. 5. *General Provisions.* (a) For purposes of this order, ''agency'' means any authority of the United States that is an ''agency'' under 44 U.S.C. 3502(1), other than those considered to be independent regulatory agencies, as defined in 44 U.S.C. 3502(5).

(b) Nothing in this order shall be construed to impair or otherwise affect:

(i) the authority granted by law to a department or agency, or the head thereof; or

(ii) the functions of the Director of the Office of Management and Budget relating to budgetary, administrative, or legislative proposals.

(c) This order shall be implemented consistent with applicable law and subject to the availability of appropriations.

(d) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

THE WHITE HOUSE,
May 10, 2012.

[FR Doc. 2012–11798
Filed 5–11–12; 11:15 am]
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Extending the Threshold of Regulation Concept: *De Minimis* Limits for Carcinogens and Mutagens

Janice M. Fiori and Roger D. Meyerhoff

Toxicology and Drug Disposition, Lilly Research Laboratories, A Division of Eli Lilly and Company, Greenfield, Indiana 46140

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Risk assessment processes for carcinogens are highly developed but risk assessment processes for mutagens are not well established. In the pharmaceutical industry, risk associated with exposure to carcinogens is tightly controlled. It is desirable to control risk associated with exposure to mutagens also, in spite of the greater uncertainty associated with the risk. In this paper, a published cancer potency database is used to frame the risk and to support risk management decisions. A *de minimis* exposure for mutagens is proposed and a decision matrix is presented to align available data with risk assessment approaches for carcinogens and mutagens. © 2002 Elsevier Science (USA)

***Key Words*: safety evaluation; mutagens; *de minimis*; carcinogens; risk assessment.**

INTRODUCTION

In the pharmaceutical industry, solvents, raw materials, intermediates, and contaminants in a synthetic route process are occasionally found to be carcinogens and/or mutagens. Risk assessments are conducted to ensure worker and product safety following guidelines from FDA, ICH, OSHA, and other regulatory groups.

From a regulatory perspective, carcinogens have historically been characterized using a linearized multistaged model. Inherent in this model is the notion that there is no threshold for cancer incidence. Therefore, it is impossible using the model to determine a dose without some calculated risk. The challenge for risk assessors is to determine a *de minimis* or threshold limit below which risk of cancer is negligible. This determination can be quite simple for a chemical with a wealth of carcinogenicity data, but can be complex for a chemical with a limited carcinogenicity dataset or for a chemical only found to be a mutagen. A quantitative risk assessment process has been developed to allow risk assessors to set limits for carcinogens and mutagens. This comprehensive approach is based on the practice supporting the threshold of regulation for indirect food additives, is consistent with methods used for drinking water standards, and incorporates a hierarchy of approaches. The result of this risk assessment process is a numerical value that can be translated into a *de minimis* daily exposure, an analytical detection level, or a cleaning limit for manufacturing equipment at which risk of cancer is negligible.

RISK ASSESSMENT PROCESSES FOR CARCINOGENS

Methods for assessing the potency of carcinogens and risk assessment tools to determine risk have been developed and the pros and cons of each have been debated. The linearized multistage model (LMS) has become the standard among regulatory groups to calculate the cancer slope factor as a measure of potency. In 1980, EPA began using the linearized multistage model to extrapolate from the dose–response curve to estimate upper-bound risks for very low doses used in setting drinking water standards (Anderson, 1983). FDA does not restrict analysis to a specific model, as long as the goal of an adequate fit to the data is achieved (Gaylor *et al.*, 1997). WHO predominantly used the linearized multistage model in calculating carcinogenic risk when developing guidelines for drinking water quality. For carcinogens for which there is convincing evidence to suggest a nongenotoxic mechanism, guideline values were calculated using a tolerable daily intake approach assuming a threshold (WHO, 1996). Recent draft guidelines for carcinogen risk assessment proposed by EPA (1996) discuss the use of a nonlinear model if the mechanism of carcinogenicity has a threshold mode of action that can be defined. This would allow for an approach using the NOEL/safety factor or benchmark-dose/safety factor method in determining an allowable exposure. Extensive study is required for an evaluation of mode of action. However, mode of action data, if available, allow matching of mathematical assumptions with the biological behavior and avoid overly conservative limits. The data requirement to conduct a linear multistage model analysis is also high.

Mathematical analyses have led to a characterization of carcinogens as a group. Correlations have been reported which allow for an estimation of potency when

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the data set is not optimal. Correlations using the TD_{50} and maximum tolerated dose (MTD) have been described. We have assembled these approaches into a continuum and extrapolated the process to apply not only to carcinogens, but also to mutagens, using concepts underlying threshold of regulation. By assembling all the available methods into a continuum, the method that matches the available data set is easily identified. The resulting decision matrix is a flexible tool to calculate a numerical exposure limit.

Currently, there is no quantitative method to incorporate mutagenicity data into a risk assessment. Rather, discussion of the mutagenicity data is part of the qualitative risk assessment. The EPA guideline for mutagenicity risk assessment (EPA, 1984) focuses on germ cells and heritable genetic risk. It does not discuss somatic cell mutation and cancer risk. Although very conservative, mutagens can be evaluated in the same risk paradigm as carcinogens by assuming mutagens have the potential to be carcinogens. This allows for control of mutagens by a quantitative process.

REGULATORY PRECEDENTS FOR NEGLIGIBLE CARCINOGENIC RISK

Acceptable risk is a concept that is required because of the adoption of the no threshold theory of carcinogenicity. Setting the acceptable risk level is a risk management decision. Several regulatory agencies have set precedents for *de minimis* carcinogenic risk. When EPA sets an acceptable risk for the general population (as for drinking water standards), the upper bound risk level of one excess cancer per 1 million people (i.e., 10^{-6}) is used (EPA, 1991), that is, a lifetime risk over background of one excess cancer death per 1 million people exposed to an agent daily for 70 years. WHO uses 10^{-5} for drinking water standards (WHO, 1993). FDA, first acting under the DES proviso, set a policy of "essentially zero" risk at one excess cancer in 1 million (FDA, 1982). Additionally, the U.S. Supreme Court has affirmed the *de minimis* principle that "safe" does not mean zero risk (U.S. Supreme Court, 1980).

Numerous factors play a role in the determination of a *de minimis* risk including the characterization of the exposed population. The population EPA is protecting through drinking water standards can be characterized as a large general population unaware of the risks. A patient population taking pharmaceuticals is comparable to the population the EPA is protecting in the drinking water standards. A policy for residuals consistent with the regulatory precedents of a *de minimis* risk of 10^{-6} for carcinogens has been adopted for patient safety.

The Occupational Safety and Health Administration (OSHA) sets standards for safety in the workplace in the United States. Airborne workplace exposure limits for carcinogens are typically set at about a risk level of 1/1000 which has been affirmed in a court ruling. The population OSHA is protecting is smaller and more homogeneous than the general population. Additionally, workers generally are aware of occupational hazards. A *de minimis* risk for workplace exposure at no more than 1 in 1000 has been adopted for worker safety.

With these two values, namely, cancer potency slope factor (CPS) and *de minimis* risk, an exposure limit can be calculated. Using the reported slope factor value, the exposure associated with a risk can be calculated directly using the equation: *de minimis* risk level/slope factor = *de minimis* exposure level.

RISK ASSESSMENT PROCESS—CONCEPTUAL BASIS OF MODEL

Chemical exposures can occur from raw materials, manufactured intermediates, final products, or contaminants. The data set available for each of these chemicals is quite variable and may affect the process for the hazard evaluation. Purchased materials range from commodity chemicals which have been thoroughly studied to specialty chemicals with limited toxicity data. Similarly, the data for contaminants can vary substantially. Intermediates are typically novel chemicals with no published toxicity data and a small internal dataset. Final pharmaceuticals typically have a large toxicity database. The completeness of the data set often dictates the process used for the risk assessment. A flow chart has been developed which links the available carcinogenic data or mutagenic data to a hazard evaluation method (Fig. 1).

Carcinogen with a published or calculated slope factor. Many high-volume chemicals have been well characterized, and fully reported 2-year bioassays with highly analyzed data sets are available. For example, the EPA has evaluated chemicals with public exposure impact and has calculated cancer potency values based upon the linearized multistage model. EPA reports its cancer potency calculations in the IRIS database. Another source of such data is the California EPA, which also evaluates chemicals for carcinogenic potency and reports the results. Using the reported slope factor value, the exposure associated with a risk can be calculated directly using the equation: *de minimis* risk level/slope factor = *de minimis* exposure level. Alternatively, software is available to conduct the LMS if the data set is available.

Carcinogen with published or calculated TD_{50}. If a slope factor value is not available, methods are available for estimating the cancer potency value from published data tables. Gold *et al.* (1984) devised a statistic termed the TD_{50} as a method for comparing carcinogens. The TD_{50} is defined as the average daily dose estimated to halve the probability of remaining tumor-free at a specified tissue site throughout a 2-year study.

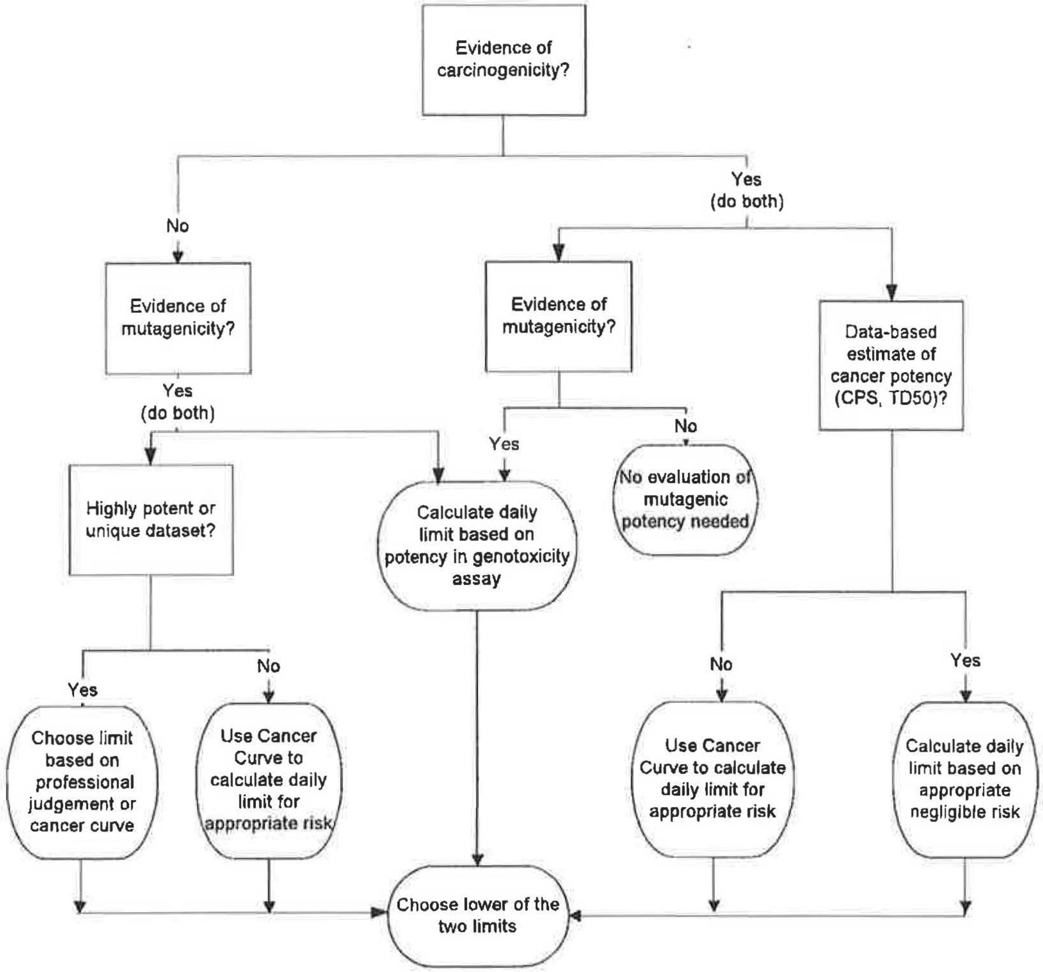

FIG. 1. Process flow diagram for risk assessment of carcinogens and mutagens.

A compilation of bioassays with a TD_{50} analysis has been published (Gold and Zeiger, 1997). Alternatively, if a complete bioassay data set is available for a given chemical, the TD_{50} can be calculated as outlined by Peto *et al.* (1984). From the TD_{50}, an estimate of the slope factor can be calculated based on the correlation reported by Gaylor and Gold (1995). Using summary data from 191 carcinogens, the relationship between the slope factor and the TD_{50} was derived. Mathematically, the slope factor $= 0.87/TD_{50}$.

Carcinogen with incomplete data (use MTD to estimate slope). Occasionally, there is no acceptable 2-year study for a chemical demonstrated to be a carcinogen. For example, the occurrence of tumors may have been reported, but tumor incidence data were incompletely or inadequately reported (e.g., lack of control data, inadequate numbers for valid statistical evaluation) to allow a conclusive analysis. Frequently, older studies do not meet current protocol standards, and the data do not fit the established models so that a slope factor cannot be calculated. In these cases, a slope factor can be estimated from a MTD based on the results of a 90-day study. The correlation is due in part to the convention of running bioassays at dose levels equal to the MTD and 1/2 MTD. Gaylor and Gold (1995) reported that the virtually safe dose (VSD), the dose associated with an excess cancer risk of 1 in 1 million, can be estimated by the relationship VSD = MTD/740,000. The result of this equation is estimated to be within a factor of 10 of the VSD that would be obtained from a rodent carcinogen based on a 2-year NCI/NTP chronic bioassay. The authors suggest that since cancer potency estimates from different experiments with the same chemical can also vary up to a factor of 10 from their geometric mean, there may be little loss in precision by estimating potency from a MTD.

Carcinogen with inadequate data to estimate slope factor from MTD. If there is evidence of carcinogenicity but the data are inadequate to calculate an estimated cancer potency value and there is no 90-day study from which to estimate a MTD, there is currently no accepted way to develop a chemical-specific potency.

In lieu of chemical-specific potency, methods based on carcinogens as a class can be used.

Rulis (1986) used this strategy to support the threshold of regulation concept for indirect food additives. The threshold of regulation established a *de minimis* level, an exposure considered to have negligible risk. To support a *de minimis* level, Rulis collected TD_{50} values and determined the risk-specific dose (RSD, the dose associated with a chosen level of risk, e.g., 10^{-6}) at a risk of 10^{-6} for a large group ($N = 343$) of animal carcinogens. He found, for example, that the RSD for 85% of the evaluated chemicals was an exposure of 0.15 μg/day.

A similar process is used here to develop a limit for carcinogens with unknown potency and for mutagens. The data set supporting threshold of regulation consisted of TD_{50} values for animal carcinogens chosen from the Gold and Zeiger database. The potency database was updated using the available summary table on the Carcinogenic Potency Project Web site. The summary table reports the most potent TD_{50} value for each species from a positive test or the harmonic mean of the lowest TD_{50} values from multiple tests on a single chemical. The lowest TD_{50} value for each of the 705 chemicals reported as positive by the study author was used in our assessment. If a TD_{50} was available for both rats and mice, the lower of the two was used. For each TD_{50}, the RSD associated with a 10^{-6} risk was calculated (see Appendix). A logistic curve was fit to the RSD values (Fig. 2) and is referred to as the cancer curve. From the model, a risk-specific dose associated with any chosen percentile can be calculated.

This process closely parallels that of Rulis. The final rule for indirect food additives (FDA, 1995) was based on a data set limited to 477 chemicals tested by the oral route only. For a broader application, our data set was not limited to oral carcinogens and includes data collected by the inhalation and parenteral routes. As predicted by Munro (1999), the distribution of potency in experimental animals is not significantly altered by addition of more chemicals. Nonetheless, the approximately 40% increase in the number of chemicals reported herein adds data points to the tails of the curve, thus increasing the confidence in the 90th and 95th percentiles. As in the Rulis approach, a linear extrapolation was used to derive risk-based doses from the TD_{50} values. The impact of the use of TD_{50} values and linear extrapolation methodology was evaluated in a workshop on the threshold of regulation value (Munro, 1990). It was again reviewed at the incorporation of the process into Joint Expert Committee on Food Additives's (JECFA) processes to evaluate flavoring substances (Munro, 1999). The results of the curve compared to previously examined datasets are presented in the appendix.

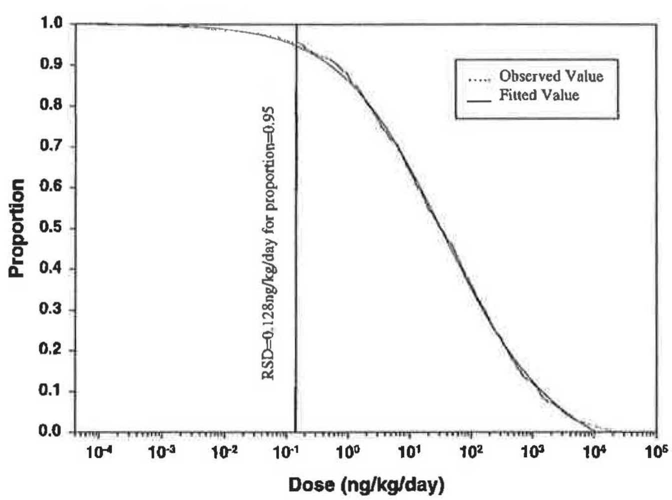

FIG. 2. Proportion of animal carcinogens ($N = 705$) with risk-specific (10^{-6}) daily dose. At the 95th percentile, the RSD is 0.128 ng/kg/day. Exposure at this level provides for 1 in 1 million excess cancer risk for 95% of the known animal carcinogens.

In the development of the threshold of regulation, Rulis originally proposed that the 85th percentile combined with a 20% probability of an untested chemical to be a carcinogen provided a *de minimis* risk of 95% probability of 1 in 1 million risk. In targeting the 95th percentile in the current strategy, no modifiers have been incorporated; 100% exposure and 100% probability of carcinogenicity are assumed. By choosing to limit exposure of a carcinogen to 95% on the cancer potency curve, the exposure will be protective at an established level of risk for 95% of the known carcinogens. At the 95th percentile, the RSD was 0.128 ng/kg/day or 9 ng/day for a 70-kg person (Fig. 2). At the RSD of 9 ng/day, there is a 95% probability of not exceeding a risk of 1 excess cancer in 1 million. The resulting exposure guideline, therefore, provides for negligible risk for all but the very most potent carcinogens with no slope factor or MTD.

No data for carcinogenicity; some data for mutagenicity. If there are no carcinogenicity data for a chemical, but results are positive in one or more primary mutagenicity tests (i.e., Ames, mouse lymphoma, mouse micronucleus test, *in vitro* or *in vivo* chromosome aberration assay, CHO/HGPRT, sister chromatid exchange assay, and unscheduled DNA synthesis assay), it may be assumed that the chemical has potential to be a carcinogen. A weight of evidence assessment is typically not used. Attempts to demonstrate an overall correlation between mutagenic potency and carcinogenic potency have yielded weak results (Fettermann *et al.*, 1997; McCann *et al.*, 1988; Piegorsch and Hoel, 1988; Hatch *et al.*, 1992). Without a measure of carcinogenic potency for a given chemical, the *de minimis* approach utilizing the cancer potency curve can be used to set a *de minimis* exposure for a mutagen.

In considering an appropriate risk level for mutagens, EPA guidance for drinking water standards for carcinogens was reviewed. Implementation of EPA standards results in detection limits associated with risk levels ranging from 10^{-6} to 10^{-4} (EPA, 1991). Following this guidance, mutagens of unknown carcinogenic potential can be controlled to a risk level of 10^{-5}, one additional cancer per 100,000 persons exposed. The cancer potency curve (adjusted for a *de minimis* risk level of 10^{-5}) shows that an exposure level of 90 ng/day (2300 μg/lifetime) will maintain a 10^{-5} risk level for 95% of the surveyed carcinogens. This limit was adopted as the *de minimis* limit for mutagens of unknown carcinogenic potency. This exposure is equal to about the 85th percentile at the 10^{-6} risk level.

The process also allows for scientific judgment to be applied in determining an appropriate risk level for mutagens. For example, a review of the genotoxicity data is conducted for unusual results or evidence that mutagenic potency is "high," suggesting that the default assumptions may not be applicable. Internal criteria may be developed to trigger a review of the risk level. On a case-by-case basis, it may be decided to control a specific chemical to a risk level of 10^{-6} ratherthan 10^{-5}.

RISK ASSESSMENT PROCESS—EXAMPLES OF APPLICATION

An illustration of the use of the flow chart and the effect on the allowable exposures is presented in Table 1. As data become available for a chemical, the allowable limit is revised. Once the chemical is identified as a mutagen (data set 1), the exposure is severely restricted, with a lifetime limit of 2300 μg (90 ng/day × 25,550 days in a 70-year lifetime). Evidence of carcinogenicity in animals further limits exposure to 10^{-6} risk with a lifetime limit of 230 μg in lieu of chemical-specific potency data (data set 2). From dose–response data, the cancer potency slope can be estimated/calculated (data set 3 and 4). For chemical A, the actual potency is not within the top 5% of the most potent carcinogens so the default limits are adequate, whereas chemical B is in the top 5% of most potent carcinogens and use of the default limits will overestimate the allowable exposure.

An example of how the process can be used for risk assessment is in setting a cleaning limit following the manufacture of a prototypic mutagenic anticancer drug. The registration package includes a genotoxicity battery and a 6-month rodent study. This compound is not acutely toxic. It is more toxic with daily repeated dosing than with intermittent dosing. Two of the four genotoxicity assays were positive, but no 2-year carcinogenicity study was conducted. Following the decision diagram, the data set can be described as positive mutagenicity with no carcinogenicity data. Therefore, the cleaning limit for the equipment will be set so that exposure to this chemical as a residual in the next drug to be manufactured will be limited to a risk of 10^{-5} at 95% of the curve or a total lifetime exposure of 2300 μg. Assuming that the second drug has a chronic daily dose of 100 mg and the potential of 35 years of therapy, exposure to the residue must be no more than 0.18 μg/day or 1.8 ppm as a residual in the second active ingredient. In this example, the limit is about 50 times lower than a normal default cleaning limit of 100 ppm. The cleaning limit will vary widely depending on dose and duration of the second product. An additional evaluation of the non-mutagenic/noncarcinogenic endpoints is also required in setting this cleaning limit. The lower limit is then adopted.

The daily limits proposed here for mutagens (90 ng/day) and carcinogens (9 ng/day) are lower than the 1.5 μg/day threshold of regulation limit currently used by FDA for indirect food additives. The FDA assumption of a 20% probability of the chemical being a carcinogen may no longer be appropriate once positive mutagenic findings are reported. This assumption is not included in the model presented here resulting in a more conservative limit. The method described here could provide an option for quantitatively framing the risk of a mutagenic indirect food additive.

TABLE 1
Limits of Exposure as a Result of the Application of the Decision Matrix

Chemical A	Data set 1	Data set 2	Data set 3	Data set 4
Mutagenicity	Positive	Positive	Positive	Positive
Carcinogenicity	No data	Unquantifiable evidence of carcinogenicity	TD_{50} = 6.15 est. CPS = 0.14	CPS = 4.5
Lifetime limit	2300 μg	230 μg	12.8 mg	0.4 mg
Chemical B	**Data set 1**	**Data set 2**	**Data set 3**	**Data set 4**
Mutagenicity	Positive	Positive	Positive	Positive
Carcinogenicity	No data	Unquantifiable evidence of carcinogenicity	TD_{50} = 0.00357 est. CPS = 244	CPS = 220
Lifetime limit	2300 μg	230 μg	7 μg	8 μg

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DISTRIBUTION OF EXPOSURE BASED ON CANCER ENDPOINTS AND GENOTOXICITY ENDPOINTS

One of the underlying principles associated with the linear low-dose extrapolation methodology is that risk associated with a short duration of exposure can be distributed across the 70-year life span. That is to say, under the theory of the no-threshold mechanism, risk is associated with the total exposure and not the pattern of exposure. The total lifetime dose is, therefore, the appropriate number to use for *de minimis* exposure. If the anticipated exposure duration is less than lifetime, the lifetime dose can be redistributed over the period of exposure. Theoretically, a single once-in-a-lifetime dose of 2300 μg of a mutagen has an excess cancer risk of 10^{-5}. This methodology is adequate for assessing cancer risk. Another endpoint to consider, however, is mutagenicity itself.

It is necessary to prevent rolling up the lifetime exposure into an excessive dose in order to control risk of mutagenicity as its own endpoint. While a genotoxicity test result does not give information about the potency of the chemical as a carcinogen, it can often provide dose–response data on mutagenicity endpoints. In order to provide a margin of safety on genotoxicity endpoints, daily exposure is restricted to provide at least a 100-fold safety margin on a first effect level in genotoxicity assays.

The lower of the two limits, one based on carcinogenic endpoints using the cancer curve and one on genotoxic endpoints, is selected as the *de minimis* risk level. Additionally, the exposure cannot exceed the safe limits as determined by nongenotoxic endpoints.

OCCUPATIONAL EXPOSURE LIMITS FOR WORKPLACE SAFETY

The same principles can be applied in setting occupational exposure levels for workplace safety. OSHA has used a risk level at about 10^{-3} in setting permissible exposure limits (PEL) for carcinogens such as benzene. For carcinogens of known potency, this same level of risk is adopted. For cases where potency is unknown, risk management decisions can be made based on the cancer potency database curve. For carcinogens of unknown potency, the limit is set at 95% of the 10^{-3} curve, resulting in a maximum daily exposure of 9 μg/day for a 70-year lifetime. OSHA has not articulated a *de minimis* range comparable to the 10^{-6} to 10^{-4} range used by EPA. Instead of accepting a higher level of risk for mutagens, a point lower on the same potency curve was selected. It was noted above that the 95th percentile at 10^{-5} was equivalent to the 85th percentile at 10^{-6} (Table 2). Therefore, a limit equal to the 85th percentile on the 10^{-3} curve is the limit used for mutagens or 90 μg/day for a 70-year lifetime. Assuming an exposure to the same compound in the workforce is limited to 20 years (250 eight-hour workdays/year) and a volume of air breathed at a moderate work level for 8 h is 10 m^3, the airborne limit for a carcinogen is about 5 μg/m^3. A similar calculation yields a default limit of about 50 μg/m^3 for mutagens.

TABLE 2
Daily Lifetime Dose at Selected Points on the Curve across Different Risk Levels

	10^{-6} risk	10^{-5} risk	10^{-3} risk
95th percentile	9 ng/day	90 ng/day	9 μg/day
85th percentile	90 ng/day		90 μg/day

It may be possible to tailor the time parameter of years of exposure by considering whether the plant site is a dedicated or a flexible manufacturing site. Even so, the limits derived by using time parameters between 35 and 5 years are only approximately sevenfold different (viz., 2/26 and 18/183 μg/m^3 for carcinogens/mutagens, at 35 and 5 years, respectively). There is a break in containment technology at about 10 to 25 μg/m^3, so that carcinogens tend to fall into a different containment configuration than mutagens irrespective of the time parameter. Furthermore, no adjustment is required to develop a 12-h limit. The number of hours worked in a year is nearly the same whether worked as 8-h shifts, 5 days a week for 50 weeks (2000 h) or as 12-h shifts, 7 days on, 7 days off for 50 weeks (2100 h).

This strategy provides a consistent approach to defining limits for exposure to carcinogens and mutagens to the public and to workers.

DISCUSSION

There are numerous chemicals involved in a synthesis route for a pharmaceutical product, and some of these chemicals are occasionally found to be carcinogens and/or mutagens. Attempts to completely eliminate the use of carcinogens or mutagens in a manufacturing process are often not feasible because of a lack of alternative solvents or intermediates. Also, with carcinogenicity studies constantly being conducted with common solvents and raw materials, there will always be the possibility of a new positive study being introduced into the literature. Therefore, a means by which a *de minimis* or threshold limit can be determined provides great value in the continued development and manufacture of a product both for product quality control and workplace safety.

Risk assessment strategies for mutagens are not well developed. The potency correlation between mutagenicity and carcinogenicity is weak. The relevance of the results in animal studies where doses are targeted at maximum tolerated doses and extrapolated to very low exposures to humans as trace residuals in food, water, or pharmaceuticals is unknown. The influence of biological repair systems on mutagenic events is not quantified. The risk management system presented here enables reasonable control of exposure to mutagens. The result of this process is a numerical limit that can be translated into a *de minimis* daily exposure, an analytical detection level, or a cleaning limit.

APPENDIX

Statistical Methods and Results

The logistic model (1.1) was selected to fit the proportion of the TD_{50} levels in mg/kg/day on the common logarithm scale (log 10 based). Although the log-normal model was attempted on the data, it resulted in a significant lack of fit with $P = 0.0012$ using the Shapiro–Wilk test (Shapiro and Wilk, 1965). Four parameters were estimated from a five-parameter logistic model with the maximum fixed at 1.0; the minimum, min; the slope parameter, slope; the location parameter, location; and the asymmetry parameter, asym. The fitted logistic curve and the observed data are plotted in Fig. 2. The TD_{50} value, below which a given proportion of the chemicals are less potent, can be calculated using Formula 1.2. The dose corresponding to one-in-a-million risk, risk-specific (10^{-6}) dose, was calculated based on the TD_{50} as in Formula 1.3.

1.1. The Model

$$\text{proportion} = (1-\min)/\left(1+10^{\text{slope}(\log_{10}\text{TD}_{50}-\text{location})}\right)^{\text{asym}}+\min, \quad (1)$$

where min = −0.0936, slope = 0.5487, location = 0.9016, asym = 0.6831.

1.2. Rearranged to Solve for $Log_{10}TD_{50}$, with Proportion = 0.95

$$\log_{10}\text{TD}_{50} = \left\{\left[\log_{10}\left(\frac{1+0.0936}{0.95+0.0936}\right)^{(1/0.6831)} - 1\right]\Big/(0.5487)\right\} + 0.9016$$

$$= (\log_{10}(1.0709-1))/0.5487 + 0.901$$

$$= -1.1930$$

$$\text{TD}_{50} = 10^{-1.1930} = 0.0641.$$

1.3. The Formula for Converting TD_{50} to RSD at 10^{-6} Risk (as Described in Rulis, 1989) is

$$\text{RSD} = \text{TD}_{50}/(0.5/1\times10^{-6}).$$

The plot of fitted results for the cancer potency curve is shown in Fig. 2. Table 3 shows the results of the computations for the 10th, 25th, 50th, 75th, 90th, and 95th percentiles using the developed model and the empirical data. Figure 3 compares the RSD values from the inverse of the expanded curve to the four data sets reviewed by Krewski *et al.* (1990). At all points the expanded curve reported herein lies in the range of the other data sets.

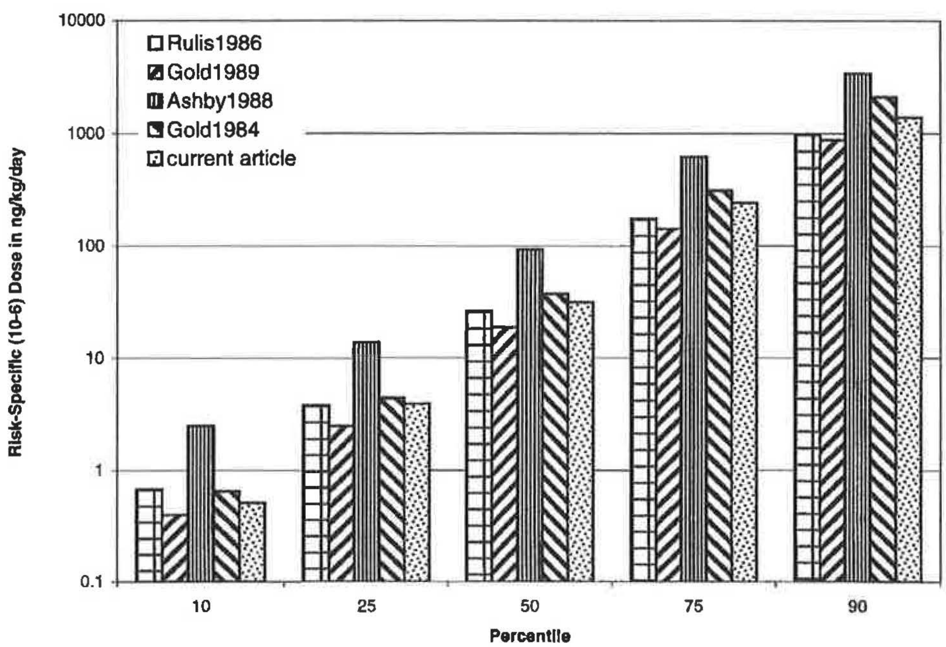

FIG. 3. Risk-specific doses at a risk of 10^{-6} across five data sets of animal carcinogens.

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TABLE 3
Percentile Distribution of Virtually Safe Doses for Cancer Potency Curve

Percentile	$LogTD_{50}$	TD_{50} (mg/kg/day)	Risk specific dose at 10^{-6}, calculated (ng/kg/day)	Risk specific dose at 10^{-6}, empirical (ng/kg/day)
95	−1.19297	0.0641	0.1283	0.18
90	−0.59620	0.2534	0.5068	0.68
75	0.29081	1.9535	3.9069	3.45
50	1.19355	15.6153	31.2306	30.73
25	2.08249	120.9170	241.8339	243.0
10	2.84240	695.6711	1391.3423	1278

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Part III

The President

Executive Order 13579—Regulation and Independent Regulatory Agencies

Federal Register
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Thursday, July 14, 2011

Presidential Documents

Title 3—

The President

Executive Order 13579 of July 11, 2011

Regulation and Independent Regulatory Agencies

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to improve regulation and regulatory review, it is hereby ordered as follows:

Section 1. *Policy.* (a) Wise regulatory decisions depend on public participation and on careful analysis of the likely consequences of regulation. Such decisions are informed and improved by allowing interested members of the public to have a meaningful opportunity to participate in rulemaking. To the extent permitted by law, such decisions should be made only after consideration of their costs and benefits (both quantitative and qualitative).

(b) Executive Order 13563 of January 18, 2011, ''Improving Regulation and Regulatory Review,'' directed to executive agencies, was meant to produce a regulatory system that protects ''public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation.'' Independent regulatory agencies, no less than executive agencies, should promote that goal.

(c) Executive Order 13563 set out general requirements directed to executive agencies concerning public participation, integration and innovation, flexible approaches, and science. To the extent permitted by law, independent regulatory agencies should comply with these provisions as well.

Sec. 2. *Retrospective Analyses of Existing Rules.* (a) To facilitate the periodic review of existing significant regulations, independent regulatory agencies should consider how best to promote retrospective analysis of rules that may be outmoded, ineffective, insufficient, or excessively burdensome, and to modify, streamline, expand, or repeal them in accordance with what has been learned. Such retrospective analyses, including supporting data and evaluations, should be released online whenever possible.

(b) Within 120 days of the date of this order, each independent regulatory agency should develop and release to the public a plan, consistent with law and reflecting its resources and regulatory priorities and processes, under which the agency will periodically review its existing significant regulations to determine whether any such regulations should be modified, streamlined, expanded, or repealed so as to make the agency's regulatory program more effective or less burdensome in achieving the regulatory objectives.

Sec. 3. *General Provisions.* (a) For purposes of this order, ''executive agency'' shall have the meaning set forth for the term ''agency'' in section 3(b) of Executive Order 12866 of September 30, 1993, and ''independent regulatory agency'' shall have the meaning set forth in 44 U.S.C. 3502(5).

(b) Nothing in this order shall be construed to impair or otherwise affect:

(i) authority granted by law to a department or agency, or the head thereof; or

(ii) functions of the Director of the Office of Management and Budget relating to budgetary, administrative, or legislative proposals.

(c) This order shall be implemented consistent with applicable law and subject to the availability of appropriations.

(d) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

THE WHITE HOUSE,
July 11, 2011.

[FR Doc. 2011–17953
Filed 7–13–11; 11:15 am]
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Report on Selected Aspects of EPA's Draft 2014 Update of Human Health Ambient Water Quality Criteria

Docket Number: EPA–HQ–OW–2014–0135

Prepared for Federal Water Quality Coalition (FWQC)

August 13, 2014

ARCADIS

Report on Selected Aspects of EPA's Draft 2014 Update of Human Health Ambient Water Quality Criteria

Docket Number: EPA–HQ–OW–2014–0135

Prepared for:

Federal Water Quality Coalition (FWQC)

Prepared by:

ARCADIS U.S., Inc.

1 Executive Drive

Suite 303

Chelmsford

Massachusetts 01824

Tel 978 937 9999

Fax 978 937 7555

Our Ref.:

ME000230.0000

Date:

August 13, 2014

Tables

Figures

Executive Summary

In May 2014, the United States Environmental Protection Agency (EPA) released its draft updated recommended water quality criteria for human health (HHWQC) for 94 chemical substances. According to EPA, the 2014 updates reflect the latest scientific information and also include updated fish consumption rates. ARCADIS has prepared these comments on select aspects of the draft updated HHWQC as they pertain to the overall approach used by EPA for development of the draft updated criteria and specific issues related to EPA's methodology and documentation on behalf of the Federal Water Quality Coalition (FWQC).

EPA has attempted to update the HHWQC methodology through the application of scientific knowledge in the fields of dietary consumption and bioaccumulation estimation. In particular, the use of a fish consumption rate representative of long-term fish consumption behaviors, instead of relying on the results of short-term surveys, and of use bioaccumulation factors (BAFs) where appropriate instead of bioconcentration factors (BCFs), can lead to HHWQC that have a scientific basis more appropriate than that of current HHWQC and are protective of public health. However, the specific methodology EPA has used for deriving the draft updated HHWQC requires substantial revision. Once such revisions are completed, the draft updated HHWQC can be revised and reissued for additional public comment.

Comments contained in this document are organized into the categories listed below.

- Comments pertaining to certain aspects of EPA's derivation of usual fish consumption rates (UFCRs) and life-cycle apportionment of marine fish species.
- Comments pertaining to EPA's assumptions regarding human exposure and toxicity benchmarks.
- Comments on EPA's selection the BCFBAF™ model for estimating national BAFs.
- EPA's choice of input parameters for the BCFBAF™ model, including a sensitivity analysis on select input parameters.

However, an overarching comment is that the overall process used by EPA to derive the draft updated HHWQC is not transparent, in large part because many decisions are presented with little or no discussion or justification. This contrasts with EPA's historical and highly commendable efforts to explain the basis for its decision making regarding development of HHWQC (e.g., EPA 2000, 2003, 2009). This lack of transparency combined with the absence of crucial information prevented us from providing EPA a full and thorough review of the draft HHWQC and the methodology used by EPA to derive the draft updated HHWQC. As a consequence, these comments should not be considered complete until all the information is provided to the public for review.

EPA's draft updated HHWQC are based on a UFCR that includes a contribution from marine fish under the pretext that fish classified as marine but caught in near shore waters (within approximately three miles of the shoreline) represent "local" fish that could be affected by chemicals at a concentration equal to the draft updated HHWQC. The key assumption is that near shore waters have concentrations of chemicals equal to the draft updated HHWQC. However, marine fish, even those caught in near shore waters, are expected to have substantially lower exposures to chemicals discharged to fresh or estuarine waters than true freshwater or estuarine fish species. Because of this, before including marine fish in the UFCR used to derive HHWQC, EPA needs to demonstrate that such exposures make a significant contribution to the chemical-specific body burdens found in marine fish caught in near shore waters. Regardless, if marine fish are to be included in the draft updated HHWQC, EPA needs to provide all the information used to develop the marine fish apportionment enabling the public to understand the contribution of marine fish to the overall UFCR.

The exposure assumptions selected by EPA to derive the draft updated HHWQC are representative of adult lifetime exposure, yet the toxicity benchmarks for some of the chemicals for which HHWQC have been proposed have been adjusted to account for exposures that occur during the pre-adult portions of a person's life (e.g., childhood). EPA should carefully consider whether adjusting toxicity factors to account for the assumed potential increased sensitivity of early lifestages when deriving updated HHWQC is appropriate and address the uncertainties embedded in this adjustment.

The draft updated HHWQC rely on the BCFBAF™ (formerly called BCFWIN™) model contained in EPA's Estimation Program Interface Suite (EPI Suite™) software. The BAF estimation algorithm of this model is based on the screening level bioaccumulation model originally published in Arnot and Gobas (2003), which in the authors' own words was developed "to screen new and existing chemicals for their potential to bioaccumulate" (Arnot and Gobas, 2004). The supporting literature for Arnot and Gobas (2003) also mentions the model as a screening tool (Gobas and Arnot, 2003; Costanza et al., 2012). It is not scientifically appropriate to derive nationwide HHWQC using a model developed primarily as a screening tool. Even if the BCFBAF™ model were not a screening tool, its current application in the derivation of nationwide HHWQC is not appropriate for the reasons listed below.

- BCFBAF™ does not allow users to employ site-specific parameters that affect bioaccumulation. This contradicts general scientific understanding about bioaccumulation and is inconsistent with previous EPA guidance on the use of site-specific BAFs to derive HHWQC.
- Some of the data used by EPA to parameterize/calibrate BCFBAF™ are representative of the Great Lakes and, therefore, the resulting BAFs should not be used to estimate BAFs for all waters of the United States.
- Several of the inputs to BCFBAF™ used by EPA to develop national BAFs appear to overestimate bioaccumulation in many waters of the United States.
- Food web structure and other site-specific parameters are embedded in the food web biomagnification factor, so cannot be modified to reflect site-specific conditions.
- Aquatic invertebrates were not included in the training or validation dataset of the whole-body biotransformation rate constant (kM) model within BCFBAF™ even though they are commonly consumed by humans (e.g., shrimp, clams, crabs, lobster). It is not clear whether BAFs derived using the model are applicable to invertebrates and, therefore, whether the draft updated HHWQC are under or over protective of human populations consuming these species.
- EPA's documentation of the BCFBAF™ model is often not fully transparent and/or is absent for many assumptions and processes used by the model.
- EPA has included the BCFBAF™ model in EPI Suite™ and proposed its use in the methodology for deriving HHWQC. This is contrary to the guidance of EPA's Science Advisory Board (SAB) which questioned whether BCFBAF™ has been sufficiently verified to be used in even screening assessments and requested review before EPA added BCFBAF™ to EPI Suite™.

Each of these points is discussed in detail in the following sections of these comments.

To provide an example of the potential bias associated with EPA's choice of input parameters for the BCFBAF™ model, a sensitivity analysis was conducted for select input parameters built into the model that may vary among surface waters of the United States. The sensitivity analysis demonstrates that BCFBAF™ appears to use values for several, but not all, key parameters that lead to overestimates of BAFs rather than central estimates of BAFs. This results in BAFs that overestimate bioaccumulation of most chemicals and lead to more conservative HHWQC than necessary to protect public health at the levels recommended by EPA.

Based on the information presented in these comments, we recommend that EPA develop and provide to the public for review and comment technical support documents (TSDs) detailing the processes and rationale behind the multiple scientific and policy decisions EPA has made as part of deriving the draft updated HHWQC. The current draft updated HHWQC should not be finalized until these TSDs have been prepared and subjected to review by EPA's SAB. Once the SAB review has been addressed, EPA can revise the draft updated HHWQC and release an updated proposal for review by the public. In particular, the TSDs should include a full presentation of the derivation of the UFCR and guidance on how state regulators and other interested parties can cost-effectively develop state-, region-, or water body-specific BAFs, which is the preferred option under existing EPA guidance. As part of this, EPA should specifically justify selection of the proposed approach to developing BAFs, especially any choice to use a QSAR model over a mechanistic food web model. Given that EPA itself has explored use of the AQUAWEB model (Arnot and Gobas 2004), EPA should, at the very least, provide a detailed justification for adopting BCFBAF™ over AQUAWEB. Ultimately, a simplified version of the AQUAWEB model allowing States and authorized Tribes to use site-specific inputs for highly-sensitive parameters, but established default values for less sensitive parameters, may be more appropriate than the current proposal based on BCFBAF™.

Specific Comments

Comment 1. Marine species should not be included in the fish consumption rate used to develop the draft updated HHWQC.

Summary: Dilution provided by the large volume of water, tides, and ocean currents present in most near shore waters indicates that concentrations of chemicals regulated by HHWQC in near shore waters will be small compared to concentrations present in fresh and estuarine waters. Additionally, marine species caught in such waters may not have been present in such waters for a long enough time to have accumulated tissue concentrations assumed by the HHWQC. As a result, concentrations of chemicals in marine fish caught in near shore waters are likely to be much lower than assumed by the draft updated HHWQC. Regardless, the chemical-specific body burdens in true marine species reflect bioaccumulation in the marine environment, which is outside the jurisdictional control of States and authorized Tribes. This means that including any marine species in the UFCR would result in HHWQC that, almost by definition, can never be achieved based on actions any one state, or any group of states, could take. Based on these observations we recommend that EPA continue its past practice of excluding marine fish from the UFCR used to derive the draft updated HHWQC. If marine fish are to be included we recommend EPA provide data and analyses demonstrating that tissue concentrations in marine fish caught in near shore waters are larger than tissue concentrations of such fish caught in open oceans.

Discussion: The UFCR used to develop the draft updated HHWQC incorporates marine species under the pretext that fish classified as marine but caught in near shore waters represent "local" fish that could be affected by chemicals at a concentration equal to the draft updated HHWQC. The key assumption is that near shore waters (within approximately three miles of the shoreline) have concentrations of chemicals equal to the draft updated HHWQC and that the fraction of marine species harvested from such near shore waters have spent sufficient time in such waters to have their tissue concentrations be in equilibrium with the concentration in the near shore waters, where the equilibrium concentration is defined by the BAF. Neither of these assumptions is likely to be representative of near shore waters and, thus, of marine fish harvested from such waters. In fact, the chemical concentrations in such waters and marine fish caught from such waters are likely to be much lower than assumed by the draft updated HHWQC.

To the extent near shore waters are affected by concentrations of chemicals regulated by HHWQC, those chemicals are present in such waters because they were discharged in a freshwater environment, transported to the near shore waters by way of a river, and then released into the near shore waters at the mouth of the river. Even if one assumes that the concentration of the chemical in the river water at its mouth prior to release to the ocean is equal to the HHWQC, which is a very unrealistic assumption given that most discharges are diluted by river flow, the concentration in the near shore waters will be greatly diluted by the volume of the ocean, tidal exchange, and ocean currents. Therefore, the concentration of chemicals in near shore waters as defined by EPA will be substantially lower than the HHWQC. Indeed, the concentrations may be so much lower as to not to lead to a material increase in exposure.

Moreover, concentrations of many chemicals in mussels and oysters collected from near shore waters have been decreasing over the past two decades or more (O'Conner and Lauenstein 2006). EPA should provide data justifying the need to include potential exposures associated with fish caught from near shore waters in the draft updated HHWQC when such fish were not included when the existing HHWQC were established and concentrations of chemicals in near shore biota were higher.

We recommend that EPA provide an evaluation of the potential contribution of freshwater releases to near shore waters to document the need for inclusion of marine fish. If near shore waters are shown to be affected by freshwater releases approaching the HHWQC, EPA should then document that the marine species caught in those waters have or are expected to have concentrations that are in equilibrium with the water concentrations. This will depend upon assumptions about uptake and depuration and time spent in the near shore waters versus open ocean waters. EPA needs to provide specific examples of species for which this is a concern and why those examples are likely to be representative of other (all) marine species harvested in near shore waters.

We acknowledge that ocean discharges represent a possible special, localized condition. EPA should examine how many such discharges occur and how the volume compares to freshwater discharges. EPA should also document that harvesting of marine fish occurs near such discharges. If such discharges are frequent enough and of a large enough magnitude to warrant consideration when setting HHWQC, we recommend that EPA develop a process that is transparent enough and flexible enough that regulatory agencies responsible for establishing allowable water concentrations can use the approach recommended by EPA to establish more stringent site-specific HHWQC for such situations. The special case of ocean discharges should not be the basis for including marine fish in the UFCR, assuming such discharges require such inclusion in the first place.

The above comments suggest that it is very unlikely that marine fish caught in near shore waters can be considered to have the same potential to accumulate chemicals as fish that reside in and are caught in fresh and estuarine waters. Based on the reduced potential, we recommend that EPA exclude marine fish from the UFCR, and that if marine fish are to be included, EPA provide data and analyses that demonstrate such exposures are material and need to be accounted for by HHWQC.

Comment 2. EPA has not adequately documented its methodology for estimating fish consumption rate and life-cycle apportionment for marine species.

Summary: The apportionment of species to freshwater, estuarine, and marine habitats is not thoroughly documented by EPA. We recommend that EPA make transparent the process by which the apportionment was conducted such that members of the public interested in the process can duplicate EPA's findings and determine the fraction of the overall fish consumption rate that is comprised of freshwater and estuarine fish versus marine fish. To facilitate this we recommend that EPA provide a summary of the commercial landings data, species-specific life history data, and species-specific fish consumption data EPA used to arrive at the apportionments shown in Table 1 of EPA (2014a).

Discussion: In contrast to EPA's existing HHWQC that do not include marine fish when deriving HHWQC, EPA's draft updated HHWQC are based on a fish consumption rate that includes a contribution from marine fish. That contribution is based on apportioning the fraction of marine species that are harvested in estuarine and near shore waters versus open ocean waters. The habitat apportionment process is poorly documented. Furthermore, for anadromous fish (i.e., those that spend part of their lives in marine waters and part of their lives in estuarine and near shore waters), this assumption oversimplifies the process by which the chemical body burdens of fish are accumulated.

EPA (2014a) states that the assignments of species to freshwater, estuarine, and marine habitats were completed by a fisheries biologist. While Appendix A of EPA (2014a) provides the results of this analysis, the methodology that was used to arrive at these assignments is not clear. For select species, EPA (2014a) states that it used NOAA landings data to apportion the species-specific consumption rate to various habitats. However, for a number of species, what appear to be generalized habitat apportionments are assigned without a strong scientific basis. For example, grouper are apportioned 50% estuarine and 50% marine, with the note that there are "150 species", some of which are "marine only, some estuarine and marine." Similarly, rockfish are apportioned 50% estuarine and 50% marine, with a similar note simply indicating that "approximately half are found in estuaries (in addition to marine habitats)." Scallops are assigned as entirely estuarine. However the NMFS landings data referred to by EPA (2014a) indicate that about 99% of scallops are ocean scallops and not bay scallops (57,540,043 pounds of ocean scallops landed in 2010 and 376,827 pounds of bay scallops). Based on the landings data, scallops should be weighted almost entirely marine and not estuarine. Because species specific consumption rates are not provided, the effect of this misclassification on the UFCR used to derive the draft updated HHWQC cannot be determined. In these cases and others, the technical justification for habitat assignments needs to be clearly documented including references to life history information used to make judgments about habitat use.

While EPA (2014a) recognizes that habitat apportionment is complicated by the fact that some species live in multiple habitat types at different life stages, the method used to apportion consumption of anadromous fish to estuarine/near shore and marine habitats is unclear. For example, an apportionment of 15% estuarine and 85% marine is assigned to both chum salmon and coho salmon, with a note simply indicating that "some populations spend many months in estuaries." In the past, EPA has designated Pacific salmon as marine species, effectively excluding them from the UFCR used to derive HHWQC (EPA 2002), as it was commonly accepted that salmon accrue most of their body mass and chemical body burden in marine waters. However, in recent years, the treatment of salmon and other anadromous species in the FCR used to derive WQC has been called into question (e.g., WDOE 2013). Not only are salmon of particular cultural significance in the Pacific Northwest, but their life histories are varied and complex. While all current research supports a conclusion that the majority (i.e., >90%) of the bioaccumulative chemical body burden in adult Pacific salmon is acquired in the marine phase of their life (Cullon et al. 2009, O'Neill and West 2009), this has not necessarily been proven for all anadromous fish. Therefore, there is some debate about the best approach to apportionment for these species. If EPA wishes to include some consumption of anadromous fish in the UFCR it needs to carefully weight apportionment based on residence time (i.e., apportionment of consumption based on relative amount of time each species spends in marine waters) vs. growth patterns (i.e., apportionment of consumption based on where and when each species accrues body mass) vs. catch location (i.e., apportionment of consumption based on where fish are caught). Whichever method is ultimately used, EPA should provide clear justification for it's selection, and the process as executed should be clearly and thoroughly documented so that reviewers can understand and reproduce the results.

EPA needs to provide all necessary information to enable stakeholders to reproduce the apportionment upon which the draft updated HHWQC are based. To that end, we recommend that EPA provide a summary of the landings data used in the habitat apportionment process. We also request that EPA provide the species specific UFCRs that were combined with the habitat apportionment estimates to determine the overall freshwater, estuarine, and near shore consumption rates.

Comment 3. EPA has not consistently applied assumptions related to toxicity and exposure.

Summary: The exposure assumptions selected by EPA to derive the draft updated HHWQC are representative of adult lifetime exposure, yet the toxicity benchmarks for some of the chemicals for which HHWQC have been proposed partially apply to exposures that happen during specific portions of a person's life (e.g., childhood). We recommend that EPA carefully consider whether adjusting toxicity factors to account for potential increased sensitivity of children when deriving the draft updated HHWQC is appropriate. If EPA wishes to retain the early lifestage adjustment, we recommend that EPA discuss the uncertainty associated with this adjustment. EPA also needs to apply this adjustment consistently for all chemicals believed to act through a mutagenic mode of action.

Discussion: All of the exposure assumptions used by EPA to derive the draft updated HHWQC are representative of adults and assume a lifetime of exposure. Body weight, drinking water intake, and fish consumption rate are all derived from data for adults 21 years of age or older. Exposure duration and averaging time are not explicitly included in the equation used to derive EPA's draft updated HHWQC and are, thus, implicit assumptions that combined have the effect of assuming daily exposure for an entire lifetime but using only exposure assumptions representative of adults. Yet the toxicity benchmarks for some of the chemicals for which HHWQC have been proposed partially apply to exposures that happen during specific portions of a person's life (e.g., childhood).

For cancer risk assessments, EPA recommends modifying the carcinogenic toxicity factors [cancer slope factors (CSFs)] for chemicals acting through a mutagenic mode of action using age-dependent adjustment factors (ADAFs) before estimating a cancer risk (EPA, 2005). ADAFs are intended to account for potential early lifestage susceptibilities to the carcinogenic effects of mutagenic chemicals. As the name implies, ADAFs are specific to certain age ranges, or life stages. During the first two years of life, the default ADAF is 10 (i.e., the expected response to a given dose is 10 times greater at this age compared to adults). For ages 2 to 16, the ADAF is 3, and for ages 16 and onward, the ADAF is 1. Without adjusting for early lifestage sensitivity, the cumulative lifetime risk associated with a given dose of a hypothetical chemical received over 70 years is calculated using the equation shown below[1]:

Lifetime risk = CSF x Dose.

If one assumes that the dose received by a given person remains constant throughout his or her lifetime, and that early lifestages demonstrate increased sensitivity to the chemical as described by the default ADAFs, a cumulative lifetime toxicity adjustment factor can be derived as follows:

Age 0 to 2 risk = Duration (2 years/70 years) x ADAF (10) x CSF x Dose
= 0.32 x CSF x Dose;

Age 2 to 16 risk = Duration (14 years/70 years) x ADAF (3) x CSF x Dose
= 0.6 x CSF x Dose;

Age 16 to 70 risk = Duration (54 years/70 years) x ADAF (1) x CSF x Dose
= 0.77 x CSF x Dose;

Lifetime risk = Sum of age-specific risks
= 1.7 x CSF x Dose.

Of the 94 chemicals for which EPA derived updated HHWQC, EPA assumes 11 act through a mutagenic mode of action (EPA, 2014b). EPA modified the carcinogenic

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[1]For simplicity, the linear cancer risk equation is shown in these comments. This equation is a special case of the more general equation: lifetime risk = $1\text{-}e^{-(\text{cancer slope factor x dose})}$. As long as the product of "cancer slope factor x dose" is less than about 1×10^{-2}, as by definition it will be for HHWQC based on an allowable risk level of between 1×10^{-6} or 1×10^{-4}, the linear equation provides an accurate representation of the cancer risk estimated by the more general exponential equation.

toxicity factors for eight of the 11 mutagenic chemicals to account for potential increased sensitivity of children (Table 1). The cumulative lifetime toxicity adjustment factor of 1.7 was applied to all of the chemicals for which this modification was made, with the exception of vinyl chloride, for which the CSF was derived using the linearized multistage method for continuous lifetime exposure from birth. While the adjustment factor of 1.7 is assumed to account for the limited duration of exposure during sensitive lifestages, a critical assumption embedded in the adjustment factor is that the dose remains constant throughout a person's lifetime. In other words, the assumption is that the dose received by an infant is the same as that received by an adolescent or an adult. However, the dose a person receives is determined by the physical and behavioral characteristics of that person (i.e., drinking water intake, fish consumption rate, body weight), which change throughout the stages of a person's lifetime.

Table 1 Mutagenic Chemicals with Updated HHWQC

Mutagenic Chemical	Toxicity Factor Adjusted for Early Lifestage Exposure?
Benzidine	No
Benzo[a]anthracene	Yes
Benzo[a]pyrene	Yes
Benzo[b]fluoranthene	Yes
Benzo[k]fluoranthene	Yes
Chrysene	Yes
Dibenzo[a,h]anthracene	No
Ideno[1,2,3-cd]pyrene	Yes
Methylene chloride	Yes
Trichloroethylene	No*
Vinyl chloride	Yes**

* Adjustment omitted for trichloroethylene because it applies only to the kidney cancer component of the total cancer risk estimate, the impact of which was considered minimal.
** The cancer slope factor for vinyl chloride was derived using the linearized multistage method for continuous lifetime exposure from birth.

To illustrate how dose might change over the course of a lifetime, hypothetical risk estimates were calculated using 50th percentile and 90th percentile age-specific fish consumption rates and drinking water intakes. These hypothetical risk estimates use an age-specific "dose" calculated as ingestion divided by body weight. Each age-specific dose is then normalized to the adult (i.e., age 21 and older) dose and multiplied by the age-specific exposure duration and ADAF to determine hypothetical risk. The results of this analysis demonstrate that the approach used by EPA to account for early lifestage exposures (i.e., applying an adjustment factor of 1.7, which assumes a constant relative dose at each lifestage) might overestimate risk by up to 50% when considering the fish consumption exposure pathway or underestimate risk by up to 20% when considering the drinking water exposure pathway (Tables 2 and 3). The degree to which the total fish consumption risk is over estimated depends on the segment of the population considered, as the relative dose received by children compared to adults appears to be lower for the general population than for upper-end consumers. Whether the total risk is over- or underestimated when the fish consumption and drinking water exposure pathways are combined will ultimately depend on the chemical in question. The fish consumption exposure pathway is the dominant pathway for chemicals that have large BAFs; that is to say, the chemical dose received by consuming fish is considerably higher than the dose received by drinking water for such chemicals. Conversely, the drinking water exposure pathway is the dominant pathway for chemicals that have small BAFs in fish tissue. EPA needs to consider the changes exposure at various lifestages and clarify whether application of ADAFs is ultimately justified.

Table 2 Hypothetical Risk Calculations for Fish Ingestion Exposure Pathway

Age	Body Weight, kg (EPA 2011)	Duration (Fraction of 70 Years)	ADAF	Implicit Assumption in EPA's Use of ADAFs		Hypothetical Risk Using 50th Percentile UFCR				Hypothetical Risk Using 90th Percentile UFCR			
				Ratio to Adult Dose	Risk	50th Percentile UFCR, g/day (EPA 2014)	UFCR/BW	Ratio to Adult Dose	Risk	90th Percentile UFCR, g/day (EPA 2014)	UFCR/BW	Ratio to Adult Dose	Risk
0 - <1	7.83	0.014	10	1	0.1429	0	0	0	0	0	0	0	0
1 - <2	11.4	0.014	10	1	0.1429	0.6	0.053	0.842	0.120	4.7	0.412	1.499	0.214
2 - <3	13.8	0.014	3	1	0.0429	0.6	0.043	0.696	0.030	4.7	0.341	1.238	0.053
3 - <4	18.6	0.014	3	1	0.0429	0.7	0.038	0.602	0.026	5.8	0.312	1.134	0.049
4 - <5	18.6	0.014	3	1	0.0429	0.7	0.038	0.602	0.026	5.8	0.312	1.134	0.049
5 - <6	18.6	0.014	3	1	0.0429	0.7	0.038	0.602	0.026	5.8	0.312	1.134	0.049
6 - <7	31.8	0.014	3	1	0.0429	1.1	0.035	0.553	0.024	7.7	0.242	0.881	0.038
7 - <8	31.8	0.014	3	1	0.0429	1.1	0.035	0.553	0.024	7.7	0.242	0.881	0.038
8 - <9	31.8	0.014	3	1	0.0429	1.1	0.035	0.553	0.024	7.7	0.242	0.881	0.038
9 - <10	31.8	0.014	3	1	0.0429	1.1	0.035	0.553	0.024	7.7	0.242	0.881	0.038
10 - <11	31.8	0.014	3	1	0.0429	1.1	0.035	0.553	0.024	7.7	0.242	0.881	0.038
11 - <12	56.8	0.014	3	1	0.0429	1.1	0.019	0.310	0.013	8.3	0.146	0.531	0.023
12 - <13	56.8	0.014	3	1	0.0429	1.1	0.019	0.310	0.013	8.3	0.146	0.531	0.023
13 - <14	56.8	0.014	3	1	0.0429	1.1	0.019	0.310	0.013	8.3	0.146	0.531	0.023
14 - <15	56.8	0.014	3	1	0.0429	1.1	0.019	0.310	0.013	8.3	0.146	0.531	0.023
15 - <16	56.8	0.014	3	1	0.0429	1.1	0.019	0.310	0.013	8.3	0.146	0.531	0.023
16 - <17	71.6	0.014	1	1	0.0143	1.4	0.020	0.313	0.004	9.5	0.133	0.482	0.007
17 - <18	71.6	0.014	1	1	0.0143	1.4	0.020	0.313	0.004	9.5	0.133	0.482	0.007
18 - <19	71.6	0.014	1	1	0.0143	1.7	0.024	0.380	0.005	11.6	0.162	0.589	0.008
19 - <20	71.6	0.014	1	1	0.0143	1.7	0.024	0.380	0.005	11.6	0.162	0.589	0.008
20 - <21	71.6	0.014	1	1	0.0143	1.7	0.024	0.380	0.005	11.6	0.162	0.589	0.008
21 +	80	0.700	1	1	0.7	5	0.063	1	0.7	22	0.28	1	0.7
				Total Hypothetical Risk:	**1.7**			**Total Hypothetical Risk:**	**1.1**			**Total Hypothetical Risk:**	**1.5**

Notes:

BW = body weight

g/day = grams per day

kg = kilograms

UFCR = usual fish consumption rate

Hypothetical risk calculated as Duration x ADAF x Ratio to Adult Dose

Table 3 Hypothetical Risk Calculations for Drinking Water Exposure Pathway

Age	Body Weight, kg (EPA 2011)	Duration (Fraction of 70 Years)	ADAF	Implicit Assumption in EPA's Use of ADAFs		Hypothetical Risk Using 50th Percentile DI				Hypothetical Risk Using 90th Percentile DI			
				Ratio to Adult Dose	Risk	50th Percentile DI, mL/day (EPA 2011)	DI/BW	Ratio to Adult Dose	Risk	90th Percentile DI, mL/day (EPA 2011)	DI/BW	Ratio to Adult Dose	Risk
0 - <1	7.83	0.014	10	1	0.1429	525	66.957	3.533	0.505	1042	133	3.442	0.492
1 - <2	11.4	0.014	10	1	0.1429	300	26.316	1.389	0.198	772	67.72	1.753	0.250
2 - <3	13.8	0.014	3	1	0.0429	341	24.710	1.304	0.056	920	66.67	1.725	0.074
3 - <4	18.6	0.014	3	1	0.0429	437	23.495	1.240	0.053	933	50.16	1.298	0.056
4 - <5	18.6	0.014	3	1	0.0429	437	23.495	1.240	0.053	933	50.16	1.298	0.056
5 - <6	18.6	0.014	3	1	0.0429	437	23.495	1.240	0.053	933	50.16	1.298	0.056
6 - <7	31.8	0.014	3	1	0.0429	574	18.050	0.953	0.041	1186	37.30	0.965	0.041
7 - <8	31.8	0.014	3	1	0.0429	574	18.050	0.953	0.041	1186	37.30	0.965	0.041
8 - <9	31.8	0.014	3	1	0.0429	574	18.050	0.953	0.041	1186	37.30	0.965	0.041
9 - <10	31.8	0.014	3	1	0.0429	574	18.050	0.953	0.041	1186	37.30	0.965	0.041
10 - <11	31.8	0.014	3	1	0.0429	574	18.050	0.953	0.041	1186	37.30	0.965	0.041
11 - <12	56.8	0.014	3	1	0.0429	689	12.130	0.640	0.027	1829	32.20	0.833	0.036
12 - <13	56.8	0.014	3	1	0.0429	689	12.130	0.640	0.027	1829	32.20	0.833	0.036
13 - <14	56.8	0.014	3	1	0.0429	689	12.130	0.640	0.027	1829	32.20	0.833	0.036
14 - <15	56.8	0.014	3	1	0.0429	689	12.130	0.640	0.027	1829	32.20	0.833	0.036
15 - <16	56.8	0.014	3	1	0.0429	689	12.130	0.640	0.027	1829	32.20	0.833	0.036
16 - <17	71.6	0.014	1	1	0.0143	973	13.589	0.717	0.010	2298	32.09	0.831	0.012
17 - <18	71.6	0.014	1	1	0.0143	973	13.589	0.717	0.010	2298	32.09	0.831	0.012
18 - <19	71.6	0.014	1	1	0.0143	986	13.771	0.727	0.010	2617	36.55	0.946	0.014
19 - <20	71.6	0.014	1	1	0.0143	986	13.771	0.727	0.010	2617	36.55	0.946	0.014
20 - <21	71.6	0.014	1	1	0.0143	986	13.771	0.727	0.010	2617	36.55	0.946	0.014
21 +	80	0.700	1	1	0.7	1516	18.95	1	0.700	3091	38.64	1	0.700
				Total Hypothetical Risk:	**1.7**			**Total Hypothetical Risk:**	**2.0**			**Total Hypothetical Risk:**	**2.1**

Notes:

BW = body weight

DI = drinking water intake

kg = kilograms

mL/day = milliliters per day

Hypothetical risk calculated as Duration x ADAF x Ratio to Adult Dose

Furthermore, EPA should clarify why it used adjusted toxicity factors for some, but not all, of the mutagenic chemicals for which it has proposed draft updated HHWQC. EPA does note that the early lifestage adjustment for trichloroethylene was omitted because it applies only to the kidney cancer component of the total cancer risk estimate, the impact of which was considered minimal. However, no explanation is provided for the lack of early lifestage adjustments for benzidine and dibenzo[a,h]anthracene.

Given that the exposure assumptions selected by EPA are representative of adult lifetime exposure, we recommend that EPA carefully consider whether adjusting carcinogenic toxicity factors to account for potential increased sensitivity of children when deriving draft updated HHWQC is appropriate. If EPA wishes to retain the early lifestage adjustment, we recommend that this adjustment be applied consistently for all chemicals believed to act through a mutagenic mode of action following the lifestage specific methodology presented in EPA (2005) guidance. Furthermore, EPA should discuss the uncertainty associated with this adjustment, in particular the uncertainty associated with assuming that a person will receive the same level of exposure throughout his or her lifetime.

Comment 4. EPA has chosen to use the BCFBAF™ model to estimate BAFs without input from EPA's Science Advisory Board (SAB).

Summary: Despite historic cautions from EPA's Science Advisory Board (SAB) that the addition of any bioaccumulation model to EPI Suite™ should be subject to careful scientific scrutiny, EPA has included the BCFBAF™ model in EPI Suite™ and is proposing to use it for estimating national BAFs to derive HHWQC. Prior to use of BAFs derived using BCFBAF™ EPA should seek SAB input on the broad question of how to incorporate BAFs into the HHWQC paradigm, as well as the specific question of which is the best model to use for estimating BAFs. EPA should not adopt national BAFs without the input of the SAB on these questions.

Discussion: EPA has proposed development of national default BAFs (and/or BSAFs) in the past, and has published a technical guidance document (TSD) outlining, in detail, an approach for developing these BAFs (EPA, 2003) independent of the BCFBAF™ model currently being proposed for this purpose. Subsequently, EPA built on this first TSD in a second TSD (EPA, 2009), addressing development of site-specific BAFs. None of these documents address use of BCFBAF™ for developing national BAFs, and in this respect the current proposal is inconsistent with previous guidance.

When the Office of Pollution and Prevention and Toxics (OPPT) requested an SAB review of the EPI Suite™ software, EPI Suite™ did not include a model for estimating bioaccumulation (or BAFs) so the SAB provided comments (EPA, 2007) on BCFWIN only. However, the SAB recommended that a model for predicting bioaccumulation be added to EPI Suite™, and that this should be considered a priority. Of note, in their discussion of bioaccumulation models, the SAB cited the mechanistic food web model of Arnot and Gobas (2004) (AQUAWEB) as a candidate model, albeit with some concern over the ability of this model to deal with metabolism, but did not discuss nor mention the QSAR model of Arnot and Gobas (2003) that EPA has now added to EPI Suite™ as BCFBAF™. In addition, the SAB cautioned the following regarding the use of any BAF module for screening assessments (EPA, 2007):

In light of the widespread application of EPI Suite™, before the decision to add a new module, such as the BAF module, the Agency should assess to the extent practical, whether there is a consensus in the scientific community that the model has been or can be appropriately parameterized and has been sufficiently verified to be applicable in screening assessments.

In the proposed approach, EPA is using BCFBAF™ for the development of regulatory criteria, which implies a higher level of scrutiny than for application in screening assessments. Despite this caution, EPA has added the BCFBAF™ model to the EPI Suite™ package and is now using it to derive HHWQC apparently without requesting input from scientific community as to whether BCFBAF™ can be appropriately parameterized or from the SAB. Given that the incorporation of BAFs will result in significant shifts in numeric HHWQC, the input of the SAB seems a valuable prerequisite to use of any model for estimating BAFs. As a consequence, EPA should heed the guidance given by the SAB and request SAB input on the broad question of how to incorporate BAFs into the HHWQC paradigm, as well as the specific question of which is the best model to use for estimating BAFs. EPA should not adopt national BAFs without the input of the SAB on these questions.

Comment 5. The current approach is inconsistent with previous EPA guidance for the derivation of national BAFs.

Comment 5.01 The current approach for estimating the national BAF does not follow previous EPA guidance for the inclusion of site-specific information

Summary: Previous EPA guidance on deriving recommended HHWQC (EPA, 2000, 2003, 2009) has focused on the inclusion of site-specific inputs when estimating BAFs. In fact, the 2009 TSD (EPA, 2009) was specifically developed to provide guidance to States and authorized Tribes on how to develop their own site-specific BAFs for use in deriving HHWQC. Despite this, under EPA's current proposal users are unable to utilize critical site-specific information as part of developing site-specific BAFs (using BCFBAF™). This is contrary to existing guidance that provides using site-specific data as the preferred option for deriving BAFs. Rather, the national BAFs are entirely based on default values, including for parameters EPA has acknowledged have significant influence on BAFs for piscivorous fish. Thus, if adopted, the current approach will effectively limit the ability of States and authorized Tribes to develop site-specific BAFs. Further, EPA has provided no guidance on how to implement such modifications or whether such modifications are even permitted. Some of the inflexibility apparent in the current proposal results from EPA's decision to use BCFBAF™ as opposed to a mechanistic food web model to estimate BAFs, yet EPA has not provided any justification for the selection of BCFBAF™ over one of these alternatives. Because some mechanistic food web models allow use of site-specific values for a wider range of inputs than BCFBAF™, most specifically inputs reflecting site-specific food web structure, we urge EPA to consider adoption of one of these alternatives to BCFBAF™. AQUAWEB is an example of such a model, though it is likely more data intensive than necessary (see *Comment 12 Development of an alternative model or methodology to predict state-, region- and water body specific BAFs* for further discussion of key aspects of the ideal bioaccumulation model).

Discussion: As noted, EPA has historically (EPA 2000, 2003) stressed the importance of including site-specific input parameters (e.g., lipid content of organisms and the fraction of freely dissolved chemical in water (or dissolved organic carbon [DOC] and particulate organic carbon [POC] by proxy)) when developing BAFs, and EPA's methodology for deriving HHWQC (EPA, 2000) encourages States and authorized Tribes to make adjustments to national BAFs to reflect local conditions. Thus, EPA provided a stand-alone TSD (EPA, 2009) intended to assist States and authorized

Tribes in selecting site-specific information for use in estimating BAFs as part of deriving HHWQC.

Under EPA's proposed approach for deriving HHWQC, EPA has selected the BCFBAF™ model for estimation of the national BAFs. This model is based on a QSAR model originally published by Arnot and Gobas (2003), and requires as input a number of parameters that are likely to vary between sites, including:

- mean water temperature;
- dissolved organic carbon (DOC) and particulate organic carbon (POC), which relate to the fraction of freely dissolved (i.e., bioavailable) chemical in water (ϕ);
- lipid content of lowest trophic organisms; and
- lipid content of TL 2, 3 and 4 fishes.

Therefore, at first glance, it appears that the proposed approach follows EPA guidance (EPA, 2000, 2003, 2009) by using a model that allows accounting for site-specific input parameters. However, as applied by EPA, default assumptions are made for these key parameters and applied across all surface waters of the U.S. Two important examples are the site-specific lipid content of TL 2, 3 and 4 fishes and the amount of freely dissolved (i.e., bioavailable) chemical in water, the importance of which is stressed in EPA (2003) (emphasis added):

…These two factors are important in affecting the bioaccumulation of nonionic organic chemicals. However, baseline BAFs are not directly used to determine national human health AWQC, <u>because they do not reflect the lipid content of target aquatic organisms and the fraction of chemical that is freely dissolved in water for the sites to which the AWQC applies</u>.

In EPA (2003), baseline BAFs are derived from BAFs measured in the field, or total BAFs (i.e., based on the total concentration of the chemical in tissue compared to the total concentration of chemical in the water), to specifically-account for these two key site-specific parameters. The following equation is presented in EPA (2003) to convert from total BAF to baseline BAF:

$$Baseline\ BAF\ =\ \left[\frac{BAF_T^t}{f_{fd}} - 1\right] \times \frac{1}{f_{R}}$$

Where: BAF_T^t is the total BAF, f_{fd} is the fraction of the total chemical that is freely dissolved in the study water, and f_R is the lipid fraction of the fish in the study.

Essentially, the baseline BAF normalizes the total BAF based on lipid fraction and bioavailability of the chemical. EPA (2003) also includes the calculation method for the national BAFs, which are estimated from baseline BAFs using site-specific values for lipid fraction (f_R) and bioavailability (f_{fd}). The approach currently proposed by EPA fails to take these key site-specific parameters into account despite EPA having previously provided extensive guidance on how to take them into consideration.

Moreover, lipid fraction and bioavailability are not the only parameters that are likely to make site-specific BAFs different than the national defaults, et al. Additional site-specific factors expected to affect BAFs include, but are not limited to, the degree of sediment-water disequilibrium and the overall food-web structure (i.e., effective trophic level(s), benthic/pelagic character of the food web, etc.). In the BCFBAF™ model, no food-web structure-specific parameters can be modified by the user with site-specific information. Instead, these parameters are collectively subsumed in the β value obtained via calibration of the BCFBAF™ model. Thus, even though EPA (2003) stresses that the feeding preference of forage fish for pelagic (e.g., zooplankton) vs. benthic (e.g., benthic invertebrates) food items is perhaps the most important ecological factor affecting ultimate BAFs for TL 4 piscivores, there is no means of accounting for site-specific differences in feeding preferences under EPA's currently proposed approach. Furthermore, EPA has not provided any information on how the TL-specific β values are expected to vary among various types of surface waters in the U.S., nor has it provided any justification for t use of a single β value for each tropic level to describe biomagnification for all fishes across all waters of the United States.

For the current draft updated HHWQC, EPA is effectively using a methodology that precludes the ability to modify the default BAFs for critical site-specific conditions. No guidance is provided on how a user should modify BCFBAF™ for this purpose even assuming the user has extensive site-specific data (e.g., tissue concentrations in multiple species, POC and DOC concentrations, sediment concentrations, water column concentrations, etc.). This suggests that, once adopted, it will be essentially impossible to modify the national default.

As discussed in Comment 12, we urge EPA to consider adopting a mechanistic food web model for estimating BAFs in place of the BCFBAF™ QSAR as these models generally allow for use of a wider range of site-specific input: a simplified version of the mechanistic food web model originally published in Arnot and Gobas (2004) (i.e., the

AQUAWEB model) is one example of such a mechanistic food web model. If EPA decides to follow through and use BCFBAF™ to develop national BAFs it should provide a thorough justification showing why use of BCFBAF™ is preferred over the use of a model such as AQUAWEB, including a direct comparison between the models demonstrating the utility each for derivation of national BAFs. This comparison should also explore how amenable each modeling approach might be to adjust for regional, state or water body-specific conditions.

Comment 5.02 EPA has failed to provide explanation of why the least preferred method for estimating national BAFs is used

Summary: EPA (2003) describes four methods of deriving baseline BAFs, or BAFs corrected for the fraction of freely dissolved chemical (i.e., fraction of chemical that is bioavailable) and the lipid fraction of the organism. EPA ranked these 4 methods in order of preference. In the current approach, EPA uses a single method for estimating BAFs, which closely aligns with the least-preferred method (estimation of BAFs via the K_{OW}), without providing any explanation of why the least preferred method) was chosen and why that specific single method was chosen over other, apparently more preferred methods. EPA needs to provide justification for the selection of a single method of estimating national BAFs (EPA, 2003) and how the currently proposed BCFBAF™ model is an improvement over historic EPA guidance on developing BAFs.

Discussion: In EPA (2003), a two-step process is described for the derivation of national BAFs. The first step involves the derivation of a baseline BAF for a particular compound, corrected for the lipid fraction (L_B) of the experimental organism (if using method 1 below, which requires experimental BAF data) and the fraction of freely dissolved chemical in water (ϕ). In the second step, trophic-level-specific national BAFs (i.e., TLs 2, 3 and 4) are calculated in each of three different food web structures (water, sediment, water and sediment) by applying site-specific information for L_B and ϕ to the baseline BAF.

EPA (2003) describes four methods for the derivation of the baseline BAF, ordered by method hierarchy, from highest to lowest:

- Method 1: Deriving the baseline BAF from experimental data (the fraction of freely dissolved chemical in water and lipid fraction are critical data points using this method, as the baseline BAF is essentially normalized for these two parameters);

- Method 2: Deriving the baseline BAFs from biota-sediment bioaccumulation factors (BSAF);
- Method 3: Deriving baseline BAFs from laboratory-measured bioconcentration factors (BCF) and food-chain multipliers (FCM); and
- Method 4: Deriving baseline BAFs from the octanol-water partitioning coefficient (K_{OW}) and the food-chain multiplier (presumably equivalent to the overall food web biomagnification factor).

Figure 3-1 of EPA (2003) shows a decision framework for selection of the method for deriving the baseline BAF. For a non-ionic substance with a log K_{OW} > 4.0 with low or unknown biotransformation, Figure 3-1 indicates that estimation from K_{OW} is the least-preferred of the four methods.

EPA needs to explain why the method based on K_{OW} was selected from the four methods presented in historical EPA guidance (EPA, 2003), focusing on how the proposed approach (using BCFBAF™ to estimate national BAFs) is an improvement over historic EPA guidance on developing BAFs, especially as it pertains to the ability to extrapolate BAFs from one ecosystem to another.

Comment 6. EPA's use of the BCFBAF model™ for estimating national BAFs is not appropriate given that the model was calibrated in large part with data representative of the Great Lakes.

Summary: The original QSAR model published by Arnot and Gobas (2003) is generally applicable to any water body provided the (extensive) data necessary for model calibration are available and Arnot and Gobas (2003) chose to use data representative of the Great Lakes in their work. Therefore, by default, results published by Arnot and Gobas (2003) reflect the chemical-, biological, and food web-specific parameters of the Great Lakes, a set of waters EPA considers so unique and distinct from other waters of the U.S. that it developed Great Lakes-specific HHWQC because national HHWQC were judged by EPA insufficiently protective of populations consuming Great Lakes fish (the Great Lakes Initiative (GLI)) (EPA, 1995a). This decision can be interpreted to be acknowledgment on the part of EPA that the resulting GLI HHWQC would not be applicable and would likely be overprotective if applied to other waters of the US. Despite this, EPA is now proposing that BAFs based in large part on Great Lakes data should be applied to all US waters. This is not only contrary to EPA's historic position, it is also scientifically indefensible.

<u>Discussion:</u> The Great Lakes constitute a highly unique ecosystem that is not representative of other U.S. surface waters. In fact, their characteristics are so distinct from other U.S. surface waters that specific water quality guidance was developed for the Great Lakes under the Great Lakes Initiative (GLI). Paragraph III.B. of the GLI preamble (60 FR 15369) states:

The final Guidance also reflects the unique nature of the Great Lakes Basin Ecosystem by establishing special provisions for chemicals of concern. EPA and the Great Lakes States believe it is reasonable and appropriate to establish special provisions for the chemicals of most concern because of the physical, chemical and biological characteristics of the Great Lakes System, and the documented environmental harm to the ecosystem from the past and continuing presence of these types of pollutants.

EPA's choice to calibrate the BCFBAF™ model for estimation of national BAFs using many data specific to the Great Lakes is somewhat ironic in that EPA has acknowledged the unique nature of the Great Lakes as the impetus for the GLI, yet is now proposing a methodology that assumes that several inputs specific to the Great Lakes are suitable for the rest of the country. This is a fundamental disconnect that will produce unreliable BAF estimates for U.S. surface waters and is not scientifically defensible. Bioaccumulation is based on many chemical-, biological- (e.g., organism weight, lipid fraction, metabolism rates), food web- (e.g., number of trophic levels, food web structure, feeding habits of foraging fish) and environmental-specific (e.g., water temperature) parameters, which as discussed in Comment 9 of this document, have a wide distribution of values across U.S. surface waters. The waters of the U.S. range from clear mountain lakes to stagnant bayous and from fast-moving, clear cold water streams to meandering, warm, black water rivers. Given the huge variation in physical, biological, and ecological characteristics of the surface waters in the U.S., EPA's proposed approach to use a single set of BAFs to describe bioaccumulation in the entire country contradicts common sense and is not scientifically defensible. In fact, as a large ecosystem, the Great Lakes themselves may not be similar enough to allow for a single set of scientifically-defensible BAFs to describe the complex process of bioaccumulation in TL 2, 3 and 4 fishes (e.g., Burkhard et al. 2006).

To demonstrate the bias associated with this approach, Comment 9 of this document compares values proposed by EPA for key input parameters to the distributions of these parameters in national surface waters. As is discussed in that comment, EPA appears to have selected values that are not representative of the country and that result in BAFs that overestimate bioaccumulation in most waters of the United States.

We urge EPA to develop a BAF modeling strategy that is transparent and accounts for the key parameters influencing site-specific bioaccumulation. Ultimately, whatever approach is used to estimate BAFs it should allow users to enter site-specific inputs, which reflect regional and state-specific differences, for the most sensitive parameters and establish default values for insensitive parameters (see the sensitivity analysis in this document showing sensitivity of the BCFBAF™ model to key input parameters). The AQUAWEB model originally published in Arnot and Gobas (2004) is a good example of a mechanistic model that allows users to enter site-specific information pertaining to chemical-, biological-, food web- and environmental-specific parameters. A trade-off exists between collecting the considerable amount of site-specific data required for any site-specific modeling versus just measuring the BAF directly. Therefore, a simplified version of the AQUAWEB model, which allows for inclusion of key site-specific parameters while incorporating default values for others shown to be less sensitive, would offer more flexibility to users by allowing them to use site-specific information (when available) rather than relying on national default assumptions for sensitive parameters.

Comment 7. Invertebrates were not included in the calibration of the biotransformation rate constant (kM) model in BCFBAF™.

Summary: As summarized in the BCFBAF™ user guidance document, the whole-body biotransformation rate constant (kM) "reflects the rate of change of the parent substance to another molecule or a conjugated form of the parent substance". The whole-body primary biotransformation rate constant model for fish used in BCFBAF™ was developed and validated against a database of kM estimates for several species of finfish (Arnot et al., 2008a), meaning that invertebrates were not considered for this model parameter. EPA needs to provide justification for the selection of a biotransformation model developed specifically for finfish to derive HHWQC that reflect consumption of aquatic invertebrates by humans and show that the proposed approach is protective of such exposures to chemicals in invertebrates.

Discussion: The whole-body biotransformation rate constant (kM) reflects the rate of change of the parent substance to another molecule or a conjugated form of the parent substance (i.e., the fraction of the mass in the whole body biotransformed per unit of time). The biotransformation model used in BCFBAF™ was developed and validated against a database of kM estimates found in Arnot et al. (2008a). In this paper, kM values are estimated (assuming first order processes) from laboratory-derived bioconcentration data for several species of finfish, including: rainbow trout, guppy, sheepshead minnow, fathead minnow, medaka, and bluegill sunfish (Arnot et al., 2008a, 2008b). Invertebrates were not included in the development of this model even though many invertebrates, including shrimp, crabs, lobster and clams; are commonly consumed as part of the human diet and are included in the UFCR. Because these taxa were not included as part of the parameterization of BCFBAF™, which relies on kM estimates specifically for finfish, the level of protection afforded by the draft updated HHWQC is unknown. EPA needs to demonstrate the BAFs derived using BCFBAF™ are representative of invertebrates as well as finfish and that the proposed approach is protective of public health.

Comment 8. EPA has not provided sufficient documentation for key input values for the BCFBAF™ model.

Summary: EPA's proposed methodology includes a number of changes to the original input parameters described in Arnot and Gobas (2003) with insufficient description of what the updated values represent or justification of why they are suitable to estimate BAFs for all surface waters of the U.S. Most of the documentation that is provided is incomplete and not transparent. EPA needs to provide detailed documentation for the selection of each of the model's input parameters, particularly those that differ from the inputs of the Arnot and Gobas (2003), model and for each parameter, document why it is acceptable to use the proposed values for all surface waters of the U.S.

Discussion: The BCFBAF™ user guidance documentation is apparently the only source of documentation for the estimation of national BAFs used in the development of the draft updated HHWQC. The 94 chemical-specific *Draft Update of Human Health Ambient Water Quality Criteria* documents appear to contain no information justifying the basis for the methodology used to estimate the national BAFs.

Users interested in understanding the basis for the BAFs must rely on Arnot and Gobas (2003) and Arnot et al. (2009), which is presumably the publication upon which the biotransformation rate constant (kM) methodology in BCFBAF™ is based, to begin to understand the methodology EPA used to derive the BAFs used as the basis for the draft updated HHWQC. As shown in Table 4 below, many of the input parameters of Arnot and Gobas (2003) have been modified by EPA for BCFBAF™. In other cases, the inputs are the same between the models; however, the original publication fails to provide adequate documentation of its assumptions for model input parameters (e.g., lipid content of lowest trophic level organisms).

Table 4 Comparison of Key Input Parameters in Arnot and Gobas (2003) and the BCFBAF™ Model

Parameter	Arnot and Gobas (2003)	BCFBAF™ Model
Weight of organism (kg)	1 (TL4)	1.43 (TL4) 0.183 (TL3) 0.096 (TL2)
Mean water temperature	10 °C (Canadian conditions)	10 °C
Overall food web biomagnification factor	130 (TL4)	62.7 (TL4) 30.1 (TL3) 16.1 (TL2)
Maximum trophic dilution factor (τ)	1 (default value) $\tau = (0.0065/(kM + 0.0065))^2$ (TL4)	$\tau = (0.0065 / ((0.447kM + 0.0065))^2$ (TL4) $\tau = (0.01 / ((0.760kM + 0.01))^2$ (TL3) $\tau = (0.02 / ((0.889kM + 0.02))^2$ (TL2)
Lipid content of lowest trophic level organisms	0.01 (TL 1)	0.01 (TL 1)
Lipid fraction	0.2 (TL4)	0.107 (TL4) 0.0685(TL3) 0.0598 (TL2)
Fraction of freely dissolved chemical in the water	$1/(1+ c_{POC} * 0.35 * K_{OW} + c_{DOC} * 0.1 * 0.35 * K_{OW})$	$1/(1+ c_{POC} * 0.35 * K_{OW} + c_{DOC} * 0.08 * K_{OW})$

kM = biotransformation rate constant

K_{OW} = octanol-water partitioning coefficient

c_{DOC} = fraction of dissolved organic carbon

c_{POC} = fraction of particulate organic carbon

Each of these modifications is described below in more detail.

(a) Weight of organism

As shown in Table 4 above, Appendix K of the BCFBAF™ user guidance indicates default values of 0.096, 0.183 and 1.43 kg were assumed for TL 2, 3 and 4 fishes, respectively. EPA provides no documentation of how these weights were derived (i.e., do they reflect the median or 95th percentile on the mean) or why they are acceptable default values to reflect the weight of TL 2, 3 and 4 fishes in surface waters throughout the U.S.

(b) Mean water temperature

In the BCFBAF™ model, a default water temperature of 10 °C is assumed for all surface waters of the U.S. While Arnot and Gobas (2003) state that this temperature was chosen to reflect the mean annual temperature of Canadian surface waters, EPA provides no documentation to support using the same mean annual temperature for all waters of the U.S. In fact, the decision to apply a temperature originally selected for Canadian surface waters to all waters in the U.S. contradicts EPA's BCFBAF™ user guidance document, which acknowledges that the model results should not be used for regions deviating from the default assumption for water temperature:

The default temperature for the BCF and BAF calculations is 10°C (temperate regions); therefore, the model predictions are not recommended for arctic, sub-tropical or tropical regions or for comparisons with other vastly different conditions (e.g., laboratory tests at ~25°C). Site-specific food web models, bioaccumulation models and bioconcentration models are available for specific modeling requirements (e.g., http://www.rem.sfu.ca/toxicology/models/models.htm, http://www.trentu.ca/cemc).

A significant portion of the southern U.S. has a climate that results in water temperatures greater than 10 °C and perhaps even 20 °C for much of the year. The BCFBAF™ model user guidance explicitly states to not use the results of the model for such areas, yet by using BCFBAF™ with its default values for temperature for all waters of the U.S., EPA has used BCFBAF™ in exactly a way the guidance says it should not be used.

Supporting the influence of temperature on the estimated BAFs, Zhang et al. (2008) investigated the sensitivity of polychlorinated biphenyl (PCB) BAFs estimated by a bioenergetics model (originally published in Zhang, 2006) to temperature, using both an average exposure temperature for a food web in Lake Michigan and a species-specific exposure temperature. The difference in responses between the average exposure temperature and individualized exposure temperature increased with increasing K_{OW} of the PCB and was typically greater than 60%. The authors conclude that "the fact that model outputs for highly hydrophobic PCB congeners are affected strongly by the values of exposure temperature suggests the importance of accurate characterization of exposure temperatures in the applications of food web models for real contaminant issues." They note that the results of their experiment do not extend to other bioaccumulation models such as the one originally published in Gobas (1993). They do caution that a "'food web-averaged' value for exposure temperature used in model simulations is an overly simplified representation of the real world situation and is likely to introduce potential substantial uncertainty in [the] model output."

EPA needs to provide justification for the selection of a water temperature of 10 °C to represent U.S. surface waters (ideally with actual data), including a discussion of why selection of a single temperature for all waters of the U.S. will not lead to biased results.

(c) Overall food web biomagnification factor (β)

Arnot and Gobas (2003) state that the default overall food web biomagnification factor (β) of 130 for TL 4 was derived by calibrating the model to the empirical BAF data and results in BAFs that are exceeded by only 2.5% of the available data (i.e., was selected to be conservative 97.5% of the time). They also state that "the calibration of the model to the data is designed to produce a QSAR for the BAF in higher trophic levels of a Canadian food web." Appendix K of the BCFBAF™ user guidance indicates β values of 62.7, 30.1 and 16.2 were selected for TLs 2, 3 and 4 (see also Table 4), respectively and provides the following explanation as the basis for the methodology "the overall food web biomagnification factors (β) in the BAF model are calibrated to each trophic level of measured BAF values (Arnot and Gobas, 2003)."

This explanation provides no reason for why the β value of 130 for TL 4 used by Arnot and Gobas (2003) was changed by EPA to 62.7. Nor does EPA provide documentation of the assumptions and methodology used to derive the β values used for the other trophic levels in BCFBAF™. Nor does the user guidance discuss the characteristics of food webs that affect β or the extent of variation of these characteristics among surface waters of the U.S. In short, EPA has provided essentially no explanation of or justification for the β values used for the three trophic levels in BCFBAF™. EPA should provide the public more information on the derivation of the default β values hardwired into BCFBAF™ to permit a thorough review of the methodology, particularly given the results of the sensitivity analysis presented at the end of these comments that shows BAFs for compounds that have high K_{OW} values and are not metabolized are relatively sensitive to this parameter.

(d) Maximum trophic dilution factor (τ)

In Arnot and Gobas (2003), the maximum trophic dilution factor (τ) was set to a default value of 1, indicating no trophic dilution. However, an equation is presented, relating τ to the biotransformation rate constant (kM), as shown in Table 4 above:

$$\tau = \left[\frac{0.0065}{kM + 0.0065^2}\right]^{n-1}$$

Where, as stated in Arnot and Gobas (2003), 0.0065 "reflects the rate at which metabolic transformation becomes greater than the other routes of chemical elimination (i.e., k_2, k_E and k_G) for a lower trophic level aquatic species" and n is the trophic level being considered.

As documented in Appendix K of the BCFBAF™ user guidance, EPA has apparently retained the 0.0065 term for the highest modeled trophic level (i.e., TL4 fish) rather than for a lower trophic level species (as specified in Arnot and Gobas [2003]), and replaced the factor of 0.0065 with 0.02 and 0.01 for TLs 2 and 3, respectively. No documentation is provided in the guidance as to why 0.0065 was used for TL 4 instead of TL 2 or how the factors of 0.01 and 0.02 were derived for TLs 2 and 3. Additionally, whereas Arnot and Gobas (2003) include the term 1kM, as shown in the equation above, Appendix K of the BCFBAF™ user guidance includes terms of 0.889kM (i.e., $[0.016/0.01]^{-0.25}$), 0.760kM (i.e., $[0.03/0.01]^{-0.25}$) and 0.447kM (i.e., $[0.25/0.01]^{-0.25}$) for TLs 2, 3 and 4, respectively, with no documentation of what these terms represent or why they were included in the calculation. (Although, it is clear that a decrease in kM increases the trophic dilution factor which ultimately increases the estimated BAF for each trophic level).

(e) Lipid content of lowest trophic level organism and number of trophic interactions in the food web

Arnot and Gobas (2003) and the BCFBAF™ model user guidance both state that percent body mass that is lipid for the lowest trophic level (i.e., invertebrates or plankton) in the food web is 1%. No documentation is provided in either reference to support a value of 1%. Given that waters of the U.S. are far more diverse than the Great Lakes and contain a variety of food webs, it is not clear that a single value for TL1 is appropriate nor is it clear that 1% is the appropriate lipid content. EPA needs to provide justification for the selection of 1% as the TL1 lipid content, particularly given the results of the sensitivity analysis presented later in these comments that show BAFs for several compounds are sensitive to this parameter.

(f) Lipid Fraction

As part of deriving the GLI BAFs, EPA developed consumption-weighted default mean values for the lipid content of TL3 and TL4 fish, and EPA provided a detailed narrative outlining the genesis of these numbers (EPA, 1995b). The resulting values were 1.82% for TL3 fish and 3.10% for TL4 fish (EPA, 1995b). These values theoretically reflect Great Lakes consumption patterns and lipid contents. These values were updated in EPA (2003), which proposed consumption-weighted mean lipid fractions of 1.9%, 2.6% and 3.0% for TL 2, 3 and 4 fishes, respectively. However, the BCFBAF™ model user guidance states that the assumed percent lipid fractions for TL 2, 3 and 4 fishes are 5.98, 6.85 and 10.7%, respectively. Therefore, in the current approach, the basis for the lipid fraction values used in the derivation of the draft updated HHWQC is unclear and not explained. It is also unclear whether they reflect whole-body lipid fraction or the edible tissue lipid fraction. Nor is it clear whether BAFs should be adjusted based on site, region or state-specific lipid contents. As described below in the sensitivity analysis, such data are available for several regions of the country and those data indicate lipid contents are substantially lower than assumed by BCFBAF™. EPA needs to provide the basis for the lipid contents used in BCFBAF™ and how BAFs are to be adjusted when lipid content of fish in other regions of the US differ from the values assumed by BCFBAF™.

(g) Fraction of freely dissolved chemical in the water (ϕ)

In Arnot and Gobas (2003), the fraction of freely dissolved chemical in the water (ϕ), is calculated as follows (as shown in Table 4 above):

$$\phi = \frac{1}{1 + \mathrm{cPOC} * 0.35 * Kow + \mathrm{cDOC} * 0.35 * 0.1 * Kow}$$

As documented in Appendix K of the BCFBAF™ user guidance, EPA has apparently replaced the α_{DOC} term of 0.35 cited in Arnot and Gobas (2003) with 0.08, as suggested by Burkhard (2000) and referenced in Arnot and Gobas (2004) without any documentation of what the factor of 0.08 represents or how it was derived. EPA needs to provide such documentation.

(h) Summary

The user guidance for the BCFBAF™ model is incomplete and not sufficiently transparent to allow a thorough review of the BAF-estimation methodology used to develop the draft updated HHWQC. While the equations used by the BCFBAF™ model to estimate bioaccumulation are based on peer-reviewed publications and appear to be scientifically defensible, insufficient or no documentation is provided to verify the values used for most of the parameters in the equations or that those values can be used to represent surface waters throughout the U.S. Prior to use in the development of HHWQC, the BCFBAF™ documentation should be revised and expanded and provided to the public for review allowing for a full and thorough evaluation.

Comment 9. For several BCFBAF™ model parameters, EPA appears to have selected default inputs that will result in BAFs that will overestimate bioaccumulation in most waters of the U.S.

Summary: The predicted BAFs from BCFBAF™ reflect the values of the default inputs for each of the parameters that affect bioaccumulation. As described in preceding comments, EPA has provided little or no supporting documentation describing the basis for the default inputs. Nor has EPA provided any information on the sensitivity of predicted BAFs to changes in input values or the variability of key inputs likely to manifest across waters of the U.S. and the effect of such variation on BAFs predicted by BCFBAF™. For several key parameters (lipid content of fish in TLs 2, 3 and 4; DOC and POC concentrations; food-web biomagnification factor [β]), EPA appears to have selected inputs that are likely to overestimate BAFs, perhaps substantially. For other parameters (e.g., temperature) the default value may underestimate BAFs. And for still other parameters (lipid content of TL 1) relatively few data are readily available making it hard to discern the effect of applying the default value to all waters of the U.S.

This section provides an overview of the historical view EPA has taken for each of three key input parameters (lipid content of fish in TLs 2, 3 and 4; DOC and POC concentrations; and β) and compares those to the proposed input values. This section also presents a sensitivity analysis of six key input parameters to help identify several inputs to which the BCFBAF™ model appears very sensitive. Table 5 lists the default values selected by EPA for BCFBAF™ model parameters and also the values used in the sensitivity analysis. This review indicates that EPA needs to provide justification for the proposed defaults used by the BCFBAF™ and also helps to prioritize those inputs for which predicted BAFs are the most sensitive and those defaults that appear to differ most from values expected in many waters of the U.S.

Table 5 Input parameters used for BCFBAF™ model sensitivity analysis

Name	Parameter	BCFBAF™ Value	Values for Sensitivity Analysis†
TL2 β	Food web biomagnification factor	16.1	1.6, 8.05, 32.2
TL3 β	Food web biomagnification factor	30.1	3.01, 15.1, 60.2
TL4 β	Food web biomagnification factor	62.7	6.27, 31.4, 125.4
DOC	Dissolved organic content (mg/L)	0.5	0.05, 5, 25
TL1 Lipid Fraction	Lipid fraction of lowest trophic level organism	0.01	0.005, 0.02, 0.1
POC	Particulate organic content (mg/L)	0.5	0.05, 5
Temperature	Water temperature (°C)	10	5, 20, 25
TL2 Weight	Organism weight (kg)	0.096	0.048, 0.192
TL3 Weight	Organism weight (kg)	0.184	0.092, 0.368
TL4 Weight	Organism weight (kg)	1.53	0.765, 3.06
TL2 Lipid Fraction	Whole-body lipid fraction of organism	0.0598	0.00524, 0.0093, 0.017
TL3 Lipid Fraction	Whole-body lipid fraction of organism	0.0685	0.0053, 0.0107, 0.017, 0.0195
TL4 Lipid Fraction	Whole-body lipid fraction of organism	0.107	0.00835, 0.0135, 0.017, 0.0247

† Values used in the sensitivity analysis were selected to be representative of possible values in U.S. surface waters.

Discussion:

(a) Lipid fraction

As discussed in Comment 8, EPA has not provided documentation supporting the proposed lipid fraction values of 5.98%, 6.85% and 10.7% for TL 2, 3 and 4 fishes. These lipid contents represent a 2 to 3-fold increase compared to lipid contents proposed previously by EPA (EPA 1995b, 2000, 2003). We compared the TL-specific lipid fraction input values obtained from the BCFBAF™ user guidance to TL-specific values obtained from the publically-available EMAP and STORET databases, both of which are maintained by EPA. As part of the water quality and toxicity data contained in both of these databases, fish lipid content is frequently reported. These databases provide a large quantity of lipid data from several regions throughout the United States and on numerous species and, thus, enable the development of specific fish lipid distributions based on region and trophic level. Distributions of lipid content in edible portions of fish were created using the observations obtained from the online databases noted above. Data points were subdivided into distinct geographic regions based on their location. Regions included Northern Atlantic, Mid-Atlantic, Midwest, and Hawaii. The databases did not include data from regions in the southern or western portions of the United States. Data were also subdivided into TLs 2, 3, and 4, based on trophic levels classified in EPA (2014a). The mean and 95th percentile upper confidence limit on the mean for all data, and for each region, as well as the default lipid contents used by BCFBAF™, is presented in Table 6. This table also shows the mean and 95th percentile upper confidence limit on the mean from a Florida statewide dataset of lipid content of near-shore marine and freshwater fish of all trophic levels.

Table 6 Regional Mean, 5th Percentile, and 95th Percentile Lipid Fractions

Dataset	BCFBAF™ Inputs*	Total			North-Atlantic			Mid-Atlantic		
		5%tile	Mean	95%tile	5%tile	Mean	95%tile	5%tile	Mean	95%tile
TL4 Edible tissue	0.107	0.0025	0.0135	0.0427	0.0015	0.00835	0.0215	0.0051	0.0247	0.0698
TL3 Edible tissue	0.0685	0.0027	0.0107	0.032	0.0029	0.00524	0.008	0.0009	0.0195	0.0444
TL2 Edible tissue	0.0598	0.0017	0.0093	0.022	0.0015	0.00524	0.0113	n/a	n/a	n/a
Florida	n/a	0.0076	0.017	0.033	nd	nd	nd	nd	nd	nd

* Not stated whether this is whole-body or edible tissue.

n/a = not applicable

nd = data not available

Lipid concentrations used in the BCFBAF™ model exceed the 95th percentile values of all trophic levels. In fact, the highest 95th percentile lipid value observed was 6.98% for TL 4 for the Mid-Atlantic region. Demonstrating the bias of EPA's lipid fractions, this 95th percentile for TL 4 is lower than the point estimate of 6.85% used by the BCFBAF™ model for TL 3. A comparison of the trophic level point estimates used by the BCFBAF™ model to the mean and 95th percentile of regionally composited distributions for each trophic level are displayed in Table 6. The BCFBAF™ model point values are substantially higher than all of the corresponding values from the distributions obtained using the national online databases.

Additionally, the BCFBAF™ model default inputs are higher than those developed in the past by several state agencies. For instance, Florida developed a statewide Florida specific distribution of lipid content of near-shore marine and freshwater fish of all trophic levels using methods consistent with EPA recommendations (FDEP, 2013). The 5th percentile, mean and 95th percentile values of this distribution (0.76%, 1.7% and 3.3%, respectively) correspond much more closely to the values obtained from the distributions developed using national online databases than to the point values used by the BCFBAF™ model.

(b) Concentration of dissolved organic carbon (DOC) and particulate organic carbon (POC)

As part of historic guidance on development of national BAFs, EPA (2000, 2003) used default POC and DOC concentrations of 0.5 ppm and 2.9 ppm, respectively. According to EPA (2003), these values represent the median (50th percentile) values from approximately 110,000 DOC measurements and 86,000 POC measurements encompassing fresh and estuarine waters in all 50 states, and EPA consciously chose these central-tendency estimates "for consistency with the goal of national BAFs" (EPA, 2003). In the current draft updated HHWQC and without providing any justification, EPA is proposing to use a default value of 0.5 ppm for both POC and DOC, which is equivalent to using the median POC concentration but a DOC concentration less than the 5th percentile of DOC concentrations (EPA, 2003). The currently proposed concentration for DOC appears to be biased low by about 6-fold. EPA provides no basis for this change in DOC concentration or, for that matter, any documentation to support either the default POC or DOC concentrations.

(c) Food web biomagnification factor (β)

According to the BCFBAF™ model user guidance, EPA has selected food web biomagnification factor (β) values of 16.1, 30.1 and 62.7, which have been "calibrated to each trophic level of measured BAF values" (Arnot and Gobas, 2003). However, Arnot and Gobas (2003) caution that β is "highly dependent on the species of interest, food web structure, environmental conditions, and ecosystem characteristics" and, most importantly, that its selection should be based on calibration with an appropriate dataset. In the current approach, EPA uses a dataset based on a food web and conditions found in the Great Lakes to calibrate β for all other food webs in national surface waters. This approach fails to take many food-web specific factors into account, most notably that food web structures in the Great Lakes are likely to consist of a much larger food chain and thus, will produce higher BAFs, particularly among the higher trophic levels. Furthermore, the basis for food chains in deep water, cold lakes (such as the Great Lakes) is likely to be different from the basis in cold, shallow mountain streams, as well as in any shallow lake or estuary, where large amounts of submerged aquatic vegetation (SAV) can be present. Ultimately, EPA needs to provide some justification for the default β values used by the BCFBAF™ model. Such justification should include a discussion of how different water body and food web characteristics affect β, a summary of β values either measured or predicted in a range of different U.S. waters, whether β varies in a predictable pattern either by water body type or geographic region of the U.S. and how BAFs are to be adjusted for state, region or water body-specific differences in β from the defaults assumed by the BCFBAF™ model.

Sensitivity analysis on select inputs for estimating national BAFs using the BCFBAF™ model

The sensitivity of the BCFBAF™ model to changes in several input parameters (organism whole-body lipid fraction, water temperature, DOC, POC, organism weight, and β) for six different chemicals (acenaphthene, aldrin, benzene, benzo[a]pyrene, chlordane, and chrysene) was examined. Table 5 lists the values used both by EPA in the BCFBAF™ model and the values used in the sensitivity analysis. Other parameters could have been included as well, but the limited information provided for the basis of the assumptions used by the BCFBAF™ model and the available time for review of the draft updated HHWQC precluded a full evaluation of the sensitivity of the model to all parameters. The range of values used for each parameter represents the range that might occur in surface waters across the U.S (Table 5). The six chemicals were selected to represent a range of chemical types (PAHs, volatile organics, and pesticides) and K_{OW} values (log K_{OW} values ranged from 2.13 to 6.50). The analysis was conducted by varying the input values for one parameter while holding all other parameters constant at the default value used by the BCFBAF™ model (Table 5). The apparent sensitivity of the model to each parameter is discussed briefly below and is plotted in Figures 1a-1c, where each figure represents the sensitivity analysis results for a specific trophic level. The sensitivity of BAFs predicted by the BCFBAF™ model to a particular parameter is represented by the height of the lines shown on the figures. Increases in BAFs compared to those predicted by the BCFBAF™ model are shown as lines above a ratio of 1.0 and decreases in BAFs compared to those predicted by the BCFBAF™ model are shown as lines below a ratio of 1.0.

Food web bioaccumulation factor (β) - Beta represents the overall biomagnification factor for each trophic level in the BCFBAF™ model, which uses default β inputs of 16.1, 30.1 and 62.7 for TLs 2, 3 and 4, respectively. The sensitivity analysis used input values ranging from a ten-fold decrease to a two-fold increase in β compared to the BCFBAF™ model's default inputs. The sensitivity analysis assumed β of 1.6, 8.05, and 32.2 for TL2, 3.01, 60.2, and 15.1 for TL3, and 6.27, 31.4, and 125.4 for TL4 (Table 5).The BAFs for aldrin and chlordane were the most sensitive to changes in β for all three trophic levels, while chrysene and benzo[a]pyrene were somewhat sensitive to β for TLs 2 and 3. The range β typical of U.S. surface waters appears more likely to decrease rather than increase estimated BAFs (Figures 1a – c).

Dissolved organic carbon (DOC) and particulate organic carbon (POC) - The BCFBAF™ model uses default DOC and POC values of 0.5 mg/L. A sensitivity analysis was conducted separately for DOC and POC. Input values for DOC ranged from a ten-fold decrease to a 50-fold increase from the default EPA input values, reflecting the DOC data distribution (minimum to 95th percentile) found in USGS National Water Information Database (USGS, 2001). Input values for POC ranged from a ten-fold decrease to a ten-fold increase from the default EPA input value, reflecting the POC data distribution (minimum to 95th percentile) found in USGS National Water Information Database (USGS, 2001). For the sensitivity analysis the POC was assumed to be 0.05 and 5 compared to a default POC of 0.5 used by EPA in BCFBAF™ (Table 5). The POC values used in the sensitivity analysis correspond to a 10 fold increase and a 10 fold decrease, respectively, over the EPA default value. For the sensitivity analysis the DOC was assumed to be 0.05, 5, and 25 compared to a default DOC of 0.05 used by EPA in BCFBAF™ (Table 5). The DOC values used in the sensitivity analysis correspond to 10 fold decrease, 10 fold increase, and 100 fold increase, respectively, over the EPA default value. Model-calculated BAFs were very sensitive to changes in DOC and POC for aldrin and chlordane, and were somewhat sensitive for benzo[a]pyrene at all three trophic levels. Values typical of DOC and POC in U.S. surface waters appear to result in lower BAFs than predicted by the defaults used in the BCFBAF™ model (Figures 1a – c).

Lipid Content of Lowest Trophic Level (Level 1) - The default lowest trophic level (i.e., TL 1 or primary producers) lipid fraction value used in BCFBAF™ is 0.01, a value derived for Canadian surface waters (and to be representative of the Great Lakes) by Arnot and Gobas (2003). For the sensitivity analysis the lipid fraction of TL 1 fish was assumed to be 0.005, 0.02, and 0.1 compared to a default lipid fraction of 0.01 used by EPA in BCFBAF™ (Table 5). The TL 1 lipid fractions correspond to a 2 fold decrease, a 2 fold increase, and a 10 fold increase, respectively, over the default EPA value. Resulting BAF's calculated by the BCFBAF™ model appear to be sensitive to changes ranging from a two-fold decrease to a ten-fold increase from EPA's default value in lipid fraction inputs at each of the three trophic levels primarily for aldrin, benzo[a]pyrene, chlordane, and chrysene (Figures 1a – c). The sensitivity to the lipid fraction of TL1 occurs at all trophic levels. Whether BAFs are actually underestimated by as much 10-fold in some surface waters will depend upon the actual lipid content of TL 1 organisms and whether other parameters interact with the lipid assumption about TL1 to reduce bioaccumulation.

<u>Water temperature</u> - The BCFBAF™ model assumes a default water temperature of 10 °C, a value also used in the BCFBAF™ model developed by Arnot and Gobas (2003). This default parameter was selected to represent Canadian aquatic habitats by Arnot and Gobas (2003), and may be appropriate for northern U.S. waters, but is unlikely to be applicable to warmer waters found in the southern portions of the U.S. For the sensitivity analysis the water temperature was assumed to be 5, 10, and 25 °C compared to a default temperature of 10°C used by EPA in BCFBAF™ (Table 5). The water temperatures used in the sensitivity analysis represent a range of temperatures found in US surface waters (EPA STORET database).

BAFs calculated using the BCFBAF™ model do not appear to be very sensitive to water temperatures ranging from 5, 20, and 25 °C. Aldrin, benzo[a]pyrene, chlordane, and chrysene show the greatest variation in BAFs with variation in water temperature model inputs but only at some of the trophic levels (Figures 1a – c).

<u>Organism weight -</u> BAFs were calculated from the BCFBAF™ model over a range of organism weight inputs that ranged from a two-fold decrease to a two-fold increase from EPA's default input parameters for each trophic level. The sensitivity analysis assumed weights (in kg) of 0.048 and 0.192 for TL2, 0.092 and 0.368 for TL3, and 0.765 and 3.06 for TL4 (Table 5) compared to default values of 0.096, 0.184 and 1.53 kg for TLs 2, 3 and 4, respectively used by EPA in the BCFBAF™ model.

Changes in organism weight did not substantially affect the calculated BAFs at any trophic level for any of the six chemicals examined (Figures 1a – c).

<u>Lipid content</u>. The default organism lipid fraction values for each of the three fish trophic levels used in the BCFBAF™ model were based on values derived for Canadian surface waters in Arnot and Gobas (2003). These lipid fraction values are almost twice as high as lipid fraction mean and 95th upper confidence limit on the mean (UCL) values derived from EPA's own databases (STORET and EMAP; see Table 6). For the sensitivity analysis the lipid fraction of TL 2 fish was assumed to be 0.00524, 0.0093 and 0.017 compared to a default lipid fraction of 0.0598 used by EPA in BCFBAF™ (Table 5). The lipid fraction of TL 3 fish was assumed to be 0.0053, 0.0107, 0.017 and 0.0195 compared to a default lipid fraction of 0.0685 used by EPA in BCFBAF™ (Table 5). The lipid fraction of TL 4 fish was assumed to be 0.00835, 0.0135, 0.017 and 0.0247 compared to a default lipid fraction of 0.107 used by EPA in BCFBAF™ (Table 5). The sensitivity of the BCFBAF™ model to lipid content of TL 2, 3 and 4 appears to vary between chemical but not a great deal between trophic levels. Acenaphthene, benzene, and chlordane appear to be most sensitive to lipid content of

TL 2, TL 3 and TL 4 (Figures 1a – c). Because the default lipid contents in BCFBAF™ lie within the upper percentiles of the distribution of lipid content for several areas of the U.S., use of more representative lipid contents will result in lower BAFs, indicating that draft updated HHWQC for many chemicals are more stringent than necessary.

Summary of sensitivity analysis findings:

The BCFBAF™ model-calculated BAFs for the pesticides aldrin and chlordane appeared to be the most sensitive to changes in many of the input parameters examined in the sensitivity analysis. Although these two chemicals have the highest log K_{OW} values of the six chemicals examined (aldrin log K_{OW} = 6.50; chlordane log K_{OW} = 6.22), the PAH benzo[a]pyrene, which has a log K_{OW} value of 6.13, did not exhibit as much sensitivity to variations in most of the input parameters. The PAH chrysene was also moderately sensitive to most of the input parameters, while both the PAH acenapthene and the volatile organic benzene showed very little sensitivity to most input parameters, except for lipid fraction of the high, middle, and low fish trophic levels.

Model-calculated BAFs for all of the chemicals examined except chlordane and benzene exhibited little sensitivity to changes in the lipid fractions of organisms at the high, middle, and low fish trophic levels. This is surprising because as the lipid fraction of an organism increases, a proportional increase in the amount of chemical accumulation in that organism's tissue is expected. The apparent absence of such a predicted response by the BCFBAF™ model requires explanation. Aldrin, benzo[a]pyrene, chlordane, and chrysene were, however, sensitive to variation in the lipid fraction of the lowest trophic level.

Sensitivity analyses, such as the one presented above, can be used to help guide the development of documentation necessary for models such as BCFBAF™ and to determine whether such models can be used to develop BAFs for use in the derivation of national HHWQC. The results of the sensitivity analysis indicate that the BCFBAF™ model, as currently configured and used by EPA to develop the draft updated HHWQC, should not be used to derive national HHWQC. The review of available data indicate that several of the default inputs used by the BCFBAF™ model are not representative of most waters of the U.S. and that the defaults used by the BCFBAF™ model are likely to overestimate bioaccumulation in surface waters for large portions of the U.S. EPA needs to develop a transparent methodology using the BCFBAF™ model, or an alternative model, that allows users to incorporate region specific inputs for key parameters that govern bioaccumulation and predict region, state and water body-specific BAFs.

Comment 10. EPA has not addressed the uncertainty associated with the default K_{OW} values used in the BCFBAF™ model.

Summary: EPA has chosen the BCFBAF™ model for the estimation of BAFs. Although K_{OW} is one of the primary predictive variables in the calculation of the BAFs in the module, EPA has largely ignored the uncertainty associated with the default K_{OW} values used in the BCFBAF™ module. EPA should seek SAB review of the K_{OW} selection methods utilized by BCFBAF module and clarify the selection of K_{OW} values, especially when multiple values are available.

Discussion: EPI Suite uses K_{OW} as a primary variable in the calculation of the BAF. The SAB reviewed the QSAR (Quantitative structure activity relationships) based method utilized by KOWWIN™ (USEPA, 2007). In addition, alternative QSAR based methods for the estimation of the portioning behavior of organic chemicals exist (e.g., Van Noort et al. [2010], Hawthorne et al. [2011]). For some PCB congeners, these methods can different from the KOWWIN™ values by as much as three orders of magnitude.

EPI Suite™ also includes a database of measured K_{OW} values compiled by SRC Inc. There is limited documentation regarding the criteria for inclusion in the database. As discussed in Beyer et al. (2002), experimentally derived K_{OW} values can vary by 30% or more. The SAB concluded that KOWWIN™ provides a suitably accurate estimation of K_{OW}. The SAB provides no review of the K_{OW} database and the process by which EPI Suite selects a preferred K_{OW} from this database. Neither EPI Suite™ nor the SAB provide guidance on how to resolve any differences between the experimental and modeled K_{OW} values. In addition, experimentally derived physicochemical parameters can be inconsistent and EPI Suite™ does not utilize methods such as those proposed by Beyer et al. (2002) to develop a consistent set of parameters.

The BCFBAF™ model uses experimentally derived K_{OW} values in preference to the KOWWIN™ derived values[2]. These two sets of values can vary significantly, resulting in significant uncertainty in the BAFs estimated by BCFBAF™. These differences are

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[2] Note that the experimentally-derived K_{OW} is the default K_{OW} passed to all other EPI Suite™ modules.

summarized for the six chemicals included in the sensitivity analysis. Table 7 compiles the percent change in the BAF when the KOWWIN™ model K_{OW} was used in preference of the value from the K_{OW} database for these chemicals.

Table 7 Percent changes in estimated BAFs using KOWWIN™-derived K_{OW} values compared to values from the experimental K_{OW} database

	Acenaphthene	Aldrin	Benzo[a]pyrene	Benzene	Chlordane	Chrysene
Percent Change	0.00	29.12	0.69	34.59	8.14	13.50

The results show a change in the BAF of as much as almost 35% for these six chemicals when the values estimated by the SAB reviewed KOWWIN™ module are used in preference to the values selected from the K_{OW} database. An extensive evaluation of all 94 chemicals for which EPA had developed draft updated HHWQC was not conducted but it is reasonable to assume that differences of 30% or more are relatively common, with larger differences being almost certain. Beyer et al. (2002) similarly observed that the range of experimentally derived K_{OW} values routinely spans 30%, or more. Given that K_{OW} values are routinely reported in $\log_{10}$ units, differences of 30% in arithmetic units are often overlooked, but they are potentially significant nonetheless. The differences between QSAR based estimates of K_{OW} also results in different estimates of the BAF. For example, KOWWIN™ estimates a log K_{OW} of 8.27, resulting in a BAF of 7.05×10^6; while Hawthorne et al. (2011) estimated a $\log_{10} K_{OW}$ of 7.12, resulting in a BAF 8.0×10^6.

This simple analysis shows that the BCFBAF™ module is sensitive to routine variability in the estimate of K_{OW} for a single compound. The selection of the default K_{OW} values used by BCFBAF™ should be more thoroughly documented and based on a peer reviewed methodology.

Comment 11. The BCFBAF™ model does not account for metabolism in the gut.

<u>Summary:</u> EPA has proposed to use the steady-state bioaccumulation model originally published by Arnot and Gobas (2003) to predict substance-specific BAFs in fish from three trophic levels as input into calculations used to derive HHWQC. This model also incorporates a QSAR for estimating the biotransformation rate in fish tissue or kM (Arnot et al., 2009). This is an important modeling advance since this process

can significantly mitigate the extent of bioaccumulation for more hydrophobic substances. However, a key limitation of the current BCFBAF™ model formulation is that while metabolism in tissue is quantitatively considered, metabolism in the gut is ignored. As discussed below, this process is critical in limiting the role of dietary uptake and subsequent bioaccumulation in the food web for a number of chemicals.

Discussion: The key model parameter that is influenced by gut metabolism is the chemical assimilation efficiency (AE) which is expressed as a fraction of chemical absorbed to that ingested via the diet in an uncontaminated fish. Currently, this key process appears to be modeled with a simple relationship that predicts AE based on the substance's log K_{OW} as reported by Kelly et al. (2004) and is described by the following equation;

$$AE = 1/(5x10^{-8} \text{ x } K_{OW} + 2)$$

It is stated in this paper that this relationship is based on the much earlier compilation of empirical AE data in fish by Gobas et al. (1988) for recalcitrant compound classes. Figure 1 shows that empirical AE data reported in this paper for polychlorinated biphenyls (PCBs) and three chlorinated insecticides (DDT, chloroane, mirex) are consistent with the above equation as denoted by the solid red line. As a result, the present AE model cannot be assumed to be broadly reliable across chemical classes for which EPA has derived HHWQC.

To support this point, empirical data on AE values obtained with trout for polyaromatic hydrocarbons (PAHs) were compiled from three earlier studies (Table 8). These data are plotted in Figure 2 as blue symbols and show the significantly lower AE values than are assumed in the current BCFBAF™ model as a consequence of gut metabolism. These empirical data were used to fit a revised relationship:

$$AE = 1/(3 \text{ x } 10^{-4} \text{ x } K_{OW} + 2.5) + 0.01$$

This relationship provides a conservative upper bound value of 0.01 at high log K_{OW} and is shown for comparison to the default model used in BCFBAF™ (Figure 3).

PAHs are not the only class of compounds that exhibit lower AEs than recalcitrant compounds like PCBs. For example, studies with individual dialkyl phthalate esters (DPEs) in staghorn sculpin demonstrated that these compounds were very effectively transformed in the gut with no significant accumulation from dietary exposure indicating very low (<0.01) assimilation efficiencies (Webster et al., 2003).

Table 8 Experimental data characterizing AE in fish for selected chemicals

Substance	Log K_{OW}	AE	Reference
Acenathalene	3.94	0.32	Niimi and Dookhran (1989)
9H-Fluorene	4.02	0.14	Niimi and Palazzo (1986)
Anthracene	4.35	0.01	Niimi and Palazzo (1986)
Phenanthrene	4.35	0.04	Niimi and Palazzo (1986)
Phenanthrene	4.46	0.12	Hellou and Leonard (2004)
Pyrene	4.88	0.02	Hellou and Leonard (2004)
2-Methyl Anthracene	4.89	0.14	Niimi and Dookhran (1989)
9-Methyl Anthracene	4.89	0.01	Niimi and Dookhran (1989)
Fluoranthene	4.93	0.01	Niimi and Palazzo (1986)
Fluoranthene	4.93	0.06	Hellou and Leonard (2004)
Triphenylene	5.52	0.04	Niimi and Dookhran (1989)
Benzo[a]pyrene	6.11	0.01	Niimi and Palazzo (1986)
Perylene	6.11	0.02	Niimi and Dookhran (1989)
Butylbenzyl Phthalate	4.73	<0.01	Webster (2003)
Bis(2-Ethylhexyl) Phthalate	7.60	<0.01	Webster (2003)

To demonstrate the impact of AE assumptions on BAF predictions, the spreadsheet version of the BCFBAF™ model was obtained from Dr. Arnot and used to perform sensitivity analyses. For PAHs the dietary uptake term in column D of the worksheet for lower, middle and upper trophic level fish was modified by multiplying by this term by the ratio of the revised to default AEs determined by equations [2] and [1], respectively. For DPEs, an upped bound revised assimilation efficiency of 0.01 was assumed so that the ratio was computed by dividing this value by the default AE predicted using equation [1]. The default and revised AEs are summarized in Table 2. A comparison of the predicted BAFs obtained with the default model (i.e. BAFs included in EPA's supporting Table summarizing updated input values for 2014 draft updated human health criteria) to values generated using the revised AE assumptions is provided in Table 9.

Table 9 **Summary of predicted 2, 3 and 4 trophic level fish BAFs using default (BCFBAF™) and revised (including gut metabolism) assumptions for the assimilation efficiency of the substance from ingested diet**

Substance	CAS Number	Log Kow	Default AE	Revised AE	Default BAF TL2	Revised BAF TL2	Default BAF TL3	Revised BAF TL3	Default BAF TL4	Revised BAF TL4
PAHs										
Acenaphthene	83-32-9	3.92	0.50	0.21	123	122	116	116	95	95
Fluorene	86-73-7	4.18	0.50	0.15	763	454	790	454	909	429
Anthracene	120-12-7	4.45	0.50	0.10	1212	844	1169	839	1151	787
Pyrene	129-00-0	4.88	0.50	0.05	1322	333	1058	303	785	227
Fluoranthene	206-44-0	5.16	0.50	0.03	790	575	563	513	388	380
Benzo(a) Anthracene	56-55-3	5.76	0.49	0.02	1577	603	749	537	406	398
Benzo(b) Fluoranthene	205-99-2	5.78	0.49	0.02	5325	1572	2643	1371	1165	993
Chrysene	218-01-9	5.81	0.49	0.02	8997	1700	4739	1555	1993	1154
Benzo(k) Fluoranthene	207-08-9	6.11	0.48	0.01	1883	479	676	398	301	288
Benzo(a) Pyrene	50-32-8	6.13	0.48	0.01	2736	500	984	419	396	300
Dibenzo(a,h)Anthracene	53-70-3	6.54	0.46	0.01	24690	1719	10700	1340	2863	889
Ideno(1,2,3-cd)Pyrene	193-39-5	6.70	0.44	0.01	5370	466	1465	354	317	243
DPEs										
Butylbenzyl Phthalate	85-68-7	4.73	0.50	0.01	62	23	55	21	40	16
Bis(2-Ethylhexyl)	117-81-7	7.60	0.25	0.01	17370	131	6120	56	1040	31

Results from Table 9 are depicted graphically by plotting the ratio of the default to revised BAF for each trophic level (denoted by different colored symbols) as a function of the log K_{OW} of the substance (see Figure 3). Result indicate that for substances with a log K_{OW} smaller than five, the additional conservatism introduced is within a factor of 5, while for substances with a log K_{OW} greater than five but smaller than seven, the factor increases to about 20 and for substances with a log Kow of greater than seven this factor can increase to more than100. Discrepancies are most pronounced for TL 2 fish as the role of fish biotransformation at subsequent trophic levels decreases the predicted BAF. These results have important implications for derivation of water quality criteria for these and other substances that are subject to transformation in the gut. Given the order of magnitude differences that are observed depending on AE assumptions it is apparent that the present BCFBAF™ model is overly conservative and cannot be reliably used to support criterion development without careful substance-specific calibration.

Comment 12. Development of an alternative model or methodology to predict state-, region- and water body-specific BAFs.

Summary: For the reasons described in the preceding comments, adopting single default values for national BAFs, especially if based on a Great Lakes food web, is not scientifically justified. In addition, many of EPA's default inputs to the BCFBAF™ model appear to contribute high bias to the resulting BAFs, particularly when taking into consideration characteristics of other U.S. waters. Such state-, region- and water body-specific characteristics, if they have an important effect on bioaccumulation, need to be accounted for. However, it appears that the BCFBAF™ model cannot fully accommodate user input of critical metrics that are known to vary on a site-specific basis. To address this critical shortcoming, we recommend that, prior to adopting any national BAFs, EPA evaluate alternatives to BCFBAF™ more amenable to development of state-, region- and water body-specific BAFs.

Discussion: There are alternative models for estimating BAFs which may be better suited for estimating site-specific BAFs, and EPA itself (Burkhard et al. 2006) has demonstrated an approach for extrapolating BAFs across ecosystems using AQUAWEB (Arnot and Gobas, 2004). In addition, AQUAWEB was identified by EPA's SAB (EPA 2007) as a potentially useful model for estimating BAFs (EPA 2007). Thus, it's unclear why EPA has selected to use BCFBAF™. Regardless, given the range of options for developing BAFs, EPA needs to provide some justification for its decision to use any one approach, including use of BCFBAF™. At the very least, EPA needs to directly compare the utility of BCFBAF™ and AQUAWEB for development of national default BAFs, paying particular attention to how amenable each approach might be to adjustment for site-, regional- or ecosystem-specific conditions. Ideally, EPA would request input for the SAB on this.

Ultimately, we suggest that EPA should specify use of some mechanistic food web model allowing use of site-specific values for all critical parameters for estimating site-specific BAFs and allow time for States and authorized Tribes to apply this model using region-, state-, or water body-specific data: a less preferred option would be for EPA to use the same model to develop default numeric BAFs appropriate for a range of waters (i.e., food webs) and afford some flexibility to States and authorized Tribes in identifying the correct BAFs for specific water bodies. Either of these options is preferable to simply adopting a single set of BAFs as national defaults. Finally, as we have stated multiple times throughout these comments, we believe it is very important that any methodology for estimating national BAFs should be reviewed by EPA's Science Advisory Board (SAB) prior to being used in development of HHWQC.

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Figures

Figure 1a - Sensitivity Analysis results for TL 2: Ratio of "user-defined BAF: BCFBAF™ default BAF" plotted for each each of six BCFBAF™ inputs (β, DOC, TL 1 lipid fraction, POC, water temperature, organism weight, and TL-specific lipid fraction) for six chemicals (acenaphthene, aldrin, benzo[a]pyrene, benzene, chlordane, and chrysene) for trophic level 2.

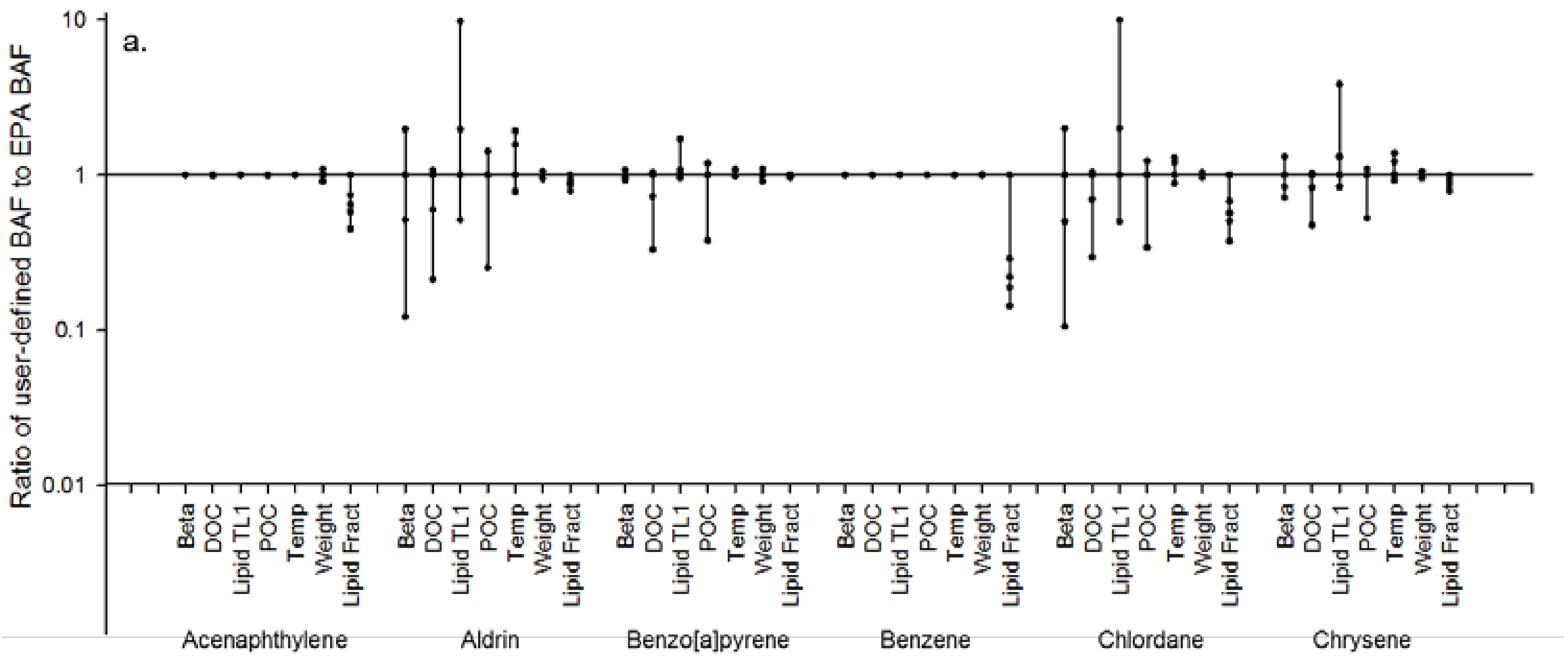

Figure 1b - Sensitivity Analysis results for TL 3: Ratio of "user-defined BAF: BCFBAF™ default BAF" plotted for each each of six BCFBAF™ inputs (β, DOC, TL 1 lipid fraction, POC, water temperature, organism weight, and TL-specific lipid fraction) for six chemicals (acenaphthene, aldrin, benzo[a]pyrene, benzene, chlordane, and chrysene) for trophic level 3.

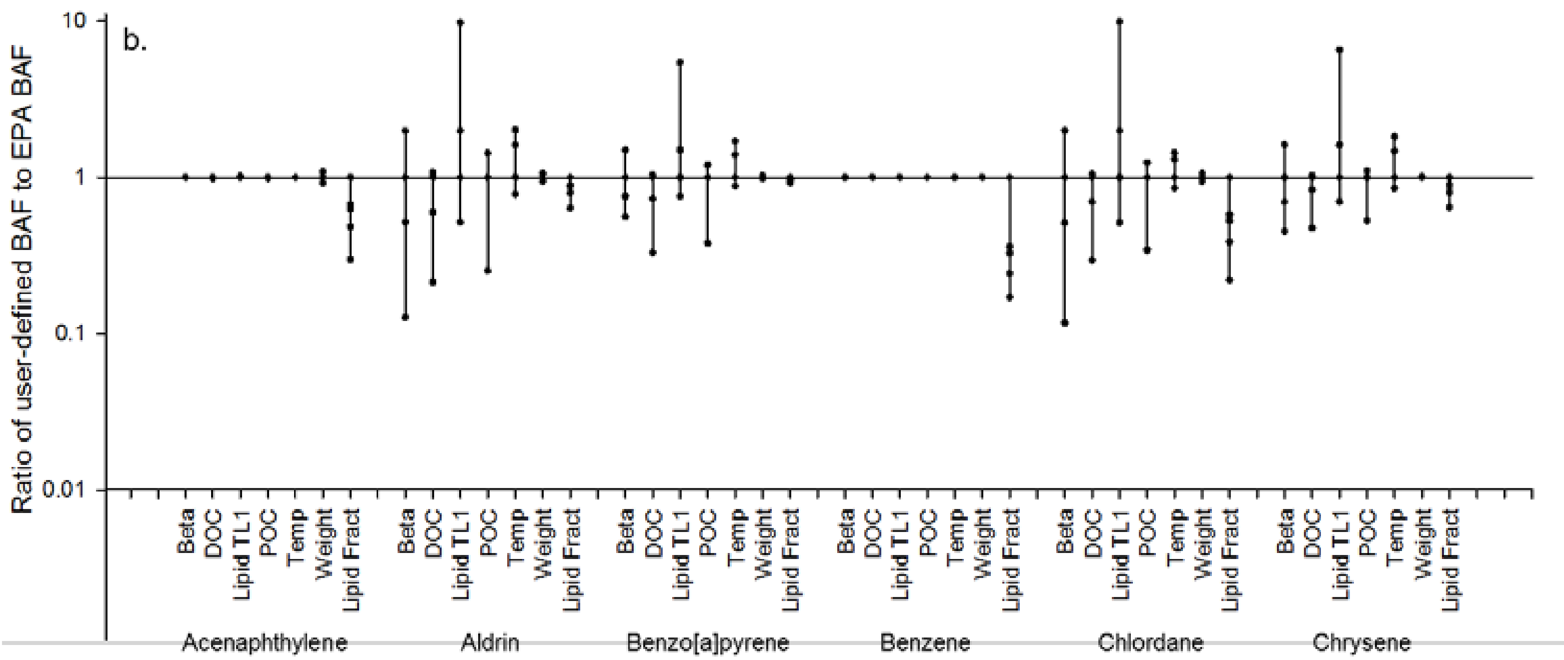

Figure 1c - Sensitivity Analysis results for TL 4: Ratio of "user-defined BAF: BCFBAF™ default BAF" plotted for each each of six BCFBAF™ inputs (β, DOC, TL 1 lipid fraction, POC, water temperature, organism weight, and TL-specific lipid fraction) for six chemicals (acenaphthene, aldrin, benzo[a]pyrene, benzene, chlordane, and chrysene) for trophic level 4.

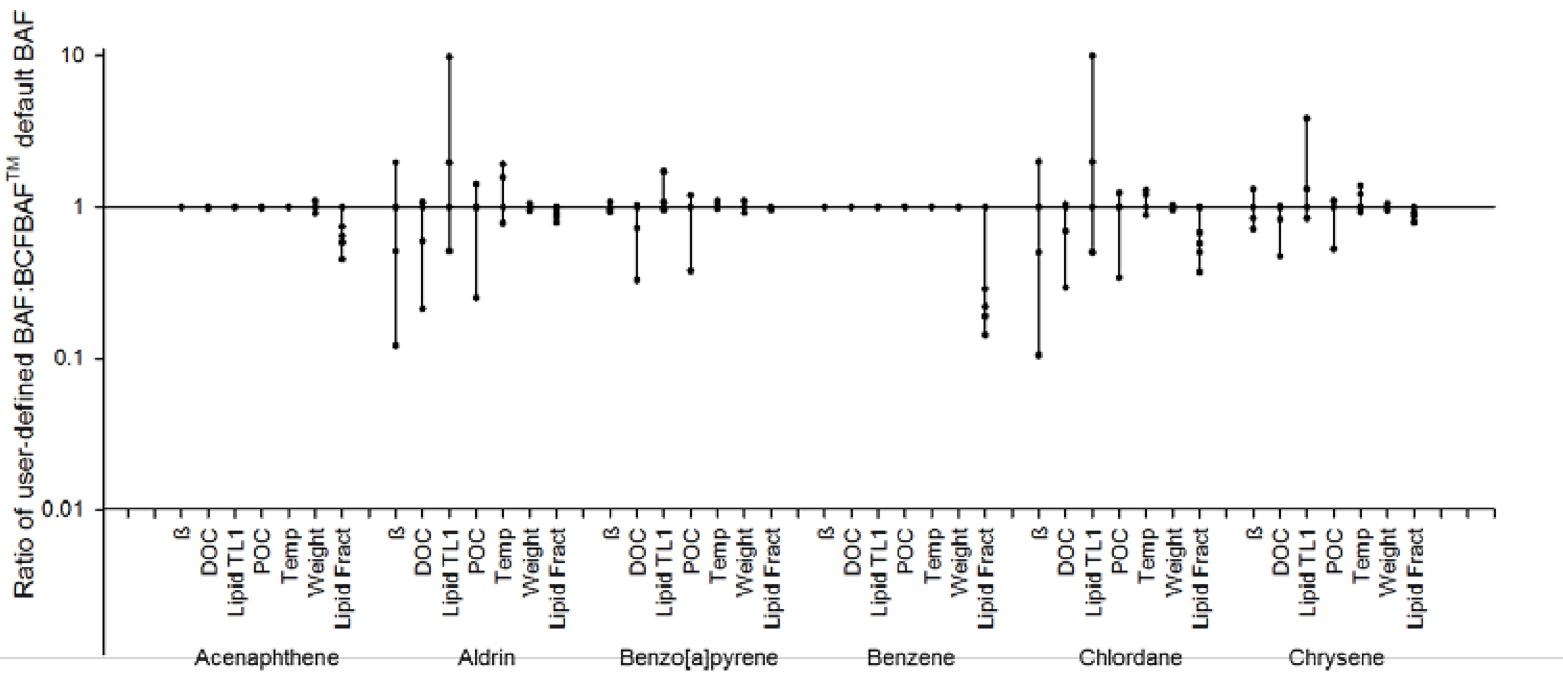

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Figure 2. Relationship between substance assimilation efficiency in ingested diet for fish with substance Log Kow. Recalcitrant compounds (red); Polyaromatic hydrocarbons (blue).

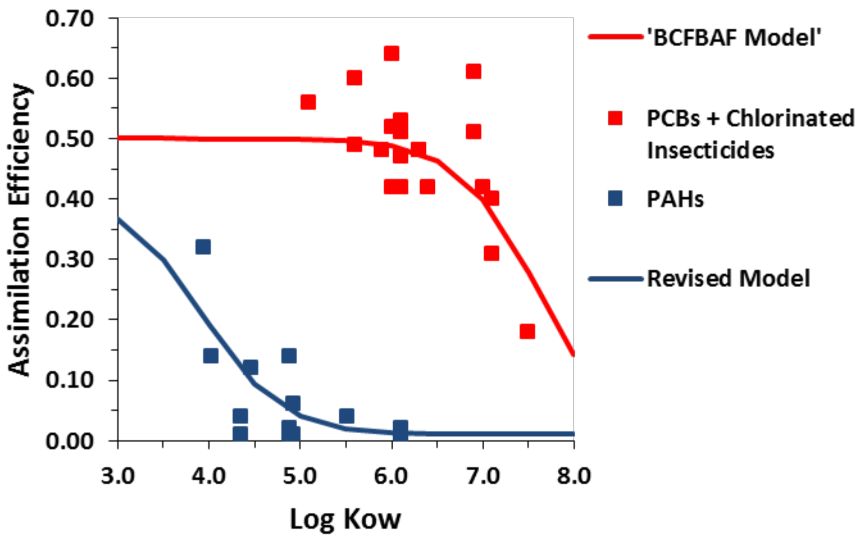

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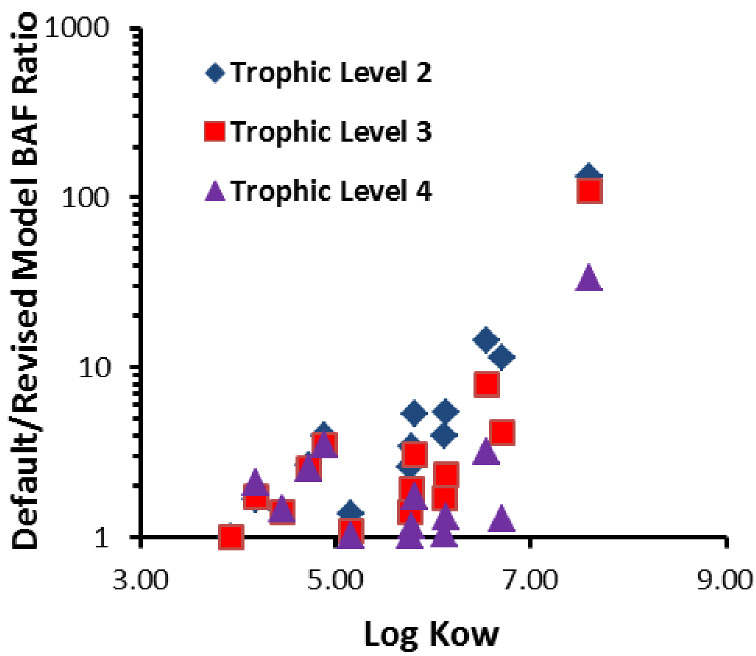
Figure 3. Sensitivity of BCFBAF model predictions to different assumptions for the substance specific assimilation efficiency (AE) input parameter.



Date October 15, 2015

TO: Adriane Borgias, Water Quality Program, Ecology

THROUGH: Dale Norton, Unit Supervisor, Environmental Assessment Program, Ecology

CC: Chris Kuperstein, City of Spokane
Jeffery Donovan, City of Spokane
Dale Arnold, City of Spokane
Chris Page, Ruckelshaus Center
Kara Whitman, Ruckelshaus Center
Spokane River Toxics Task Force

FROM: William Hobbs, Environmental Assessment Program, Ecology

SUBJECT: **Spokane Stormwater**

Background: The first comprehensive sampling of the City of Spokane stormwater discharges (4 CSO basins and 10 stormwater basins) occurred in May and June 2007 by Ecology and Parsons (Parsons, 2007). This sampling event, coupled with the Spokane River PCB Source Assessment (Serdar et al, 2011) suggested that stormwater was a significant contributor of PCBs to the Spokane River. In 2009-2011, Ecology collected some samples from select basins (e.g. Union) in an effort to trace sources. From 2012 through 2014, the City of Spokane monitored 3 MS4 stormwater basins (Cochran, Union, Washington) and 2 CSO basins (CSO34 and CSO06) regularly (nearly monthly). The monitoring was part of City's Integrated Clean Water Plan (City of Spokane, 2015). The monitoring began in October 2012 for 2 of the MS4s (Cochran and Union) and in spring 2013 for the Washington MS4 basin and CSO 34, and late 2013 for CSO 6. The City of Spokane has completed a significant amount of work on the stormwater infrastructure since the 2007 sampling. Many of the basins have changed configuration and CSOs have been re-routed. Furthermore, sampling techniques are different between the 2007 (grab) and 2012-13 (composite) sampling periods. Comparison between the sample periods is therefore difficult. However, rough comparisons between available data suggests that there have been minimal changes in the PCB concentrations of stormwater. Loads were not compared because previous loads were annual, while the current loads are storm event-based. The City of Spokane has 129 stormwater basins and 24 CSOs that discharge to the river via 20 outfalls. The current area sampled by the City represents 43% of the total stormwater catchment area, leaving 57% un-sampled.

Goal: To provide an understanding of current stormwater quantity and quality in order to refine our understanding of stormwater loading to the Spokane River. This information will be useful to the Spokane River Regional Toxics Task Force (SRRTTF) in designing sampling to fill data gaps in our understanding of stormwater loading. This analysis involved three components:

1. Evaluation of hydrologic contributions of stormwater
2. Evaluation of PCB concentrations over time
3. Mass loading of PCBs to the river

***Runoff Quantity* :** Runoff quantity was assessed by comparing 2 individual storm events (October 25-29, 2012 and May 21-23, 2013) that have measured flow volume and precipitation data with the USGS recorded flow of the Spokane River for the same period of time. The USGS station (12422500) at Spokane was used. The City of Spokane supplied the measured flow volumes and precipitation data from their ongoing monitoring program. The calculations therefore do not encompass all stormwater contributions to the Spokane River, only the monitored outfalls. Storms were selected in October 2012 and May 2013 based on the completeness of the data. The amount of precipitation varied across the City of Spokane. The October 2012 event ranged from 0.03 - 0.43 inches of precipitation, and 1.09 - 0.25 inches in May 2013. The flow of the Spokane River during the October 2012 event was near average, whereas the flow during the May 2013 event was at and below average (Figure 1).

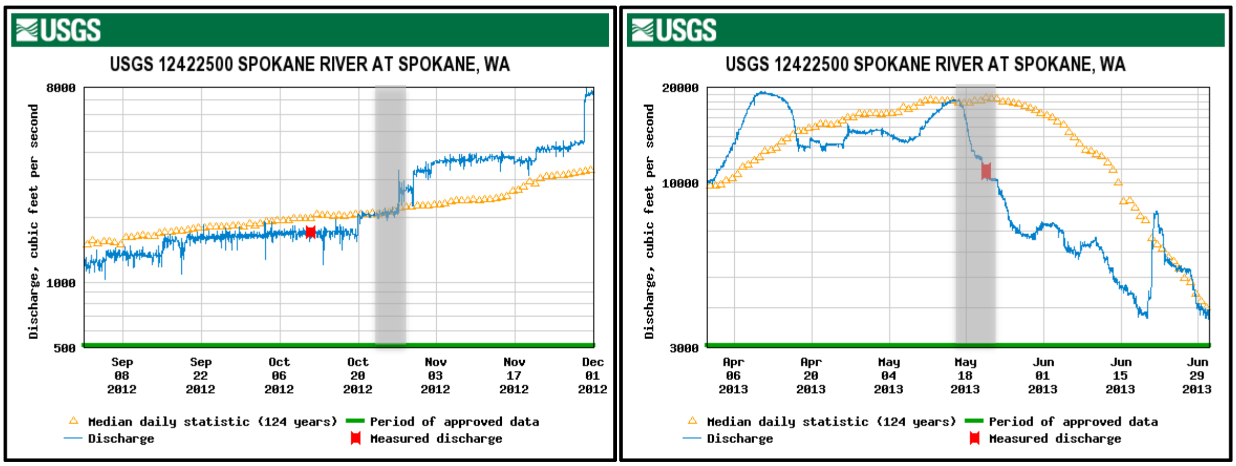


Figure 1: Hydrographs of Spokane River discharge for October 2012 (left panel) and May 2013 (right panel). Grey shading indicates the period of time used in comparison to stormwater flow.

The results show that during the October 2012 storm the stormwater contributed approximately 0.25% of the volume of water present in the Spokane River (Table 1). During May, the percent contribution was an even smaller fraction of the (0.03%) of the total volume of the Spokane (Table 1).

Table 1: % contribution of measured stormwater/CSOs during the October 2012 and May 2013 storm event by absolute volume.

	hydrology (liters)
October 2012	
Spokane River	6.65×10^{9}
stormwater/CSO	1.60×10^{7}
	0.240%
May 2013	
Spokane River	3.72×10^{10}
stormwater/CSO	1.20×10^{7}
	0.032%

The measured stormwater and CSO discharge volumes were also compared with volumes derived using standard approaches to estimating runoff. These standard methods are based on the "Simple Method" and were used in both the Parsons (Parsons, 2007) and Ecology (Serdar et al. 2011) previous studies. The Simple Method estimates stormwater runoff pollutant loads from urban areas (Shueler, 1987). The Simple Method estimates annual runoff as a product of annual runoff volume and the runoff coefficient (Rv); where Rv is unitless and can be estimated using the formula:

$$Rv = 0.05 + 0.9 * fraction\ of\ impervious\ cover\ (Ia)$$

In reality the runoff coefficient is simply the ratio of volume of precipitation falling onto a catchment basin : volume of runoff from the catchment basin. The measured runoff coefficients were calculated for each storm event for approximately 2 years of sampling using the City of Spokane data and compared to estimated values from the Simple Method. The measured values are an order of magnitude lower than those estimated using the Simple Method. Table 2 describes the measured and estimated percent of the rainfall that becomes runoff from the three main basins runoff. This would mean that actual runoff volumes are lower than those estimated using the Simple Method. Furthermore, the runoff coefficients vary from storm to storm and would likely vary with the season. The estimated runoff volumes were used in the previous assessment of PCB load from stormwater and therefore it was likely an over-estimate of actual runoff volumes. The over-estimate of runoff volumes would result in an over-estimate of PCB loads. It would be preferable that the runoff coefficient be as accurate as possible when used to estimate runoff volumes. It may be possible to calculate an adjustment factor between measured and estimated runoff coefficients for Spokane.

Table 2: Estimated and measured runoff coefficients as percentages for 3 main stormwater basins. The values are the percent of the rainfall that becomes runoff. The measured coefficients are described as median values with total number of values used (n) and the standard deviation of the data (sd).

	Measured runoff coefficient			**Estimated runoff coefficient (simple method)**
	Median	**n**	**sd**	
Trent & Erie (Union Basin)	8.72%	8	4.2%	31%
Cleveland & Nettleton (Cochran Basin)	7.17%	21	31.9%	23%
Washington St Bridge (Washington Basin)	6.70%	7	5%	29%

PCB Concentrations: The City of Spokane has 2 years of high resolution PCB data for the Union storm basin. Union basin has not changed considerably since the Parsons sampling in 2007. Alterations to the Cochran basin prevent comparisons between Ecology and City of Spokane sampling. The concentrations obtained during the Union sampling by Parsons and later by Ecology can be compared to gauge whether

PCB concentrations have changed. However, it should be acknowledged that sampling protocols were different between the sampling events; grab sampling in the Parsons and Ecology and composite sampling by the City of Spokane. Composite samples are more representative of event mean concentrations for a storm event. Sampling events were compared as three groups of data (Ecology/Parsons 2007, Ecology-2009-2011, and City of Spokane 2012-2013) (Table 3 and Figure 2). Data was also explored in groups of data separated by cleaning events in the Union lines (Table 3). Data was grouped by pre-cleaning, post-maintenance (2010), and post-maintenance (2012) (Figure 2). All data was tested for statistical significance using an analysis of variance on log transformed data to assure normality of the data.

Table 3: PCB data from City of Spokane (2014) report (Table 5) and Parsons (2007) report from Union basin.

SAMPLE/ ORGANIZATION	**DATE**	**Sample Type**	**Precipitation (inches)**	**PCBs (pg/l)**
Ecology/Parsons (UNION)	5/2/2007	Grab	unk	168,160
	5/21/2007	Grab	unk	16,100
Ecology (UNIONLPT Sample Location)	6/8/2009	Grab	0.29	73,000
	10/2/2009	Grab	0.11	58,200
	2/16/2010	Grab	0.12	460,000
	4/29/2010	Grab	0.48	60,600
	Union Basin Pipe Cleaning and Lee/Springfield Plug Installed June 2010; Remedial Maintenance July-Aug 2010			
	9/9/2010	Grab	0.06	256,000
	1/7/2011	Grab	0.19	55,300
City of Spokane (Trent & Erie Sample Location)	10/29/2012	Composite	0.43	37,346
	Union Basin Remedial Maintenance 10/29/12 to 11/5/12			
	11/1/2012	Composite	0.11	43,841
	11/3/2012	Composite	0.24	47,972
	11/8/2012	Composite	0.34	18,113
	11/12/2012	Composite	0.33	48,862
	3/20/2013	Composite	0.26	19,403
	4/10/2013	Composite	0.07	13,766
	5/13/2013	Composite	0.31	47,455

Union basin continues to have the highest measured concentrations of PCBs out of all basins monitored by the City. Sampling of the Union basin over time has shown a decrease in concentrations (Figure 2). Overall, there is a statistically significant difference over time (ANOVA p=0.045). This difference is because of the decrease between the Ecology 2009 and City of Spokane 2012-13 sampling (p=0.036); there is no difference between the Ecology 2007 and 2009 samples. It is possible that the observed difference in concentration is due to differences in sampling technique. The Ecology 2007 and 2009 samples were collected as grab samples, whereas the City samples in 2012/13 were composite samples.

Composite samples would better represent the storm event mean concentrations and therefore be more reliable.

In addition, the City has cleaned the stormwater pipes in the Union basin on two occasions (2010 and 2012), as detailed in Table 3. The analysis of data pre- and post-cleaning of the pipes includes both grab and composite samples. Cleaning of the Union line has not reduced the PCB concentrations to a level of statistical significance (ANOVA p=0.124) (Figure 2).

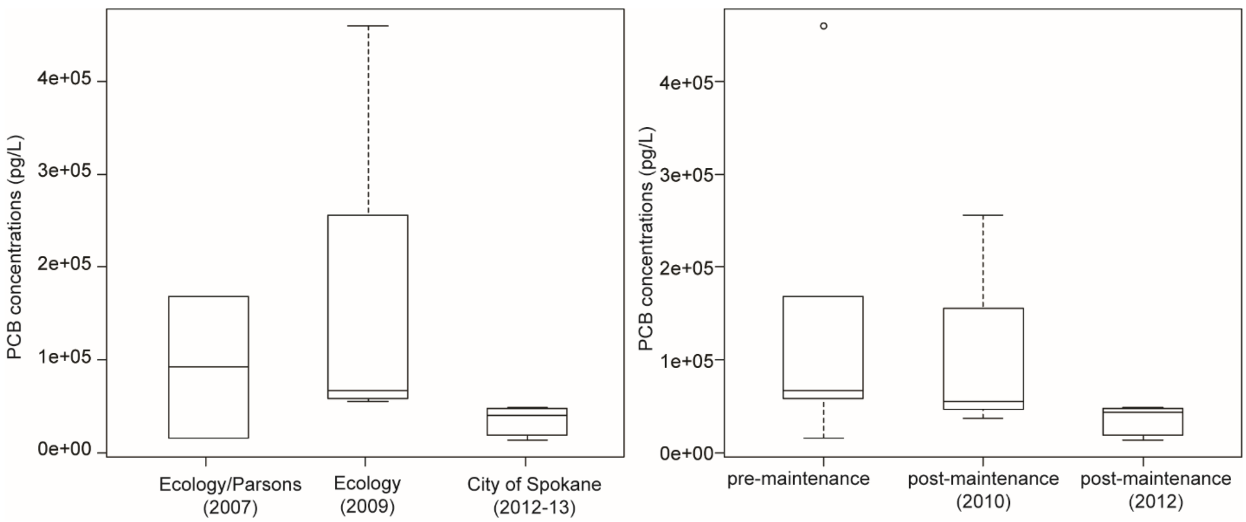
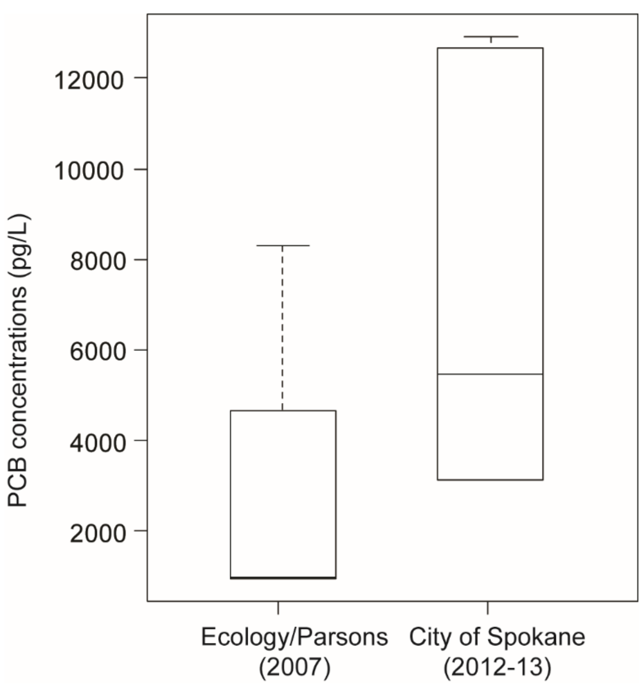


Figure 2: Boxplot of PCB concentrations from the Union basin over time (left panel) and pre- and post-maintenance of the lines (right panel). Horizontal lines within the boxes are median concentrations and the limits of the boxes are 25th and 75th percentiles of the data.



The Washington storm basin was sampled by Ecology in 2007 and by the City of Spokane in 2012. It appears there are higher PCB concentrations during the more recent City sampling (Figure 3), however there is no statistical difference between the two sample periods (t-test p=0.052).

Figure 3: Boxplot of PCB concentrations from Washington basin, comparing the 2007 and 2012 sampling periods. There is no significant difference.

PCB Loading: In a similar approach to assessing water quantity, the PCB concentrations were used to compare the measured PCB mass (load) contributed during the October 2012 and May 2013 storm events with the total PCB mass in the Spokane River over the same period of time. PCB mass was summed from the monitored stormwater / CSO basins. The PCB mass in the Spokane River during each storm event was calculated using the USGS flow data over the period of sampling and the concentration data from Era-Miller (2013). The Era-Miller (2013) data were accessed through Ecology's EIM system using the project code "BERA0009" (https://fortress.wa.gov/ecy/eimreporting/). Comparisons were made for 2 locations in the Spokane River (Table 4). The measurements of flow and PCB mass from the Spokane River are not co-located, but the timing of river and stormwater sampling do overlap.

During the October 2012 storm event the measured outfalls contributed 51% of the PCB mass (Table 4). No samples exist during October 2012 from the Spokane River upriver of the storm outfalls. During the May 2013 storm event the measured outfalls contributed about 18% of the PCB mass (mg) (Table 4).

Table 4: % contribution of measured stormwater/CSOs during the October 2012 and May 2013 storm event by absolute PCB mass.

	Upriver Dam - PCB mass (mg)	**Above Latah - PCB mass (mg)**
October 2012		
Spokane River	ns	112
stormwater/CSO	ns	57.3
	ns	**50.97%**
May 2013		
Spokane River	1438	906
stormwater/CSO	166	166
	11.52%	**18.29%**

Un-sampled Load: The City of Spokane has 129 stormwater basins and 24 CSOs (Table 5). The basins currently sampled are all above the 80th percentile by area (Figure 4) and represent 43% of the total drainage area of Spokane. Delineation of the all the catchments exists, but no flow or PCB data for the basins outside those targeted in the Integrated Clean Water Plan (5 basins, 6 sample sites) is available.

The original Parsons report (2007) estimated contributions from un-sampled CSOs using the Simple Method for a "high CSO load scenario". The flow from a CSO is not described by the Simple Method and the runoff coefficients therein because it does not flow continuously, which is what the Simple Method assumes. Therefore only the "low CSO load scenario" (as estimated by Parsons, 2007) that relies on measured flow should be used. Un-sampled CSO basins do have continuous flow monitoring; therefore we can take a median CSO concentration and apply to the individual flows to get an estimate of un-sampled CSO PCB contributions.

Table 5: Statistical summary of Spokane storm basin areas in acres.

number of basins	minimum	maximum	mean	25%	median (50%)	75%	90%	95%
153	0.07	5245.00	115.5	0.85	4.15	54.35	188.94	458.37

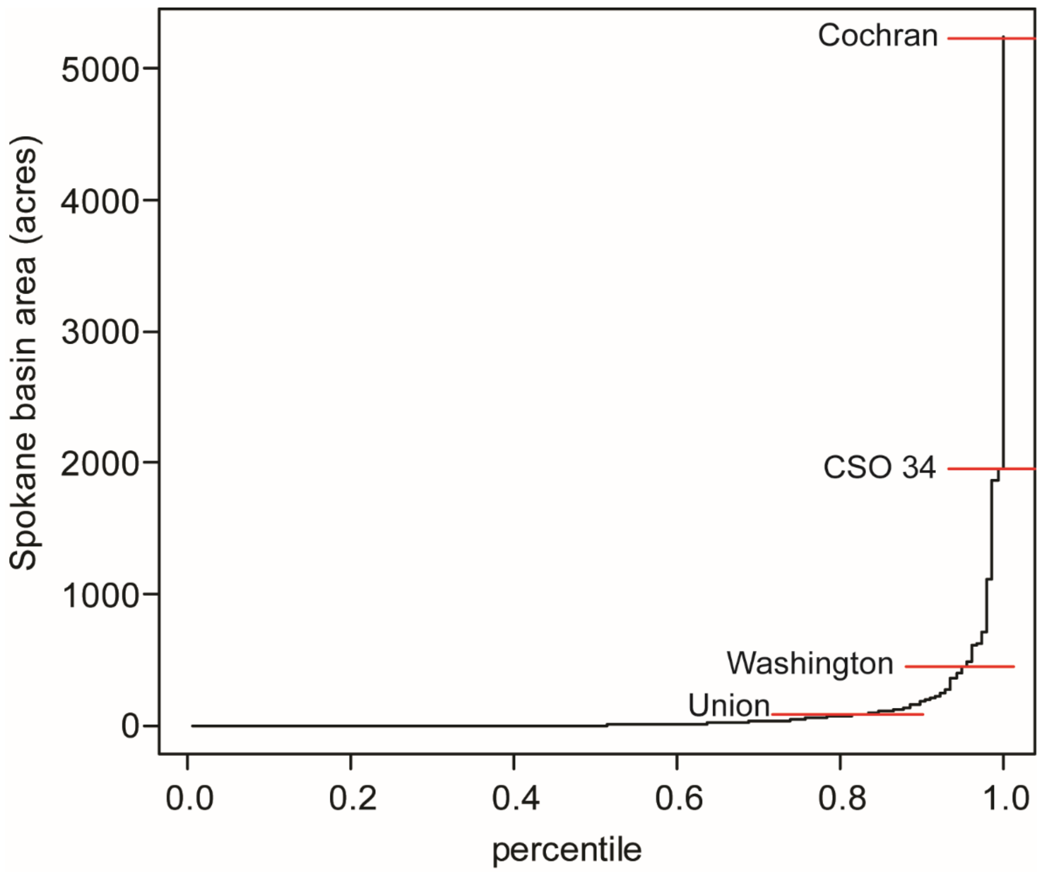


Figure 4: Empirical density function (EDF) of stormwater and CSO basin area (acres). Shows the distribution of all the basins by size. The basins currently monitored by the City of Spokane are highlighted by red lines. Percentile represents the percentage of basins smaller; for example the Washington basin is at percentile 0.94, meaning 94% of the basins are smaller than the Washington basin.

The flow from the Cochran basin is currently being modeled by the City of Spokane to understand the measured flow. Once this is complete it will provide a means to estimate flow from un-sampled basins more accurately. Unfortunately, this will not be completed in time for any potential sampling events in the Fall of 2015. In the interim estimating the un-sampled flow from all MS4 stormwater basins may be possible using established precipitation-runoff relationships from the sampled catchments and a corrected Simple Model for the un-sampled basins. The PCB load could then be estimated using the median PCB concentrations from the 2 years of sampling by the City.

An attempt was made here to use the precipitation – runoff relationships to estimate annual runoff volume and annual PCB load. However, verifying the results with the model established for the Cochran basin showed that simple estimates based on the precipitation – runoff model overestimated annual runoff by 200%. Further work with the City of Spokane is required to be able to use precipitation-runoff relationships and existing stormwater models.

In addition, the previous estimates were based on one annual rainfall total. There is spatial variability among the Spokane rain gauges and each basin rainfall total should be triangulated to the nearest stations.

Summary of findings

- Based on recent sampling (2012-2013), the mass of PCBs discharged in the MS4 and CSO systems of Spokane, seem to represent a significant fraction of what's in the river during storm events. The 2 storm events analyzed suggest a range of 18-50% based on 2012-13 data.
- It does not appear that PCB concentrations have significantly changed between the 2007 (Parsons, 2007) and the 2013 (City of Spokane, 2014) sampling periods.
- The biggest gap in estimating PCB loads for all stormwater discharges is understanding the actual runoff volume.

Recommendations

- The simple method for estimating flow should not be applied to Spokane basins, unless a suitable correction factor or revision of coefficients is possible.
- CSO flow should rely on measured values from the City of Spokane system.
- Continue to develop the model for the Cochran basin; consider what would be necessary to measure during future sampling events to allow this model to be applicable to other smaller basins to get a decent estimate of flow.
- Consider sampling a subsection of the small basins which have not been monitored to give some estimate of concentrations and flow.
- Alternatively, consider sampling more of the larger basins to increase the total percent of Spokane drainage area sampled:
    - ► Sampling all the basins larger than Union, which is 30 basins, would capture 92% of the drainage area of Spokane
    - ► Sampling the top 10 basins by area, which are mainly CSOs, plus Union basin would capture 75% of the Spokane drainage area.
- All planning for future stormwater sampling should be done in consultation with the City of Spokane.

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EPA POLICY FOR THE ADMINISTRATION OF ENVIRONMENTAL PROGRAMS ON INDIAN RESERVATIONS

INTRODUCTION

The President published a Federal Indian Policy on January 24, 1983, supporting the primary role of Tribal Governments in matters affecting American Indian reservations. That policy stressed two related themes: (1) that the Federal Government will pursue the principle of Indian "self-government" and (2) that it will work directly with Tribal Governments on a "government-to-government" basis.

The Environmental Protection Agency (EPA) has previously issued general statements of policy which recognize the importance of Tribal Governments in regulatory activities that impact reservation environments. It is the purpose of this statement to consolidate and expand on existing EPA Indian Policy statements in a manner consistent with the overall Federal position in support of Tribal "self-government" and "government-to-government" relations between Federal and Tribal Governments. This statement sets forth the principles that will guide the Agency in dealing with Tribal Governments and in responding to the problems of environmental management on America Indian reservations in order to protect human health and the environment. The Policy is intended to provide guidance for EPA program managers in the conduct of the Agency's congressionally mandated responsibilities. As such, it applies to EPA only and does not articulate policy for other Agencies in the conduct of their respective responsibilities.

It is important to emphasize that the implementation of regulatory programs which will realize these principles on Indian Reservations cannot be accomplished immediately. Effective implementation will take careful and conscientious work by EPA, the Tribes and many others. In many cases, it will require changes in applicable statutory authorities and regulations. It will be necessary to proceed in a carefully phased way, to learn from successes and failures, and to gain experience. Nonetheless, by beginning work on the priority problems that exist now and continuing in the direction established under these principles, over time we can significantly enhance environmental quality on reservation lands.

POLICY

In carrying out our responsibilities on Indian reservations, the fundamental objective of the Environmental Protection Agency is to protect human health and the environment. The keynote of this effort will be to give special consideration to Tribal interests in making Agency policy, and to insure the close involvement of Tribal Governments in making decisions and managing environmental programs affecting reservation lands. To meet this objective, the Agency will pursue the following principles:

1. **THE AGENCY STANDS READY TO WORK DIRECTLY WITH INDIAN TRIBAL GOVERNMENTS ON A ONE-TO-ONE BASIS (THE "GOVERNMENT-TO-GOVERNMENT" RELATIONSHIP). RATHER THAN AS SUBDIVISIONS OF OTHER GOVERNMENTS.**

   EPA recognizes Tribal Governments as sovereign entities with primary authority and responsibility for the reservation populace. Accordingly, EPA will work directly with Tribal Governments as the independent authority for reservation affairs, and not as political subdivisions of States or other governmental units.

2. **THE AGENCY WILL RECOGNIZE TRIBAL GOVERNMENTS AS THE PRIMARY PARTIES FOR SETTING STANDARDS, MAKING ENVIRONMENTAL POLICY DECISIONS AND MANAGING PROGRAMS FOR RESERVATIONS, CONSISTENT WITH AGENCY STANDARDS AND REGULATIONS.**

   In keeping with the principle of Indian self-government, the Agency will view Tribal Governments as the appropriate non-Federal parties for making decisions and carrying out program responsibilities affecting Indian reservations, their environments, and the health and welfare of the reservation populace. Just as EPA's deliberations and activities have traditionally involved the interests and/or participation of State Governments, EPA will look directly to Tribal Governments to play this lead role for matters affecting reservation environments.

3. **THE AGENCY WILL TAKE AFFIRMATVE STEPS TO ENCOURAGE AND ASSIST TRIBES IN ASSUMING REGULATORY AND PROGRAM MANAGEMENT RESPONSIBILITIES FOR RESERVATION LANDS.**

   The Agency will assist interested Tribal Governments in developing programs and in preparing to assume regulatory and program management responsibilities for reservation lands. Within the constraints of EPA's authority and resources, this aid will include providing grants and other assistance to Tribes similar to that we provide State Governments. The Agency will encourage Tribes to assume delegable responsibilities, (i.e. responsibilities which the Agency has traditionally delegated to State Governments for non-reservation lands) under terms similar to those governing delegations to States.

   Until Tribal Governments are willing and able to assume full responsibility for delegable programs, the Agency will retain responsibility for managing programs for reservations (unless the State has an express grant of jurisdiction from Congress sufficient to support delegation to the State Government). Where EPA retains such responsibility, the Agency will encourage the Tribe to participate in policy-making and to assume appropriate lesser or partial roles in the management of reservation programs.

4. **THE AGENCY WILL TAKE APPROPRIATE STEPS TO REMOVE EXISTING LEGAL AND PROCEDURAL IMPEDIMENTS TO WORKING DIRECTLY AND EFFECTIVELY WITH TRIBAL GOVERNMENTS ON RESERVATION PROGRAMS.**

A number of serious constraints and uncertainties in the language of our statues and regulations have limited our ability to work directly and effectively with Tribal Governments on reservation problems. As impediments in our procedures, regulations or statues are identified which limit our ability to work effectively with Tribes consistent with this Policy, we will seek to remove those impediments.

5. **THE AGENCY, IN KEEPING WITH THE FEDERAL TRUST RESPONSIBILITY, WILL ASSURE THAT TRIBAL CONCERNS AND INTERESTS ARE CONSIDERED WHENEVER EPA'S ACTIONS AND/OR DECISIONS MAY AFFECT RESERVATION ENVIRONMENTS.**

EPA recognizes that a trust responsibility derives from the historical relationship between the Federal Government and Indian Tribes as expressed in certain treaties and Federal Indian Law. In keeping with that trust responsibility, the Agency will endeavor to protect the environmental interests of Indian Tribes when carrying out its responsibilities that may affect the reservations.

6. **THE AGENCY WILL ENCOURAGE COOPERATION BETWEEN TRIBAL, STATE AND LOCAL GOVERNMENTS TO RESOLVE ENVIRONMENTAL PROBLEMS OF MUTUAL CONCERN.**

Sound environmental planning and management require the cooperation and mutual consideration of neighboring governments, whether those governments be neighboring States, Tribes, or local units of government. Accordingly, EPA will encourage early communication and cooperation among Tribes, States and local governments. This is not intended to lend Federal support to any one party to the jeopardy of the interests of the other. Rather, it recognizes that in the field of environmental regulation, problems are often shared and the principle of comity between equals and neighbors often serves the best interests of both.

7. **THE AGENCY WILL WORK WITH OTHER FEDERAL AGENCIES WHICH HAVE RELATED RESPONSIBILITIES ON INDIAN RESERVATIONS TO ENLIST THEIR INTEREST AND SUPPORT IN COOPERATIVE EFFORTS TO HELP TRIBES ASSUME ENVIRONMENTAL PROGRAM RESPONSIBILITIES FOR RESERVATIONS.**

EPA will seek and promote cooperation between Federal agencies to protect human health and the environment on reservations. We will work with other agencies to clearly identify and delineate the roles, responsibilities and relationships of our respective organizations and to assist Tribes in developing and managing environmental programs for reservation lands.

8. THE AGENCY WILL STRIVE TO ASSURE COMPLIANCE WITH ENVIRONMENTAL STATUTES AND REGULATIONS ON INDIAN RESERVATIONS.

In those cases where facilities owned or managed by Tribal Governments are not in compliance with Federal environmental statues, EPA will work cooperatively with Tribal leadership to develop means to achieve compliance, providing technical support and consultation as necessary to enable Tribal facilities to comply. Because of the distinct status of Indian Tribes and the complex legal issues involved, direct EPA action through the judicial or administrative process will be considered where the Agency determines, in its judgement, that: (1) a significant threat to human health or the environment exists, (2) such action would reasonably be expected to achieve effective results in a timely manner, and (3) the Federal Government cannot utilize other alternatives to correct the problem in a timely fashion.

In those cases where reservation facilities are clearly owned or managed by private parties and there is no substantial Tribal interest or control involved, the Agency will endeavor to act in cooperation with the affected Tribal Government, but will otherwise respond to noncompliance by private parties on Indian reservations as the Agency would to noncompliance by the private sector elsewhere in the country. Where the Tribe has a substantial proprietary interest in, or control over, the privately owned or managed facility, EPA will respond as described in the first paragraph above.

9. THE AGENCY WILL INCORPORATE THESE INDIAN POLICY GOALS INTO ITS PLANNING AND MANAGEMENT ACTIVITIES, INCLUDING ITS BUDGET, OPERATING GUIDANCE, LEGISLATIVE INITIATIVES, MANAGEMENT ACCOUNTABILITY SYSTEM AND ONGOING POLICY AND REGULATION DEVELOPMENT PROCESSES.

It is a central purpose of this effort to ensure that the principles of this Policy are effectively institutionalized by incorporating them into the Agency’s ongoing and long-term planning and management processes. Agency managers will include specific programmatic actions designed to resolve problems on Indian reservations in the Agency’s existing fiscal year and long-term planning and management processes.

William D. Ruckelshaus

Szelag, Matthew

From:	Szelag, Matthew
Sent:	Tuesday, July 14, 2015 9:37 AM
To:	Edgell, Joe; Szalay, Endre; Ford, Peter
Cc:	Fleisig, Erica; Schroer, Lee; Fabiano, Claudia; Buffo, Corey; Castanon, Lisa; Chung, Angela
Subject:	RE: Federal Water Quality Coalition Letter to EPA re Human Health Standards

Thanks for your thoughts everyone. I agree that it makes sense to refer Cheryl to our comment letter and the Maine documents. I know she's read through these items carefully but it's a good idea to direct her to the specific areas you pointed out. I'm sure she'll also be interested if we respond to the letter from the Federal Water Quality Coalition.

I think that is sufficient for our initial response on this. Thanks for the assistance.

Matthew Szelag | Water Quality Standards Coordinator
U.S. Environmental Protection Agency | Region 10
1200 6th Avenue, Suite 900, OWW-191 | Seattle, WA 98101
P: (206) 553.5171 | szelag.matthew@epa.gov

From: Edgell, Joe
Sent: Tuesday, July 14, 2015 9:28 AM
To: Szalay, Endre; Ford, Peter; Szelag, Matthew
Cc: Fleisig, Erica; Schroer, Lee; Fabiano, Claudia; Buffo, Corey; Castanon, Lisa
Subject: RE: Federal Water Quality Coalition Letter to EPA re Human Health Standards

[redacted]

[redacted]

Joe

From: Szalay, Endre
Sent: Tuesday, July 14, 2015 11:47 AM
To: Ford, Peter; Szelag, Matthew
Cc: Fleisig, Erica; Schroer, Lee; Fabiano, Claudia; Buffo, Corey; Edgell, Joe; Castanon, Lisa
Subject: RE: Federal Water Quality Coalition Letter to EPA re Human Health Standards

Thanks, Pete. I agree. Refer her to the relevant sections in our March 23 comments. [redacted] Along those lines, you could refer Cheryl to our disapproval in Maine and associated documents. For example, the January 30 letter from DOI to Avi re WQS and tribal fishing rights (attached). Pages 7-10 discuss the legal basis for concluding that tribal fishing rights include the right to sufficient water quality.

Endre Szalay
US EPA Region 10
206-553-1073

From: Ford, Peter
Sent: Tuesday, July 14, 2015 5:52 AM
To: Szelag, Matthew; Szalay, Endre
Cc: Fleisig, Erica; Schroer, Lee; Fabiano, Claudia; Buffo, Corey; Edgell, Joe
Subject: RE: Federal Water Quality Coalition Letter to EPA re Human Health Standards

We sort of spelled out the answer to her question re CRL on p. 5 of our Mar 23 comment letter when we said: “Here, the state has not demonstrated how its use of a CRL of 10-5 would result in WQC that adequately protect tribal fish consumers as the target general population as opposed to a highly exposed subpopulation within the broader general population in WA. For example, the CRL for tribal members whose consumption is not suppressed (i.e., greater than 175 g/day), would very likely be higher than 10-5.” [redacted] “It should also be noted that the 2000 HH Meth did not consider how CWA decisions should account for applicable treaty-reserved fishing rights, and the treaties themselves may require higher levels of protection.” [redacted] “Therefore, the EPA supports the state’s decision to derive the HHC using a FCR of 175 g/day so long as the state also retains a CRL of 10-6, which the tribes have generally viewed as a compromise minimum value in tribal consultation.” [redacted] You could direct her to these sentences if OW and R10 ok with doing that.

I’m adding others (Lee, Joe, Claudia, Corey) so they’re in the loop.

Peter Z. Ford
U.S. EPA Office of General Counsel
202.564.5593

From: Szelag, Matthew
Sent: Monday, July 13, 2015 6:59 PM
To: Ford, Peter; Szalay, Endre
Cc: Fleisig, Erica
Subject: FW: Federal Water Quality Coalition Letter to EPA re Human Health Standards

Hi Pete and Endre,
Any thoughts on how to respond to Cheryl? I’m planning to give her a call tomorrow morning. [redacted]

Let me know if you have any additional thoughts. Thanks,

Matthew Szelag | Water Quality Standards Coordinator
U.S. Environmental Protection Agency | **Region 10**
1200 6th Avenue, Suite 900, OWW-191 | Seattle, WA 98101
P: (206) 553.5171 | szelag.matthew@epa.gov

06441

From: Niemi, Cheryl (ECY) [mailto:cnie461@ECY.WA.GOV]
Sent: Monday, July 13, 2015 12:43 PM
To: Szelag, Matthew
Subject: FW: Federal Water Quality Coalition Letter to EPA re Human Health Standards

Hi Matt. Just saw this letter today.

Does EPA have an OGC or other legal opinion or rationale on how risk level and treaty tribal rights are connected, and why 10-6 is looked upon by EPA as fulfilling the rights, and 10-5 is not? Could you send me a copy of the opinion/rationale document?

Thanks,

Cheryl

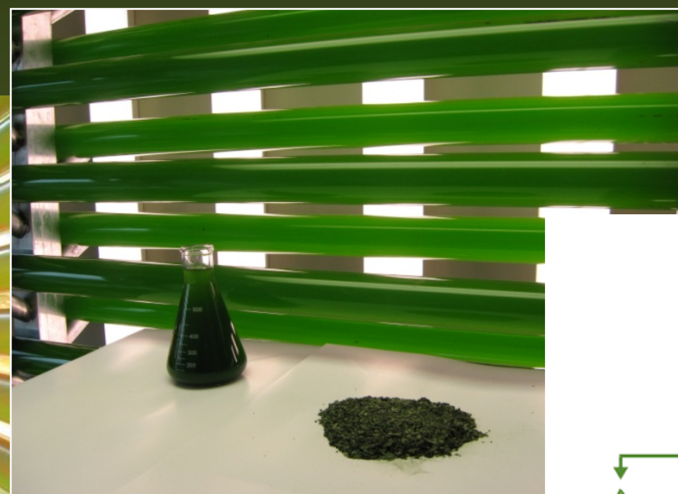
Cheryl A. Niemi
Surface Water Quality Standards Specialist
Department of Ecology
P.O. Box 47600
Olympia WA 98504
360.407.6440
cheryl.niemi@ecy.wa.gov

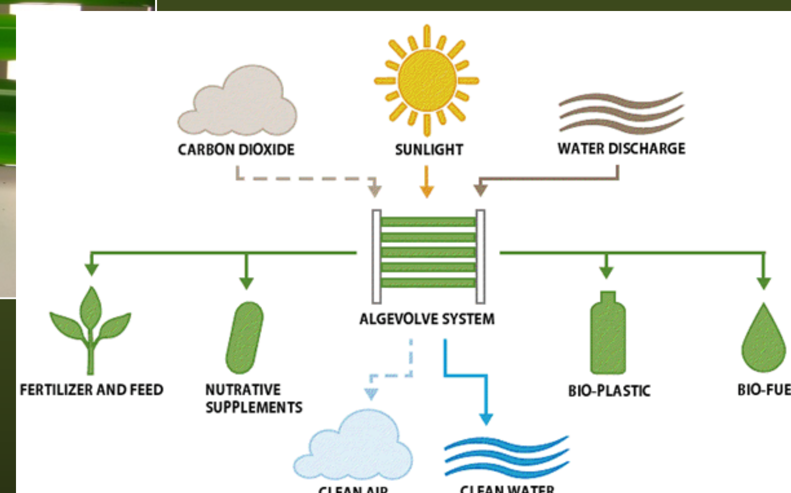
Note: This e-mail may be subject to public disclosure.

From: Johnson, Ken [mailto:ken.johnson@weyerhaeuser.com]
Sent: Friday, July 10, 2015 1:27 PM
To: Susewind, Kelly (ECY); Gildersleeve, Melissa (ECY); Niemi, Cheryl (ECY)
Subject: Federal Water Quality Coalition Letter to EPA re Human Health Standards

Ken Johnson
Weyerhaeuser Company
CH1 J32
P.O. Box 9777
Federal Way, WA 98063-9777
Office Phone 253-924-3426
Mobile Phone 253-279-4073
ken.johnson@weyerhaeuser.com

Inland Empire Paper Company





2012 NCASI West Coast Conference
Dealing with PCB's in the Spokane River

06443

October 2, 2012

Spokane River PCB Source Assessment

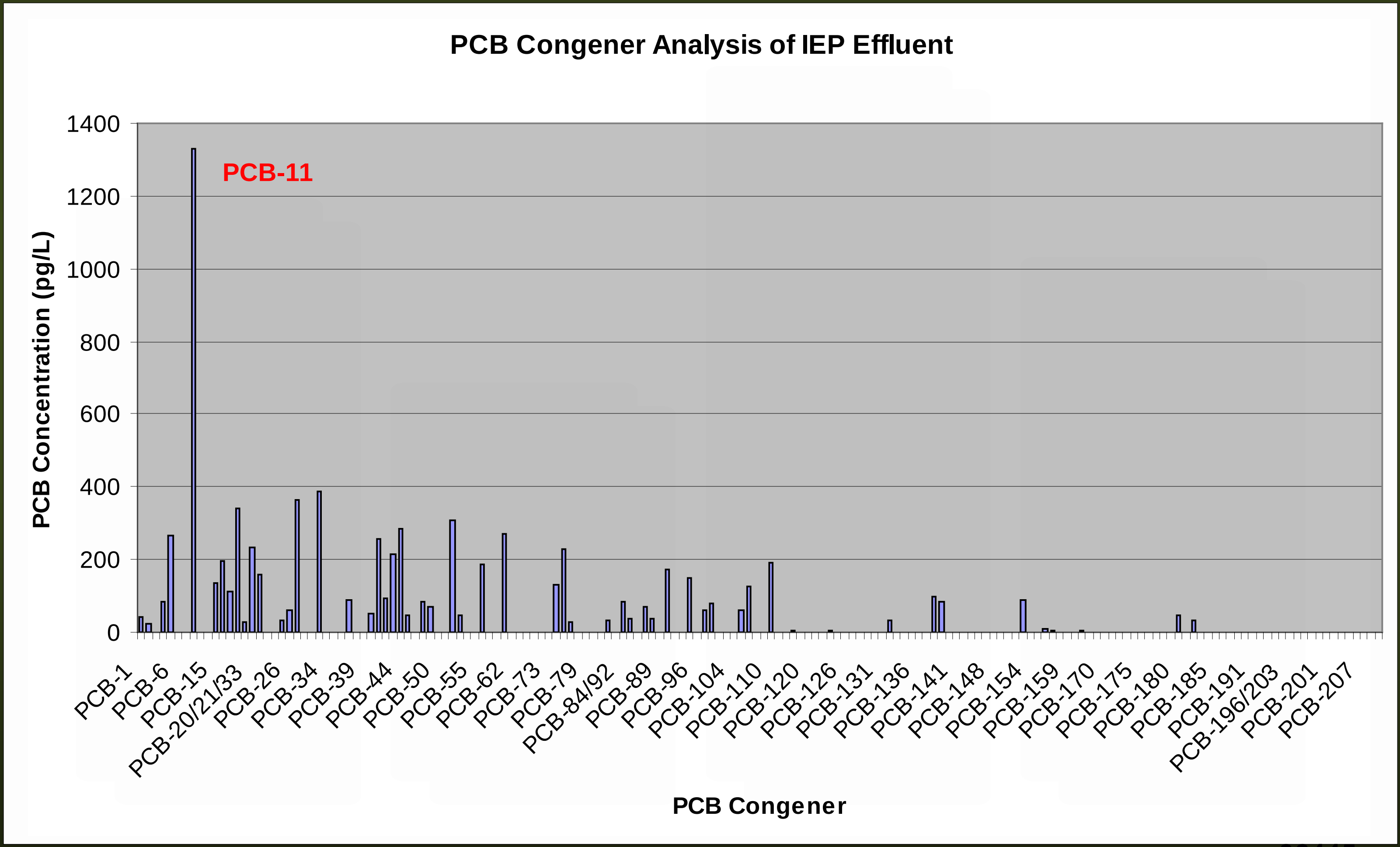
Facility	RM	Total PCB (pg/l)	Discharge (ML/day)	Total PCB Load (mg/day)
Liberty Lake WWTP	92.7	1,121	2.5	2.9
Kaiser Trentwood	86.0	1,080	60	65
Inland Empire Paper	82.5	2,544	18	45
Spokane WWTP	67.4	1,364	143	194
			Total =	307

ML/day = megaliters/day [0.264 MGD (million gallons per day)].

*Using EPA Method 1668A with a 100 pg/L PQL per congener

06444

PCB Analysis at IEP



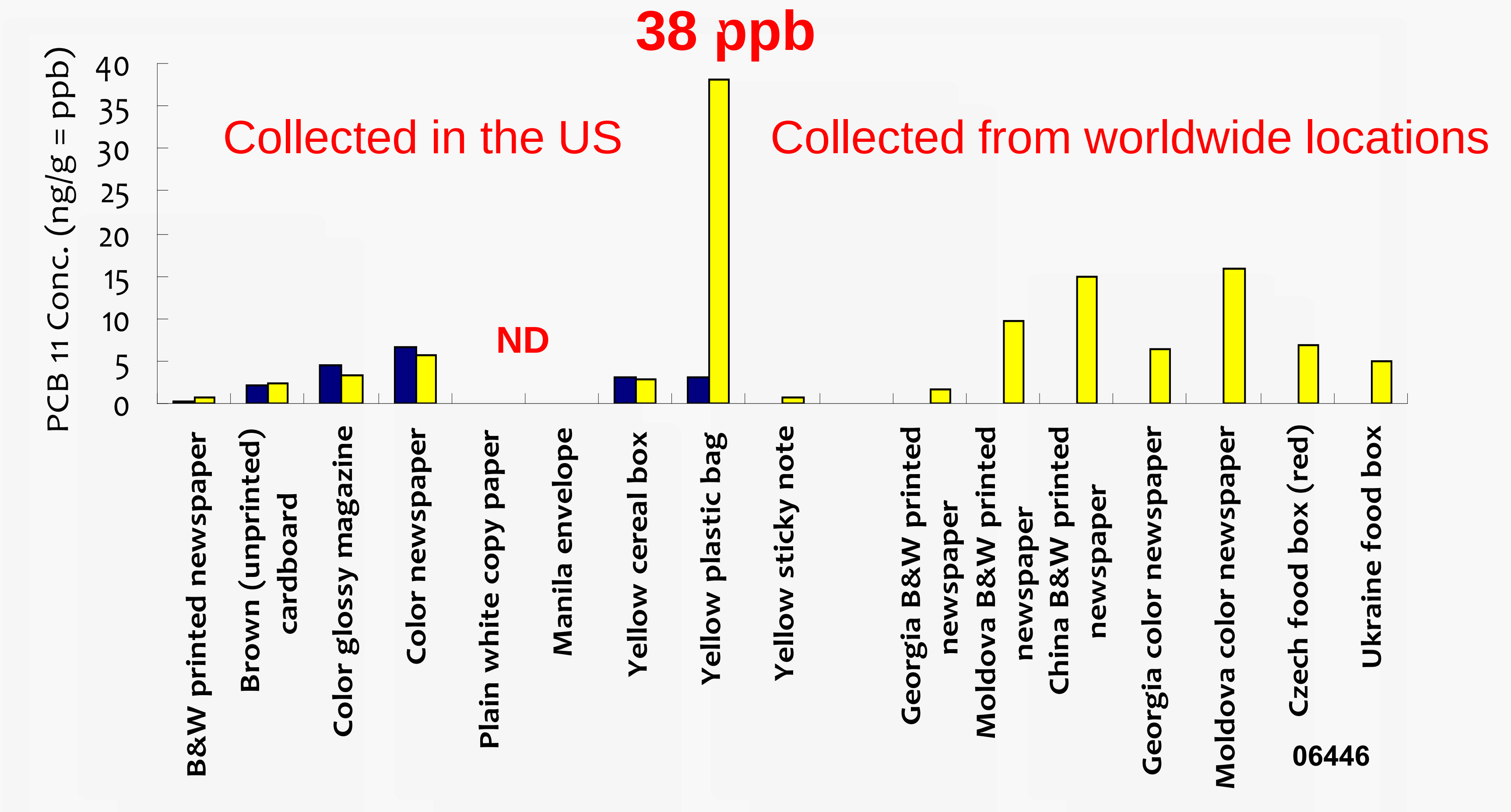
06445

RUTGERS

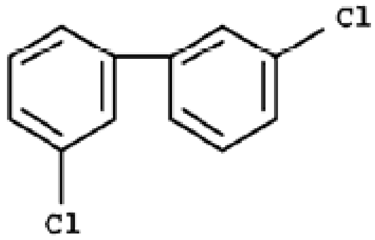
PCB 11 Concentration in Consumer Goods

PCB 11 mostly associated with materials printed with yellow ink

One cereal box can contaminate ~ **2,000 L** of water at the WQS of **64 pg/L**



Production of PCB 11



- 2006 worldwide production of color organic pigments ~ **250M** t
- 25% of this production is diarylide yellow, containing a few **ppb** of PCB 11
- 65% of all diarylide yellow is used in printing
- We estimate worldwide production of PCB 11 ~ **1.5 metric tons** in 2006 (Rodenburg et al. 2009, ES&T)

Other PCBs in Pigments

From Hu and Hornbuckle, 2010

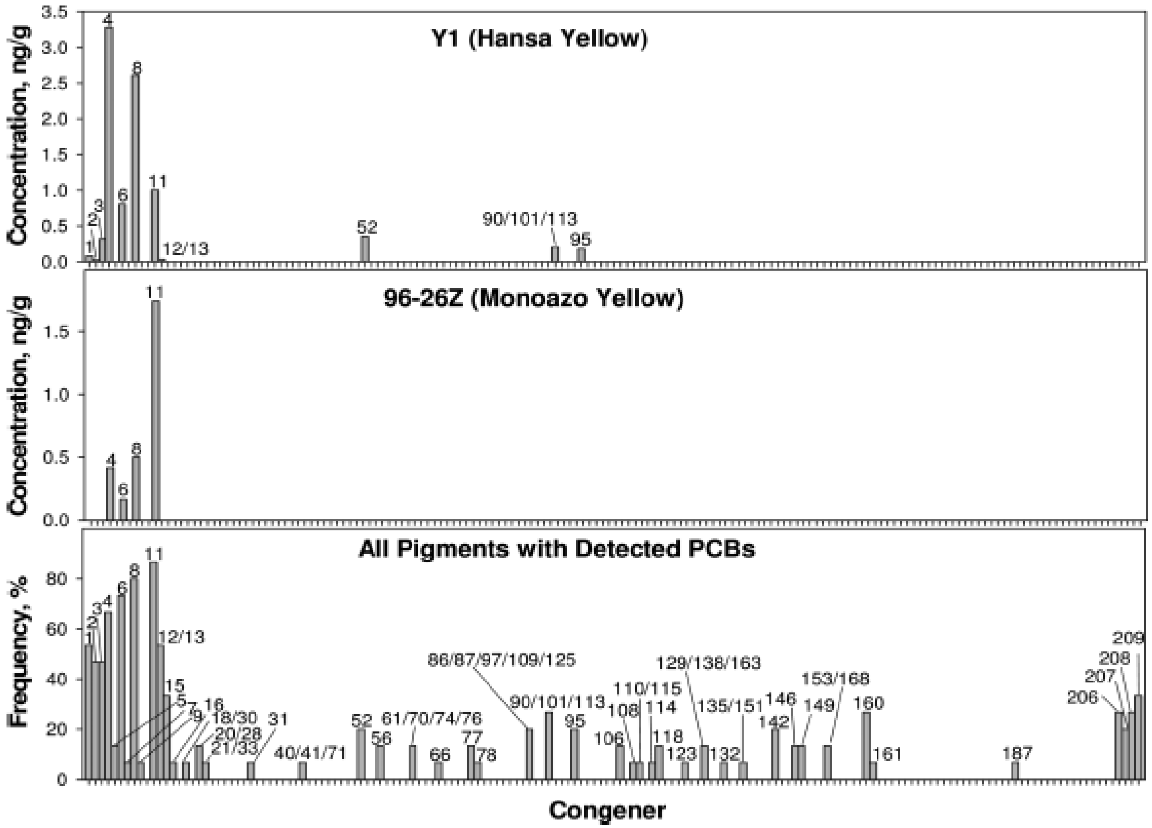


FIGURE 2. Examples of PCB profiles in paint pigments (top two plots) and the frequency of congener detection in the 15 pigments with detected PCBs (bottom plot).

06448

Federal Regulations

SUBCHAPTER R - TOXIC SUBSTANCES CONTROL ACT, PART 761

- Manufacturing and processing of PCBs was banned under TSCA in 1979

- …pigments that contain 50 ppm or greater PCB may be processed, distributed in commerce, and used in a manner other than a totally enclosed manner until January 1, 1982*…40 C.F.R. § 761.3 (g), Reserved after 1999*

- The concentration of inadvertently generated PCBs in products leaving any manufacturing site or imported into the United States must have an annual average of less than 25 ppm, with a 50 ppm maximum" *40 C.F.R. § 761.3 (1)*

PCB Paradox

Reference	PCB Concentration (ppm)	Magnitude Difference
Federal Allowance	50	----
IEP's Effluent	0.0000024	20,833,333
WA Current HHWQC	0.00000017	294,117,647
EPA Current HHWQC	0.000000064	781,250,000
*Spokane Tribe WQS	0.0000000013	38,461,538,462

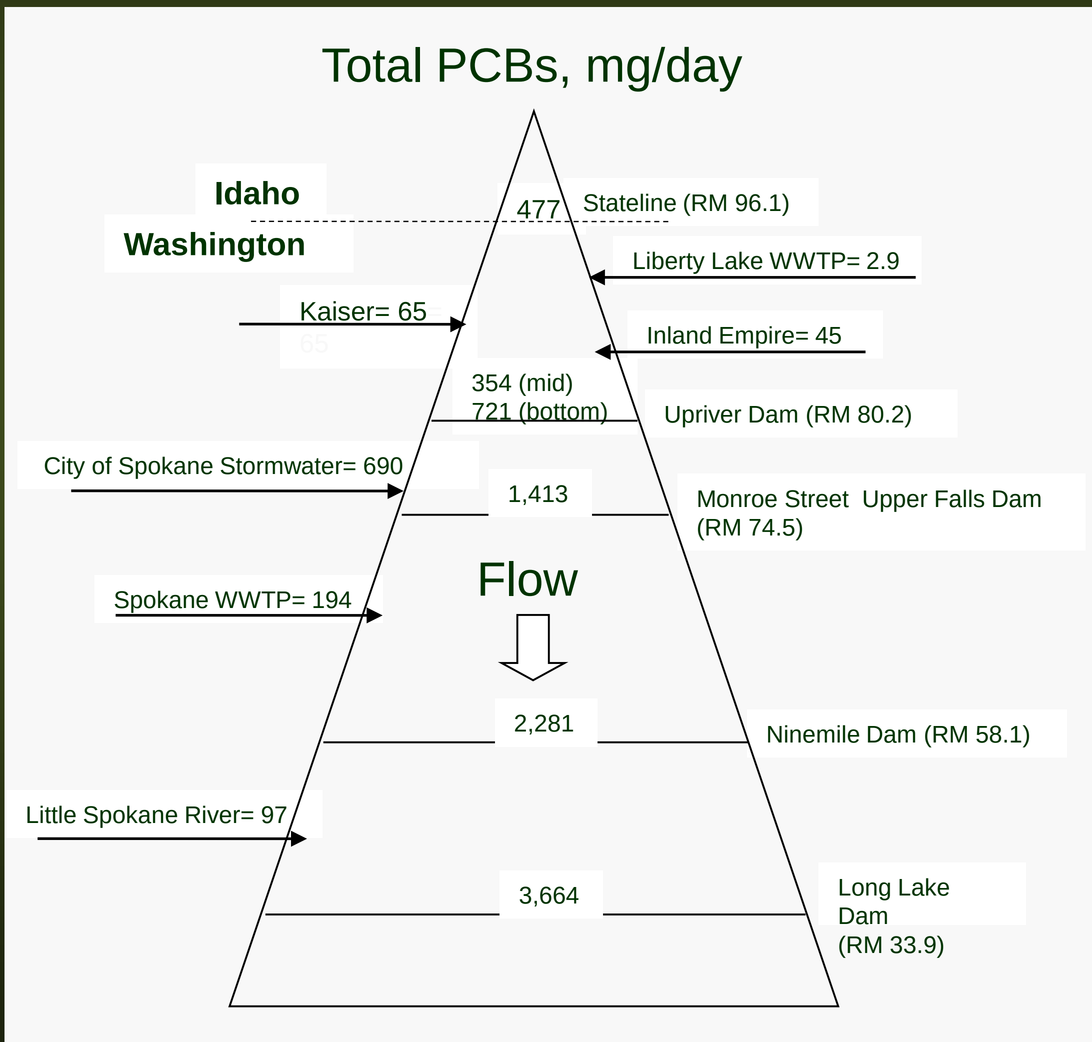
*Adopted a Fish Consumption Rate 1.9 pounds/day

Reductions Needed to Meet Standards

Location on Spokane River	Current t-PCB Load (mg/day)	Target t-PCB Load (mg/day) at Water Quality Criterion		t-PCB Load Reduction Required to Meet Water Quality Criterion	
		NTR (170 pg/l)	Spokane Tribe (3.37 pg/l)	NTR	Spokane Tribe
Stateline	477	766	15	none required	97%
Upriver Dam	537	780	15		97%
Monroe St.	1,413	1,208	24	15%	98%
Ninemile	2,281	1,243	25	46%	99%
Little Spokane River	97	83	2	15%	98%
Lake Spokane (lower)	3,664	1,562	31	57%	99%
Little Falls	3,664	1,562	31	57%	99%
Spokane Arm	3,664	1,562	31	57%	99%

06451

PCB Loading in Spokane River

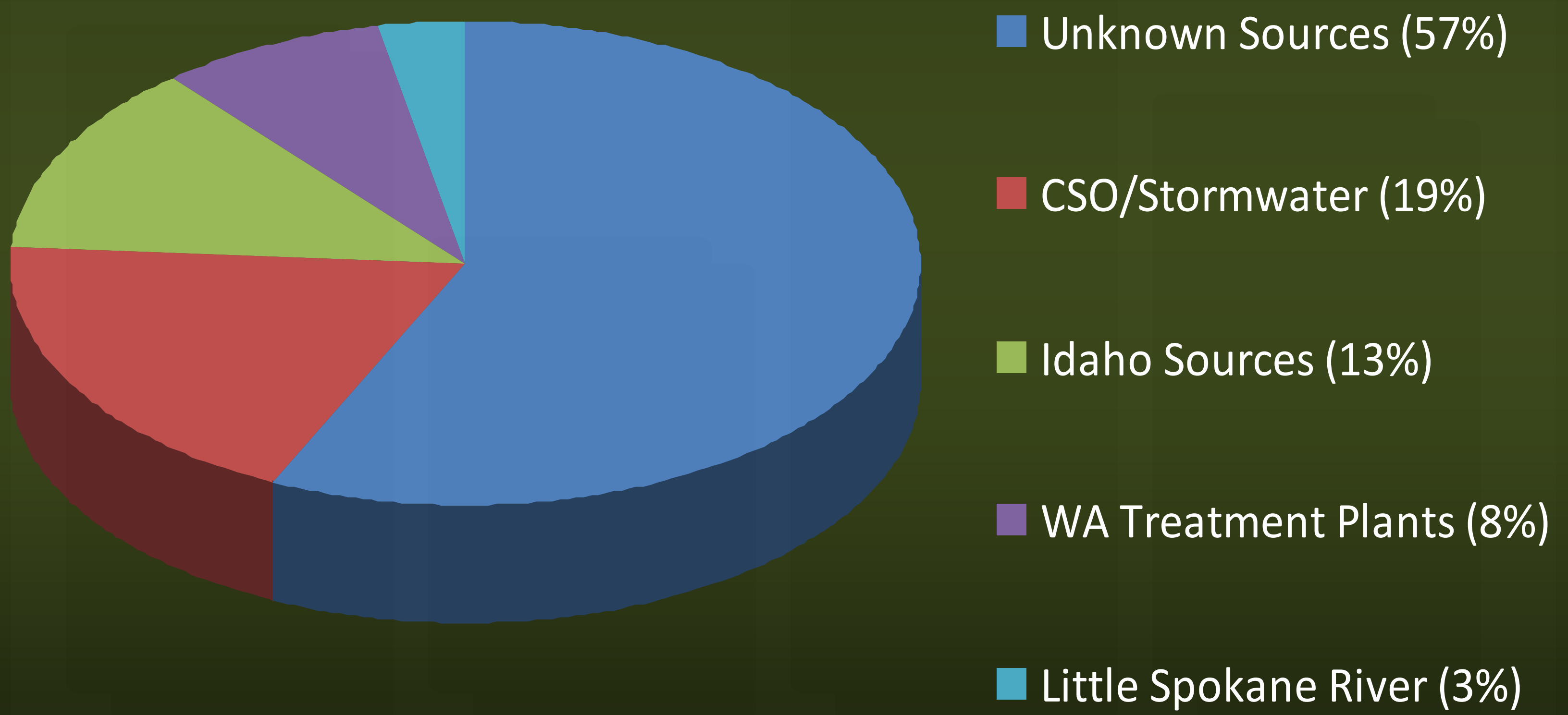


Source	Load (mg/day)
City of Spokane Stormwater	690
Stateline	477
Spokane WWTP	194
Little Spokane River	95
Kaiser	65
Inland Empire Paper	45
Liberty Lake WWTP	2.9
Total Measured	1569
Long Lake	3,664

Measured 43% of Load

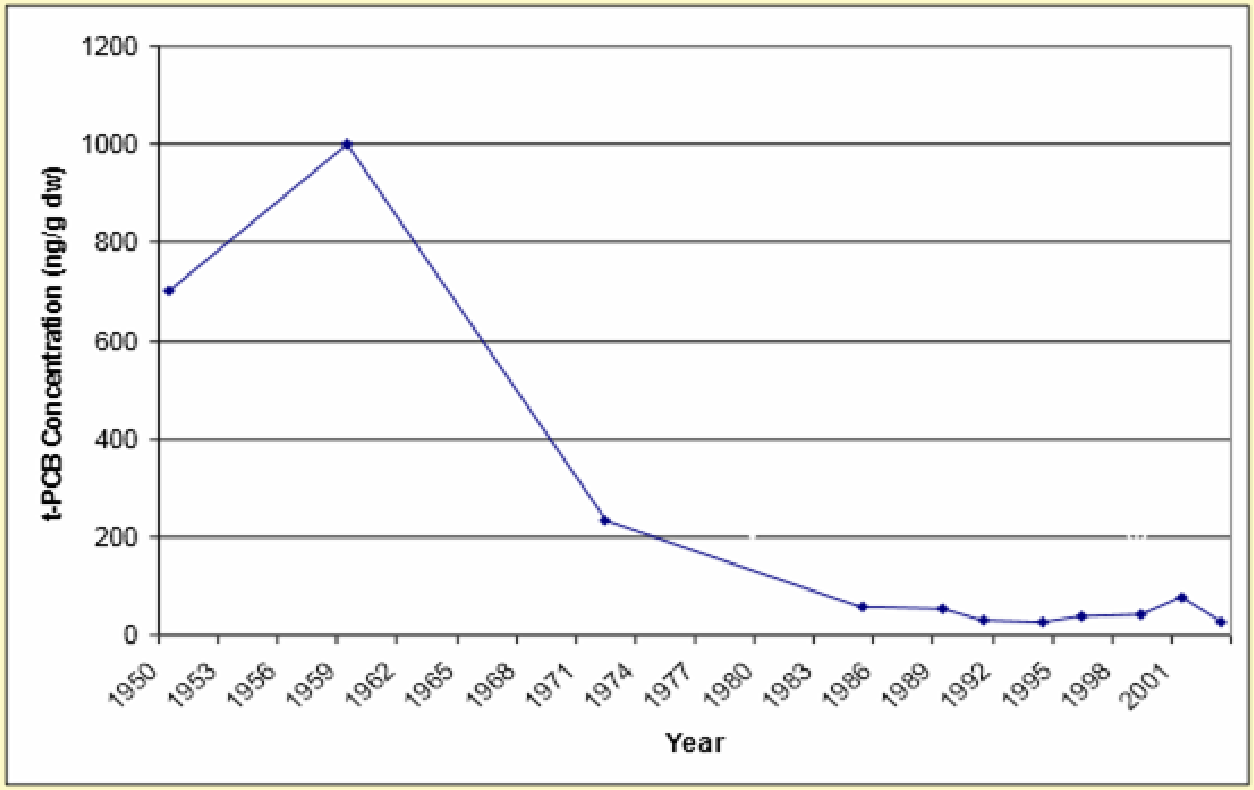
06452

PCB Sources to Spokane River



06453

PCBs History from Sediment Record Lower Lake Spokane



Total PCBs in Age Dated Sediment Core (2003)

- Steep declines from 1960s through mid-1980s

· Approximately 50% decline in 20 years (1980-2000)

06454

IEP NPDES Permit

- Conservation groups threatened to appeal permits for not including a WLA for PCB's
- **S7. REGIONAL TOXICS TASK FORCE:**

  "The goal of the Regional Toxics Task Force is to develop a comprehensive plan to bring the Spokane River into compliance with applicable water quality standards for PCBs."
- Termed "Straight to Implementation (STI)"
- Also effluent testing Method 1668 & BMP's

Toxics Task Force (SRRTTF)

Memorandum of Agreement

- Spokane County
- Liberty Lake Sewer and Water District
- Inland Empire Paper Company
- Kaiser Aluminum
- City of Spokane
- Spokane Regional Health District
- Washington State Department of Health
- Lake Spokane Association
- The Lands Council
- Spokane Riverkeeper
- Avista
- Washington State Department of Ecology
- U.S. Environmental Protection Agency
- Idaho Municipal Dischargers (Coeur d'Alene, Post Falls and Hayden)
- Idaho Department of Environmental Quality
- Spokane & Coeur d'Alene Tribe of Indians

Toxics Task Force (SRRTTF)

Technical Workshop

- National experts on PCBs
- Work in other watersheds:
  - Delaware River Basin
  - Hudson River & NY/NJ Harbor
  - Indiana Harbor to Lake Michigan
  - Puget Sound
  - Lower Duwamish
  - Portland Harbor

Toxics Task Force (SRRTTF)

Technical Workshop

- What did we learn (hear):
  - Most watersheds are dealing in ppm and pounds, we are dealing with ppq and grams
  - Atmospheric deposition by itself will likely cause exceedance of WQS
  - Idaho 30%, Stormwater 44%
  - Rainwater has been measured at concentrations >100 ppq
  - Snow is 100 times more effective than rain at scavenging PCBs
  - Stormwater in our basin is largest contributor
  - +90% of PCB's in Spokane River samples are in dissolved phase
  - Total PCB levels below 1,000 pg/L are variable and highly blank influenced
  - See www.srrttf.org for archive of presentations

Threats to SRRTTF

- Sierra Club in Spokane has 2 pending lawsuits regarding PCB’s:
  - Appeal of new Spokane County Permit
  - Unlawful to issue a permit for a new discharge without an approved TMDL for PCBs (Hearing before the PCHB in March 2013)

  - Federal Court action against EPA
  - EPA unlawfully approved a decision by the state of Washington to not prepare a PCB TMDL (July 2013)

- Not Demonstrating “Measurable Progress”

“If Ecology determines the Regional Toxics Task Force is failing to make measurable progress toward meeting applicable water quality criteria for PCBs, Ecology would be obligated to proceed with development of a TMDL in the Spokane River for PCBs or determine an alternative to ensure water quality standards are met.”

Other Efforts

- 2010 Advance Notice of Proposed Rulemaking addressing PCB Reassessment of Use Authorizations
  - IEP submitted comments in collaboration with the Spokane Riverkeepers and the Lands Council

- ECOS
  - Collaborative presentations with Riverkeepers & Rutgers
  - Resulted in a Resolution from the ECOS Committee

ECOS Resolution

- Recommends that EPA, industry, and states work together to develop alternative pigment and ink manufacturing processes in the next five years that do not generate PCBs;
- Supports a national R & D effort to reduce or eliminate inadvertently-created PCB products;
- Supports EPA's proposed rulemaking to reassess the current use authorizations for PCBs, which includes products with PCBs and products with inadvertently-generated PCBs;
- Recommends that U.S. EPA continue its efforts to reduce PCBs and work with the international community on the elimination of PCBs

PCBs are Nationwide Issue

- Up to 200 known chemical processes that may inadvertently create PCB byproducts:
  - Paint
  - Inks
  - Titanium Dioxide (white pigments)
  - Ag chemicals
  - Plastics
  - Soaps
  - Silicone rubber
  - Caulk measured up to = 300,000 ppm
- 2010 – 1,084 fish advisories for PCB's in 40 States
- 5,578 water bodies on 303(d) list for PCBs
- Many States are adopting revised FCR

Questions?

INLAND EMPIRE
PAPER COMPANY

Szelag, Matthew

From: Szelag, Matthew
Sent: Tuesday, March 17, 2015 12:47 PM
To: Ford, Peter; Schroer, Lee; Guadagno, Tony; Edgell, Joe; Szalay, Endre; Castanon, Lisa; Fleisig, Erica; Buffo, Corey; Chung, Angela; Fabiano, Claudia; Kissinger, Lon
Subject: RE: WA HHC comments

Hi everyone,
Thanks again for your time on the call earlier today, I thought it was very helpful. Here's the latest (clean) version with the edits we discussed plus a few relatively minor revisions.

We're sharing this version with Dan and Dennis and I know Pete needed a version to share with Ethan.

Our call with the tribes went well earlier today. The biggest message we heard was that 175 g/day and 10-6 is a minimum compromise. We've made a minor adjustment in our comments to reflect that.

WA HHC
comments (3/17 ...

Let me know if you have any questions and thanks again.

Matthew Szelag | Water Quality Standards Coordinator
U.S. Environmental Protection Agency | Region 10
1200 6th Avenue, Suite 900, OWW-191 | Seattle, WA 98101
P: (206) 553.5171 | szelag.matthew@epa.gov

From: Szelag, Matthew
Sent: Tuesday, March 17, 2015 8:14 AM
To: Ford, Peter; Schroer, Lee; Guadagno, Tony; Edgell, Joe; Szalay, Endre; Castanon, Lisa; Fleisig, Erica; Buffo, Corey; Chung, Angela; Fabiano, Claudia; Kissinger, Lon
Subject: RE: WA HHC comments

I've put the latest version (the one Joe sent yesterday at 5:21 eastern) in Sharepoint. This is the version we will be discussing on the call shortly.

[redacted]

Thanks everyone,

Matthew Szelag | Water Quality Standards Coordinator
U.S. Environmental Protection Agency | Region 10
1200 6th Avenue, Suite 900, OWW-191 | Seattle, WA 98101
P: (206) 553.5171 | szelag.matthew@epa.gov

-----Original Appointment-----
From: Szelag, Matthew
Sent: Friday, March 13, 2015 4:42 PM
To: Szelag, Matthew; Ford, Peter; Schroer, Lee; Guadagno, Tony; Edgell, Joe; Szalay, Endre; Castanon, Lisa; Fleisig, Erica; Buffo, Corey; Chung, Angela; Fabiano, Claudia; Kissinger, Lon
Subject: WA HHC comments
When: Tuesday, March 17, 2015 8:30 AM-9:30 AM (UTC-08:00) Pacific Time (US & Canada).
Where: [redacted]

Discuss the latest edits to our comments on Washington’s human health criteria.

Szelag, Matthew

From: Brown, Katherine
Sent: Friday, June 05, 2015 6:57 AM
To: Duncan, Bruce
Cc: Fleming, Sheila; Szelag, Matthew; Kissinger, Lon
Subject: Re: Updates on Tribal Work - Hot Topics on QA, seafood consumption, climate change, and Tribal Science Council

Thank you!!

From: Duncan, Bruce
Sent: Thursday, June 4, 2015 3:52 PM
To: Brown, Katherine
Cc: Fleming, Sheila; Szelag, Matthew; Kissinger, Lon
Subject: RE: Updates on Tribal Work - Hot Topics on QA, seafood consumption, climate change, and Tribal Science Council

Hi Katherine – here is an update from Lon and cleared by Matt for the WA information.

Thanks Lon for carving out some time for this.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

06466

WA: Washington's human health criteria are based on a fish consumption rate of 6.5 grams per day and therefore are not sufficiently protective of high fish consumers. Ecology has missed several deadlines to update the criteria and has proposed a rule with a higher fish consumption rate of 175 grams per day, but a less stringent cancer risk level of 10-5. On March 23, EPA submitted extensive comments on Ecology's proposed human health criteria. The tribes regard the 175 grams per day value as a compromise and a minimum acceptable value. Ecology is responding to comments and may adopt the human health criteria between 7/1 to 8/3. If the state adopts the proposed rule, Ecology will submit materials to EPA for approval or disapproval under the Clean Water Act. In addition, EPA has initiated the process to update the National Toxics Rule for Washington's human health criteria to take into account the best available science, including local and regional information, as well as applicable EPA policies, guidance, and legal requirements, in case the State is unable to adopt a protective rule in a timely manner. EPA is working internally to develop a rule proposal and has engaged the tribes for their input. The earliest EPA could propose a federal rule is fall 2015.

From: Duncan, Bruce
Sent: Tuesday, June 02, 2015 8:04 AM
To: Cox, Michael; Kissinger, Lon; Cope, Ben; Elleman, Robert; Matheny, Don
Subject: Updates on Tribal Work - Hot Topics on QA, seafood consumption, climate change, and Tribal Science Council
Importance: High

Hi all

Next meeting of Tribal Specialists is tomorrow. I only need a bullet for any updates in the past month – I will keep these from now on and reflect them back each month for any changes. I will try stop by as well today.

Lon: Updates on
1. Tribal Science Council
2. Tribal seafood consumption

Mike: Updates on climate change related to Tribes

Ben: Interactions/support/meetings with Tribes this past month?

Don: Any interactions/support/etc. with Tribes this past month?

Thanks,

Bruce

Bruce Duncan
Regional Science Liaison to Office of Research & Development

U.S. Environmental Protection Agency | Region 10
1200-6th Ave, Suite 900, OEA-095; Seattle, WA 98101
206.553.0218 | duncan.bruce@epa.gov

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 131

[WH-FRL-4029-2]

Amendments to the Water Quality Standards Regulation To Establish the Numeric Criteria for Priority Toxic Pollutants Necessary to Bring All States Into Compliance With Section 303(c)(2)(B)

AGENCY: Environmental Protection Agency.

ACTION: Proposed rule.

SUMMARY: This proposed rulemaking would promulgate the chemical-specific, numeric criteria for priority toxic pollutants necessary to bring all States into compliance with the requirements of section 303(c)(2)(B) of the Clean Water Act (CWA). States which have been determined by EPA to fully comply with section 303(c)(2)(B) requirements would not be affected by today's proposed rulemaking.

The proposed rulemaking addresses several situations. For a few States EPA would promulgate only a limited number of criteria because the Agency previously identified, in disapproval letters to such States, the specific priority toxic pollutants that require new or revised criteria. For these States, EPA would promulgate Federal criteria only for the priority toxic pollutants which require new or revised criteria. In the vast majority of States, EPA would promulgate, at a minimum, broadly applicable Federal criteria for all priority toxic pollutants for which EPA has issued section 304(a) water quality criteria guidance and that are not the subject of approved State criteria.

For those priority toxic pollutants included in today's proposed rulemaking where the section 304(a) criteria recommendation is based on carcinogenicity, the proposed criteria are based on an incremental one in one million cancer risk level (i.e., 10^{-6}).

The primary focus of this rule is the inclusion of the water quality criteria for pollutant(s) in State standards as necessary to support water quality-based control programs. The Agency is accepting comment on the criteria proposed in today's rule. However, Congress has established a very ambitious schedule for the promulgation of the final criteria. The statutory deadline in section 303(c)(4) clearly indicates that Congress intended the Agency to move very expeditiously when Federal action is warranted. The Agency believes that the limited time available for promulgation of the regulation can be used most efficiently and effectively by addressing those issues that have not already come before the Agency.

DATES: All written comments received on or before December 19, 1991, will be considered in the preparation of any final rulemaking.

A public hearing will be held on December 19, 1991, in Washington, DC, beginning at 9 a.m. The hearing officer reserves the right to limit oral testimony to 10 minutes, if necessary.

ADDRESSES: Comments, in quadruplicate, on this proposed rule should be addressed to William R. Diamond, Director, Standards and Applied Science Division (WH-585), Office of Science and Technology, 401 M Street, SW., Washington, DC 20460 (Telephone: 202-260-1315). The public may inspect the administrative record for this rulemaking, including documentation supporting the aquatic life and human health criteria, and all comments received on this proposed rule at EPA's Public Information Reference Unit, EPA Library, room 2904, Waterside Mall, 401 M Street, SW., Washington, DC 20460 (Telephone: 202-260-5926) on weekdays during the Agency's normal business hours of 8 a.m. to 4:30 p.m. Each of EPA's ten Regional offices will also have copies for public inspection and copying of the administrative records for the States in that Region. These records will be available in the Water Management Divisions of each respective Regional office. A reasonable fee will be charged for photocopies.

The public hearing will be held in the EPA auditorium, 401 M Street, SW., Washington, DC.

FOR FURTHER INFORMATION CONTACT: David K. Sabock or R. Kent Ballentine, Telephone 202-260-1315.

SUPPLEMENTARY INFORMATION:

This preamble is organized according to the following outline:

A. Introduction and Overview

1. Introduction

This section of the preamble introduces the topics which are addressed subsequently and provides a brief overview of EPA's basis and rationale for proposing to promulgate Federal criteria for priority toxic pollutants. Section B of this preamble presents a description of the evolution of the Federal Government's efforts to control toxic pollutants beginning with a discussion of the authorities in the Federal Water Pollution Control Act Amendments of 1972. Also described in some detail is the development of the water quality standards review and revision process which provides for establishing both narrative goals and enforceable numeric requirements for controlling toxic pollutants. This discussion includes the recent changes enacted in the 1987 Clean Water Act Amendments which are the basis for this proposed rulemaking. Section C summarizes State efforts since 1987 to comply with the requirements of Section 303(c)(2)(B). Section D describes EPA's procedure for determining whether a State has fully complied with Section 303(c)(2)(B). Section E sets out the rationale and approach for developing today's proposed rulemaking, including a discussion of EPA's legal basis. Section F describes the development of the criteria included in today's proposed rulemaking. Section G summarizes the provisions of the proposed rule and Section H highlights certain issues raised by the proposal for public comment. Sections I, J, and K address the requirements of Executive Order 12291, the Regulatory Flexibility Act, and the Paperwork Reduction Act, respectively. Section L provides a list of subjects covered in today's proposed rulemaking.

2. Overview

Today's proposed rulemaking to establish Federal toxics criteria for States is important for a number of environmental, programmatic and legal reasons.

First, control of toxic pollutants in surface waters is an important priority to achieve the Clean Water Act's goals and objectives. The most recent National Water Quality Inventory indicates that one-third of monitored river miles, lake acres, and coastal waters have elevated levels of toxics. Forty-seven States and Territories have reported elevated levels of toxic pollutants in fish tissues. States have issued a total of 586 fishing advisories and 135 bans, attributed mostly to industrial discharges and land disposal.

The absence of State water quality standards for toxic pollutants undermines EPA's overall toxic control efforts to address these problems. Without clearly established water quality goals, the effectiveness of many of EPA's water programs is jeopardized. Permitting, enforcement, coastal water quality improvement, fish tissue quality protection, certain nonpoint source controls, drinking water quality protection, and ecological protection all depend to a significant extent on complete and adequate water quality standards. Numeric criteria for toxics are essential to the process of controlling toxics because they allow States and EPA to evaluate the adequacy of existing and potential control measures to protect aquatic ecosystems and human health. Formally adopted standards form the legal basis for including water quality-based effluent limitations in NPDES permits to control toxic pollutant discharges. The critical importance of controlling toxic pollutants has been recognized by Congress and is reflected, in part, by the addition of section 303(c)(2)(B) to the Act. Congressional impatience with the pace of State toxics control programs is well documented in the legislative history of the 1987 CWA amendments. In order to protect human health, aquatic ecosystems, and successfully implement toxics controls, EPA believes that all actions which are available to the Agency must be taken to ensure that all necessary numeric criteria for priority toxic pollutants are established in a timely manner.

Second, as States and EPA continue the transition from an era of primarily technology-based controls to an era in which technology-based controls are integrated with water quality-based controls, it is important that EPA ensures timely compliance with CWA requirements. An active Federal role is essential to assist States in getting in place complete toxics criteria as part of their pollution control programs. While most States recognize the need for enforceable water quality standards for toxic pollutants, their recent adoption efforts have often been stymied by a variety of factors including limited resources, competing environmental priorities, and difficult scientific, policy and legal challenges. Although many water quality criteria for toxic pollutants have been available since 1980 and the water quality standards regulation has required State adoption of numeric criteria for toxic pollutants since 1983 (see 40 CFR 131.11), a preliminary assessment of the water quality standards for all States in February of 1990 showed that only six States had established fully acceptable criteria for toxic pollutants. This rate of toxics criteria adoption is contrary to the CWA requirements and is a reflection of the difficulties faced by States. EPA should exercise its CWA authorities to assist States in such circumstances.

EPA's proposed action will also help restore equity among the States. The CWA is designed to ensure all waters are sufficiently clean to protect public health and the environment. The CWA allows some flexibility and differences among States in their adopted and approved water quality standards, but it was not designed to reward inaction and inability to meet statutory requirements.

Although most States have made some progress toward satisfying CWA requirements, many appear to have failed to fully comply with section 303(c)(2)(B). The CWA assigns EPA the legal responsibility to promulgate standards where necessary to meet the requirements of the Act. Where States have not satisfied the CWA requirement to adopt water quality standards for toxic pollutants, which was re-emphasized by Congress in 1987, it is imperative that EPA take action.

EPA's ability to oversee State standards-setting activities and to correct deficiencies in State water quality standards is critical to the effective implementation of section 303(c)(2)(B). This proposed rulemaking is a necessary and important component of EPA's implementation of section 303(c)(2)(B) as well as EPA's overall efforts to control toxic pollutants in surface waters.

B. Statutory and Regulatory Background

1. Pre-Water Quality Act Amendments of 1987 (Pub. L. 100-4)

Section 303(c) of the 1972 Federal Water Pollution Control Act Amendments (FWPCA) (33 U.S.C. 1313(c)) established the statutory basis for the current water quality standards program. It completed the transition from the previously established program of water quality standards for interstate waters to one requiring standards for all surface waters of the United States.

Although the major innovation of the 1972 FWPCA was technology-based controls, Congress maintained the concept of water quality standards both as a mechanism to establish goals for the Nation's waters and as a regulatory requirement when standardized technology controls for point source discharges and/or nonpoint source controls were inadequate. In recent years these so-called water quality-based controls have received new emphasis by Congress and EPA in the continuing quest to enhance and maintain water quality to protect the public health and welfare.

Briefly stated, the key elements of section 303(c) are:

(a) A water quality standard is defined as the designated beneficial uses of a water segment and the water quality criteria necessary to support those uses;

(b) The minimum beneficial uses to be considered by States in establishing water quality standards are specified as public water supplies, propagation of fish and wildlife, recreation, agricultural uses, industrial uses and navigation;

(c) A requirement that State standards must protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act;

(d) A requirement that States must review their standards at least once each three year period using a process that includes public participation;

(e) The process for EPA review of State standards which may ultimately result in the promulgation of a superseding Federal rule in cases where a State's standards are not consistent with the applicable requirements of the CWA, or in situations where the Agency determines Federal standards are necessary to meet the requirements of the Act.

Another major innovation in the 1972 FWPCA was the establishment of the

National Pollutant Discharge Elimination System (NPDES) which requires point source dischargers to obtain a permit before legally discharging to the waters of the United States. In addition to the permit limits established on the basis of technology (e.g. effluent limitations guidelines), the Act requires dischargers to meet instream water quality standards. (See section 301(b)(1)(C), 33 U.S.C. 1311(b)(1)(C)).

Thus water quality standards serve a dual function under the Clean Water Act regulatory scheme. Standards establish narrative and numeric definitions and quantification of the Act's goals and policies (see section 101, 33 U.S.C. 1251) which provide a basis for identifying impaired waters. Water quality standards also establish regulatory requirements which are translated into specific discharge requirements. In order to fulfill this critical function, adopted State criteria must contain sufficient parametric coverage to protect both human health and aquatic life.

In its initial efforts to control toxic pollutants, the FWPCA, pursuant to section 307, required EPA to designate a list of toxic pollutants and to establish toxic pollutant effluent standards based on a formal rulemaking record. Such rulemaking required formal hearings, including cross-examination of witnesses. EPA struggled with this unwieldy process and ultimately promulgated effluent standards for six toxic pollutants, pollutant families or mixtures. (See 40 CFR part 129.) Congress amended section 307 in the 1977 Clean Water Act Amendments by endorsing the Agency's alternative procedure of regulating toxic pollutants by use of effluent limitationguidelines, by amending the procedure for establishing toxic pollutant effluent standards to provide for more flexibility in the hearing process for establishing a record, and by directing the Agency to include sixty-five specific pollutants or classes of pollutants on the toxic pollutant list. EPA published the required list on January 31, 1978 (43 FR 4109). This toxic pollutant list was the basis on which EPA's efforts on criteria development for toxics was focused.

During planning efforts to develop effluent limitation guidelines and water quality criteria, the list of sixty-five toxic pollutants was judged too broad as some of the pollutants were, in fact, general families or classes of organic compounds consisting of many individual chemicals. EPA selected key chemicals of concern within the 65 families of pollutants and identified a more specific list of 129 priority toxic pollutants. Three volatile chemicals were removed from the list (see 46 FR 2266, January 8, 1981; 46 FR 10723, February 4, 1981) so that at present there are 126 priority toxic pollutants. This list is published as Appendix A to 40 CFR part 423.

Another critical section of the 1972 FWPCA was section 304(a) (33 U.S.C. 1314(a)). Section 304(a)(1) provides, in pertinent part, that EPA

> * * * shall develop and publish * * * criteria for water quality accurately reflecting the latest scientific knowledge (A) on the kind and extent of all identifiable effects on health and welfare including, but not limited to, plankton, fish, shellfish, wildlife, plant life, shorelines, beaches, esthetics, and recreation which may be expected from the presence of pollutants in any body of water, * * * and (C) on the effects of pollutants on biological community diversity, productivity, and stability, * * *

In order to avoid confusion, it must be recognized that the Clean Water Act uses the term "criteria" in two separate ways. In section 303(c), which is discussed above, the term is part of the definition of a water quality standard. That is, a water quality standard is comprised of designated uses and the criteria necessary to protect those uses. Thus, States are required to adopt regulations or statutes which contain legally achievable criteria. However, in section 304(a), the term criteria is used in a scientific sense and EPA develops recommendations which States consider in adopting regulatory criteria.

In response to this legislative mandate and an earlier similar statutory requirement, EPA and a predecessor agency have produced a series of water quality criteria documents. Early Federal efforts were Water Quality Criteria (1968 "Green Book") and Quality Criteria for Water (1976 "Red Book"). EPA also sponsored a contract effort with the National Academy of Science—National Academy of Engineering which resulted in Water Quality Criteria, 1972 (1973 "Blue Book"). These early efforts were premised on the use of literature reviews and the collective scientific judgment of Agency and advisory panels. However, when faced with the list of 65 toxic pollutants and the need to develop criteria for human health as well as aquatic life, the Agency determined that new procedures were necessary. Continued reliance solely on existing scientific literature was now inadequate, since for many pollutants essential information was not available. EPA scientists developed formal methodologies for establishing scientifically defensible criteria. These were subjected to review by the Agency's Science Advisory Board and the public. This effort culminated on November 28, 1980, when the Agency published criteria development guidelines for aquatic life and for human health, along with criteria for 64 toxic pollutants. (See 45 FR 79318.) Since that initial publication, the aquatic life methodology was slightly amended (50 FR 30784, July 29, 1985) and additional criteria were proposed for public comment and finalized as Agency criteria guidance. EPA summarized the available criteria information in Quality Criteria for Water 1986 (1986 "Gold Book") which is updated from time-to-time. However, the individual criteria documents, as updated, are the official guidance documents.

EPA's criteria documents provide a comprehensive toxicological evaluation of each chemical. For toxic pollutants, the documents tabulate the relevant acute and chronic toxicity information for aquatic life and derive the criteria maximum concentrations (acute criteria) and criteria continuous concentrations (chronic criteria) which the Agency recommends to protect aquatic life resources. For human health criteria, the document provides the appropriate reference doses, and if appropriate the carcinogenic slope factors, and derives recommended criteria. The details of this process are described more fully in a following part of this preamble.

Programmatically, EPA's initial efforts were aimed at converting a program focused on interstate waters into one addressing all interstate and intrastate surface waters of the United States. Guidance was aimed at the inclusion of traditional water quality parameters to protect aquatic life (e.g., pH, temperature, dissolved oxygen and a narrative "free from toxicity" provision), recreation (e.g., bacteriological criteria) and general aesthetics (e.g., narrative "free from nuisance" provisions). EPA also required State adoption of an antidegradation policy to maintain existing high quality or ecologically unique waters as well as maintain improvements in water quality as they occur.

The initial water quality standards regulation was actually a part of EPA's water quality management regulations implementing section 303(e) (33 U.S.C. 1313(e)) of the Act. It was not comprehensive and did not address toxics or any other criteria specifically. Rather, it simply required States to adopt appropriate water quality criteria necessary to support designated uses. (See 40 CFR 130.17 as promulgated in 40 FR 55334, November 28, 1975).

After several years of effort and faced with increasing public and Congressional concerns about toxic pollutants, EPA realized that proceeding under section 307 of the Act would not comprehensively address in a timely manner the control of toxics through either toxic pollutant effluent standards or effluent limitations guidelines because these controls are only applicable to specific types of discharges. EPA sought a broader, more generally applicable mechanism and decided to vigorously pursue the alternative approach of EPA issuance of scientific water quality criteria documents which States could use to adopt enforceable water quality standards. These in turn could be used as the basis for establishing State and EPA permit discharge limits pursuant to section 301(b)(1)(C) which requires NPDES permits to contain

* * * any more stringent limitation, including those necessary to meet water quality standards * * *, or required to implement any applicable water quality standard established pursuant to this Act.

Thus, the adoption by States of appropriate toxics criteria applicable to their surface waters, such as those recommended by EPA in its criteria documents, would be translated by regulatory agencies into point source permit limits. Through the use of water quality standards, all discharges of toxics are subject to permit limits and not just those discharged by particular industrial categories. In order to facilitate this process, the Agency amended the water quality standards regulation to explicitly address toxic criteria requirements in State standards. The culmination of this effort was the promulgation of the present water quality standards regulation on November 8, 1983 (40 CFR part 131, 48 FR 51400).

The current water quality standards regulation (40 CFR part 131) is much more comprehensive than its predecessor. The regulation addresses in detail both the beneficial use component and the criteria component of a water quality standard. Section 131.11 of the regulation requires States to review available information and,

* * * to identify specific water bodies where toxic pollutants may be adversely affecting water quality or the attainment of the designated water use or where the levels of toxic pollutants are at a level to warrant concern and must adopt criteria for such toxic pollutants applicable to the water body sufficient to protect the designated use.

The regulation provided that either or both numeric and narrative criteria may be appropriately used in water quality standards.

EPA's water quality standards emphasis since the early 1980's reflected the increasing importance placed on controlling toxic pollutants. States were strongly encouraged to adopt criteria in their standards for the priority toxic pollutants, especially where EPA had published criteria guidance under Section 304(a) of the Act.

Under the statutory scheme, during the 3-year triennial review period following EPA's 1980 publication of water quality criteria for the protection of human health and aquatic life, States should have reviewed those criteria and adopted standards for many priority toxic pollutants. In fact, State response to EPA's criteria publication and toxics initiative was disappointing. A few States adopted large numbers of numeric toxics criteria, although primarily for the protection of aquatic life. Most other States adopted few or no water quality criteria for priority toxic pollutants. Some relied on a narrative "free from toxicity" criterion, and so-called "action levels" for toxic pollutants or occasionally calculated site-specific criteria. Few States addressed the protection of human health by adopting numeric human health criteria.

In support of the November, 1983, water quality standards rulemaking, EPA issued program guidance entitled, Water Quality Standards Handbook (December 1983) simultaneously with the publication of the final rule. The foreword to that guidance noted EPA's two-fold water quality based approach to controlling toxics: chemical specific numeric criteria and biological testing in whole effluents or ambient waters to comply with narrative "no toxics in toxic amounts" standards. More detailed programmatic guidance on the application of biological testing was provided in the Technical Support Document for Water Quality Based Toxics Control (TSD) (EPA 440/4–85–032, September 1985). This document provided the needed information to convert chemical specific and biologically based criteria into water quality standards for ambient receiving waters and permit limits for discharges to those waters. The TSD focused on the use of bioassay testing of effluents (so-called whole effluent testing or WET methods) to develop effluent limitations within discharge permits. Such effluent limits were designed to implement the "free from toxicity" narrative standards in State water quality standards. The TSD also focused on water quality standards. Procedures and policy were presented for appropriate design flows for EPA's section 304(a) acute and chronic criteria. EPA revised the TSD. (Technical Support Document for Water Quality-based Toxics Control, EPA 505/2–90–001, March 1991.) A Notice of Availability was published in the **Federal Register** on April 4, 1991 (56 FR 13827). All references in this Preamble are to the revised TSD.

The Water Quality Standards Handbook and the TSD are examples of EPA's efforts and assistance that were intended to help, encourage and support the States in adopting appropriate water quality standards for the protection of their waters against the deleterious effects of toxic pollutants. In some States, more and more numeric criteria for toxics were being included as well as more aggressive use of the "free from toxics" narratives in setting protective NPDES permit limits. However, by the time of Congressional consideration and action on the CWA reauthorization, most States had adopted few, if any, water quality standards for priority toxic pollutants.

State practices of developing case-by-case effluent limits using procedures that were not standardized in State regulations made it difficult to ascertain whether such procedures were consistently applied. The use of approaches to control toxicity that did not rely on the statewide adoption of numeric criteria for the priority toxic pollutants generated frustration in Congress. Senator Robert Stafford, first chairman and then ranking minority member of the authorizing committee, noted during the Senate debate:

An important problem in this regard is that few States have numeric ambient criteria for toxic pollutants. The lack of ambient criteria (for toxic pollutants) make it impossible to calculate additional discharge limitations for toxics * * * It is vitally important that the water quality standards program operate in such a way that it supports the objectives of the Clean Water Act to restore and maintain the integrity of the Nation's Waters. (bracketed material added). A Legislative History of the Water Quality Act of 1987 (Pub. L. 100–4), Senate Print 100–144, USGPO, November 1988 at page 1324.

Other comments in the legislative history similarly note the Congressional perception that the States were failing to aggressively address toxics and that EPA was not using its oversight role to push the States to move more quickly and comprehensively. Thus Congress developed the water quality standards amendments to the Clean Water Act for reasons similar to those strongly stated during the Senate debate by a chief sponsor, Senator John Chaffee, A cornerstone of the bill's new toxic pollution control requirements is the so called beyond-BAT program. * * * Adopting the beyond BAT provisions will assure that EPA continues to move forward rapidly on the program. * * * If we are going to repair the damage to those water bodies that have become highly degraded as a result of toxic substances, we are going to have to move forward expeditiously on this beyond-BAT program. The Nation cannot tolerate endless delays and negotiations between EPA and States on this program. Both entities must move aggressively in taking the necessary steps to make this program work within the time frame established by this Bill * * * Ibid, at page 1309.

This Congressional impatience with the pace of State and EPA progress and an appreciation that the lack of State standards for toxics undermined the effectiveness of the entire CWA-based scheme, resulted in the 1987 adoption of stringent new water quality standard provisions in the Water Quality Act amendments.

2. The Water Quality Act Amendments of 1987 (Pub. L. 100-4)

a. Description of the New Requirements

The 1987 Amendments to the Clean Water Act added section 303(c)(2)(B) which provides:

Whenever a State reviews water quality standards pursuant to paragraph (1) of this subsection, or revises or adopts new standards pursuant to this paragraph, such State shall adopt criteria for all toxic pollutants listed pursuant to section 307(a)(1) of this Act for which criteria have been published under section 304(a), the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses. Such criteria shall be specific numerical criteria for such toxic pollutants. Where such numerical criteria are not available, whenever a State reviews water quality standards pursuant to paragraph (1), or revises or adopts new standards pursuant to this paragraph, such State shall adopt criteria based on biological monitoring or assessment methods consistent with information published pursuant to section 304(a)(8). Nothing in this section shall be construed to limit or delay the use of effluent limitations or other permit conditions based on or involving biological monitoring or assessment methods or previously adopted numerical criteria.

b. EPA's Initial Implementing Actions for Sections 303(c) and 304(l)

This new requirement to the existing water quality standards review and revision process of section 303(c) did not change the existing procedural or timing provisions. For example, section 303(c)(1) still requires that States review their water quality standards at least once each 3 year period and transmit the results to EPA for review. EPA's oversight and promulgation authorities and statutory schedules in section 303(c)(4) were likewise unchanged. Rather, the provision required the States to place heavy emphasis on adopting numeric chemical-specific criteria for toxic pollutants (i.e., rather than just narrative approaches) during the next triennial review cycle. As discussed in the previous section, Congress was frustrated that States were not using the numerous section 304(a) criteria that EPA had developed, and was continuing to develop, to assist States in controlling the discharge of priority toxic pollutants. Congress therefore took an usual action; for the first time in the history of the Clean Water Act, it explicitly mandated that States adopt numeric criteria for specific toxic pollutants.

In response to this new Congressional mandate, EPA redoubled its efforts to promote and assist State adoption of water quality standards for priority toxic pollutants. EPA's efforts included the development and issuance of guidance to the States on acceptable implementation procedures for several new sections of the Act, including Sections 303(c)(2)(B) and 304(l).

The 1987 CWA Amendments added to, or amended, other CWA sections related to toxics control. Section 304(l) (33 U.S.C. 1314(l)) was an important corollary amendment because it required States to take actions to identify waters adversely affected by toxic pollutants, particularly those waters entirely or substantially impaired by point sources. Section 304(l) entitled "Individual Control Strategies for Toxic Pollutants," requires in part, that States identify and list waterbodies where the designated uses specified in the applicable water quality standards cannot reasonably be expected to be achieved because of point source discharge of toxic pollutants. For each segment so identified, the State is required to develop individual control strategies to reduce the discharge of toxics from point sources so that in conjunction with existing controls on point and nonpoint sources, water quality standards will be attained. To assist the States in identifying waters under section 304(l), EPA's guidance listed a number of potential sources of available data for States to review. States generally assembled data for a broad spectrum of pollutants, including the priority toxic pollutants, which could be useful in complying with sections 304(l) and 303(c)(2)(B). In fact, between February 1988 and October 1988, EPA assembled pollutant candidate lists for section 304(l) which were then transmitted to each jurisdiction. Thus, each State had a preliminary list of pollutants that had been identified as present in, or discharged to, surface waters. Such lists were limited by the quantity and distribution of available effluent and ambient monitoring data for priority toxic pollutants. This listing exercise further emphasized the need for water quality standards for toxic pollutants. Lack of standards increased the difficulty of identifying impaired waters. On the positive side, the data gathered in support of the 304(l) activity proved helpful in identifying those pollutants most obviously in need of water quality standards.

EPA, in devising guidance for section 303(c)(2)(B), attempted to provide the maximum flexibility in its options that not only complied with the express statutory language but also with the ultimate congressional objective: Prompt adoption of numeric toxics criteria. EPA believed that flexibility was important so that each State could comply with section 303(c)(2)(B), accommodate its existing water quality standards regulatory approach, and not violate the resource constraints specific to the State. These options are described in the next Section of this preamble. EPA's program guidance was issued in final form on December 12, 1988 but was not substantially different from earlier drafts available for review by the States. The availability of the guidance was published in a **Federal Register** notice on January 5, 1989 (54 FR 346).

3. EPA's Program Guidance for Section 303(c)(2)(B)

EPA's section 303(c)(2)(B) program guidance identified three options that could be used by a State to meet the requirement that the State adopt toxic pollutant criteria "* * * the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses."

Option 1. Adopt statewide numeric criteria in State Water Quality Standards for all section 307(a) toxic pollutants for which EPA has developed criteria guidance, regardless of whether the pollutants are known to be present.

This option is the most comprehensive approach to satisfy the statutory requirements because it would include all of the priority toxic pollutants for which EPA has prepared section 304(a) criteria guidance for either or both aquatic life protection and human health protection. In addition to a simple adoption of EPA's section 304(a) guidance as standards, a State must select a risk level for those toxic pollutants which EPA believes are carcinogens (i.e., that cause, or may cause cancer in humans). EPA also recommended that States should supplement this comprehensive approach with a water quality standard variance and/or a site-specific criteria methodology to provide the opportunity for flexibility in applying criteria.

Many States found this option attractive because it ensured comprehensive coverage of the priority toxic pollutants with scientifically defensible criteria without the need to conduct a resource-intensive evaluation of the particular segments and pollutants requiring criteria or future prevalence of priority toxic pollutants in their waters. It was also determined this option would not be more costly to dischargers than the other options because permit limits would only be based on the regulation of the particular toxic pollutants in their discharges and not on the total listing in the water quality standards. Thus, actual permit limits should be the same under any of the options.

Option 2. Adopt chemical-specific numeric criteria for priority toxic pollutants that are the subject of EPA section 304(a) criteria guidance, where the State determines based on available information that the pollutants are present or discharged and can reasonably be expected to interfere with designated uses.

This option results in the adoption of numeric water quality standards for some subset of those pollutants for which EPA has issued section 304(a) criteria guidance based on a review of current information. To satisfy this option, the guidance recommended that States use the data gathered during the section 304(l) water quality assessments as a starting point to identify those water segments that need water quality standards for priority toxic pollutants. That data would be supplemented by a State and public review of other data sources to ensure sufficient breadth of coverage to meet the statutory objective. Among the available data to be reviewed were: (1) Ambient water monitoring data, including those for the water column, sediment, and aquatic life (e.g., fish tissue data); (2) NPDES permit-applications and permittee self-monitoring reports; (3) effluent guideline development documents, many of which contain priority toxic pollutant scans; (4) pesticide and herbicide application information and other records of pesticide or herbicide inventories; (5) public water supply source monitoring data noting pollutants with maximum contaminant levels (MCLs); and (6) any other relevant information on toxic pollutants collected by Federal, State, industry, agencies, academic groups, or scientific organizations. EPA also recommended that States adopt a translator provision similar to that described in Option 3 but applicable to all chemicals causing toxicity, and not just priority toxic pollutants.

This Option 2 review resulted in a State proposing new or revised water quality standards and providing an opportunity for public review and comment on the pollutants, criteria, and water bodies included. Throughout this process, EPA's Regional Offices were available to assist States by providing additional guidance and technical assistance on applying EPA's recommended criteria to particular situations in the States.

Option 3. Adopt a procedure to be applied to a narrative water quality standard provision prohibiting toxicity in receiving waters. Such procedures would be used by the State in calculating derived numeric criteria which must be used for all purposes under section 303(c) of the CWA. At a minimum, such criteria need to be developed for section 307(a) toxic pollutants, as necessary to support designated uses, where these pollutants are discharged or present in the affected waters and could reasonably be expected to interfere with designated uses.

The combination of a narrative standard (e.g., "free from toxics in toxic amounts") and an approved translator mechanism as part of a State's water quality standards satisfies the requirements of section 303(c)(2)(B). As noted above, such a procedure is also a valuable supplement to either option 1 or 2. There are several regulatory and scientific requirements EPA's guidance specifies are essential to ensure acceptable scientific quality and full involvement of the public and EPA in this approach. Briefly stated these are:

- The procedure (i.e., narrative criterion and translator) must be used to calculate numeric water quality criteria;
- The State must demonstrate to EPA that the procedure results in numeric criteria that are sufficiently protective to meet the goals of the Act;
- The State must provide for full opportunity for public participation during the adoption of the procedure;
- The procedure must be formally adopted as a State rule and be mandatory in application; and
- The procedure must be submitted for review and approval by EPA as part of the State's water quality standards regulation.

Several States currently apply translators that have been approved by EPA. The scientific elements of a translator are similar to EPA's 304(a) criteria methodologies when applied on a site-specific basis. For example, aquatic criteria are developed using a sufficient number and diversity of aquatic species representative of the biological assemblage of a particular water body. Human health criteria focus on determining appropriate exposure conditions (e.g. amount of aquatic life consumed per person per day) rather than underlying pollutant toxicity. The results of the procedures are scientifically defensible criteria that are protective for the site's particular conditions. EPA review of translator procedures includes an evaluation of the scientific merit of the procedure using the Section 304(a) methodolgy as a guide.

Ideally, States adopting option 3 translator procedures should prepare a preliminary list of criteria and specify the waters the criteria apply to at the time of adoption. Although under option 3 the State retains flexibility to derive new criteria without revising the adopted standards, establishing this preliminary list of derived criteria at the time of the triennial review will assist the public in determining the scope of the adopted standards, and help ensure that the State ultimately complies with the requirement to establish criteria for all pollutants that can "reasonably be expected" to interfere with uses. EPA believes that States selecting solely option 3 should prepare an analysis similar to that required of option 2 States at the time of the triennial review.

EPA's December 1988 guidance also addressed the timing issue for State compliance with section 303(c)(2)(B). The statutory directive was clear: All State standards triennial reviews initiated after passage of the Act must include a consideration of numeric toxic criteria.

The structure of section 303(c) is to require States to review their water quality standards at least once each three year period. Section 303(c)(2)(B) instructs States to include reviews for toxics criteria whenever they initiate a triennial review. EPA initially looked at February 4, 1990, the 3-year anniversary of the 1987 CWA amendments, as a convenient point to index State compliance. The April 1990 **Federal Register** notice used this index point for the preliminary assessment. However, some States were very nearly completing their State administrative processes for ongoing reviews when the 1987 amendments were enacted and could not legally amend those proceedings to address additional toxics criteria. Therefore, in the interest of fairness, and to provide such States a full 3-year review period, EPA's FY 1990 Agency Operating Guidance provided that "By the end of the FY 88–90 triennium, States should have completed adoption of numeric criteria to meet the section 303(c)(2)(B) requirements." (p. 48.) The FY 88–90 triennium ended on September 30, 1990.

Clean Water Act section 303(c) does not provide penalties for States that do not complete timely water quality standards reviews. In no previous case has the EPA Administrator found that State failure to complete a review within three years jeopardized the public health or welfare to such an extent that promulgation of Federal standards pursuant to section 303(c)(4)(B) was justified. The pre-1987 CWA never mandated State adoption of priority toxic pollutants or other specific criteria. EPA relied on its water quality standards regulation (40 CFR 131.11) and its criteria and program guidance to the States on appropriate parametric coverage in State water quality standards, including toxic pollutants. However, because of Congressional concern exhibited in the legislative history for the 1987 Clean Water Act amendments regarding undue delays by States and EPA, and because States have been explicitly required to adopt numeric criteria for appropriate priority toxic pollutants since 1963, the Agency in this proposed rulemaking is proceeding pursuant to section 303(c)(4)(B) and 40 CFR 131.22(b).

4. Revisions to the Water Quality Standards Regulation to Incorporate the Requirements of Section 303(c)(2)(B)

In a rulemaking separate from today's proposal, EPA intends to propose amendments to the Water Quality Standards Regulation to incorporate the requirements of section 303(c)(2)(B). EPA views the effects of that intended rulemaking to be prospective only. EPA's expected regulatory change would provide principally more consistency among the States in their approaches to adopting appropriate toxic and other criteria in future triennial reviews.

The current requirements for water quality criteria in State water quality standards are addressed in 40 CFR 131.11. EPA's intended rulemaking will propose amendments to this section and incorporate the three options described in its December 12, 1988 guidance. Of special concern are the specific requirements for the translator provision described as option 3.

The current regulation at 40 CFR part 131 in conjunction with the statutory language provides a clear and unambiguous basis and process for today's proposed Federal promulgation.

C. State Actions Pursuant to Section 303(c)(2)(B)

There has been substantial progress by many States in the adoption, and EPA approval, of water quality standards for toxic pollutants. For example, for freshwater aquatic life uses, the average number of priority toxic pollutants with criteria adopted has tripled from ten per State in 1986 to thirty per State on February 4, 1990. In addition, the number of States with at least some aquatic life criteria adopted has increased from thirty-three in April 1986 to forty-five as of February 4, 1990.

Furthermore, virtually all States have at least proposed new toxics criteria for priority toxic pollutants since section 303(c)(2)(B) was added to the CWA in February of 1987. Unfortunately, not all such State proposals address, in a comprehensive manner, the requirements of section 303(c)(2)(B). For example, some States have proposed to adopt criteria to protect aquatic life, but not human health; other States have proposed human health criteria which do not address major human exposure pathways. In addition, in some cases final adoption of proposed State toxics criteria which would be approvable by EPA has been substantially delayed due to controversial and difficult issues associated with the toxics criteria adoption process. For purposes of today's proposed rulemaking, it is EPA's judgment that only 35 States completed actions which fully satisfy the requirements of section 303(c)(2)(B).

The difficulties faced by States in adopting criteria for priority toxic pollutants are exemplified by recent State efforts to adopt criteria for the priority toxic pollutant 2,3,7,8-TCDD (dioxin). As is generally true of State section 303(c)(2)(B) efforts, State efforts to adopt numeric human health dioxin criteria have been slow and controversial, but in many respects impressive. For example, since 1987, a total of 34 States have adopted numeric human health criteria for dioxin which have been approved by EPA. In total, 38 States have adopted numeric human health criteria for dioxin. Twenty-five of these 38 States adopted criteria during calendar year 1991, showing that the pace of State actions to adopt dioxin criteria has accelerated substantially.

The progress which has been made by States in adopting dioxin criteria is particularly impressive in light of the substantial attention and controversy which has been focused on such actions. EPA, States, dischargers, environmental groups, and the public at large have been involved in discussions concerning the ambient level of protection that is protective of public health. In some States, the struggle to select an appropriate dioxin criterion has been the major impediment to successful completion of section 303(c)(2)(B) actions.

At issue are scientific questions specific to dioxin, such as determining the carcinogenic potency of the pollutant and the extent to which the pollutant tends to accumulate in fish tissues. Other issues are generic to EPA'S human health criteria, such as determining the rate at which humans consume fish and other forms of aquatic life, and the necessity of setting ambient criteria at levels which may not be detected by state-of-the-art laboratories. Most of these issues relate, directly or indirectly, to concerns expressed by dischargers regarding the cost of complying with water quality-based effluent limits for dioxin which, although variable from State to State, generally are based on State numeric water quality criteria that allow only minute quantities of dioxin per liter of water. For example, twelve States have adopted EPA's recommended ambient water column concentration of 0.013 picograms per liter.

Currently, a total of eleven States have proposed, or are expected to propose, numeric human health-based criteria for dioxin. These States could face the same issues, obstacles, and resource requirements that the 38 States which previously adopted criteria have faced.

In summary, States have devoted substantial resources, and have made substantial progress, in adopting new or revised numeric criteria for priority pollutants. In so doing they have addressed a number of significant and difficult issues. These issues and the attendant controversy has accounted, at least in part, for the fact that 22 jurisdictions still have not adopted numeric toxics criteria that fully comply with section 303(c)(2)(B). For a more detailed State-specific outline of actions taken in response to section 303(c)(2)(B), refer to part III of appendix 1, which itemizes State actions to adopt toxics criteria for States approved by EPA as being in full compliance as well as States which EPA has not approved as being in full compliance with section 303(c)(2)(B).

D. Determining State Compliance With Section 303(c)(2)(B)

1. EPA's Review of State Water Quality Standards for Toxics

The EPA Administrator has delegated the responsibility and authority for review and approval or disapproval of all State water quality standards actions to the 10 EPA Regional Administrators (see 40 CFR 131.21). State section 303(c)(2)(B) actions are thus submitted to the appropriate EPA Regional Administrator for review and approval. This de-centralized EPA system for State water quality standards review and approval is guided by EPA Headquarter's Office of Water, which issues national policies and guidance to the States and Regions such as the annual Office of Water Operating Guidance and various technical operating guidance manuals.

For purposes of evaluating State compliance with CWA section 303(c)(2)(B), EPA relied on the language of section 303(c)(2)(B), the existing water quality standards regulation, and section 303(c)(2)(B) national guidance to provide the basis for EPA review. In some cases, individual Regions also used Regional policies and procedures in reviewing State section 303(c)(2)(B) actions. The flexibility provided by the national guidance, coupled with subtle differences in Regional policies and procedures, contributed to some differences in the approaches taken by States to satisfy section 303(c)(2)(B) requirements.

As discussed previously, EPA's final guidance on compliance with section 303(c)(2)(B) was developed to provide States with the necessary flexibility to allow State standards revisions that would complement the State's existing water quality standards program, fully comply with section 303(c)(2)(B), and not violate State-specific resource constraints. As guidance, it did not contain clearly defined limits on the range of acceptable approaches, but rather described EPA's recommendations on approaches States could use to satisfy the statutory requirements. Some innovative State approaches were expected as well as differences in terms of criteria coverage, stringency and application procedures.

Although the guidance provided for State flexibility, it was also consistent with existing water quality standards regulation requirements at 40 CFR 131.11 that explicitly require State criteria to be sufficient to protect designated uses. Such water quality criteria also must be based on sound scientific rationale and support the most sensitive use designated for a water body.

The most complicated EPA compliance determinations involve States that select EPA Options 2 or 3. Since most States use EPA's Section 304(a) criteria guidance, where States select Option 1, EPA normally is able to focus Agency efforts on verifying that all available EPA criteria are included, appropriate cancer risk levels are selected, and that sufficient application procedures are in place (e.g. laboratory analytical methods, mixing zones, flow condition, etc.).

However, for States using EPA's Option 2 or 3, substantially more EPA evaluation and judgment is required because the Agency must evaluate which priority pollutants and, in some cases, segments or designated uses, require numeric criteria. Under these options, the State must adopt or derive numeric criteria for priority toxic pollutants for which EPA has section 304(a) criteria, "* * * the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State * * *" The necessary justification and the ultimate coverage and acceptability of a State's actions vary State-to-State because of differences in the adequacy of available monitoring information, local water bodies use designations, the effluent and nonpoint source controls in place, and different approaches to the scientific basis for criteria.

In submitting criteria for the protection of human health, States are not limited to a 1 in 1 million risk level (10^{-6}). EPA generally regulates pollutants treated as carcinogens in the range of 10^{-6} to 10^{-4} for average exposed individuals. If a State selects a criterion that represents an upper bound risk level less protective than 1 in 100,000 (i.e., 10^{-5}), however, the State will need to have substantial support in the record for this level. This support should focus on two distinct issues. First, the record must include documentation that the decision maker considered the public interest of the State in selecting the risk level, including documentation of public participation in the decision making process as required by the water quality standards regulation at 40 CFR 131.20(b). Second, the record must include an analysis showing that the risk level selected, when combined with other risk assessment variables, is a balanced and reasonable estimate of actual risk posed, based on the best and most representative information available. The importance of the estimated actual risk increases as the degree of conservatism in the selected risk level diminishes. EPA will carefully evaluate all assumptions used by a State if the State chooses to alter any one of the standard EPA assumption values.

Where States select Option 3, EPA reviews must also include an evaluation of the scientific defensibility of the translator procedure. EPA must also verify that a requirement to apply the translator whenever toxics may reasonably be expected to interfere with designated uses (e.g., where such toxics exist or are discharged) is included in the State's water quality standards. Satisfactory application procedures must also be developed by States selecting Option 3.

In general, each EPA Region made compliance decisions based on whatever information was available to the State at the time of the triennial review. For some States, information on the presence and discharge of priority toxic pollutants is extremely limited. Nevertheless, during the period of February 1988 to October 1990, to supplement State efforts, EPA assembled the available information and provided each State with various pollutant candidate lists in support of the section 304(l) and section 303(c)(2)(B) activities. These were based in part on computerized searches of existing Agency data bases.

Beginning in 1988, EPA provided States with candidate lists of priority toxic pollutants and water bodies in support of CWA section 304(l) implementation. These lists were developed because States were required to evaluate existing and readily available water-related data in order to comply with section 304(l). 40 CFR 130.10(d). A similar "strawman" analysis of priority pollutants potentially requiring adoption of numeric criteria under section 303(c)(2)(B) was furnished to most States in September or October of 1990 for their use in on-going and subsequent triennial reviews. The primary differences between the "strawman" analysis and the section 304(l) candidate lists were that the "strawman" analysis: (1) Organized the results by chemical rather than by water body, (2) included data for certain STORET monitoring stations that were not used in constructing the candidate lists, (3) included data from the Toxics Release Inventory database, and (4) did not include a number of data sources used in preparing the candidate lists (e.g., those, such as fish kill information, that did not provide chemical specific information).

In its 1988 section 303(c)(2)(B) guidance, EPA urged States, at a minimum, to use the information gathered in support of section 304(l) requirements as a starting point for identifying which priority toxic pollutants require adoption of numeric criteria. EPA also encouraged States to consider the presence or potential construction of facilities that manufacture or use priority toxic pollutants as a strong indication of the need for toxics criteria. Similarly, EPA indicated to States that the presence of priority pollutants in ambient waters (including those in sediments or in aquatic life tissue) or in discharges from point or nonpoint sources also be considered as an indication that toxics criteria should be adopted. A limited amount of data on the effluent characteristics of NPDES discharges was readily available to States. States were also expected to take into account newer information as it became available, such as information in annual reports from the Toxic Chemical Release Inventory requirements of the Emergency Planning and Community Right-To-Know Act of 1986. (Title III, Pub. L. 99-499.)

In summary, EPA and the States had access to a variety of information gathered in support of section 304(l), section 303(c)(2)(B), and section 305(b) activities. For some States, as noted above, such information for priority toxic pollutants is extremely limited. In the final analysis, the Regional Administrator made a judgment on a duly submitted State standards triennial review based on the State's record and the Region's independent knowledge of the facts and circumstances surrounding the State's actions. These actions, taken in consultation with the Office of Water, determined which State actions were sufficiently consistent with the coverage contemplated in the statute to justify approval. These approval actions include allowable variations among State water quality standards. EPA approval indicates that, based on the record, the State water quality standards met the requirements of the Act.

2. Determining Current Compliance Status

The following summarizes the process generally followed by the Agency in assessing compliance with section 303(c)(2)(B). As with other aspects of this rule, EPA invites comments on the compliance determination process.

A State was determined to be in full compliance with the requirements of section 303(c)(2)(B) if,

a. The State had submitted a water quality standards package for EPA review since enactment of the 1987 Clean Water Act amendments or was determined to be already in compliance, and,

b. The adopted State water quality standards are effective under State law and consistent with the CWA and EPA's implementing regulations (EPA's December 1988 guidance described three Options, any one, or a combination of which EPA suggested States could adopt for compliance with the CWA and EPA regulations), and

c. EPA has issued a formal approval determination to the State.

States meeting these criteria are not included in this proposed rulemaking.

States which adopted standards following Option 1 generally have been found to satisfy section 303(c)(2)(B). An exception exists for selected States which attempted to follow Option 1 by adopting all EPA section 304(a) criteria by reference. EPA has withheld approval for a few States which have adopted such references into their standards because the adopted standards did not specify application factors necessary to implement the criteria (e.g., a risk level for carcinogens). Other States have achieved full compliance following options 1, 2, 3, or some combination of these options.

As of the date of signature of today's proposal, the Agency has determined that 35 States and Territories are in full compliance with the requirements of section 303(c)(2)(B). Compliance status for all States and Territories is set forth in Table 1.

TABLE 1.—PRELIMINARY ASSESSMENT OF STATE COMPLIANCE WITH CWA SECTION 303(C)(2)(B)

State	Is State in compliance with section 303(c)(2)(B)?
Alabama	Yes.
Alaska	No.
Arizona	No.
Arkansas	No.
California	No.
Colorado	No.
Connecticut	No.
Delaware	Yes.
Florida	No.
Georgia	Yes.
Hawaii	No.
Idaho	No.
Illinois	Yes.
Indiana	Yes.
Iowa	Yes.
Kansas	No.
Kentucky	Yes.
Louisiana	No.
Maine	Yes.
Maryland	Yes.
Massachusetts	Yes.
Michigan	No.
Minnesota	Yes.
Mississippi	Yes.
Missouri	Yes.
Montana	Yes.
Nebraska	Yes.
Nevada	No.
New Hampshire	No.
New Jersey	No.
New Mexico	Yes.
New York	Yes.
North Carolina	Yes.
North Dakota	Yes.
Ohio	Yes.
Oklahoma	Yes.
Oregon	Yes.
Pennsylvania	Yes.
Rhode Island	No.
South Carolina	Yes.
South Dakota	Yes.
Tennessee	Yes.
Texas	Yes.
Utah	Yes.
Vermont	No.
Virginia	No.
Washington	No.
West Virginia	Yes.
Wisconsin	Yes.
Wyoming	Yes.
American Samoa	Yes.
Commonwealth of the Northern Marianas Islands.	No.
District of Columbia	No.
Guam	Yes.
Puerto Rico	No.
Tr. Territories	Yes.
Virgin Islands	Yes.

Section III of appendix 1 provides a State-by-State summary of how compliance was achieved for the EPA-approved States, and what has been, and yet needs to be, accomplished in States included in this proposed rule.

E. Rationale and Approach for Developing Today's Proposed Rulemaking

The addition of section 303(c)(2)(B) to the Clean Water Act was an unequivocal signal to the States that Congress wanted toxics criteria in the State's water quality standards. The legislative history notes that the "beyond BAT" program (i.e., controls necessary to comply with water quality standards that are more stringent than technology-based controls) was the cornerstone to the Act's toxic pollution control requirements.

The major innovation of the 1972 Clean Water Act Amendments was the concept of effluent limitation guidelines

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which were to be incorporated into NPDES permits. In many cases, this strategy has succeeded in halting the decline in the quality of the Nation's waters and, often, has provided improvements. However, the effluent limitation guidelines for industrial discharges and the similar technology-based secondary treatment requirements for municipal discharges are not capable, by themselves, of ensuring that the fishable-swimmable goals of the Clean Water Act will be met.

The basic mechanism to accomplish this in the Act is water quality standards. States are required to periodically review and revise these standards to achieve the goals of the Act. In the 1987 CWA amendments, Congress focused on addressing toxics in several sections of the Act, but special attention was placed on the section 303 water quality standards program requirements. Congress intended that the adoption of numeric criteria for toxics would result in direct improvements in water quality by forcing, where necessary, effluent limits more stringent than those resulting from technology-based effluent limitations guidelines.

As the legislative history demonstrates, Congress was dissatisfied with the piecemeal, slow progress being made by States in setting standards for toxics. Congress reacted by legislating new requirements and deadlines directing the States to establish toxics criteria for pollutants addressed in EPA Section 304(a) criteria guidance, especially for those priority toxic pollutants that could reasonably be expected to interfere with designated uses. In today's action, EPA is exercising its authority under section 303(c)(4) to propose criteria where States have failed to act in a timely manner.

For those States not in compliance with section 303(c)(2)(B) four and one-half years after enactment, EPA now begins the process that will culminate in the promulgation of appropriate toxics criteria and the determination of the necessary parametric coverage and stringency of such criteria. While the previous section of this preamble explains EPA's approach to evaluating the adequacy of State actions in response to section 303(c)(2)(B), this section explains EPA's legal basis for issuing today's proposed rulemaking, discusses EPA's general approach for developing the proposed State-specific requirements in § 131.36(d).

In addition to the Congressional directive and the legal basis for this proposed action, there are a number of environmental and programmatic reasons why further delay in establishing water quality standards for toxic pollutants is no longer acceptable.

Prompt control of toxic pollutants in surface waters is critical to the success of a number of Clean Water Act programs and objectives, including permitting, enforcement, fish tissue quality protection, coastal water quality improvement, sediment contamination control, certain nonpoint source controls, pollution prevention planning, and ecological protection. The decade-long delay in State adoption of water quality standards for toxic pollutants has had a ripple effect throughout EPA's water programs. Without clearly established water quality goals, the effectiveness of many water programs is jeopardized.

Failure to take prompt action at this juncture would also undermine the continued viability of the current statutory scheme to establish standards. Continued delay subverts the entire concept of the triennial review cycle which is to combine current scientific information with the results of previous environmental control programs to direct continuing progress in enhancing water quality.

Finally, another reason to proceed expeditiously is to bring closure to this long-term effort and allow State attention and resources to be directed towards important, new national program initiatives. Until standards for toxic pollutants are in place, neither EPA nor the States can fully focus on the emerging, ecologically based water quality activities such as wetlands criteria, biological criteria and sediment criteria.

1. Legal Basis

Clean Water Act section 303(c) specifies that adoption of water quality standards is primarily the responsibility of the States. However, section 303(c) also describes a role for EPA of overseeing State actions to ensure compliance with CWA requirements. If the Agency's review of the State's standards finds flaws or omissions, then the Act authorizes EPA to initiate promulgation to correct the deficiencies (see section 303(c)(4)). The water quality standards promulgation authority has been used by EPA to issue final rules on nine separate occasions. These actions have addressed both insufficiently protective State criteria and/or designated uses and failure to adopt needed criteria. Thus, today's action is not unique, although it would affect more States and pollutants than previous actions taken by the Agency.

The Clean Water Act in section 303(c)(4) provides two bases for promulgation of Federal water quality standards. The first basis in paragraph (A) applies when a State submits new or revised standards that EPA determines are not consistent with the applicable requirements of the Act. If, after EPA's disapproval, the State does not promptly amend its rules so as to be consistent with the Act, EPA must promulgate appropriate Federal water quality standards for that State. The second basis for EPA's action is paragraph (B), which provides that EPA shall promptly initiate promulgation "* * * in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of this Act." EPA is relying on both section 303(c)(4)(A) and section 303(c)(4)(B) as the legal basis for this proposed rulemaking.

Section 303(c)(4)(A) supports today's action for several States. These States have submitted criteria for some number of priority toxic pollutants and EPA has disapproved the State's adopted standards. The basis for EPA's disapproval generally has been the lack of sufficient criteria or particular criteria that were insufficiently stringent. In these cases, EPA has, by letter to the State, noted the deficiencies and specified the need for corrective action. (See section III of appendix 1 for a summary description of each State's section 303(c)(2)(B) history.) Not having received an appropriate correction within the statutory time frame, EPA is today proposing the needed criteria. The action in today's proposal pursuant to section 303(c)(4)(A) may differ from those taken pursuant to section 303(c)(4)(B) by being limited to criteria for specific priority toxic pollutants, particular geographic areas, or particular designated uses.

Section 303(c)(4)(B) is the basis for EPA's proposed requirements for most States. For these States, the Administrator proposes criteria that would bring the States into compliance with the requirements of the CWA. In these cases, EPA is proposing, at a minimum, criteria for all priority toxic pollutants not addressed by approved State criteria. EPA is also proposing criteria for priority toxic pollutants where any previously-approved State criteria do not reflect current science contained in revised criteria documents and other guidance sufficient to fully protect all designated uses or human exposure pathways, or where such previously-approved State criteria are not applicable to all appropriate designated uses. EPA's action pursuant to section 304(c)(4)(B) may include several situations.

In some cases, the State has failed to adopt and submit for approval any criteria for those priority toxic pollutants for which EPA has published criteria. This includes those States that have not submitted triennial reviews. In other cases, the State has adopted and EPA has approved criteria for either aquatic life or human health, but not both. In yet a third siuation, States have submitted some criteria but not all necessary criteria. Lastly, one State has submitted criteria that do not apply to all appropriate geographic sections of the waters of the State. (See section III of appendix 1.)

The use of section 303(c)(4)(B) requires a determination by the Administrator "* * * that a revised or new standard is necessary to meet the requirements of * * *" the Act. The Administrator's determination could be supported in different ways.

One approach would be for EPA to undertake a time-consuming effort to research and marshall data to demonstrate the need for promulgation for each criteria for each stream segment or waterbody in each State. This would include evidence for each section 307(a) priority toxic pollutant for which EPA has section 304(a) criteria and that there is a "discharge or presence" which could reasonably "be expected to interfere with" the designated use. This approach would not only impose an enormous administrative burden, but would be contrary to the statutory scheme and the compelling Congressional directive for swift action reflected in the 1987 addition of section 303(c)(2)(B) to the Act.

An approach that is more reasonable and consistent with Congressional intent focuses on the State's failure to complete the timely review and adoption of the necessary standards required by section 303(c)(2)(B) despite information that priority toxic pollutants may interfere with designated uses of the State's waters. This approach is consistent with the fact that in enacting section 303(c)(2)(B) Congress expressed its determination of the necessity for prompt adoption and implementation of water quality standards for toxic pollutants. Therefore, a State's failure to meet this fundamental 303(c)(2)(B) requirement of adopting appropriate standards constitutes a failure "to meet the requirements of the Act." That failure to act can be a basis for the Administrator's determination under section 303(c)(4)(B) that new or revised criteria are necessary to ensure designated uses are adequately protected. Here, this determination is buttressed by the existence of evidence of the discharge or presence of priority toxic pollutants in a State's waters for which the State has not adopted numeric water quality criteria. The Agency has compiled an impressive volume of information in the record for this rulemaking (See appendix 1) on the discharge or presence of toxic pollutants in State waters. This data supports the Administrators's proposed determination pursuant to section 303(c)(4)(B).

The Agency's choice to base the proposed determination on the second approach is supported by both the elicit language of the statutory provision and by the legislative history. Congress added subsection 303(c)(2)(B) to section 303 with full knowledge of the existing requirements in section 303(c)(1) for triennial water quality standards review and submission to EPA and in section 303(c)(4)(B) for EPA promulgation. There was a clear expectation that these provisions be used in concert to overcome the programmatic delay that many legislators criticized and achieve the Congressional objective of the rapid availability of enforceable water quality standards for toxic pollutants. As quoted earlier, chief Senate sponsors, including Senators Stafford, Chafee and others, wanted the provision to eliminate State and EPA delays and force aggressive action.

In normal circumstances, it might be argued that to exercise section 303(c)(4)(B) the Administrator might have the burden of marshalling conclusive evidence of "necessity" for Federally promulgated water quality standards. However, in adopting section 303(c)(2)(B), Congress made clear that the "normal" procedure had become inadequate. The specificity and deadline in section 303(c)(2)(B) were layered on top of a statutory scheme already designed to achieve the adoption of toxic water quality standards. Congressional action to adopt an essentially redundant provision was driven by their impatience with the lack of State progress. The new provision was essentially a Congressional "determination" of the necessity for new or revised comprehensive toxic water quality standards by States. In deference to the principle of State primacy, Congress, by linking section 303(c)(2)(B) to the section 303(c)(1) three-year review period, gave States a last chance to correct this deficiency on their own. However, this Congressional indulgence does not alter the fact that section 303(c)(2)(B) changed the nature of the CWA State/EPA water quality standard relationship. The new provision and its legislative background indicate that the Administrator's determination to invoke his section 303(c)(4)(B) authority in this circumstance can be met by a generic finding of inaction on the part of a State and without the need to develop data for individual stream segments. Otherwise, the Agency would face the heavy data gathering burden of justifying the need for each Federal criterion, the process could stretch for years and never be realized. To interpret the combination of subsections (c)(2)(B) and (c)(4) as an effective bar to prompt achievement of statutory objectives would be a perverse conclusion and render section 303(c)(2)(B) essentially meaningless.

A second strong argument against requiring EPA to shoulder a heavy burden to exercise section 303(c)(4)(B) authority is that it would invert the traditional statutory scheme of EPA as national overseer and States as the entity with the greatest local expertise. The CWA provides States the flexibility to tailor water quality standards to local conditions and needs based upon their wealth of first-hand experience, knowledge and data. However, this allowance for flexibility is based on an assumption of reasoned and timely State action, not an abdication of State responsibility by failure to act. EPA does not possess the local expertise or resources necessary to successfully tailor State water quality standards. Therefore, the fact that the CWA allows States flexibility in standards development does not impose an inappropriate burden on EPA in the exercise of its oversight promulgation responsibilities. A broad Federal promulgation based on a showing of State inaction coupled with basic information on the discharge and presence of toxic pollutants meets the statutory objective of having criteria in place that are protective of public health and the environment. Without local expertise to help accurately narrow this list of pollutants and segments requiring criteria, there is no assurance of comparable protection. Nothing in the overall statutory water quality standards scheme anticipates EPA would develop this expertise in lieu of the States. EPA's lack of familiarity with local conditions argues strongly for a simple "determination" test to trigger section 303(c)(4)(B) promulgations. It also supports the concept of an across-the-board rulemaking for all priority toxic pollutants with section 304(a) criteria.

A final major reason supporting a simple determination to trigger 303(c)(4)(B) action is that comprehensive

Federal promulgation imposes no undue or inappropriate burden on States or dischargers. It merely puts in place standards for toxic pollutants that are utilized in implementing Clean Water Act programs. Under this rulemaking, a State still retains the ability to adopt alternative water quality standards simply by completing its standards adoption process. Upon EPA approval of those standards, EPA would take actions to withdraw the Federally-promulgated criteria.

Federal promulgation of State water quality standards should be a course of last resort. It is symptomatic of something awry with the basic statutory scheme. Yet, when it is necessary to exercise this authority, as the evidence suggests is this case, there should be no undue impediments to its use. Section 303(c)(4) is replete with deadlines and Congressional directives for the Administrator to act "promptly" in these cases. The statute indicates that the Administrator of EPA, is to "* * * promptly prepare and publish proposed regulations setting forth a revised or new water quality standard * * *" and "* * * shall promulgate any revised or new standard * * * not later than 90 days after he published such proposed standards, unless prior to such promulgation, such State has adopted a revised or new standard which the Administrator determines to be in accordance with the Act." EPA intends to make every effort to meet the 90 day schedule. The adoption of section 303(c)(2)(B) reinforced this emphasis on expeditious actions. EPA has demonstrated extensive deference to State primacy and a willingness to provide broad flexibility in their adoption of State standards for toxics. However, to fulfill its statutory obligation requires that EPA's deference and flexibility cannot be unlimited.

For the reasons just discussed, EPA does not believe it is necessary to support the criteria proposed today on a pollutant specific, State-by-State, waterbody-by-waterbody basis. Nonetheless, over the course of the past several years in working with and assisting the States, the Agency has reviewed the readily-available data on the discharge and presence of priority toxic pollutants. While this data is not necessarily comprehensive, it constitutes a substantial record to support a *prima facie* case for the need for numeric criteria for most priority toxic pollutants with section 304(a) criteria guidance in most States. In the absence of final State actions to adopt criteria pursuant to either Option 2 or 3 which meet the requirements for EPA approval, this evidence strongly supports EPA's decision to propose, pursuant to Section 303(c)(4)(B), criteria for all priority toxic pollutants not fully addressed by State criteria. The EPA data supporting this assertion is discussed more fully in the next section.

2. Approach for Developing Today's Proposed Rulemaking

The proposed State-specific requirements in § 131.36(d) were developed using one of two approaches. In the formal review of the adopted standards for certain States, EPA has determined that specific numeric toxics criteria are lacking. For some, criteria were omitted from the State standards, even though in EPA's judgment, the pollutants can reasonably be expected to interfere with designated uses. In these cases where EPA has specifically identified deficiencies in a State submission, today's proposed rule would establish Federal criteria for that limited number of priority toxic pollutants necessary to correct the deficiency.

For the balance of the States, EPA proposes to apply, to all appropriate State waters, the section 304(a) criteria for all priority toxic pollutants which are not the subject of approved State criteria. EPA also proposes to promulgate Federal criteria for priority toxic pollutants where any previously-approved State criteria do not reflect current science contained in revised criteria documents and other guidance sufficient to fully protect all designated uses or human health exposure pathways, where such previously-approved State criteria do not protect against both acute and chronic aquatic life effects, or where such previously-approved State criteria are not applicable to all appropriate State designated uses. EPA encourages public comments regarding any data which demonstrate that specific priority pollutants or water bodies may not require Federal criteria to protect State designated uses.

Absent a State-by-State pollutant specific analysis to narrow the list, existing data sources strongly support a comprehensive rulemaking approach. Information in the rulemaking record from a number of sources indicates the discharge, potential discharge or presence of virtually all priority toxic pollutants in all States. The data available to EPA has been assembled into a "strawman" analysis designed to identify priority toxic pollutants that potentially require the adoption of numeric criteria. Information on pollutants discharged or present was identified by accessing various national data sources:

—Final section 304(1) short lists identifying toxic pollutants likely to impair designated uses;
—Water column, fish tissue and sediment observations in the Storage Retrieval (STORET) data base (i.e., where the pollutant was detected);
—The National Pollutant Discharge Elimination System's (NPDES) Permit Compliance System data base to identify those pollutants limited in direct dischargers' permits;
—Pollutants included on Form 2(c) permit applications which have been submitted by wastewater dischargers;
—Information on discharges to surface waters or POTWs from the Toxics Release Inventory required by the Emergency Planning and Community Right-To-Know Act of 1986 (title III, Pub. L. 99–499);
—Pollutants predicted to be in the effluent of NPDES dischargers based on industry-specific analyses conducted for the Clean Water Act effluent guideline program.

The extent of this data supports a conclusion that promulgation of Federal criteria for all priority toxic pollutants with section 304(a) criteria guidance documents is appropriate for those States that have not completed their standards adoption process. This conclusion is supported by several other factors.

First, many of the available data sources have limitations which argue against relying on them solely to identify all needed water quality criteria. For example, the section 304(l) short lists only identified water bodies where uses were impaired by point source discharges; State long lists did not generally identify pollutants causing use impairment by nonpoint sources. Other available data sources (i.e., NPDES permit limits) have a similar narrow scope because of their particular purposes. Even the value of those data bases designed to identify ambient water problems is restricted by the availability of monitoring data.

In many States, the quantity, spatial and temporal distribution, and pollutant coverage of monitoring data is severely limited. For example, the most recent Water Quality Inventory Report to Congress included an evaluation of use attainment for only one-third of all river miles and less than one-half of lake acres. Even for those waters where use attainment status was reported, many assessments were based on data which did not include the chemical-specific information necessary to identify the priority toxic pollutants which pose a threat to designated uses. After evaluating this data, EPA concluded that it most likely understates the adverse presence or discharge of priority toxic pollutants.

Further evidence justifying a broad promulgation rulemaking can be found in the State actions to date in their standards adoption process. While many have not come to completion, the initial steps have led many States to develop or propose rulemaking packages with extensive pollutant coverage. The nature of these preliminary State determinations argues for a Federal promulgation of all section 304(a) criteria pollutants to ensure adequate public health and environmental protection against priority toxic pollutant insults.

EPA's strawman analysis for each State is described in greater detail in part III of appendix 1 and the complete record is available for public review.

The detailed assumptions and "rules" followed by EPA in writing the proposed § 131.36(d) requirements for all jurisdictions are listed below. Comment is invited on the details of these determinations.

(1) No criteria are proposed for States which have been fully approved by EPA as complying with the section 303(c)(2)(B) requirements.

(2) For States which have not been fully approved, if EPA has not previously determined which specific pollutants/criteria/waterbodies are lacking from a State's standards (i.e., as part of an approval/disapproval action only), all of the criteria in columns B, C, and D of the proposed § 131.36(b) matrix are proposed for statewide application to all appropriate designated uses, except as provided for elsewhere in these rules. That is, EPA proposes to bring the State into compliance with section 303(c)(2)(B) via an approach which is comparable to option 1 of the December 1988 national guidance for section 303(c)(2)(B).

(3) If EPA has previously determined which specific pollutants/criteria/waterbodies are needed to comply with CWA section 303(c)(2)(B) (i.e., as part of an approval/disapproval action only), the criteria in proposed section 131.36(b) are proposed for only those specific pollutants/criteria/waterbodies (i.e., EPA proposes to bring the State into compliance via an approach which is comparable to option 2 of the December 1988 national guidance for section 303(c)(2)(B)).

(4) For aquatic life, except as provided for elsewhere in these rules, all waters with designated aquatic life uses providing even minimal support to aquatic life are included in the proposed rule (i.e., fish survival, marginal aquatic life, etc.).

(5a) For human health, except as provided for elsewhere in these rules, all waters with designated uses providing for public water supply protection (and therefore a potential water consumption exposure route) or minimal aquatic life protection (and therefore a potential fish consumption exposure route) are included in the proposed rule.

(5b) Where a State has determined the specific aquatic life segments which provide a fish consumption exposure route (i.e., fish or other aquatic life are being caught and consumed) and EPA approved this determination as part of standards approval/disapproval action, the proposed rule includes the fish consumption (Column D(II)) criteria for only those aquatic life segments, except as provided for elsewhere in these rules. In making a determination that certain segments do not support a fish consumption exposure route, a State must have completed, and EPA approved, a use attainability analysis consistent with the provisions of 40 CFR 131.10(j). In the absence of such an approved State determination, EPA has proposed fish consumption criteria for all aquatic life segments.

(6) Uses/Classes other than those which support aquatic life or human health are not included in the proposed rulemaking (e.g., livestock watering, industrial water supply), unless they are defined in the State standards as also providing protection to aquatic life or human health (i.e., unless they are described as protecting multiple uses including aquatic life or human health). For example, if the State standards include a use such as industrial water supply, and in the narrative description of the use the State standards indicate that the use includes protection for resident aquatic life, then this use is included in the proposed rulemaking.

(7) For human health, the "water+fish" criteria in Column D(I) of § 131.36(b) are proposed for all waterbodies where public water supply and aquatic life uses are designated, except as provided for elsewhere in these rules (e.g., rule 9).

(8) If the State has public water supplies where aquatic life uses have not been designated, or public water supplies that have been determined not to provide a potential fish consumption exposure pathway, the "water only" criteria in Column D(I) of § 131.36(b) are proposed for such waterbodies, except as provided for elsewhere in these rules (e.g., rule 9).

(9) EPA is generally not proposing criteria for priority toxic pollutants for which a State has adopted criteria and received EPA approval. The exceptions to this general rule are described in rules 10 and 11.

(10) For priority toxic pollutants where the State has adopted human health criteria and received EPA approval, but such criteria do not fully satisfy section 303(c)(2)(B) requirements, the proposed rule includes human health criteria for such pollutants. For example, consider a case where a State has a water supply segment that poses an exposure risk to human health from both water and fish consumption. If the State has adopted, and received approval for, human health criteria based on water consumption only (e.g., Safe Drinking Water Act Maximum Contaminant Levels (MCLs)) which are less stringent than the "water+fish" criteria in Column D(I) of proposed § 131.36(b), the Column D(I) criteria are proposed for those water supply segments. The rationale for this is to ensure that both water and fish consumption exposure pathways are adequately addressed and human health is fully protected. If the State has adopted water consumption only criteria which are more stringent or equal to the Column D(I) criteria, the "water+fish" criteria in Column D(I) criteria are not proposed.

(11) For priority toxic pollutants where the State has adopted aquatic life criteria and previous to the 1987 CWA Amendments received EPA approval, but such criteria do not fully satisfy section 303(c)(2)(B) requirements, the proposed rule includes aquatic life criteria for such pollutants. For example, if the State has adopted not-to-be-exceeded aquatic life criteria which are less stringent than the 4-day average chronic aquatic life criteria in § 131.36(b) (i.e., in Columns B(II) and C(II)), the acute and chronic aquatic life criteria in Section 131.36(b) are proposed for those pollutants.

The rationale for this is that the State-adopted criteria do not protect resident aquatic life from both acute and chronic effects, and that Federal criteria are necessary to fully protect aquatic life designated uses. If the State has adopted not-to-be-exceeded aquatic life criteria which are more stringent or equal to the chronic aquatic life criteria in § 131.36(b), the acute and chronic aquatic life criteria in § 131.36(b) are not proposed for those pollutants.

(12) Under certain conditions discussed in rules 9, 10, and 11, criteria listed in § 131.36(b) are not proposed for specific pollutants; however, EPA made such exceptions only for pollutants for which criteria have been adopted by the State and approved by EPA, where such criteria are currently effective under State law the appropriate EPA Region

concluded that the State's criteria fully satisfy section 303(c)(2)(B) requirements.

3. Approach for States That Fully Comply Subsequent to Issuance of Today's Proposed Rulemaking

As discussed in prior sections of this preamble, the water quality standards program has been established with an emphasis on State primacy. Although this proposed rule has been developed to Federally promulgate toxics criteria for States, EPA prefers that States maintain primacy, revise their own standards, and achieve full compliance. EPA is hopeful that today's proposed rulemaking will provide additional impetus for non-complying States to adopt the criteria for priority toxic pollutants necessary to comply with section 303(c)(2)(B).

For States that achieve full compliance before publication of the final rulemaking, EPA will not include such States in the final rulemaking. At any point in the process prior to final promulgation, a State can ensure that it will not be affected by this action by adopting the necessary criteria pursuant to State law and receiving EPA approval. The content of the adopted standards must be within the boundaries of the several acceptable approaches described earlier in this preamble.

Following a final promulgation of this rule, removal of a State from the rule will require rulemaking by EPA according to the requirements of the Administrative Procedure Act (5 U.S.C. 551 *et seq.*). EPA will withdraw the Federal rule without a notice and comment rulemaking when the State adopts standards no less stringent than the Federal rule (i.e., standards which provide, at least, equivalent environmental protection). For example, see 51 FR 11580, April 4, 1986, which finalized EPA's removal of a Federal rule for the State of Mississippi.

However, if a State adopts standards for toxics which are less stringent than the Federal rule but, in the Agency's judgment, fully meet the requirements of the Act, EPA will propose to withdraw the rule with a notice of proposed rulemaking and provide for public participation. This procedure would be required for partial or complete removal of a State from this rulemaking. A State covered by the final rule could adopt the necessary criteria using any of the three options or combinations of those Options described in EPA's 1989 guidance.

EPA cautions States and the public that promulgation of a Federal rule removes most of the flexibility available to States for modifying their standards on a discharger-specific or stream-specific basis. For example, variances, site-specific criteria and schedules of compliance actions pursuant to State law for federally promulgated criteria are precluded. Each of these types of modifications would require Federal rulemaking on a case-by-case basis to change the Federal rule for that State.

F. Derivation of Proposed Criteria

1. Sections 304(a) Criteria Process

Under the authority of CWA section 304(a) EPA has developed methodologies and specific criteria to protect aquatic life and human health. These methodologies are intended to provide protection for all surface water on a national basis. As described below, there are site specific procedures for more precisely addressing site specific conditions for an individual water body. However, these site-specific criteria procedures are infrequently used because the section 304(a) criteria recommendations have proven themselves to be appropriate for the vast majority of water bodies. The methodologies have been subject to public review, as have the individual criteria documents. Additionally, the methodologies have been reviewed and approved by EPA's Science Advisory Board.

EPA incorporates by reference into the record of this proposed rulemaking the aquatic life methodology as described in "Appendix B—Guidelines for Deriving Water Quality Criteria for the Protection of Aquatic Life and Its Uses" (45 FR 79341, November 28, 1980) as amended by "Summary of Revisions to Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" (50 FR 30792, July 29, 1985). EPA also incorporates by reference into the record of this proposed rulemaking the human health methodology as described in "Appendix C—Guidelines and Methodology Used in the Preparation of Health Effects Assessment Chapters of the Consent Decree Water Criteria Documents" (45 FR 79347, November 28, 1980). EPA also recommends that the following be reviewed for information: "Appendix D—Response to Comments on Guidelines for Deriving Water Quality Criteria for the Protection of Aquatic Life and Its Uses," (45 FR 79357, November 28, 1980); "Appendix E—Responses to Public Comments on the Human Health Effects Methodology for Deriving Ambient Water Quality Criteria" (45 FR 79368, November 28, 1980); and "Appendix B—Response to Comments on Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" (50 FR 30793, July 29, 1985). EPA also is placing into the record the most current individual criteria documents for the priority toxic pollutants included in today's proposal.

The primary focus of this rule is the inclusion of the water quality criteria for pollutant(s) in State standards as necessary to support water quality-based control programs. The Agency is accepting comment on the criteria proposed in today's rule. However, Congress has established a very ambitious schedule for the promulgation of the final criteria. The statutory deadline in section 303(c)(4) clearly indicates that Congress intended the Agency to move very expeditiously when Federal action is warranted. The Agency believes that the limited time available for promulgation of the regulation can be used most efficiently and effectively by addressing those issues that have not already come before the Agency.

The methodology used to develop the criteria and the criteria themselves (to the extent not updated through IRIS) have previously undergone scientific peer review and public review and comment, and have been revised as appropriate. For the most part, this review occurred before Congress amended the Act in 1987, to require the inclusion of numeric criteria for certain toxic pollutants in State standards. Congress acted with full knowledge of the EPA process for developing criteria and the Agency's recommendations under section 304(a). EPA believes it is consistent with Congressional intent to rely in large part on existing criteria rather than engage in a time-consuming reevaluation of the underlying basis for water quality criteria. Accordingly, the Agency does not intend in this rulemaking to address the issues that have already been addressed by the Agency in response to previous comments. It is the Agency's belief that this approach will best achieve the purpose of moving forward in promulgating criteria for States not in compliance with section 303(c)(2)(B) so that environmental controls intended by Congress can be put into place to protect public health and welfare and enhance water quality.

It should be noted that the Agency is initiating a review of the basic guidelines for developing criteria and that comments received in this rulemaking may be of value in that effort as well. Future revisions to the criteria guidelines will be reviewed by the Agency's Science Advisory Board and submitted to the public for review and comment following the same process that was used in issuing the existing methodological guidelines. Subsequent revisions of criteria documents and the issuance of any new criteria documents will also be subject to public review.

2. Aquatic Life Criteria

Aquatic life criteria may be expressed in numeric or narrative forms. EPA's guidelines describe an objective, internally consistent and appropriate way of deriving chemical-specific, numeric water quality criteria for the protection of the presence of, as well as the uses of, both fresh and marine water aquatic organisms.

An aquatic life criterion derived using EPA's section 304(a) method represents an estimate of the highest concentration of a pollutant in water that does not present a significant risk to aquatic organisms *per se* or to their use. EPA's guidelines are designed to derive criteria that protect aquatic communities by protecting most of the species and their uses most of the time, but not necessarily all of the species all of the time. Aquatic communities can tolerate some stress and occasional adverse effects on a few species so that total protection of all species all of the time is not necessary. EPA's guidelines attempt to provide a reasonable and adequate amount of protection with only a small possibility of substantial overprotection or underprotection. As discussed in detail below, there are several individual factors which may make the criteria somewhat overprotective or underprotective. Clearly, addressing them all is probably infeasible and, in any case, would make the criteria derivation process unduly resource intensive and time consuming. The approach EPA is using is believed to be as well balanced as possible, given the state of the science.

Numerical aquatic life criteria derived using EPA's most recent guidelines are expressed as short-term and long-term numbers, rather than one number, in order that the criteria more accurately reflect toxicological and practical realities. The combination of a criteria maximum concentration (CMC), a one-hour average acute limit, and a criteria continuous concentration (CCC), a four-day average concentration chronic limit, provide protection of aquatic life and its uses from acute and chronic toxicity to animals and plants, and from bioconcentration by aquatic organisms, without being as restrictive as a one-number criterion would have to be.

The two number criteria are intended to identify average pollutant concentrations which will produce water quality generally suited to maintenance of aquatic life and their uses while restricting the duration of excursions over the average so that total exposures will not cause unacceptable adverse effects. Merely specifying an average value over a time period is insufficient unless the time period is short, because excursions higher than the average can kill or cause substantial damage in short periods.

EPA's guidelines were developed on the assumption that the results of laboratory tests are generally useful for predicting what will happen in field situations. Certain ambient waters may have some capacity to bind pollutants and make them less bioavailable. The site-specific criteria process provides a means of addressing this effect (i.e., by allowing development and use of a "water effect ratio" that quantifies the difference in toxicity of a pollutant in site water versus the toxicity of the pollutant in the laboratory water used to develop the section 304(a) criteria recommendation). However, in the absence of such an approach, the criteria may be somewhat overprotective in some situations.

A minimum data set of eight specified families is required for criteria development (details are given in the methodology cited above). The eight specific families are intended to be representative of a wide spectrum of aquatic life. For this reason it is not necessary that the specific organisms tested be actually present in the water body. States may develop site-specific criteria using native species, provided that the broad spectrum represented by the eight families is maintained. All aquatic organisms and their common uses are meant to be considered, but not necessarily protected, if relevant data are available.

EPA's application of guidelines to develop the criteria matrix in the proposed rule is judged by the Agency to be applicable to all waters of the United States, and to all ecosystems. There are waters and ecosystems where site-specific criteria could be developed, as discussed below, but it is up to States to identify those waters and develop the appropriate site-specific criteria.

Fresh water and salt water (including both estuarine and marine waters) have different chemical compositions, and freshwater and saltwater species rarely inhabit the same water simultaneously. To provide additional accuracy, criteria developed recently are developed for fresh water and for salt water.

Assumptions which may make the criteria underprotective include the use of criteria on an individual basis, with no consideration of additive or synergistic effects, and the general lack of consideration of impacts on wildlife, due principally to a lack of data.

3. Criteria for Human Health

As with aquatic life, EPA's guidelines for human health criteria attempt to provide a reasonable and adequate amount of protection with only a small possibility of substantial overprotection or underprotection. EPA's section 304(a) criteria for human health are based on two types of biological endpoints:

(1) Carcinogenicity and (2) systemic toxicity (i.e., all other adverse effects other than cancer). Thus, there are two procedures for assessing these health effects: One for carcinogens and one for non-carcinogens.

EPA's guidelines assume that carcinogenicity is a "non-threshold phenomenon," that is, there are no "safe" or "no-effect levels" because even extremely small doses are assumed to cause a finite increase in the incidence of the response (i.e., cancer). Therefore, EPA's water quality criteria for carcinogens are presented as pollutant concentrations corresponding to increases in the risk of developing cancer.

For pollutants that do not manifest any apparent carcinogenic effects in animal studies (i.e., systemic toxicants), EPA assumes that the pollutant has a threshold below which no effects will be observed. This assumption is based on the premise that a physiological mechanism exists within living organisms to avoid or overcome the adverse effects of the pollutant below the threshold concentration.

The human health risks of a substance cannot be determined with any degree of confidence unless dose-response relationships are quantified. Therefore, a dose-response assessment is required before a criterion can be calculated. The dose-response assessment determines the quantitative relationships between the amount of exposure to a substance and the onset of toxic injury or disease. Data for determining dose-response relationships are typically derived from animal studies, or less frequently, from epidemiological studies in exposed populations.

The dose-response information needed for carcinogens is an estimate of the carcinogenic potency of the compound. Carcinogenic potency is defined here as a general term for a chemical's human cancer-causing potential. This term is often used loosely to refer to the more specific carcinogenic or cancer slope factor which is defined as an estimate of carcinogenic potency derived from animal studies or epidemiological data of human exposure. It is based on extrapolation from test exposures of high dose levels over relatively short periods of time to more realistic low dose levels over a lifetime exposure period by use of linear extrapolation models. The cancer slope factor, q1*, is EPA's estimate of carcinogenic potency and is intended to be a conservative upper bound estimate (e.g. 95% upper bound confidence limit).

For non-carcinogens, EPA uses the reference dose (RfD) as the dose response parameter in calculating the criteria. The RfD was formerly referred to as an "Acceptable Daily Intake" or ADI. The RfD is useful as a reference point for gauging the potential effects of other doses. Doses that are less than the RfD are not likely to be associated with any health risks, and are therefore less likely to be of regulatory concern. As the frequency of exposures exceeding the RfD increases and as the size of the excess increases, the probability increases that adverse effects may be observed in a human population. Nonetheless, a clear conclusion cannot be categorically drawn that all doses below the RfD are "acceptable" and that all doses in excess of the RfD are "unacceptable." In extrapolating non-carcinogen animal test data to humans to derive an RfD, EPA divides a no-observed-effect dose observed in animal studies by an "uncertainty factor" which is based on professional judgment of toxicologists and typically ranges from 10 to 10,000.

For section 304(a) criteria development, EPA typically considers only exposures to a pollutant that occur through the ingestion of waters and contaminated fish and shellfish. Thus the criteria are based on an assessment of risks related to the surface water exposure route only.

The assumed exposure pathways in calculating the criteria are the consumption of 2 liters per day at the criteria concentration and the consumption of 6.5 grams per day of fish/shellfish contaminated at a level equal to the criteria concentration but multiplied by a "bioconcentration factor." The use of fish consumption as an exposure factor requires the quantification of pollutant residues in the edible portions of the ingested species. Bioconcentration factors (BCFs) are used to relate pollutant residues in aquatic organisms to the pollutant concentration in ambient waters. BCFs are quantified by various procedures depending on the lipid solubility of the pollutant. For lipid soluble pollutants, the average BCF is calculated from the weighted average percent lipids in the edible portions of fish/shellfish, which is about 3%; or it is calculated from theoretical considerations using the octanol/water partition coefficient. For non-lipid soluble compounds, the BCF is determined empirically. The assumed water consumption is taken from the National Academy of Sciences publication "Drinking Water and Health" (1977). The 6.5 grams per day contaminated fish consumption value is equivalent to the average per-capita consumption rate of all (contaminated and non-contaminated) freshwater and estuarine fish for the U.S. population.

EPA also assumes in calculating water quality criteria that the exposed individual is an average adult with body weight of 70 kilograms. The issue of concern is dose per kilogram of body weight. EPA assumes 6.5 grams per day of contaminated fish consumption and 2 liters per day of contaminated drinking water consumption for a 70 kilogram person in calculating the criteria. Persons of smaller body weight are expected to ingest less contaminated fish and water, so the dose per kilogram of body weight is generally expected to be roughly comparable. There may be subpopulations within a State, such as subsistence fishermen, who as a result of greater exposure to a contaminant, are at greater risk than the hypothetical 70 kilogram person eating 6.5 grams per day of maximally contaminated fish and shellfish and drinking 2 liters per day of maximally contaminated drinking water. (EPA is in part addressing the potential that highly exposed subpopulations exist by selecting a relatively stringent cancer risk level (10^{-6}) for use in deriving State-wide criteria for carcinogens. Individuals that ingest ten times more of a pollutant than is assumed in derivation of the criteria will be protected to a 10^{-5} level, which EPA has historically considered to be adequately protective. There may, nevertheless, be circumstances where site-specific numeric criteria that are more stringent than the State-wide criteria are necessary to adequately protect highly exposed subpopulations. Although EPA intends in this initial promulgation to focus on promulgation of appropriate State-wide criteria that will reduce risks to all exposed individuals, including highly exposed subpopulations, site specific criteria may be developed subsequently by EPA or the States where warranted to provide necessary additional protection.)

For non-carcinogens RfDs are developed based on pollutant concentrations that cause threshold effects. The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime.

Criteria are calculated for individual chemicals with no consideration of additive, synergistic or antagonistic effects in mixtures. If the conditions within a State differ from the assumptions EPA used, the States have the option to perform the analyses for their conditions.

EPA has a process to develop a scientific consensus on oral reference doses and carcinogenic slope factors. Reference doses and slope factors are validated by two Agency work groups (i.e., one work group for each) which are composed of senior Agency scientists from all of the program offices and the Office of Research and Development. These work groups develop a consensus of Agency opinion for Rfds and slope factors which are then used throughout the Agency for consistent regulation and guidance development. EPA maintains an electronic data base which contains the official Agency consensus for Rfd's and slope factors which is known as the Integrated Risk Information System (IRIS). It is available for use through EPA's electronic mail system, and also available through the Public Health Network of the Public Health Foundation, and on the National Institutes of Health National Library of Medicine's TOXNET system. For the criteria included in today's proposal, EPA used the criteria recommendation from the appropriate section 304(a) criteria document. (The availability of EPA's criteria documents has been announced in various **Federal Register** notices. These documents are also placed in the record for today's proposed rule.) However, if the Agency has changed in IRIS any parameters used in criteria derivation since issuance of the criteria guidance document, EPA recalculated the criteria recommendation with the latest information. (This information is included in the record.) Thus, there may be differences between the original recommendation, and those in today's proposal, but today's proposal presents the Agency's most current section 304(a) criteria recommendation. The recalculated human health numbers are denoted by an "a" in the criteria matrix in subsection 131.36(b) of today's proposed rule.

In order to base its regulatory decisions on the best available science, EPA continuously updates its assessment of the risk from exposure to contaminants. On September 11, 1991, EPA's Office of Research and Development (ORD) began reassessing the scientific models and exposure scenarios used to predict the risks of biological effects from exposure to low levels of dioxin. This reassessment has the potential to alter the risk assessment for dioxin and accordingly the Agency's regulatory decisions related to dioxin. At this time, EPA is unable to say with any certainty what the degree or directions of any changes in risk estimates might be. This rulemaking includes a proposed Agency action with regard to dioxin that may be affected by the reassessment. The Agency will be carefully monitoring ORD's efforts in order to ensure that appropriate actions are taken during the course of this rulemaking to reflect any necessary changes resulting from the reassessment. If a final Agency action on this rulemaking occurs prior to completion of ORD's work, the Agency will consider revisiting that decision.

4. Section 304(a) Human Health Criteria Excluded

Today's proposal does not contain certain of the Section 304(a) criteria for priority toxic pollutants because those criteria were not based on toxicity. The basis for these particular criteria are organoleptic effects (e.g., taste and odor) which would make water and edible aquatic life unpalatable but not toxic. Because the basis for this proposed rulemaking is to protect the public health and aquatic life from toxicity consistent with the language in section 303(c)(2)(B), EPA is proposing criteria only for those priority toxic pollutants whose criteria recommendations are based on toxicity. The Section 304(a) human health criteria based on organoleptic effects for copper, zinc, 2,4-dimethylphenol, and 3-methyl-4-chlorophenol are excluded for this reason.

5. Cancer Risk Level Proposed

EPA's Section 304(a) criteria guidance documents for priority toxic pollutants which are based on carcinogenicity present concentrations for upper bound risk levels of 1 excess cancer per 100,000 people (10^{-5}), per 1,000,000 people (10^{-6}), and per 10,000,000 people (10^{-7}). However, the criteria documents do not recommend a particular risk factor as EPA policy.

In the April, 1990, **Federal Register** notice of preliminary assessment of State compliance, EPA announced the intention to include in the proposed rulemaking an incremental cancer risk level of one in a million (10^{-6}) for all priority toxic pollutants regulated as carcinogens. That cancer risk level is reflected in this proposed rule. The reasons supporting this decision are discussed below. However, EPA's Office of Water's guidance to the States has consistently reflected the Agency's policy of accepting cancer risk policies from the States in the range of 10^{-6} to 10^{-4}. EPA reviews individual State policies as part of its water quality standards oversight function and determines if States have appropriately consulted its citizens and applied good science in adopting water quality criteria.

First, EPA's human health criteria have been developed based on a number of exposure assumptions. Many of these assumptions are based on the exposure for an average individual. For example, EPA's criteria assumes exposure of a 70 kilogram (154 pound) adult who consumes 2 liters (2.1 quarts) of water per day and 6.5 grams of fish per day (less than 7 ounces per month). These assumptions are based on approximate national averages, but considerably understate the exposure that would occur for certain segments of the population that have high fish consumption or depend on fish consumption for subsistence. Similarly, it would overstate the exposure of those who consume less fish than the National average amount. Therefore, although EPA would accept a lower State adopted risk level, in the range of 10^{-4} to 10^{-6}, EPA has chosen a 10^{-6} risk level to protect the average exposed individual at a conservative incremental lifetime cancer risk.

A second strong reason is that a 10^{-6} risk level is consistent with what most States have selected, or are expected to select, as their risk level. A recent EPA status report on State compliance with section 303(c)(2)(B) found that 36 of the 57 States and Territories will select 10^{-6} as their risk level (12 States have selected or are expected to select 10^{-5} and 9 of the remaining States are undecided). EPA's proposal is therefore consistent with the majority of the States, does not contradict those States choosing a 10^{-6} risk level and does not preclude States from eventually choosing a risk level below 10^{-6}.

Third, by selecting a risk level of 10^{-6} for the average exposed individual, some assurance is provided against the possibility that current section 304(a) criteria are not sufficiently stringent. The various parameters used in deriving the Section 304(a) criteria (e.g. cancer potency slopes, reference doses, bioaccumulation factors, etc.) are based on the state of present science. With additional research and experience, EPA may find that one or more of these factors understates the actual public risk. In addition, in many cases, EPA's criteria are based upon a single health effect. As the science evolves and available information expands, there is the potential that EPA will determine that other endpoints or effects are more sensitive than those currently considered. This risk level also reflects a recognition that certain factors are not considered in the current criteria methodology.

A proposed 10^{-6} risk level does not preclude State alternatives. If a State decides that a different risk level is more appropriate, it may avoid Federal promulgation by completing its standards adoption process in compliance with section 303(c)(2)(B). As discussed earlier, this would be the case both in advance of or subsequent to final promulgation.

6. Applying EPA's Nationally Derived Criteria to State Waters

To assist States in modifying EPA's water quality criteria, the Agency has provided guidance on developing site specific criteria for aquatic life and human health (see Water Quality Standards Handbook and the Guidelines for Deriving Numerical National Water Quality Criteria). This guidance can be used by the appropriate regulatory authority to develop alternative criteria Where such criteria are more stringent than the criteria finally developed pursuant to this proposed rulemaking, section 510 of the Clean Water Act (33 U.S.C. 1370) provides authority for their implementation and enforcement in lieu of today's proposed criteria.

EPA's experience with such site-specific criteria has verified that the national criteria are generally protective and appropriate for direct use by the States.

G. Description of the Proposed Rule

EPA's final rule would establish a new § 131.36 in 40 CFR part 131 entitled. "Toxics Criteria for Those States Not Fully Complying With Clean Water Act section 303(c)(2)(B)."

1. Scope

Subsection (a), entitled "Scope", clarifies that this section is not a general promulgation of the section 304(a) criteria for priority toxic pollutants but is restricted to specific pollutants in specific States.

2. EPA Criteria for Priority Toxic Pollutants

Subsection (b) presents a matrix of the applicable EPA criteria for priority toxic pollutants. Section 303(c)(2)(B) of the Act addresses only pollutants listed as "toxic" pursuant to section 307(a) of the Act. As discussed earlier in this preamble, the section 307(a) list of toxics contains 65 compounds and families of compounds, which potentially include thousands of specific compounds. The Agency uses the list of 126 "priority toxic pollutants" for administrative purposes (see 40 CFR part 423, appendix A). Reference in this proposed rule to priority toxic pollutants, toxic pollutants, or toxics refers to the 126 priority toxic pollutants.

However, EPA has not developed both aquatic life and human health section 304(a) criteria for all of the 126 priority toxic pollutants. The matrix in paragraph (b) contains human health criteria in Column D for 102 priority toxic pollutants which are divided into criteria (Column I) for water consumption (i.e., 2 liters per day) and aquatic life consumption (i.e., 6.5 grams per day of aquatic organisms), and Column II for aquatic life consumption only. The term aquatic life includes fish and shellfish such as shrimp, clams, oysters and mussels. The total number of priority toxic pollutants with criteria proposed today differs from the total number of priority toxic pollutants with section 304(a) criteria because EPA has developed and is proposing chromium criteria for two valence states. Thus, although chromium is a single priority toxic pollutant, there are two criteria for chromium. See numbers 5a and 5b in proposed § 131.36(b).

The matrix contains aquatic life criteria for 30 priority pollutants. These are divided into freshwater criteria (Column B) and saltwater criteria (Column C). These columns are further divided into acute and chronic criteria. The aquatic life criteria are considered by EPA to be protective when applied under the conditions described in the section 304(a) criteria documents and in the "Technical Support Document for Water Quality-based Toxics Control." For example, waterbody uses should be protected if the criteria are not exceeded, on average, once every three year period. It should be noted that the criteria maximum concentrations (the acute criteria) are one-hour average concentrations and that the criteria continuous concentrations (the chronic criteria) are four-day averages. It should also be noted that for certain of the metals, the actual criteria are equations which are included as footnotes to the matrix. The toxicity of these metals are water hardness dependent. The values shown in the table are based on a hardness expressed as calcium carbonate of 100 mg/l. Finally, the criterion for pentachlorophenol is pH dependent. The equation is the actual criterion and is included as a footnote. The value shown in the matrix is for a pH of 7.8 units.

Several of the freshwater aquatic life criteria are incorporated into the matrix in the format used in the 1980 criteria methodology. This distinction is noted in footnote (g) to the table. EPA has not updated these criteria for various reasons. Footnote (g) describes an approximate method to translate these 1980 criteria to the equivalent criteria by the 1985 methodology. EPA could make this translation in a final rule and solicits public comment on which approach is better.

The matrix also includes toxicity-based human health criteria for copper, 2-chloroethylvinyl ether, 1,2-trans-dichloroethylene, 2-chlorophenol, acenaphthene, butylbenzyl phthalate, and N-nitrosodi-n-propylamine. The criteria for these substances are shown in parentheses and are *not* being proposed today but are included for informational purposes and as notice for consideration in all future State triennial reviews. Although sufficient information on these compounds was previously unavailable to calculate a section 304(a) criterion based on carcinogenicity or systemic toxicity, Agency-approved information in IRIS now allow calculation of these criteria using the EPA criteria guidelines. EPA has assembled another matrix which provides all of the factors used to calculate the proposed human health criteria. This supplementary matrix is included in the record for this proposal.

3. Applicability

Section 131.36(d) establishes the applicability of the criteria proposed for each included State. It provides that the criteria promulgated for each State supersede and/or complement any State criteria for that toxic pollutant. EPA believes it has not proposed to supersede any State criteria for priority toxic pollutants unless the State-adopted criteria are disapproved or otherwise insufficient. The approach followed by the Agency in preparing proposed § 131.36(d) is described in section E.2, and further rationale is provided in section E.3 of this preamble. EPA invites comment on the accuracy of the Agency's decisions to include or exclude particular priority toxic pollutant criteria.

EPA's principal purpose today is to propose the toxics criteria necessary to comply with section 303(c)(2)(B). However, in order for such criteria to achieve their intended purpose the implementation scheme must be such that the final results protect the public health and welfare. In section F of this preamble a discussion focused on the factors in EPA's assessment of criteria for carcinogens. For example, fish consumption rates, bioaccumulation factors, and cancer potency slopes were discussed. When any one of these factors is changed, the others must also be evaluated so that, on balance, resulting criteria are adequately protective.

Once an appropriate criterion is selected for either aquatic life or human health protection, then appropriate conditions for calculating water quality-based effluent limits for that chemical must be established in order to maintain the intended stringency and achieve the necessary toxics control. EPA has included in this proposal appropriate implementation factors necessary to maintain the level of protection intended. These proposals are included in subsection (c).

For example, most States have low flow values for streams and rivers which establish flow rates below which numeric criteria may be exceeded. These low flow values became design flows for sizing treatment plants and developing water quality-based effluent limits. Historically, these so-called "design" flows were selected for the purposes of waste load allocation analyses which focused on instream dissolved oxygen concentrations and protection of aquatic life. With the publication of the 1985 Technical Support Document for Water Quality Based Toxics Control (TSD), EPA introduced hydrologically and biologically based analyses for the protection of aquatic life and human health.[1] EPA recommended either of two methods for calculating acceptable low flows, the traditional hydrologic method developed by the U.S. Geological Survey and a biological based method developed by EPA. The

[1] These concepts have been expanded subsequently in guidance entitled "Technical Guidance Manual for Performing Wasteload Allocations, Book 6, Design Conditions," USEPA, Office of Water Regulations and Standards, Washington, DC (1986). These new developments are included in appendix D of the revised TSD. The discussion here is greatly simplified and is provided to support EPA's decision to propose baseline application values for instream flows and thereby maintain the intended stringency of the criteria for priority toxic pollutants.

results of either of these two methods may be used.

Some States have adopted specific low flow requirements for streams and rivers to protect designated uses against the effects of toxics. Generally these have followed the guidance in the TSD. However, EPA believes it is essential to include proposed design flows in today's proposed rule so that, where States have not yet adopted such design flows, the criteria proposed today would be implemented appropriately. Clearly, if the proposed criteria were implemented using inadequate design flows, the resulting toxics controls would not be fully effective, because the resulting ambient concentrations would exceed EPA's recommended levels.

In the case of aquatic life, more frequent violations than the once in 3 years assumed exceedences would result in diminished vitality of stream ecosystems characteristics by the loss of desired species such as sport fish. The low flow values proposed are:

Aquatic Life:	
Acute criteria (CMC).	1 Q 10 or 1 B 3.
Chronic criteria (CCC).	7 Q 10 or 4 B 3
Human Health:	
Non-carcinogens	30 Q 5.
Carcinogens..............	harmonic mean flow.

Where:

1 Q 10 is the lowest one day flow with an average recurrence frequency of once in 10 years determined hydrologically;

1 B 3 is biologically based and indicates an allowable exceedence of once every 3 years. It is determined by EPA's computerized method (DFLOW model);

7 Q 10 is the lowest average 7 consecutive day low flow with an average recurrence frequency of once in 10 years determined hydrologically;

4 B 3 is biologically based and indicates an allowable exceedence for 4 consecutive days once every 3 years. It is determined by EPA's computerized method (DFLOW model);

30 Q 5 is the lowest average 30 consecutive day low flow with an average recurrence frequency of once in 5 years determined hydrologically; and

The harmonic mean flow is a long term mean flow value calculated by dividing the number of daily flows analyzed by the sum of the reciprocals of those daily flows.

EPA is proposing the harmonic mean flow to be applied with human health criteria. The concept of a harmonic mean is a standard statistical data analysis technique. EPA's model for human health effects assumes that such effects occur because of a long-term exposure to low concentration of a toxic pollutant. For example, two liters of water per day for seventy years. To estimate the concentrations of the toxic pollutant in those two liters per day by withdrawal from streams with a high daily variation in flow, EPA believes the harmonic mean flow is the correct statistic to use in computing such design flows rather than other averaging techniques.[2]

All waters, whether or not suitable for such hydrologic calculations but included in this proposed rule (including lakes, estuaries, and marine waters), must contain the criteria proposed today. Such attainment must occur at the end of the discharge pipe, unless the State has an EPA approved mixing zone regulation. If the State has an EPA approved mixing zone regulation, then the criteria would apply at the locations stated in that regulation. For example, the chronic criteria (CCC) must apply at the geographically defined boundary of the mixing zone. Discussion and guidance of these factors are included in the revised TSD in chapter 4.

EPA is aware that the criteria proposed today for some of the priority toxic pollutants are at concentrations less than EPA's current analytical detection limits. Detection limits have never been an acceptable basis for setting standards since they are not related to actual environmental impacts. The environmental impact of a pollutant is based on a scientific determination, not an arbitrary measuring technique which is subject to change. Setting the criteria at levels that reflect adequate protection tends to be a forcing mechanism to improve analytical detection methods. As the methods improve, limits closer to the actual criteria necessary to protect aquatic life and human health are measurable. The Agency does not believe it is appropriate to promulgate insufficiently protective criteria (e.g., criteria equal to the current analytical detection limits).

EPA does believe, however, that the use of analytical detection limits are appropriate for determining compliance with NPDES permit limits. This historical view of the role of detection limits was recently articulated in guidance for translating dioxin criteria into NPDES permit limits which is the principal method used for water quality standards enforcement.[3] This guidance presents a model for addressing toxic pollutants which have criteria recommendations less than current detection limits. This guidance is equally applicable to other priority toxic pollutants with criteria recommendations less than current detection limits. The guidance explains that detection limits may be used for purposes of determining compliance with permit limits, but not for purposes of establishing water quality criteria or permit limits. Because under the Clean Water Act analytical detection limits are appropriately used only in connection with NPDES permit limit compliance determinations, EPA has not considered analytical detection limits in deriving the criteria proposed today.

EPA has added provisions in paragraph (c)(3) to determine when fresh water or saltwater aquatic life criteria apply. The structure of the paragraph is to establish presumptively applicable rules and to allow for site-specific determinations where the rules are not consistent with actual field conditions. Because a distinct separation generally does not exist between fresh water and marine water aquatic communities, EPA is proposing the following: (1) The fresh water criteria apply at salinities of 1 part per thousand and below; (2) marine water criteria apply at 10 parts per thousand and above; and (3) at salinities between 1 and 10 parts per thousand the more stringent of the two apply unless EPA approves another site specific criterion for the pollutant. This proposed assignment of criteria for fresh, brackish and marine waters was developed in consultation with EPA's research laboratories at Duluth, Minnesota and Narragansett, Rhode Island. The Agency believes such an approach is consistent with field experience.

In paragraph (c)(4)(i) EPA has included a limitation on the amount of hardness that EPA can allow to antagonize the toxicity of certain metals (see footnote (e) in the criteria matrix in paragraph (b) of the rule). The data base used for the Section 304(a) criteria documents for metals do not include data supporting the extrapolation of the hardness effects on metal toxicity beyond a range of hardness of 25 mg/l to 400 mg/l (expressed as calcium carbonate). Thus, the aquatic life values for the CNC (acute) and CCC (chronic) criteria for these metals in waters with a hardness less than 25 mg/l, must nevertheless use 25 mg/l when calculating the criteria; and in waters with a hardness greater than 400 mg/l, must nevertheless use 400 mg/l when calculating the criteria.

[2] For a description of harmonic means see "Design Stream Flows Based on Harmonic Means," Lewis A. Rossman, J. of Hydraulics Engineering, Vol. 116, No. 7, July, 1990. This article is contained in the record for this proposal.

[3] Strategy for the Regulation of Discharges of PHDDs and PHDFs from Pulp and Paper Mills to Waters of the United States," memorandum from the Assistant Administrator for Water to the Regional Water Management Division Directors and NPDES State Directors, May 21, 1990.

Subsection (d) lists the States for which rules are being proposed. For each identified State, the water uses impacted (and in some cases the waters covered) and the criteria proposed are identified.

H. Specific Issues for Public Comment

As is the Agency's custom, EPA would like to request that particular public review be directed to the issues and alternatives presented in this section. Although the issues presented below are particularly notable and worthy of comment, EPA encourages public comment on any aspect of this proposed rule.

1. In section D of this preamble, EPA has presented a discussion of how EPA determines State compliance with section 303(c)(2)(9). The process described has been the Agency's general practice since the beginning of the water quality standards program, although the requirements specific to toxics criteria have evolved over the years. Briefly stated, EPA's ten Regional offices review the State-adopted standards to ascertain compliance with the Clean Water Act using the information developed by the State and other relevant and available data and information.

For compliance with section 303(c)(2)(B), EPA's focus in many cases was on the process the State used to assemble the criteria for those priority toxic pollutants which could reasonably be expected to interfere with the State's designated uses. For example, EPA's review of individual State water quality standards had to balance a need for national consistency with the need to implement the CWA scheme that provides for State primacy and State-specific approaches. If EPA had information on a toxic pollutant sufficient to satisfy the test that the pollutant can reasonably be expected to interfere with designated uses, and the State did not adopt sufficient, scientifically defensible criteria for that pollutant, EPA disapproved the State action as being inconsistent with Section 303(c)(2)(B). Alternative approaches could have had either a narrower focus on fewer priority toxic pollutants (for example, relying only on the results of the section 304(l) short list process) or might have been broader, (for example, requiring most States to adopt criteria for the complete list of priority toxic pollutants addressed in EPA section 304(a) criteria recommendations). EPA solicits comment on whether the Agency's traditional review process should have been changed.

2. EPA's approach and rationale for deciding which criteria to propose for a State is discussed in section E of this Preamble. Briefly stated, EPA either: (1) Proposed to promulgate Federal criteria for all priority toxic pollutants not acceptably addressed by approved State criteria (this approach is used for most States), or (2) proposed to promulgate Federal criteria only for specific priority pollutants for which State criteria are lacking or insufficient (this approach is used for only a few States). EPA could have used other approaches and solicits public comment. For example, EPA could have relied totally on the State's own determination pursuant to section 304(l) and 305(b), or entirely on an Option 1 approach of promulgating all Federal criteria for all State waters.

3. This proposed rulemaking includes proposed minimum implementation factors for the criteria, such as flow conditions. As proposed, these factors are dependent on existing State rules but subject to base values which are those used in developing the criteria. EPA's revised TSD explains more fully the details of these base values. EPA could rely entirely on existing State rules or establish the proposed Federal rules.

4. The conditions under which States will be removed from the rule, either before or after final promulgation, are described in section E.4 of this preamble. EPA could make the conditions for removing the applicability of the rule to a State more or less stringent. A difficult aspect of this issue is a definition of what the State must adopt for EPA to withdraw the applicability of its rule entirely. As currently stated, EPA's policy is that if the State's standards are judged to meet the requirements of the Act and thereby provide adequate environmental protection, EPA will withdraw the applicability of the Federal Rule as to that State. In the context of this proposal, the State would have to demonstrate that the criteria it adopted meet the statutory test of protecting the public health and would protect designated uses. State compliance could be by any one or a combination of the 3 options described in EPA's guidance. Once such a showing were made EPA would propose to withdraw the applicability of its rule entirely. However, if a State fails to make such a demonstration for all pollutants, partial withdrawals for certain pollutants could occur, leaving applicable parts of the Federal rule.

5. EPA must also decide whether it should pick a uniform cancer risk level of, for example, 10^{-6}, for all States included in a final rule, or whether different risk levels for different States are appropriate. EPA today proposes the human health criteria at a cancer risk level of 10^{-6} because such a risk level is conservative for the general population and in the generally applied risk range. However, as noted in section F.5., EPA has approved human health risk levels of 10^{-5} in 10 States, and for some criteria and uses risk levels of 10^{-4}. EPA's review of the explanations provided by the States supporting State-adopted risk levels of less than 10^{-5} focuses on public participation and the supportability of the risk factors included in the State's analysis.

While today's proposed action is predicated on a 10^{-6} risk level for carcinogens, another option that the public should consider in responding to this rule is the application of the proposed criteria at a 10^{-5} risk level. EPA's rationale for proposing at a 10^{-6} risk level was articulated earlier in the preamble. However, there are several arguments to support a less protective 10^{-5}level. The model used to calculate the criteria for carcinogens is a conservative one and has a very low probability of underestimating the potency of a carcinogen. As a result, a higher level of accepted risk as the endpoint for criteria calculations may be reasonable. For "Class C" carcinogens, i.e., those for which the data demonstrating oncogenicity in animal studies are most limited, a 10^{-5} risk level is closer to the criteria values calculated as Rfds (non-cancer endpoints of toxicity) for these chemicals. Use of RfDs reduces the likelihood that EPA is over-regulating chemicals of less definitive cancer potency. A 10^{-5} risk is within the range of accepted risks for other major EPA rulemakings which aim to protect the general public, such as national drinking water standards.

Similarly, EPA must decide what a State must adopt in the way of a risk level for EPA to withdraw a final rule. The question to be addressed is whether EPA can accept less stringent risk levels (applied statewide; by individual chemicals, or by geographical sub-area) than contained in EPA's final rule if such less stringent risk levels were adopted following State administrative procedures and adequately supported by the administrative record.

6. Today's proposed rulemaking includes an Agency proposal to establish criteria for only those EPA priority toxic pollutant criteria which are based on toxic effects. The Agency could include other section 304(a) priority toxic pollutant criteria

recommendations which are based on organoleptic (i.e., taste and odor) effects. The logic would be that the congressional reference to "toxic pollutants" in section 303(c)(2)(B) was the generic list of 126 priority toxic pollutants and EPA should include all such criteria developed for these pollutants rather than just those based on toxicity. Organoleptic effects cause taste and odor problems in drinking water which may increase treatment costs or the selection by the public of alternative but less protective sources of drinking water; and may cause tainting or off flavors in fish flesh and other edible aquatic life reducing their marketability, thus diminishing the recreational and resource value of the water. EPA believes that because the Section 303(c)(2)(B) focuses on toxicity of the priority toxic pollutants, EPA's proposal should likewise focus on toxicity.

7. EPA also invites public comment on the merits of promulgating a translator procedure (that could support derivation of new or revised chemical-specific criteria for those priority toxic pollutants for which EPA has not issued section 304(a) criteria guidance) for States in this rule to enhance State and EPA implementation of section 303 (c)(2)(B). Such a procedure would supplement the specific numeric criteria included in this proposal. The rationale for, and specifics of, such an approach are described below.

As discussed in previous sections of this preamble, CWA section 303(c)(2)(B) represents a clear congressional mandate for State adoption of chemical-specific numeric criteria for priority toxic pollutants where EPA has issued section 304(a) criteria guidance. However, where no such criteria exist, section 303(c)(2)(B) went on to direct States that, " * * * Where such numerical criteria are not available, whenever a State reviews water quality standards * * * or revises or adopts new standards * * *, such State shall adopt criteria based on biological monitoring or assessment methods * * *.

EPA's December 1988 national guidance provided States with three options for satisfying the chemical-specific criteria requirements. Option 3 of the guidance allows States to adopt and apply translator procedures. As described in section B-3 of this preamble, such translator procedures are defined as the methods, equations, and protocols by which a State calculates derived chemical-specific numeric criteria for priority toxic pollutants to ensure that the State's narrative toxics criterion is fully satisfied.

There are several alternative approaches for establishing a translator procedure. All approaches would utilize EPA's criteria guidelines (i.e., for aquatic life and human health as described in section F.1. of this preamble) as the basis for deriving chemical-specific criteria. They could also require EPA to periodically issue an updated list of derived numeric criteria and notice the availability of the list in the **Federal Register**.

One alternative would be to promulgate a mechanism for State usage only for the pollutants where EPA has not issued a section 304 (a) criteria guidance document.

Another alternative would be to allow criteria revisions in specific situations where EPA determines that a revised criterion is necessary. For example, if EPA issued a final revised estimate of the cancer potency slope of a priority toxic pollutant (i.e., by adding it to IRIS), such cancer slopes would be available for use in deriving new human health criteria for that pollutant following the translator procedure. Another example would be situations where additional data on the toxicity of a pollutant to aquatic life becomes available such that the minimum database requirements in the EPA criteria guidelines are satisfied. In such situations, the data could be applied to the translator procedure to derive new or revised aquatic life criteria more rapidly than the current method of proposing for comment and then publishing a final section 304(a) recommendation for subsequent consideration by States. This alternative would apply to criteria for both aquatic life and human health protection and could apply to pollutants for which a section 304(a) criteria recommendation exists or to those pollutants where no such recommendation exists.

A third approach would limit the applicability of the translator procedure to the priority toxic pollutants for which numeric criteria are contained in today's proposed rulemaking. Under this alternative, criteria could not be derived for pollutants without a section 304(a) criteria recommendation using the translator procedure, even where: (1) Formal Agency estimates of the parameters necessary to support derivation are issued, or (2) the data necessary to satisfy the minimum database requirements become available.

A final alternative providing only limited flexibility would be to limit use of the translator procedure to human health criteria where the Agency issues a final revised risk assessment for the parameter in IRIS. Such IRIS estimates are subject to extensive intra-Agency review. This alternative would limit revisions to situations where EPA makes a formal determination that a revised human health risk assessment is appropriate.

The Agency invites public comment on the environmental, programmatic and legal aspects of including a promulgation of a criteria translator mechanism for each State in the final issuance of this rulemaking. Comment is also invited on the scope and details of such an approach as described above.

8. EPA solicits comment on the section 304(a) assessment methodology (cancer and non-cancer) used to derive human health criteria for section 307(a) priority toxic pollutants. This methodology is discussed in section F of the Preamble but is derived in the criteria methodology published in the **Federal Register** on November 26, 1980 (45 FR 79347). For example, EPA has included proposed criteria for 3 PAHs (acenaphthylene, benzo(ghi)perylene and phenanthrene). The included criteria treat these PAHs as carcinogens and are based on data for benzo(a)pyrene. The section 304(a) criteria methodology does not distinguish between classes of carcinogens and allows the use of closely related chemicals of similar structure to carry the same criteria recommendation. This methodology is basic to the development of the human health criteria proposed today.

I. Executive Order 12291

Executive Order 12291 requires EPA and other agencies to perform regulatory impact analyses for major regulations. Major regulations are those that impose an annual cost to the economy of $100 million or more, or meet other criteria. This is a major regulation, however, a regulatory impact analyses has been waived by the Office of Management and Budget for this proposal for the reasons discussed below.

This rulemaking establishes a legal minimum standard where States have failed to comply with the statutory mandate to adopt numeric criteria for toxic pollutants. The impacts to dischargers are no different than what would occur if States had acted to adopt their own standards. There will be a cost to dischargers for complying with these proposed new standards as the standards are translated into specific NPDES permit limits for individual dischargers. However, for reasons discussed in more detail below, a meaningful cost estimate is difficult to develop. The increased costs incurred will depend upon the type and amount of pollutants discharged and the extent to which additional treatment needs to be installed beyond that which is required to meet the generally applicable technology-based limit regulations. As discussed earlier in the Preamble, the control of toxic pollutants is expected to provide societal benefits by reducing risk to human health and to reduce ecological impacts on aquatic life.

The general impacts on point source dischargers, publicly owned treatment works (POTWs) and nonpoint sources may be described. By establishing new goals for a waterbody, the addition of criteria for toxic pollutants into State water quality standards will affect the wasteload allocations developed for each waterbody segment to the extent the pollutant is actually discharged into the stream. If the pollutant is not present in the wastestream, the addition of criteria has no impact. Revised wasteload allocations may result in adjustments to individual NPDES permit limits for point source dischargers which could result in increased incremental treatment costs required to meet the revised water quality standards. These costs will vary depending on the types of treatment involved, the number and kind of pollutant(s) being treated, and the controls necessary to meet the technologically based effluent limits for a given industry.

Compliance costs for indirect industrial dischargers will be reflected in increased incremental costs for POTWs assuming that industrial sources are the primary source of toxics discharged by POTWs and that the incremental treatment costs incurred by POTWs will be passed along to their industrial dischargers. Possible areas where the addition of criteria for toxic pollutants into State standards may have a cost impact include: (1) POTW expansion, (2) operational changes, and (3) increased operator training costs.

Increased costs may also be incurred by nonpoint sources of toxic pollutants to the extent that best management practices need to be modified to reflect the revised standards. Although there is no comparable Federal permit program for nonpoint sources as there is to control point source discharges, there are existing State regulatory programs to control nonpoint sources.

Monitoring programs to generate information on the existing quality of water and the kinds and amount of pollutants being discharged are likely to be affected by this proposed rulemaking. However, the addition of criteria for toxic pollutants into State standards does not require the State to engage in a program to monitor for all such pollutants unless there is some reasonable expectation that the pollutants are manufactured or actually used in the State with the likelihood that they will be discharged into surface waters.

While recognizing that the application of criteria for toxic pollutants will result in increased treatment costs and that such costs are appropriately considered in several areas of the standards to permits process, it is important to consider the difficulties and the large potential uncertainties involved in developing meaningful cost estimates for purposes of this proposed rulemaking. The development of compliance cost estimates would require numerous assumptions about pollutant loadings, impacts of technology-based regulations on loadings, combinations of pollutants handled by a given treatment approach, the costs of each treatment train and the variables for each pollutant in each waterbody in each State. There are many sources of uncertainty in making these assumptions, and the resulting estimates could contain such significant estimation errors that the figures would have questionable value.

This proposed rule, including the above determination, has been reviewed by the Office of Management and Budget. Any written comments from OMB to EPA and any EPA response to those comments are included in the public record and are available for inspection.

J. Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*, Pub. L. 96–354) requires EPA to assess whether its regulations create a disproportionate effect on small entities. According to the provisions of the Act, EPA must prepare an initial regulatory flexibility analysis for all proposed regulations that have a significant impact on a substantial number of small entities. There will be a cost to dischargers for complying with these standards as they are translated into permit limits for individual dischargers. However, for the reasons discussed in the previous section, a meaningful estimate of the total cost or impact on small entities cannot be meaningfully computed.

This proposed regulation fills a regulatory void left by States not fully complying with the statute; thus, the impact on small entities is not different than what would have occurred if States had acted to adopt standards. In addition, the water quality standards regulation provides several means (such as adjusting designated uses, setting site-specific criteria, or granting variances) to consider costs and adjust standards to account for the impacts on dischargers.

K. Paperwork Reduction Act

The information collection requirements associated with this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* An Information Collection Request (ICR) document has been prepared by EPA (ICR No. 0988.04) and a copy may be obtained from Sandy Farmer, Information Policy Branch; EPA; 401 M St., SW. (PM-223Y); Washington, DC 20460 or by calling (202) 382–2740.

Public reporting burden for this collection of information is estimated to average 745 hours per respondent, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection information.

Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Chief, Information Policy Branch, PM-223Y, U.S. EPA, 401 M St., SW., Washington, DC 20460; and to the Office of Information and Regulatory Affairs; Office of Management and Budget, Washington, DC 20503, marked "Attention: Desk Officer for EPA." The final rule will respond to any OMB or public comments on the information collection requirements contained in th s proposal.

List of Subjects

Water quality standards, Toxic pollutants.

Dated: November 6, 1991.

William K. Reilly,

Administrator.

For the reasons set out in the preamble, part 131 of title 40 of the Code of Federal Regulations is proposed to be amended as follows:

PART 131—WATER QUALITY STANDARDS

1. The authority citation for part 131 continues to read as follows:

Authority: Clean Water Act, Pub. L. 92–500, as amended; 33 U.S.C. 1251 *et seq.*

2. Section 131.36 is added to subpart D, to read as follows:

§ 131.36 Toxics criteria for those states not complying with Clean Water Act section 303(c)(2)(B)

(a) *Scope.* This section is not a general promulgation of the section 304(a) criteria for priority toxic pollutants but is restricted to specific pollutants in specific States.

(b) *EPA's Section 304(a) Criteria for Priority Toxic Pollutants*

	A		B		C		D	
			Freshwater		Saltwater		Human health (10^{-6} risk for carcinogens)	
							For consumption of:	
	(#) Compound	CAS No.	Criterion maximum concentration d (μg/L) B1	Criterion continuous concentration d (μg/L) B2	Criterion maximum concentration d (μg/L) C1	Criterion continuous concentration d (μg/L) C2	Water and organisms (μg/L) D1	Organisms only (μg/L) D2
1	Antimony	7440360					14 a	4300 a
2	Arsenic	7440382	360	190	69	36	0.018 bc	0.14 bc
3	Beryllium	7440417					0.0077 ac	0.13 ac
4	Cadmium	7440439	3.9 e	1.1 e	43	9.3	16	170 aj
5a	Chromium (III)	16065831	1700 e	210 e			33000 a	670000 a
b	Chromium (VI)	18540299	16	11	1100	50	170 a	3400 a
6	Copper	7440508	18 e	12 e	2.9	2.9	(1300) b	
7	Lead	7439921	62 e	3.2 e	220	8.5	50	
8	Mercury	7439976	2.4	0.012 i	2.1	0.025 i	0.14	0.15
9	Nickel	7440020	1400 e	160 e	75	8.3	610 a	4600 a
10	Selenium	7782492	20	5	300	71	100 b	6800 bj
11	Silver	7440224	4.1 e		2.3		105 a	65000 aj
12	Thallium	7440280					1.7 a	6.3 a
13	Zinc	7440666	120 e	110 e	95	86		
14	Cyanide	57125	22	5.2	1	1	700 a	220000 aj
15	Asbestos	1332214					7,000,000 fibers/L k	
16	2,3,7,8-TCDD (Dioxin)	1746016					0.000000013 c	0.000000014 c
17	Acrolein	107028					320	780
18	Acrylonitrile	107131					0.059 ac	0.66 ac
19	Benzene	71432					1.2 ac	71 ac
20	Bromoform	75252					4.3 ac	360 ac
21	Carbon Tetrachloride	56235					0.25 ac	4.4 ac
22	Chlorobenzene	108907					680 a	21000 aj
23	Chlorodibromomethane	124481					0.41 ac	34 ac
24	Chloroethane	75003						
25	2-Chloroethylvinyl Ether	110758						
26	Chloroform	67663					5.7 ac	470 ac
27	Dichlorobromomethane	75274					0.27 ac	22 ac
28	1,1-Dichloroethane	75343						
29	1,2-Dichloroethane	107062					0.38 ac	99 ac
30	1,1-Dichloroethylene	75354					0.057 ac	3.2 ac
31	1,2-Dichloropropane	78875					(0.52) kc	(39) kc
32	1,3-Dichloropropylene	542756					10 a	1700 a
33	Ethylbenzene	100414					3100 a	29000 a
34	Methyl Bromide	74839					48 a	4000 a
35	Methyl Chloride	74873					5.7 ac	470 ac
36	Methylene Chloride	75092					4.7 ac	1600 ac
37	1,1,2,2-Tetrachloroethane	79345					0.17 ac	11 ac
38	Tetrachloroethylene	127184					0.8 c	8.85 c
39	Toluene	108883					6800 a	200000 a
40	1,2-Trans-Dichloroethylene	156605					(700) a	(140000) a
41	1,1,1-Trichloroethane	71556					3100 a	(170000) a
42	1,1,2-Trichloroethane	79005					0.60 ac	42 ac
43	Trichloroethylene	79016					2.7 c	81 c
44	Vinyl Chloride	75014					2 c	525 c
45	2-Chlorophenol	95578					(120) a	(400) a
46	2,4-Dichlorophenol	120832					93 a	790 aj
47	2,4-Dimethylphenol	105679					(540) a	(2300) a
48	2-Methyl-4,6-Dinitrophenol	534521					13.4	765
49	2,4-Dinitrophenol	51285					70 a	14000 a
50	2-Nitrophenol	88755						
51	4-Nitrophenol	100027						
52	3-Methyl-4-Chlorophenol	59507						
53	Pentachlorophenol	87865	20 f	13 f	13	7.9	0.28 ac	8.2 acj
54	Phenol	108952					21000 a	4600000 aj
55	2,4,6-Trichlorophenol	88062					2.1 ac	6.5 ac
56	Acenaphthene	83329					(1200) a	(2700) a
57	Acenaphthylene	208968					0.0028 c	0.031 c
58	Anthracene	120127					9600 a	110000 a
59	Benzidine	92875					0.00012 ac	0.00054 ac
60	Benzo(a)Anthracene	56553					0.0028 c	0.031 c
61	Benzo(a)Pyrene	50328					0.0028 c	0.031 c
62	Benzo(b)Fluoranthene	205992					0.0028 c	0.031 c

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A			B		C		D	
			Freshwater		Saltwater		Human health (10^{-6} risk for carcinogens)	
							For consumption of:	
(#)	Compound	CAS No.	Criterion maximum concentration d (μg/L) B1	Criterion continuous concentration d (μg/L) B2	Criterion maximum concentration d (μg/L) C1	Criterion continuous concentration d (μg/L) C2	Water and organisms (μg/L) D1	Organisms only (μg/L) D2
63	Benzo(ghi)Perylene	191242					0.0028 c	0.031 c
64	Benzo(k)Fluoranthene	207089					0.0028 c	0.031 c
65	Bis(2-Chloroethoxy)Methane	111911						
66	Bis(2-Chloroethyl)Ether	111444					0.031 ac	1.4 ac
67	Bis(2-Chloroisopropyl)Ether	108601					1400 a	170000 a
68	Bis(2-Ethylhexyl)Phthalate	117817					1.8 ac	5.9 ac
69	4-Bromophenyl Phenyl Ether	101553						
70	Butylbenzyl Phthalate	85687					(3000) a	(5200) a
71	2-Chloronaphthalene	91587					(1700) a	(4300) a
72	4-Chlorophenyl Phenyl Ether	7005723						
73	Chrysene	218019					0.0028 c	0.031 c
74	Dibenzo(a,h)Anthracene	53703					0.0028 c	0.031 c
75	1,2-Dichlorobenzene	95501					2700 a	17000 a
76	1,3-Dichlorobenzene	541731					400	2600
77	1,4-Dichlorobenzene	106467					400	2600
78	3,3'-Dichlorobenzidine	91941					0.04 ac	0.077 ac
79	Diethyl Phthalate	84662					23000 a	120000 a
80	Dimethyl Phthalate	131113					313000	2900000
81	Di-n—Butyl Phthalate	84742					2700 a	12000 a
82	2,4-Dinitrotoluene	121142					0.11 c	9.1 c
83	2,6-Dinitrotoluene	606202						
84	Di-n-Octyl Phthalate	117840						
85	1,2-Diphenylhydrazine	122667					0.040 ac	0.54 ac
86	Fluoranthene	206440					300 a	370 a
87	Fluorene	86737					1300 a	14000 a
88	Hexachlorobenzene	118741					0.00075 ac	0.00077 ac
89	Hexachlorobutadiene	87683					0.44 ac	50 ac
90	Hexachlorocyclopentadiene	77474					240 a	17000 aj
91	Hexachloroethane	67721					1.9 ac	8.9 ac
92	Indeno(1,2,3-cd)Pyrene	193395					0.0028 c	0.031 c
93	Isophorone	78591					8.4 ac	600 ac
94	Naphthalene	91203						
95	Nitrobenzene	98953					17 a	1900 aj
96	N-Nitrosodimethylamine	62759					0.00069 ac	8.1 ac
97	N-Nitrosodi-n-Propylamine	621647					(0.005) ac	(1.4) ac
98	N-Nitrosodiphenylamine	86306					5.0 ac	16 ac
99	Phenanthrene	85018					0.0028 c	0.031 c
100	Pyrene	129000					960 a	11000 a
101	1,2,4-Trichlorobenzene	120821						
102	Aldrin	309002	3 g		1.3 g		0.00013 ac	0.00014 ac
103	alpha-BHC	319846					0.0039 ac	0.013 ac
104	beta-BHC	319857					0.014 ac	0.046 ac
105	gamma-BHC	58899	2 g	0.08 g	0.16 g		0.019 c	0.063 c
106	delta-BHC	319868						
107	Chlordane	57749	2.4 g	0.0043 g	0.09 g	0.004 g	0.00057 ac	0.00059 ac
108	4-4'-DDT	50293	1.1 g	0.001 g	0.13 g	0.001 g	0.00059 ac	0.00059 ac
109	4,4'-DDE	72559					0.00059 ac	0.00059 ac
110	4,4'-DDD	72548					0.00083 ac	0.00084 ac
111	Dieldrin	60571	2.5 g	0.0019 g	0.71 g	0.0019 g	0.00014 ac	0.00014 ac
112	alpha-Endosulfan	959988	0.22 g	0.056 g	0.034 g	0.0087 g	0.93 a	2.0 a
113	beta-Endosulfan	33213659	0.22 g	0.056 g	0.034 g	0.0087 g	0.93 a	2.0 a
114	Endosulfan Sulfate	1031078					0.93 a	2.0 a
115	Endrin	72208	0.18 g	0.0023 g	0.037 g	0.0023 g	0.76 a	0.81 aj
116	Endrin Aldehyde	7421934					0.76 a	0.81 aj
117	Heptachlor	76448	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00021 ac	0.00021 ac
118	Heptachlor Epoxide	1024573	0.52 g	0.0038 g	0.053 g	0.0036 g	0.00010 ac	0.00011 ac
119	PCB-1242	53469219		0.014 g		0.03 g	0.000044 ac	0.000045 ac
120	PCB-1254	11097691		0.014 g		0.03 g	0.000044 ac	0.000045 ac
121	PCB-1221	11104282		0.014 g		0.03 g	0.000044 ac	0.000045 ac
122	PCB-1232	11141165		0.014 g		0.03 g	0.000044 ac	0.000045 ac
123	PCB-1248	12672296		0.014 g		0.03 g	0.000044 ac	0.000045 ac
124	PCB-1260	11096825		0.014 g		0.03 g	0.000044 ac	0.000045 ac
125	PCB-1016	12674112		0.014 g		0.03 g	0.000044 ac	0.000045 ac
126	Toxaphene	8001352	0.73	0.0002	0.21	0.0002	0.00073 ac	0.00075 ac
	Total No. of Criteria (h) =		24	29	33	27	103	102

Footnotes:

a. Criteria revised to reflect current agency $q_1{}^*$ or RfD, as contained in the Integrated Risk Information System (IRIS). The fish tissue bioconcentration factor (BCF) from the 1980 criteria documents was retained in all cases. Values in parentheses indicate that no health based criteria appeared in the 1980 documents. The criteria in parentheses are not being proposed today but are presented as notice for inclusion in future state triennial reviews.

b. EPA in the Office of Research and Development's Environmental Criteria and Assessment Office prepared draft updates of criteria documents for arsenic, copper and selenium which are used instead of IRIS for this rulemaking. Each document was entitled as an "Addendum" to the prior criteria documents. These documents are available in the record for this proceeding.

c. Criteria based on carcinogenicity (10^{-6} risk).

d. Criteria Maximum Concentration=the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects.

Criteria Continuous Concentration=the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4-days) without deleterious effects.

μg/L=micrograms per liter

e. Freshwater aquatic life criteria for these metals are expressed as a function of total hardness (mg/L), as follows (where exp represents the base e exponential function). (Values displayed above in the matrix correspond to a total hardness of 100 mg/L.)

	CMC=exp{m_A [ln(hardness)] + b_A}		CCC=exp{m_C [ln(hardness)] + b_C}	
	m_A	b_A	m_C	b_C
Cadmium	1.128	−3.828	0.7852	−3.490
Copper	0.9422	−1.464	0.8545	−1.465
Chromium (III)	0.8190	3.688	0.8190	1.561
Lead	1.273	−1.460	1.273	−4.705
Nickel	0.8460	3.3612	0.8460	1.1645
Silver	1.72	−6.52		
Zinc	0.8473	0.8604	0.8473	0.7614

f. Freshwater aquatic life criteria for pentachlorophenol are expressed as a function of pH, and are calculated as follows. (Values displayed above in the matrix correspond to a pH of 7.8.)

CMC=exp(1.005(pH)−4.830) CCC=exp(1.005(pH)−5.290)

g. Aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development. The acute values shown are final acute values (FAV). According to the 1980 Guidelines, the acute values were intended to be interpreted as instantaneous maximum values, and the chronic values shown were interpreted as 24-hour average values. EPA has not updated these criteria pursuant to the 1985 Guidelines. However, as an approximation, dividing the final acute values in columns B1 and C1 by 2 yields a Criterion Maximum Concentration. No numeric changes are required for columns B2 and C2, and EPA suggests using these values directly as Criterion Continuous Concentration.

h. These totals simply sum the criteria in each column. For aquatic life, there are 30 priority toxic pollutants with some type of freshwater or saltwater, acute or chronic criteria proposed. For human health, there are 102 priority toxic pollutants with either "water + fish" or "fish only" criteria proposed. Note that these totals count chromium as one pollutant even though EPA has developed criteria based on two valence states. In the matrix, EPA has assigned numbers 5a and 5b to the proposed criteria for chromium to reflect the fact that the list of 126 priority toxic pollutants includes only a single listing for chromium. Criteria enclosed in parentheses are also *not* included in the totals.

i. Applies to methyl mercury.

j. No criteria for protection of human health from consumption of aquatic organisms (excluding water) was presented in the 1980 criteria document or in the 1986 Quality Criteria for Water. Nevertheless, the criterion value has not been placed in parentheses, because sufficient information was presented in the 1980 document to allow a calculation of a criterion, even though the results of such a calculation were not shown in the document.

k. The criterion for asbestos is the MCL (56 FR 3526, January 30, 1991). The criteria for 1,2-dichloropropane have been derived using MCL (56 FR 3526, January 30, 1991).

General notes:

(1) This chart lists all of EPA's priority toxic pollutants whether or not criteria recommendations are available. Blank spaces indicate the absence of criteria recommendations. Because of variations in chemical nomenclature systems, this listing of toxic pollutants does not duplicate the listing in appendix A of 40 CFR part 423. EPA has added the Chemical Abstracts Service (CAS) registry numbers, which provide a unique identification for each chemical.

(2) The following chemicals have organoleptic based criteria recommendations that are not included on this chart (for reasons which are discussed in the preamble): copper, zinc, chlorobenzene, 2-chlorophenol, 2,4-dichlorophenol, acenaphthene, 2,4-dimethylphenol, 3-methyl-4-chlorophenol, hexachlorocyclopentadiene, pentachlorophenol, phenol

(3) For purposes of this rulemaking, freshwater criteria apply at salinity levels equal to or less than 1 part per thousand (ppt); saltwater criteria apply at salinity levels equal to or greater than 10 ppt; for waters with salinity between 1 and 10 ppt, the applicable criteria are the more stringent of the freshwater or saltwater criteria.

(c) *Applicability.* (1) The criteria in paragraph (b) of this section apply to the States' designated uses cited in paragraph (d) of this section and supersede any criteria adopted by the State, except when State regulations contain criteria which are more stringent for a particular use in which case the State's criteria will continue to apply;

(2) The criteria established in this section are subject to the State's general rules of applicability in the same way and to the same extent as are the other numeric toxics criteria when applied to the same use classifications including mixing zones, and low flow values below which numeric standards can be exceeded in flowing fresh waters, but only if these State general policies have been reviewed and approved previously by EPA after November 8, 1983.

(i) For all waters with approved EPA mixing zone regulations or implementation procedures, the criteria apply at the appropriate locations within or at the boundary of the mixing zones; otherwise the criteria apply throughout the waterbody including at the end of any discharge pipe, canal or other discharge point.

(ii) A State shall not use a low flow value below which numeric standards can be exceeded that is less stringent than the following for waters suitable for the establishment of low flow return frequencies (i.e., streams and rivers):

Aquatic Life
- acute criteria (CMC): I Q 10 or I B 3
- chronic criteria (CCC): 7 Q 10 or 4 B 3

Human Health
- non-carcinogens; 30 Q 5
- carcinogens; harmonic mean flow

where:

CMC—criteria maximum concentration=the water quality criteria to protect against acute effects in aquatic life and is the highest instream concentration of a priority toxic pollutant consisting of a one-hour average not to be exceeded more than once every three years on the average.

CCC—criteria continuous concentration=the water quality criteria to protect against chronic effects in aquatic life is the highest instream concentration of a priority toxic pollutant consisting of a 4-day average not to be exceeded more than once every three years on the average.

1 Q 10 is the lowest one day flow with an average recurrence frequency of once in 10 years determined hydrologically;

1 B 3 is biologically based and indicates an allowable exceedence of once every 3 years. It is determined by EPA's computerized method (DFLOW model);

7 Q 10 is the lowest average 7 consecutive day low flow with an average recurrence frequency of once in 10 years determined hydrologically:

4 B 3 is biologically based and indicates an allowable exceedence for 4 consecutive days once every 3 years. It is determined by EPA's computerized method (DFLOW model);

30 Q 5 is the lowest average 30 consecutive day low flow with an average recurrence frequency of once in 5 years determined hydrologically and, the harmonic mean flow is a long term mean flow value calculated by dividing the number of daily flows analyzed by the sum of the reciprocals of those daily flows.

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(iii) If a State does not have such a low flow value for numeric standards compliance, then none shall apply and the criteria included in paragraph (d) of this section herein apply at all flows.

(3) The aquatic life criteria in the matrix in paragraph (b) of this section apply as follows:

(i) For waters in which the salinity is equal to or less than 1 part per thousand, the applicable criteria are the freshwater criteria in Column B.

(ii) For waters in which the salinity is equal to or greater than 10 parts per thousand, the applicable criteria are the saltwater criteria in Column C;

(iii) For waters in which the salinity is between 1 and 10 parts per thousand, the applicable criteria are the more stringent of the freshwater or saltwater criteria. However, the Regional Administrator may approve the use of alternative criteria if scientifically defensible information and data demonstrate that on a site-specific basis the biology of the waterbody is dominated by freshwater aquatic life and that freshwater criteria are more appropriate; or conversely, the biology of the waterbody is dominated by saltwater aquatic life and that saltwater criteria are more appropriate.

(4) Application of metals criteria. (i) For purposes of calculating freshwater aquatic life criteria for metals from the equations in footnote (e) in the criteria matrix in paragraph (b) of this section, the minimum hardness allowed for use in those equations shall not be less than 25 mg/l, as calcium carbonate, even if the actual ambient hardness is less than 25 mg/l as calcium carbonate. The maximum hardness value for use in those equations shall not exceed 400 mg/l as calcium carbonate, even if the actual ambient hardness is greater than 400 mg/l as calcium carbonate.

(ii) The hardness values used shall be consistent with the design discharge conditions established in pararaph (c)(2) of this section for flows and mixing zones.

(d) *Criteria for Specific Jurisdictions.*—(1) *Connecticut, Region 1*

(i) All waters assigned to the following use classifications in the "State of Connecticut Water Quality Standards" adopted pursuant to section 22a–426 of the Connecticut General Statutes are subject to the criteria in paragraph (d)(1)(ii) of this section, without exception:

II.5.(A)—Class AA Surface Waters
II.5.(B)—Class A and SA Surface Waters
II.5.(C)—Class B and SB Surface Waters

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classifications identified in paragraph (d)(1)(i) of this section:

Use classification	Applicable criteria
Class AA; Class A; Class B waters where water supply use is designated.	Each of these classifications is assigned the criteria in: Column B(I)—all. Column B(II)—all. Column D(I)—all.
Class B waters where water supply use is not designated.	This classification is assigned the criteria in: Column B(I)—all. Column B(II)—all. Column D(II).
Class SA; Class SB	Each of these classifications is assigned the criteria in: Column C(I)—all. Column C(II)—all. Column D (II)—all.

(2) *New Hampshire, Region 1*

(i) All waters assigned to the following use classifications in the New Hampshire Revised Statutes Annotated Chapter 149:3 are subject to the criteria in paragraph (d)(2)(ii) of this section, without exception:

149:3.I Class A
149:3.II Class B
149:3.III Class C

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classifications identified in paragraph (d)(a)(i) of this section:

Use classification	Applicable criteria
Class A; Class B waters where water supply use is designated.	Each of these classifications is assigned the criteria in: Column D (I)—#16.
Class B waters where water supply use is not designated Class C.	Column D(II)—#16.

(3) *Rhode Island, Region 1*

(i) All waters assigned to the following use classifications in the Water Quality Regulations for Water Pollution Control adopted under chapters 46–12, 42–17.1, and 42–35 of the General Laws of Rhode Island are subject to the criteria in paragraph d(3)(ii) of this section without exception:

6.21 Freshwater
Class A
Class B
Class C
6.22 Saltwater
Class SA
Class SB
Class SC

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classifications identified in paragraph (d)(3)(i) of this section:

Use classification	Applicable criteria
Class A; Class B waters where water supply use is designated.	These classifications are assigned the criteria in: Column D (I)—all.
Class B waters where water supply use is not designated Class C; Class SA; Class SB; Class SC.	Each of these classifications is assigned the criteria in: Column D (II)—all.

(4) *Vermont, Region 1*

(i) All waters assigned to the following use classifications in the Vermont Water Quality Standards adopted under the authority of the Vermont Water Pollution Control Act (10 V.S.A., Chapter 47) are subject to the criteria in paragraph (d)(4)(ii) of this section, without exception:

Class A
Class B
Class C

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classifications identified in paragraph (d)(4)(i) of this section:

Use classification	Applicable criteria
Class A; Class B waters where water supply use is designated.	This classification is assigned the criteria in: Column B(I)—all. Column B(II)—all. Column D(I)—all.
Class B waters where water supply use is not designated; Class C.	These classifications are assigned the criteria in: Column B(I)—all. Column B(II)—all. Column D(II)—all.

(5) *New Jersey, Region 2*

(i) All waters assigned to the following use classifications in the New Jersey Administrative Code (N.J.A.C.) 7:9–4.1 et seq., Surface Water Quality Standards, are subject to the criteria in paragraph (d)(5)(ii) of this section, without exception:

N.J.A.C. 7:9–4.12(c): Class FW2
N.J.A.C. 7:9–4.12(d): Class SE1
N.J.A.C. 7:9–4.12(e): Class SE2
N.J.A.C. 7:9–4.12(f): Class SE3
N.J.A.C. 7:9–4.12(g): Class SC

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classifications identified in paragraph (d)(5)(i) of this section:

Use classification	Applicable criteria
FW2	This classification is assigned the criteria in: Column B(1)—all except #102, 105, 107, 108, 111, 112, 113, 115, 117, and 118. Column B(2)—all except #105, 107, 108, 111, 112, 113, 115, 117, 118, 119, 120, 121, 122, 123, 124, and 125. Column D(1)—all except #4, 5a, 5b, 7, 10, and 11. Column D(2)—all.
SE1, SE SE3, SC.	These classifications are each assigned the criteria in: Column C(1)—all except #102, 105, 107, 108, 111, 112, 113, 115, 117, and 118. Column C(2)—all except #105, 107, 108, 111, 112, 113, 115, 117, 118, 119, 120, 121, 122, 123, 124, and 125. Column D(2)—all.

(6) *Puerto Rico, Region 2*

(i) All waters assigned to the following use classifications in the Puerto Rico Water Quality Standards (promulgated by Resolution Number R-83-5-2) are subject to the criteria in paragraph (d)(6)(ii) of this section, without exception.

Article 2.2.2—Class SB
Article 2.2.3—Class SC
Article 2.2.4—Class SD

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classifications identified in paragraph (d)(6)(i) of this section:

Use classification	Applicable criteria
Class SD	This classification is assigned criteria in: Column B(1)—all, except: 10, 102, 105, 107, 108, 111, 112, 113, 115, 117, and 126. Column B(2)—all, except: 105, 107, 108, 112, 113, 115, and 117. Column D(1)—all, except: 4, 5a, 5b, 6, 7, 10, 11, 14, 105, 112, 113, and 115. Column D(2)—all, except: 4, 5a, 5b, 10, 14, 105, 112, 113, and 115.
Class SB, Class SC.	These classifications are assigned criteria in: Column C(1)—all, except: 4, 5b, 7, 8, 10, 11, 13, 102, 105, 107, 108, 111, 112, 113, 115, 117, and 126. Column C(2)—all, except: 4, 5b, 10, 13, 108, 112, 113, 115, and 117. Column D(2)—all, except: 4, 5a, 5b, 10, 14, 105, 112, 113, and 115.

(7) *Virginia, Region 3*

(i) All waters assigned to the following use classifications in the Virginia Water Quality Standards, VR680-21 are subject to the criteria in paragraph (d)(6)(ii) of this section without exception:

VR680-21-08 Classes I-VII and PWS

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classifications identified in paragraph (d)(7)(i) of this section:

Use classification	Applicable criteria
Class I	This classification is assigned the criteria in: Column C(I)—all. Column C(II)—all. Column D(II)—all, except #16.
Class II	This classification is assigned the criteria in: Column B(I)—all. Column B(II)—all. Column C(I)—all. Column C(II)—all. Column D(II)—all, except #16.
Class III-VII	Each of these classifications is assigned the criteria in: Column B(I)—all. Column B(II)—all. Column D(II)—all, except #16.
PWS	This classification is assigned the additional criteria in: Column D(I)—all, except #16.

(8) *District of Columbia, Region 3*

(i) All waters assigned to the following use classifications in Chapter 11 Title 21 DCMR, Water Quality Standards of the District of Columbia are subject to the criteria in paragraph (d)(8)(ii) of this section without exception:

1101.2 Class C waters

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classification identified in paragraph (d)(8)(i) of this section:

Use classification	Applicable criteria
Class C	This classification is assigned the additional criteria in: Column B(II)—#10, 118, 126. Column D(I)—#7, 15, 16, 44, 67, 68, 79, 80, 81, 88, 114, 116, 118. Column D(II)—all.

(9) *Florida, Region 4*

(i) All waters assigned to the following use classifications in Chapter 17-301 of the Florida Administrative Code (i.e., identified in Section 17-302.600) are subject to the criteria in paragraph (d)(9)(ii) of this section, without exception:

Class I
Class II
Class III

(ii) The following criteria from the matrix paragraph (b) of this section apply to the use classifications identified in paragraph (d)(9)(i) of this section:

Use classification	Applicable criteria
Class I	This classification is assigned the criteria in: Columns B1 and B2—5(b), 6, 7, 8, 9, 10, 11, 107, 111, 115, 118, and 126; and Column D1—all.
Class II; Class III (marine).	This classification is assigned the criteria in: Columns C1 and C2—2, 6, 7, 8, 9, 11, 13, 14, 111, 115, 118, and 126; and Column D2—all.
Class III (freshwater).	This classification is assigned the criteria in: Columns B1 and B2—5(b), 6, 7, 8, 9, 10, 11, 107, 111, 115, 118, and 126; and Column D2—all.

(10) *Michigan, Region 5*

(i) All waters assigned to the following use classifications in the Michigan Department of Natural Resources Commission General Rules, R 323.1043 Definitions; A to N, (i.e., identified in Section (g) "Designated use") are subject to the criteria in paragraph (d)(10)(ii) of this section, without exception:

(A) Industrial water supply
(B) Agricultural water supply
(C) Public water supply
(D) Recreation
(E) Fish, other aquatic life, and wildlife
(F) Navigation

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classifications identified in paragraph (d)(10)(i) of this section:

Use classification	Applicable criteria
Public water supply	This classification is assigned the criteria in: Column B (I)—all, Column B (II)—all, Column D (I)—all.
All other designations.	These classifications are assigned the criteria in: Column B (I)—all, Column B (II)—all, and Column D (II)—all.

(11) *Arkansas, Region 6*

(i) All waters assigned to the following use classification in Section 4C (Waterbody uses) identified in Arkansas Department of Pollution Control and Ecology's Regulation No. 2 as amended and entitled, "Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas" are subject to the criteria in paragraph (d)(11)(ii) of this section, without exception:

(A) Extraordinary Resource Waters
(B) Ecologically Sensitive Waterbody
(C) Natural and Scenic Waterways
(D) Fisheries:
(*1*) Trout
(*2*) Lakes and Reservoirs
(*3*) Streams
(*i*) Ozark Highlands Ecoregion
(*ii*) Boston Mountains Ecoregion
(*iii*) Arkansas River Valley Ecoregion
(*iv*) Ouachita Mountains Ecoregion
(*v*) Typical Gulf Coastal Ecoregion
(*vi*) Spring Water-influenced Gulf Coastal Ecoregion
(*vii*) Least-altered Delta Ecoregion
(*viii*) Channel-altered Delta Ecoregion
Domestic Water Supply

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classification identified in paragraph (d)(11)(i) of this section:

Use classification	Applicable criteria
Extraordinary resource waters Ecologically sensitive waterbody Natural and scenic waterways Fisheries: (1) Trout (2) Lakes and reservoirs (3) Streams (a) Ozark highlands ecoregion (b) Boston mountains ecoregion (c) Arkansas river valley ecoregion (d) Ouachita mountains ecoregion (e) Typical gulf coastal Ecoregion (f) Spring water-influenced gulf coastal ecoregion (g) Least-altered Delta ecoregion (h) Channel-altered Delta ecoregion.	These uses are each assigned the criteria in Column B1—# 2, 4, 5a, 5b, 6, 7, 8, 9, 10, 11, 13, 14. Column B2—# 2, 4, 5a, 5b, 6, 7, 8, 9, 10, 13, 14. Column D2—all.
Domestic water supply.	This use is assigned the criteria in: Column D1—all.

(12) *Louisiana, Region 6*

(i) All waters assigned to the following use designations in the Louisiana Administrative Code, Title 33—Environmental Quality, Part IX—Water Quality Regulations, Chapter 11 (i.e., identified in Section 1111 Water Use Designations) are subject to the criteria in paragraph (d)(12)(ii) of this section, without exception:

(A) Public Water Supply
(B) Fish and Wildlife Propagation
(C) Oyster Propagation

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classifications identified in paragraph (d)(12)(i) of this section:

Use classification	Applicable criteria
Public water supply	This classification is assigned the criteria in: Column D(I)—#16.
Fish and wildlife propagation.	These classifications are assigned the criteria in: Column D(II) #16.
Oyster propagation	Column D(II) #16.

(13) *Kansas, Region 7*

(i) All waters assigned to the following use classification in the Kansas Department of Health and Environment regulations, K.A.R. 28–16–28b through K.A.R. 28–16–28f, are subject to the criteria in paragraph (d)(13)(ii) of this section, without exception.

Section 28–16–28d:
Section (2)(A)—Special Aquatic Life Use Waters
Section (2)(B)—Expected Aquatic Life Use Waters
Section (2)(C)—Restricted Aquatic Life Use Waters
Section 3—Domestic Water Supply
Section (6)(c)—Consumptive Recreation Use.

(ii) The following criteria from the matrix is paragraph (b) of this section apply to the use classifications identified in paragraph (d)(13)(i) of this section:

Use classification	Applicable criteria
Sections (2)(A), (2)(B), (2)(C), 6(C).	These classifications are each assigned all criteria in: Column B(I), except #9, 13, 102, 105, 107, 108, 111–113, 115, 117, and 126; Column B(II), except #9, 13, 105, 107, 108, 111-113, 115, 117, 119-125, and 126; and Column D(II), except #9, 10, 112, 113, and 115.
Section (3)	This classification is assigned all criteria in: Column D(I), except #9, 10, 12, 112, 113, and 115.

(14) *Colorado, Region 8*

(i)(A) All waters assigned to the following use classifications in the Colorado Classifications and Numeric Standards for the following Basins:

(*1*) Arkansas River Basin—3.2.0 (5CCR 1002–8);
(*2*) Upper Colorado River Basin and North Platte River Basin (Planning Region 12)—3.3.0 (5CCR 1002–8);
(*3*) San Juan and Dolores River Basins—3.4.0 (5CCR 1002–8);
(*4*) Gunnison and Lower Dolores River Basins—3.5.0 (5CCR 1002–8);
(*5*) Rio Grande River Basin 3.6.0 (5CCR 1002–8);
(*6*) Lower Colorado Basin—3.7.0 (5CCR 1002–8);
(*7*) South Platte River Basin, Laramie River Basin, Republican River Basin, Smoky Hill River Basin—3.8.0 (5CCR 1002–8);

are subject to the criteria in paragraph (d)(14)(ii) of this section, except where only particular segments require criteria as delineated in paragraph (d)(14)(ii) of this section.

The following are the use classifications:

(*1*) Domestic Water Supply
(*2*) Class 1—Cold Water Aquatic Life
(*3*) Class 2—Cold Water Aquatic Life
(*4*) Class 1—Warm Water Aquatic Life
(*5*) Class 2—Warm Water Aquatic Life

(ii) The following criteria from the matrix in paragraph (b) of this section apply to the use classifications in paragraph (d)(14)(i) of this section:

Use classification	Applicable criteria
Domestic water supply.	All waters assigned to this use classification are subject to the criteria in: Column D(I)—all except #4, 5a, 5b, 6, 7, 10, 11, 22, 33, 39, 41, 44, 53, 66, 77, 90, 95, 115.
Class 1 Cold Water A.L. Class 2 Cold Water A.L. Class 1 Warm Water A.L. Class 2 Warm Water A.L..	All waters assigned to these use classifications are subject to the criteria in: Column B(I)—#10. Column B(II)—#10. Column D(II)—all and the following specific segments (which have been assigned one of these aquatic life uses) are further assigned the criteria set forth below.

1. The criteria in: B(I)—#2, 4, 5a, 5b, 6, 7, 8, 9, 11, 13, 14; B(II)—#2, 4, 5a, 5b, 6, 7, 8, 9, 13, 14 are assigned to the following specific segments:

• Basin 3.2.0

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