Delaware Riverkeeper Network

Please find attached three documents further demonstrating the dangers of frack wastewater. The first attachment (entitled EPA Consent Order) is an Administrative Order for Compliance on Consent between the EPA and Fluid Recovery Services, Inc., Hart Resource Technologies, Inc., and Pennsylvania Brine Treatment, Inc. This consent order is an example of how fracking wastewater treatment plants routinely exceed effluent limits and face compliance issues for years. The second attachment (entitled Central PA Water Treatment NPDES Application) is a NPDES Permit Application for the Central Pennsylvania Water Treatment facility in McElhattan, PA. Laboratory test results starting on the 43rd page of the PDF show high levels of Alpha and Beta radiologicals as well as high levels of Radium 226 and Radium 228. The third attachment (entitled PA Brine-Rouseville Influent Analysis) is an influent analysis for Pennsylvania Brine Treatment's Rouseville facility. The ninth page of the PDF shows measured levels of Alpha and Beta radioactivity.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

VIA UPS OVERNIGHT DELIVERY

Mr. Paul Hart, President
Hart Resource Technologies, Inc.
Pennsylvania Brine Treatment, Inc.
5035 U.S. Route 110 West
Creekside, Pennslyvania 15732

MAY 0 8 2013

Mr. Devesh Mittal
Fluid Recovery Services, LLC
1 Four Coins Drive
Canonsburg, Pennsylvania 15317

Re: Administrative Order for Compliance on Consent
EPA Docket No.: CWA-03-2013-0051DN

Dear Messrs. Hart and Mittal:

Enclosed please find a fully executed copy of the Administrative Order for Compliance on Consent (AOCC) between EPA and Fluid Recovery Services, Inc. (FRS), Hart Resource Technologies, Inc. (Hart), and Pennsylvania Brine Treatment, Inc (PBT). The AOCC, along with two Consent Agreements and Final Orders (CAFOs) (In re: Hart Resource Technologies, Inc.; EPA Docket No.: CWA-03-2013-0049; and In re: Pennsylvania Brine Treatment, Inc.; EPA Docket No.: CWA-03-2013-0050), collectively embody the settlement of EPA's alleged Clean Water Act violations at facilities currently owned and/or operated by Hart and PBT, located in Creekside, Pennsylvania (Hart), Franklin, Pennsylvania (PBT) and Josephine, Pennsylvania (PBT) (hereinafter, the Facilities). As the parties have discussed, the CAFOs will be finalized after EPA considers any public comments received during the public comment period, which will conclude forty (40) days after the CAFOs are issued.

EPA understands that FRS, Hart, and PBT have also entered into a Consent Order and Agreement (COA) with the Pennsylvania Department of Environmental Protection (DEP) relating to the transfer of National Pollutant Discharge Elimination System Permits from Hart and PBT to FRS. EPA further understands that the COA also provides for the cleanup of radium and other radionuclide materials found at the Facilities pursuant to Pennsylvania's Clean Streams Law, Radiation Protection Act and other state statutes.

If you require any information or assistance regarding this matter, please contact Mr. Mark Bolender, Assistant Regional Council at 215-814-2642 or Ms. Rebecca Crane, Enforcement Officer, NPDES Enforcement Branch, 215-814-2389.

Sincerely,

Jon M. Capacasa, Director
Water Protection Division

Enclosure

cc: Mr. John Holden, PADEP Northwest Regional Office
Mr. Samuel Harper, PADEP Southwest Regional Office
Mr. Lee McDonnell, PADEP Central Office

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

In the Matter of Fluid Recovery Services, LLC One Four Coins Drive Canonsburg, PA 15317 Hart Resource Technologies, Inc. 5035 U.S. Route 110 West Creekside, PA 15732 Pennsylvania Brine Treatment, Inc. 5035 U.S. Route 110 West Creekside, PA 15732 Respondents.	Docket No. CWA-03-2013-0051DN **ADMINISTRATIVE ORDER FOR COMPLIANCE ON CONSENT**

ADMINISTRATIVE ORDER FOR COMPLIANCE ON CONSENT

I. STATUTORY AUTHORITY

1. This Administrative Order for Compliance on Consent ("AOCC" or "Order"), Docket No. CWA 03-2013-0051DN, is issued to Fluid Recovery Services, LLC ("FRS"); Hart Resource Technologies, Inc. ("HRT"); and Pennsylvania Brine Treatment, Inc. ("PBT"), collectively "Respondents," under the authority vested in the United States Environmental Protection Agency ("EPA") by Section 309(a) of the Clean Water Act ("CWA" or "Act"), 33 U.S.C. § 1319(a). The Administrator has delegated this authority to the Regional Administrator of EPA Region III, who, in turn, has re-delegated such authority to the Director of the Water Protection Division for EPA Region III.

II. BACKGROUND

2. Respondent FRS is a Delaware Limited Liability Company.

3. Respondent FRS will be the successor in interest to HRT and PBT as a result of a merger, scheduled to take place on May 9, 2013. When the merger occurs, all assets and liabilities of HRT and PBT will be merged into FRS.

4. As the sole successor to HRT and PBT, Respondent FRS will become the operator of the Creekside centralized waste treatment ("CWT") facility and the owner and operator of the Josephine and Franklin CWT facilities (collectively, the "Facilities") as set forth below:

   a. Hart Resource Technologies- Creekside Facility (the "Creekside Facility")
   5035 U.S. Route 110 West
   Creekside, PA 15732;

   b. Pennsylvania Brine Treatment- Josephine Facility (the "Josephine Facility")
   931 Bells Mill Road
   Josephine, PA 15750; and,

   c. Pennsylvania Brine Treatment- Franklin Facility (the "Franklin Facility")
   5148 U.S. Route 322
   Franklin, PA 16323.

5. On September 28, 2011, EPA issued Administrative Orders for Compliance to HRT (Docket No. CWA-03-0269DN) and PBT (Docket Nos. CWA-03-0273DN and CWA-03-0274DN) for exceeding effluent limits in the Facilities' respective National Pollutant Discharge Elimination System ("NPDES") permits in violation of Section 301 of the Act, 33 U.S.C. § 1311.

6. Issued concurrently with this AOCC are two Consent Agreements and Final Orders ("CAFOs"): (1) Docket No. CWA-03-2013-0049 between EPA and HRT; and (2) Docket No. CWA-03-2013-0050 between EPA and PBT; that resolve administrative penalty liability for CWA violations alleged by EPA in the Administrative Orders referenced in Paragraph 5.

7. EPA considered the terms of this AOCC in entering into the CAFOs referenced in Paragraph 6, above.

8. On April 19, 2011, Pennsylvania Department of Environmental Protection ("PADEP") Secretary Michael Krancer requested that oil and gas well operators to stop transporting wastewater from shale gas extraction activities to CWT facilities and Publicly Owned Treatment Works that could not achieve certain effluent standards. Respondents had been accepting such wastewater for treatment at the Facilities but had also accepted, and still accept, wastewater from operators of conventional oil and gas wells for treatment. Wastewater from conventional oil and gas production was not the subject of Secretary Krancer's request. At present, Respondents are not accepting wastewater from shale gas extraction activities for treatment at the Facilities.

9. For purposes of this AOCC, the term "unconventional oil and gas" shall mean gas from geological shale formations existing below the base of the Elk Sandstone or its geologic

9. For purposes of this AOCC, the term "unconventional oil and gas" shall mean gas from geological shale formations existing below the base of the Elk Sandstone or its geologic equivalent stratigraphic interval where oil and/or natural gas generally cannot be produced at economic flow rates or in economic volumes except by vertical or horizontal well bores stimulated by hydraulic fracture treatments or by using multilateral well bores or other techniques to expose more of the formation to the well bore.

III. FINDINGS OF FACT AND JURISDICTIONAL ALLEGATIONS

10. The findings of fact, jurisdictional allegations, and conclusions of law identified in the Administrative Orders, Docket Nos. CWA-03-2011-0269DN, CWA-03-2011-0273DN, and CWA-03-2011-0274DN, issued to HRT and PBT on September 28, 2011, are incorporated herein by reference. Respondents neither admit nor deny the findings of fact, alleged violations, and conclusions of law contained or referenced in this AOCC.

11. Respondents admit the jurisdictional allegations contained in this AOCC and agree not to contest EPA's jurisdiction to issue and enforce the terms of this AOCC.

IV. CONCLUSIONS OF LAW

12. As described in the Findings of Fact and Jurisdictional Allegations referenced in Paragraph 10, above, EPA concludes that the elements of Section 309(a)(3) of the CWA, 33 USC § 1319(a)(3) are satisfied.

V. ORDER FOR COMPLIANCE

WHEREAS, when the merger referenced in Paragraph 3 occurs, Respondent FRS commits to making significant investments in evaporative based technologies at each of the Facilities that would enable Respondent FRS to treat such wastewater from unconventional oil and gas extraction activities such that all discharges from the Facilities will contain levels of Total Dissolved Solids ("TDS") that do not exceed a monthly average of 500 mg/L.

WHEREAS, Respondents shall submit applications for a PADEP Waste Management General Permit for the Processing and Beneficial Use of Oil and Gas Liquid Waste ("WMGR123") for any Facility at which Respondents wish to accept wastewater from unconventional oil and gas extraction activities for recycle or reuse.

WHEREAS, Respondents shall apply to PADEP for Water Quality Management ("WQM") Permits, where applicable, prior to the construction and installation of new treatment equipment at any of the Facilities in accordance with all applicable requirements in 40 C.F.R. Part 122, and the Pennsylvania Code.

Therefore, this 9th day of May, 2013, Respondents are hereby ORDERED, pursuant to Section 309(a) of the CWA, 33 U.S.C. § 1319(a), and do

consent to the following:

13. Respondents shall apply to PADEP for timely renewal or modification of the NPDES Permit at each of the Facilities and request that the renewal or modification of each NPDES Permit include an effluent limit for TDS not to exceed a monthly average of 500 mg/L. Complete applications shall be submitted, with copies or notices of the applications sent to EPA, according to the following schedule:

    a. For the Josephine Facility: on or before May 15, 2013;

    b. For the Creekside Facility: on or before May 31, 2013; and

    c. For the Franklin Facility: on for before August 28, 2013.

14. Respondent's applications for NPDES Permit renewals or modifications at each of the Facilities shall comply with the requirements of the CWA and the regulations promulgated thereunder.

15. Respondents agree that discharges from the Facilities will be considered "new and expanding mass loadings" as defined in 25 Pa. Code § 95.10 with respect to effluent limits for the constituents set forth in § 95.10(b)(3), if and when PADEP renews the Facilities' NPDES permits.

16. Respondents shall not discharge from any Facility, wastewater from unconventional oil and gas extraction activities until PADEP has issued, and Respondents are in full compliance with, WQM Permits and renewed or modified NPDES Permits at such Facility containing effluent limitations for TDS not to exceed a monthly average of 500 mg/L and all other requirements of this AOCC.

17. Respondents shall ensure that after the water treatment equipment required by the WQM Permits is installed and operational, discharges from the Facilities will contain levels of TDS not to exceed a monthly average of 500 mg/L, in addition to all other applicable requirements.

18. Respondents shall continue to comply with the applicable NPDES Permits under which each of the Facilities currently operates, as well as the terms of the renewed or modified NPDES Permits referenced in Paragraph13, above.

19. For a period of six (6) months following the initial acceptance of wastewater from unconventional oil and gas extraction activities at each Facility Respondents shall conduct biweekly composite sampling, of a minimum of 8-hour duration, of effluent at each Facility for the analysis for TDS, chloride, bromide, sulfate, Gross Alpha, Radium 226 and 228 and Uranium. Samples shall be analyzed by an accredited laboratory using EPA-approved

methods. Respondents shall submit to EPA and PADEP the additional monitoring data of their effluent with their monthly Discharge Monitoring Reports to characterize water quality.

20. Respondents' failure to complete or comply with any requirement of this AOCC shall be deemed a violation of this Order.

21. All notices and submissions to EPA required under this AOCC shall be sent to:

Rebecca K. Crane
Water Protection Division
NPDES Enforcement Branch
U.S. Environmental Protection Agency
Region III (Mail Code 3WP42)
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2389
Mail-in email database info to be inserted

and,

Chief, Operations Section
Pennsylvania Department of Environmental Protection
400 Waterfront Drive
Pittsburgh, PA 15222

All notices required to be sent to FRS shall be sent to:

Devesh Mittal
FRS
One Four Coins Drive
Canonsburg, PA 15317
(724) 746-5301 x281

and

Paul Hart
FRS Creekside Facility
5035 Route 110
PO Box 232
Creekside, PA 15732
(724) 349-8600

and

Lawrence A. Demase, Esquire
Reed Smith LLP
225 Fifth Avenue, Suite 1200
Pittsburgh, PA 15222
(412) 288-4050

and

Kevin J. Garber, Esquire
Babst Calland Clements & Zomnir, P.C.
Two Gateway Center, Sixth Floor
Pittsburgh, PA 15222
(412) 394-5404

22. All submissions provided pursuant to this Order shall be signed by the appropriate Respondent(s) and shall include the following certification:

> "I certify that the information contained in or accompanying this submission is true, accurate and complete to the best of my knowledge. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

VI. GENERAL PROVISIONS

23. Respondents waive any and all claims for relief and otherwise available rights or remedies to judicial or administrative review which the Respondents may have with respect to any issue of fact or law set forth in this Order, including, but not limited to, any right of judicial review of the Order under the Administrative Procedure Act, 5 U.S.C. §§ 701-708.

24. Respondents reserve their rights to contest liability in any subsequent action filed by EPA to seek penalties for a violation of this Order, and reserve their rights to contest liability in any subsequent action filed by EPA for any violations alleged in the Findings above. However, Respondents waive their rights to claim that the Order was invalid or that EPA lacked authority to issue this Order or any of the Order's terms.

25. This AOCC shall not relieve Respondents of their obligations to comply with all applicable provisions of federal, state or local law and ordinance, nor shall it be construed to be a ruling on, or determination of, any issue related to any federal, state or local permit. This AOCC does not constitute a waiver, suspension or modification of the requirements of the CWA. To the extent that any requirement of this AOCC is in conflict with any new or modified

permit or related State or federal law or regulation, then Respondents shall comply with the new or modified permit, or related State or federal law or regulation, unless the new or modified permit term(s), or related State or federal law or regulation, is less restrictive, and in which case Respondents shall comply with the terms of this AOCC. In the event of such a conflict, Respondents shall so notify EPA within thirty (30) days pursuant to the notification provisions of this AOCC. Such notification shall, at a minimum identify: (1) the new or modified permit or related State or federal law or regulation; (2) the AOCC requirement contrary thereto; (3) the basis and reason why Respondents have determined that a conflict exists; and (4) steps the Respondents are taking to ensure compliance with the new or modified permit, or related State or federal law or regulation.

26. Issuance of this AOCC is intended to address the violations described by the Administrative Orders for Compliance referenced in Paragraph 5 of this AOCC. EPA reserves the right to commence action against any person, including Respondents, in response to any condition which EPA determines may present an imminent and substantial endangerment to the public health, public welfare, or the environment. Further, EPA reserves any rights and remedies available to it under the CWA, 33 U.S.C. §§ 1251- 1387, the regulations promulgated thereunder, and any other federal laws or regulations for which EPA has jurisdiction. In addition, issuance of this Order is subject to all limitations on the scope of resolution and to the reservation of rights set forth in 40 C.F.R. § 22.18(c) of the Consolidated Rules of Practice.

27. EPA reserves all existing inspection and information gathering authority otherwise available to EPA pursuant to Section 308 of the CWA, 33 U.S.C. § 1318, or pursuant to any other statute or law.

28. Respondents' compliance with the terms of this Order shall not relieve Respondents of the obligation to comply with the CWA or any other federal, state or local law or regulation; nor does this AOCC constitute a waiver or modification of the terms or conditions of any issued permit.

29. Nothing in this AOCC shall be construed as prohibiting, altering or in any way eliminating the ability of EPA to seek any other remedies or sanctions available by virtue of Respondents' violations of this AOCC or of the statutes and regulations upon which this AOCC is based or for Respondents' violation of any applicable provision of law.

30. Respondents reserve all defenses to any action asserted or taken by EPA under its reservations in this AOCC or otherwise.

31. This AOCC, in conjunction with the CAFOs referenced in Paragraph 6, terminates and closes the following Administrative Orders for Compliance issued to HRT and PBT on September 28, 2011:

    a. Docket No.: CWA-03-2011-0269DN;

    b. Docket No.: CWA-03-2011-0273DN; and

    c. Docket No.: CWA-03-2011-0274DN.

32. Respondents' undersigned representatives certify that they are fully authorized by the party represented to enter into the terms and conditions of this AOCC and to execute and legally bind that party to it.

33. All of the terms and conditions of this AOCC together comprise one agreement, and each of the terms and conditions is in consideration of all of the other terms and conditions. In the event that this AOCC, or one or more of its terms and conditions, is held invalid, or is not executed by all of the signatories in identical form, or is not approved in such identical form by the Regional Administrator or his designee, then the entire AOCC shall be null and void.

34. When the merger referenced in Paragraph 3 occurs, this AOCC's requirements shall apply to any and all successors and assigns of FRS.

35. This AOCC and all of FRS's obligations hereunder shall terminate after the six (6) months monitoring set forth in paragraph 19 above provided that PADEP has issued renewed or modified NPDES permits containing, among other things, effluent limitations for TDS not to exceed a monthly average of 500 mg/L for each of the Facilities.

VI. EFFECTIVE DATE

36. The effective date of this Order shall be the date that the fully executed Order is received by Respondents.

FOR RESPONDENT FLUID RECOVERY SERVICES, LLC

Paul Hart

Date: 5-1-13

Paul Hart, President
Fluid Recovery Services, LLC

FOR RESPONDENT HART RESOURCE TECHNOLOGIES, INC.

Paul Hart

Date: 5-1-13

Paul Hart, President
Hart Resource Technologies, Inc.

FOR RESPONDENT PENNSYLVANIA BRINE TREATMENT, INC.

Paul Hart

Date: 5-1-13

Paul Hart, President
Pennsylvania Brine Treatment, Inc.

FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY REGION III

Jon M. Capacasa, Director
Water Protection Division

NPDES PERMIT APPLICATION
WASTEWATER TREATMENT FACILITY

Prepared on Behalf of:

Central Pennsylvania Water Treatment, LLC
476 Rolling Ridge Drive
Suite 300
State College, Pennsylvania

Prepared for:

Pennsylvania Department of Environmental Protection
Bureau of Oil and Gas Management
Northwest Region
230 Chestnut Street
Meadville, PA 16335-3481

By:

ARM Group Inc.
1631 South Atherton Street
Suite 101
State College, PA 16801

July 15, 2008

ARM Project 08165

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

PROJECT NARRATIVE

The development and operation of natural gas production wells in the Marcellus Shale formation located in central Pennsylvania, specifically in Clinton and Lycoming Counties, will result in the generation of fracturing (flowback) and produced waters containing brine. Central Pennsylvania Water Treatment, LLC (CPWT) has engaged ARM Group, Inc. (ARM) to locate and design a facility in Clinton County to treat this wastewater. Included in that task is the preparation and submission of required environmental permit applications, specifically National Pollutant Discharge Elimination System (NPDES) Part 1 and Water Quality Management (WQM) Part 2 permit applications.

The enclosed NPDES Part 1 permit application is being submitted to determine discharge limits for the proposed facility. Concurrent with submittal of the NPDES permit application to the Pennsylvania Department of Environmental Protection (PADEP), treatability studies are being completed in order to finalize design of the proposed treatment facility and to complete the WQM Part 2 permit application. The WQM Part 2 permit application will be submitted as soon as possible following completion of treatability studies and design drawings for the proposed treatment facility.

1.0 Capacity Evaluation

There are four existing wastewater treatment facilities located in Pennsylvania that treat flowback and production waters such as may be produced by the subject natural gas wells. These facilities have very little capacity available. There are also several Publicly Owned Treatment Works (POTWs) that can accept such water on a limited basis. The increased demand for this type of wastewater treatment which is expected to result from gas well development in the Marcellus Shale will exceed the existing treatment capacity. Consequently, additional such wastewater treatment capacity will be required, and CPWT intends to construct a wastewater treatment facility to address that need.

CPWT estimates that each Marcellus well will produce, on average, approximately 1,000,000 gallons of flowback water associated with the process of hydraulic fracturing. Typically, flowback is produced over a period of a few weeks time, following the "fracing" event. CPWT estimates that demand for wastewater treatment associated with Marcellus gas well development will meet or even exceed its proposed capacity of 500,000 gallons per day (gpd).

2.0 Location of Proposed Treatment Facility

CPWT evaluated several potential locations for construction of its wastewater treatment facility. Site attributes such as water quality of the receiving stream, flow of receiving steam, site access, and location of populated areas were evaluated with respect to suitability for the treatment facility. The location of the proposed facility is shown in Figure 1.

3.0 Water Quality

The majority of the wastewater to be treated at the proposed facility is expected to originate in central Pennsylvania. CPWT does not currently have any water quality data for Marcellus wells in central Pennsylvania. However, data is available for wells from other parts of Pennsylvania, and this data is included in Appendix A. The sample identified as "BAME #1" is flowback water from a newly drilled well in the Marcellus Formation in Butler County. The sample identified as "Washington" is produced water from a 2 to 3 year old well in the Marcellus Formation in Washington County. Frontier Club #2 is produced water from a well in the Devonian Formation.

It is estimated that flowback water from the Marcellus Formation will account for 85 percent of the water to be treated, while produced water from the Marcellus Formation will account for 10 percent of the water treated, and produced water from the Devonian Formation will account for 5 percent of the water treated. The weighted average in the summary table reflects this predicted contribution.

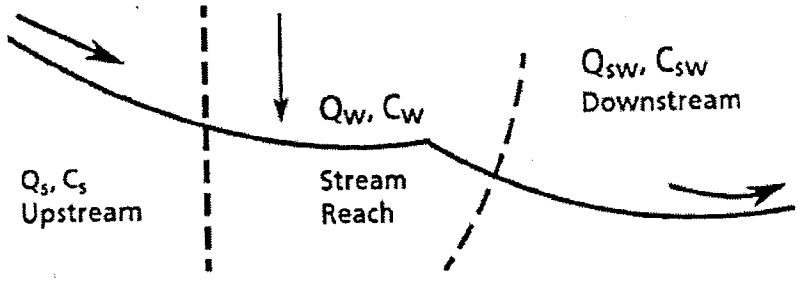
Flowback and produced water from the Marcellus Formation are expected to contain elevated concentrations of settleable and suspended solids, total dissolved solids (TDS) and chloride. The tables contained in Appendix A summarize analytical data available for the three wells mentioned previously. Analytical data for the wastewater samples reflect the following ranges: TDS 84,200 to 169,000 milligrams per liter (mg/l); chlorides 71,200 to 93,100 mg/l; and osmotic pressure 2,420 to 4,800 milliosmoles per kilogram (mOs/kg).

It should be noted that the high total dissolved solids concentrations caused the laboratory reporting limits for a number of parameters to be higher than normal. Parameters affected included fluoride, sulfate, nitrate, nitrite, metals, and organics.

4.0 Mass Balance Calculations

Existing treatment practices for this type of wastewater (Marcellus flowback) as well as current permitting guidelines of the Pennsylvania Department of Environmental Protection (PADEP) rely on natural attenuation or dilution by receiving streams as the method of dealing with dissolved parameters (i.e., chlorides and TDS). As a consequence of relying on this natural dilution, water quality criteria for osmotic pressure, TDS, and chloride are typically the determining factors with respect to discharge limitations for the discharge of brine water.

According to Chapter 3 of PADEP "Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits", conservative substances, such as TDS and chloride, are those which are mitigated primarily by natural stream flow dilution after entering receiving bodies of waters. A mass balance water quality model is commonly used to develop effluent limitations for conservative pollutants. The mass-balance model is a means of equating the mass of pollutants downstream to the mass of pollutants upstream of a given point (generally at a pollutant discharge, tributary stream or lateral inflow) after complete mixing. The following diagram illustrates the mass balance concept.



Using this simplified diagram, the general formula for the mass-balance model is:

$$Q_w C_w + Q_s C_s = Q_{sw} C_{sw}$$

Q_w = waste discharge, million gallons per day (mgd) or cubic feet per second (CFS)
C_w = pollutant concentration in waste discharge, mg/l
Q_s = background stream flow, mgd or CFS, above point of discharge
C_s = background in-stream pollutant concentration, mg/l
Q_{sw} = $Q_w + Q_s$, mgd or CFS
C_{sw} = resultant in-stream pollutant concentration, mg/l, in the stream reach (after complete mixing occurs)

The equation can be rearranged as follows:

$$C_W = \frac{Q_{sw} C_{sw} - Q_s C_s}{Q_w}$$

The effluent limitation (mg/l) or its concentration (C_w) for a particular parameter, such as TDS, can be determined by setting C_{sw} equal to the water quality criteria (expressed in mg/l). The stream flow that is available for dilution, Q_s, is the $Q_{7\text{-}10}$ or the minimum seven-consecutive-day average flow (low flow) which occurs at a statistical frequency of once in ten years. Natural stream flows will normally exceed $Q_{7\text{-}10}$ more than 99 percent of the time. The background concentration of the parameter in the stream is C_s.

This methodology was used in conjunction with the analytical data in Appendix A and the receiving stream flow and water quality data in Appendix B to determine resulting mass balance concentrations contained in Appendix C.

As indicated previously, the flowback water contains conservative substances (i.e., TDS and chloride). Consequently the mass balance calculations were performed for TDS, chloride, and osmotic pressure. TDS and chloride were evaluated at the nearest downstream public water supply from the proposed discharge location, while osmotic pressure was evaluated at the point where the discharge enters the West Branch of the Susquehanna River (West Branch).

Based on information available to ARM, from the point where the discharge enters the West Branch, the nearest downstream public water supply intake is located in Milton, Pennsylvania.

Consequently, with respect to the concentration of TDS and chloride relative to water quality standards, the evaluation point was Milton.

Using the water quality analyses presented in Appendix A, in conjunction with flow data and water quality data for the West Branch at Milton (Appendix B), the mass balance tables contained in Appendix C were calculated. These calculations indicate that Water Quality Standards for TDS, chloride, and sulfate would be maintained at Milton at a wastewater discharge rate of 350 gpm or 0.504 mgd.

Flow data (Q_{7-10}) for the West Branch at Milton was obtained from United States Geological Survey (USGS) "Low Flow Statistics for Pennsylvania Streams", Reference Gage 01553500 from the period 1962 to 1995. The flow (Q_{7-10}) for that period was 700 CFS or 314,181 gpm. Water quality data for the West Branch is from USGS "Water Quality in Pennsylvania", Reference Gage 01553500, Lewisburg from the period 1970 to 2008. Water quality data available for Renovo, an upstream monitoring point, and Jersey Shore, a downstream monitoring point, relative to McElhattan are limited with respect to parameters monitored. Data from another nearby monitoring point, Lock Haven, are outdated ending in 1972. Consequently, water quality data from Lewisburg were used for mass balance calculation for both Milton and McElhattan.

Mass balance calculations were also used to evaluate osmotic pressure where the discharge enters the West Branch near McElhattan, Pennsylvania. Flow data (Q_{7-10}) for the West Branch at Jersey Shore (nearest gage or bridge site) was obtained from United States Geological Survey (USGS) "Low Flow Statistics for Pennsylvania Streams", Reference Gage 01551500 from the period 1962 to 1995. The flow (Q_{7-10}) for that period was 557 CFS or 249,999 gpm. At a wastewater discharge rate of 350 gpm or 0.504 mgd, the calculated osmotic pressure for the West Branch (Appendix C) was 14 milliosmoles per kilogram compared to the Water Quality Standard of 50 mOs/kg.

Data for osmotic pressure was not included in available water quality data for the West Branch. However, using analytical data in Appendix A, a relationship was developed between TDS and osmotic pressure. An osmotic pressure of 50 mOs/kg is approximately equivalent to a TDS concentration of 1,742 mg/l.

5.0 Proposed Treatment Processes

Pursuant to technology based effluent limitation developed for the oil and gas industry, all discharges of wastewaters to surface waters from the oil and gas operations must be at least as stringent as the following limits.

Parameter	Average Monthly (mg/l)	Instantaneous Maximum (mg/l)
Total Suspended Solids	30	60
Oils and Grease	15	30
Iron, Total	3.5	7.0
Acidity	Less than Alkalinity	

pH	6 to 9 Standard Units

The design of treatment facilities must incorporate the following:

a. Flow equalization to ensure optimum treatment efficiency of the facilities and minimization of water quality impacts.
b. Gravity separation and surface skimming, or equivalent technology, for oil and grease removal.
c. Chemical addition for pH control and metals removal, if necessary (a pH range of 8.0 - 8.5 is desirable).
d. Aeration, or equivalent technology, for reducing volatile petroleum hydrocarbons and oxidation for metals removal.
e. Settling (retention) or filtration for removal of solids, including oxidized metals.

The proposed treatment processes contained in the "Schematic Flow Diagram" (Figure 2) are based on available water quality analyses. Proposed treatment will include required components mentioned previously, and it will meet technology based effluent limitations.

Actual treatment components will be confirmed following treatability studies. Consequently it is not possible to definitively state what type of treatment will be required. Based on currently available information, wastewater treatment will consist of pH adjustment, oxidation for removal of biochemical oxygen demand (BOD), and polymer addition for removal of suspended solids and metals. Mixing equipment will be required for these chemical additives and clarification will be required following mixing. A filter press or similar type of equipment will be required for dewatering of solids. Significant pretreatment storage will be required in the form of tanks or impoundments. Post treatment storage in the form of a lined impoundment or tanks will also be provided.

Treatment components may be installed in parallel trains to transition from an initial volume to the permitted volume.

6.0 Considerations for Permit Conditions

Using available analytical data, it was determined, through the mass balance calculations contained in Appendix C, that a discharge volume of 504,000 gpd of wastewater could be discharged from the proposed treatment facility while maintaining Water Quality Criteria at Milton.

The mass balance calculations contained in Appendix C illustrate the mass in pounds per day of TDS, chloride, and sulfate. The brine water concentrations used in the mass balance calculations are based on three sets of analytical data. Analytical data for wells in central Pennsylvania may or may not be similar to existing data. Consequently, it is requested that consideration be given to establishing permit limits on a mass basis (pounds per day), rather than a concentration basis (milligrams per liter).

Additionally, the mass balance calculations included with this application utilized the $Q_{7,10}$ flow when determining the effect the proposed discharge would have on concentrations in the West Branch. Natural stream flows will normally exceed $Q_{7\text{-}10}$ more than 99 percent of the time. Accordingly, CPWT requests that PADEP consider seasonally higher discharge rates that are proportional to river flow levels monitored on a real time basis.

8000-PM-IT0001 Rev 06/07/2002

FORM

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL PROTECTION
GENERAL INFORMATION FORM – AUTHORIZATION APPLICATION

Before completing this General Information Form (GIF), read the step-by-step instructions provided in this application package. This version of the General Information Form (GIF) must be completed and returned with any program-specific application being submitted to the Department.

Related ID#s (If Known)		DEP USE ONLY
Client ID#	APS ID#	Date Received & General Notes
Site ID#	Auth ID#	
Facility ID#		

CLIENT INFORMATION

DEP Client ID# | **Client Type / Code**

Organization Name or Registered Fictitious Name: Central Pennsylvania Water Treatment, LLC | **Employer ID#** (EIN) | **Dun & Bradstreet ID#**

Individual Last Name | **First Name** | **MI** | **Suffix** | **SSN**

Additional Individual Last Name | **First Name** | **MI** | **Suffix** | **SSN**

Mailing Address Line 1: 476 Rolling Ridge Drive
Mailing Address Line 2: Suite 300

Address Last Line – City: State College
State: PA
ZIP+4: 16801
Country: USA

Client Contact Last Name: Hulburt
First Name: Benjamin
MI: W
Suffix:

Client Contact Title: President & Chief Executive Officer
Phone: 800-430-0295
Ext:

Email Address: bhulburt@rexenergycorp.com
FAX: 814-278-7286

SITE INFORMATION

DEP Site ID#
Site Name: Central Pennsylvania Water Treatment, LLC

EPA ID#
Estimated Number of Employees to be Present at Site: 3 to 5

Description of Site: Proposed treatment facility for waste water from natural gas wells

County Name	Municipality	City	Boro	Twp	State
Clinton	Wayne	☐	☐	☒	
		☐	☐	☐	

Site Location Line 1: 213 McKinney Road
Site Location Line 2:

Site Location Last Line – City: McElhattan
State: PA
ZIP+4: 17748

Detailed Written Directions to Site: Take McElhattan/Woolrich exit of US 220, go north on McElhattan Drive, turn left on Old Bridge Road, turn left on McKinney Road, travel approximately 1 mile, site is on right.

Site Contact Last Name: Nelson
First Name: Kim
MI: A
Suffix: P.E.

Site Contact Title: Senior Engineer
Site Contact Firm: ARM Group Inc.

Mailing Address Line 1: 1631 South Atherton Street
Mailing Address Line 2: Suite 101

Mailing Address Last Line – City: State College
State: PA
ZIP+4: 16801

Phone	Ext	FAX	Email Address
814-272-0455			knelson@armgroup.net

NAICS Codes (Two- & Three-Digit Codes – List All That Apply): 562

6-Digit Code (Optional): 562219

Client to Site Relationship: Owner

FACILITY INFORMATION

Modification of Existing Facility

		Yes	No
1.	**Will this project modify an existing facility, system, or activity?**	☐	☒
2.	**Will this project involve an addition to an existing facility, system, or activity?**	☐	☒

If "Yes", check all relevant facility types and provide DEP facility identification numbers below.

	Facility Type	DEP Fac ID#		Facility Type	DEP Fac ID#
☐	Air Emission Plant		☐	Industrial Minerals Mining Operation	
☐	Beneficial Use (water)		☐	Laboratory Location	
☐	Blasting Operation		☐	Land Recycling Cleanup Location	
☐	Captive Hazardous Waste Operation		☐	MineDrainageTrmt/LandRecyProjLocation	
☐	Coal Ash Beneficial Use Operation		☐	Municipal Waste Operation	
☐	Coal Mining Operation		☐	Oil & Gas Encroachment Location	
☐	Coal Pillar Location		☐	Oil & Gas Location	
☐	Commercial Hazardous Waste Operation		☐	Oil & Gas Water Poll Control Facility	
☐	Dam Location		☐	Public Water Supply System	
☐	Deep Mine Safety Operation -Anthracite		☐	Radiation Facility	
☐	Deep Mine Safety Operation -Bituminous		☐	Residual Waste Operation	
☐	Deep Mine Safety Operation -Ind Minerals		☐	Storage Tank Location	
☐	Encroachment Location (water, wetland)		☐	Water Pollution Control Facility	
☐	Erosion & Sediment Control Facility		☐	Water Resource	
☐	Explosive Storage Location		☐	Other:	

Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Waste Water Treatment Facility	41	8	51.2	-77	22	31.8

Horizontal Accuracy Measure: Feet --or-- Meters

Horizontal Reference Datum Code
- ☒ North American Datum of 1927
- ☐ North American Datum of 1983
- ☐ World Geodetic System of 1984

Horizontal Collection Method Code

Reference Point Code

Altitude: Feet 544 --or-- Meters

Altitude Datum Name
- ☐ The National Geodetic Vertical Datum of 1929
- ☐ The North American Vertical Datum of 1988 (NAVD88)

Altitude (Vertical) Location Datum Collection Method Code

Geometric Type Code

Data Collection Date

Source Map Scale Number: Inch(es) = Feet; --or-- Centimeter(s) = Meters

PROJECT INFORMATION

Project Name: Central Pennsylvania Water Treatment, LLC

Project Description: Waste water treatment facility

Project Consultant Last Name	First Name	MI	Suffix
Nelson	Kim	A	P.E.

Project Consultant Title: Senior Engineer

Consulting Firm: ARM Group Inc.

Mailing Address Line 1: 2013 Sandy Drive

Mailing Address Line 2: Suite 205

Address Last Line – City: State College

State: PA

ZIP+4: 16803

Phone	Ext	FAX	Email Address
814-272-0455		814-272-0467	knelson@armgroup.net

Time Schedules	Project Milestone (Optional)
ASAP	Project construction will begin as soon as permits are obtained.

1.	**Is this application for an authorization type on the list of authorizations affected by the land use policy?** **Note:** If "Yes", you must complete the following Land Use Information section, unless exempted by Questions 2 or 3 below. If "No", skip Questions 2 & 3 below as well as the following Land Use Information section. For referenced list, see Appendix A attached to the GIF Instructions.	☒	Yes	☐	No
2.	**For an Air program authorization only. All other authorizations continue with Question 3 below. Will the permit authorize the construction of facilities outside an existing permitted area?** **Note:** If "Yes", you must complete the following Land Use Information section unless exempted by Question 3 below. If "No", skip Question 3 below as well as the following Land Use Information section.	☐	Yes	☐	No
3.	**Have you attached or submitted municipal and county 'Early Opt Out' approval letters for the project?** **Note:** If "Yes" to Question 3, skip the following Land Use Information section. This should only be checked "Yes" if applicant is choosing the early opt-out option. Required approval letters described in the GIF Checklist and Instructions should be attached. If "No" to Question 3, continue with the following Land Use Information section.	☐	Yes	☒	No

LAND USE INFORMATION

Note: Applicants are encouraged to submit copies of local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances.

1.	**Is there a municipal comprehensive plan(s)?**	☒	Yes	☐	No
2.	**Is there a county comprehensive plan(s)?**	☒	Yes	☐	No
3.	**Is there a multi-municipal or multi-county comprehensive plan?**	☐	Yes	☒	No
4.	**Is the proposed project consistent with these plans?** If no plan(s) exists, answer "Yes".	☒	Yes	☐	No
5.	**Is there a municipal zoning ordinance(s)?**	☒	Yes	☐	No
6.	**Is there a joint municipal zoning ordinance(s)?**	☐	Yes	☒	No
7.	**Will the proposed project require a zoning approval (e.g., special exception, conditional approval, re-zoning, variance)?** If zoning approval has already been received, attach documentation.	☒	Yes	☐	No
8.	**Are any zoning ordinances that are applicable to this project currently the subject of any type of legal proceeding?**	☐	Yes	☒	No
9.	**Will the project be located on a site that has been or is being remediated under DEP's Land Recycling Program?**	☐	Yes	☒	No
10.	**Will the project result in reclamation of abandoned mine lands through re-mining or as part of DEP's Reclaim PA Program?**	☐	Yes	☒	No
11.	**Will the project be located in an agricultural security area or an area protected under an agricultural conservation easement?**	☐	Yes	☒	No
12.	**Will the project be located in a Keystone Opportunity Zone or Enterprise Development Area?**	☐	Yes	☒	No
13.	**Will the project be located in a Designated Growth Area as defined by the Municipalities Planning Code?** ***Project will be within "Central Core Growth Area" depicted in Clinton County Comprehensive Plan Update.***	☒	Yes	☐	No

COORDINATION INFORMATION

Note: The PA Historical and Museum Commission must be notified of proposed projects in accordance with DEP Technical Guidance Document 012-0700-001 and the accompanying Cultural Resource Notice Form.

If the activity will be a mining project (i.e., mining of coal or industrial minerals, coal refuse disposal and/or the operation of a coal or industrial minerals preparation/processing facility), respond to questions 1.0 through 2.5 below.

If the activity will not be a mining project, skip questions 1.0 through 2.5 and begin with question 3.0.

1.0	**Is this a coal mining project?** If "Yes", respond to 1.1-1.6. If "No", skip to Question 2.0. (DEP Use/48y1)	☐	Yes	☒	No
1.1	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be equal to or greater than 200 tons/day?** (DEP Use/4x70)	☐	Yes	☐	No
1.2	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be greater than 50,000 tons/year?** (DEP Use/4x70)	☐	Yes	☐	No
1.3	**Will this coal mining project involve coal preparation/ processing activities in which thermal coal dryers or pneumatic coal cleaners will be used?** (DEP Use/4x70)	☐	Yes	☐	No
1.4	**For this coal mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?** (DEP Use/4x62)	☐	Yes	☐	No
1.5	**Will this coal mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?** (DEP Use/3140)	☐	Yes	☐	No
1.6	**Will this coal mining project involve underground coal mining to be conducted within 500 feet of an oil or gas well?** (DEP Use/4z41)	☐	Yes	☐	No
2.0	**Is this a non-coal (industrial minerals) mining project?** If "Yes", respond to 2.1-2.6. If "No", skip to Question 3.0. (DEP Use/48y1)	☐	Yes	☒	No
2.1	**Will this non-coal (industrial minerals) mining project involve the crushing and screening of non-coal minerals other than sand and gravel?** (DEP Use/4x70)	☐	Yes	☐	No
2.2	**Will this non-coal (industrial minerals) mining project involve the crushing and/or screening of sand and gravel with the exception of wet sand and gravel operations (screening only) and dry sand and gravel operations with a capacity of less than 150 tons/hour of unconsolidated materials?** (DEP Use/4x70)	☐	Yes	☐	No
2.3	**Will this non-coal (industrial minerals) mining project involve the construction, operation and/or modification of a portable non-metallic (i.e., non-coal) minerals processing plant under the authority of the General Permit for Portable Non-metallic Mineral Processing Plants (i.e., BAQ-PGPA/GP-3)?** (DEP Use/4x70)	☐	Yes	☐	No
2.4	**For this non-coal (industrial minerals) mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?** (DEP Use/4x62)	☐	Yes	☐	No
2.5	**Will this non-coal (industrial minerals) mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?** (DEP Use/3140)	☐	Yes	☐	No

3.0	**Will your project, activity, or authorization have anything to do with a well related to oil or gas production, site development for such activity, or the waste from such a well?** If "Yes", respond to 3.1-3.3. If "No", skip to Question 4.0. (DEP Use/4z41)	☒	Yes	☐	No
3.1	**Does the oil- or gas-related project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water (including wetlands)?** (DEP Use/4z41)	☐	Yes	☒	No
3.2	**Will the oil- or gas-related project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system or storm water system?** If "Yes", discuss in *Project Description*. (DEP Use/4z41)	☒	Yes	☐	No
3.3	**Will the oil- or gas-related project involve the construction and operation of industrial waste treatment facilities?** (DEP Use/4z41)	☒	Yes	☐	No
4.0	**Will the project involve a construction activity that results in earth disturbance?** If "Yes", specify the total disturbed acreage. (DEP Use/4x66) 4.0.1 **Total Disturbed Acreage** 5 to 10 acres (estimated)	☒	Yes	☐	No
5.0	**Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water (including wetlands)?** (DEP Use/4x66)	☐	Yes	☒	No
6.0	**Will the project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system or separate storm water system?** If "Yes", discuss in *Project Description*. (DEP Use/4x62)	☒	Yes	☐	No
7.0	**Will the project involve the construction and operation of industrial waste treatment facilities?** (DEP Use/4x62)	☒	Yes	☐	No
8.0	**Will the project involve construction of sewage treatment facilities, sanitary sewers, or sewage pumping stations?** If "Yes", indicate estimated proposed flow (gal/day). Also, discuss the sanitary sewer pipe sizes and the number of pumping stations/treatment facilities/name of downstream sewage facilities in the *Project Description*, where applicable. (DEP Use/4x62) 8.0.1 **Estimated Proposed Flow (gal/day)** Septic system for plant office (3 to 5 people)	☒	Yes	☐	No
9.0	**Was sewage planning submitted and approved?** If "Yes", attach the Act 537 approval letter unless the submitted application is actually requesting Act 537 approval (Approval required prior to 105/NPDES approval). (DEP Use/4x61) 9.0.1 **Is Act 537 Approval Letter attached?**	☐	Yes	☒	No
10.0	**Is this project for the beneficial use of biosolids for land application within Pennsylvania?** If "Yes" indicate how much (i.e. gallons or dry tons per year). (DEP Use/4X62) 10.0.1 **Gallons Per Year (residential septage)** _____ 10.0.2 **Dry Tons Per Year (biosolids)**	☐	Yes	☒	No
11.0	**Does the project involve construction, modification or removal of a dam?** If "Yes", identify the dam. (DEP Use/3140) 11.0.1 **Dam Name**	☐	Yes	☒	No
12.0	**Will the project interfere with the flow from, or otherwise impact, a dam?** If "Yes", identify the dam. (DEP Use/3140) 12.0.1 **Dam Name**	☐	Yes	☒	No
13.0	**Will the project involve operations (excluding during the construction period) that produce air emissions (i.e., NOX, VOC, etc.)?** If "Yes", identify each type of emission followed by the amount of that emission. (DEP Use/4x70) 13.0.1 **Enter all types & amounts of emissions; separate each set with semicolons.** VOC: 0.76 ton/year (Estimated)	☒	Yes	☐	No

14.0	**Is an on-site drinking water supply (well), other than individual house wells, proposed for your project?** If "Yes", indicate total number of people served and/or the total number of connections served, if applicable. Also, check all proposed sub-facilities. (DEP Use/4x81)	☒	Yes	☐	No
	14.0.1 Number of Persons Served 3 to 5 employees				
	14.0.2 Number of Employee/Guests 3 to 5 employees				
	14.0.3 Number of Connections				
	14.0.4 Sub-Fac: Distribution System	☐	Yes	☒	No
	14.0.5 Sub-Fac: Water Treatment Plant	☐	Yes	☒	No
	14.0.6 Sub-Fac: Source	☒	Yes	☐	No
	14.0.7 Sub-Fac: Pump Station	☒	Yes	☐	No
	14.0.8 Sub-Fac: Entry Point	☒	Yes	☐	No
	14.0.9 Sub-Fac: Transmission Main	☐	Yes	☒	No
	14.0.10 Sub-Fac: Storage Facility	☐	Yes	☒	No
15.0	**Will your project involve purchasing water in bulk, excluding during the construction period?** If "Yes, name the provider. Also, indicate the daily number of employees or guests served. (DEP Use/4x81)	☐	Yes	☒	No
	15.0.1 Provider's Name				
	15.0.2 Number of Employees/Guests				
16.0	**Is your project to be served by public water supply?** If "Yes", indicate name of supplier and attach letter from supplier stating that it will serve the project. (DEP Use/4x81)	☐	Yes	☒	No
	16.0.1 Supplier's Name				
	16.0.2 Letter of Approval from Supplier is Attached	☐	Yes	☐	No
17.0	**Will this project involve a new or increased drinking water withdrawal from a stream or other water body?** If "Yes", provide name of stream. (DEP Use/4x81)	☐	Yes	☒	No
	17.0.1 Stream Name				
18.0	**Will the construction or operation of this project involve treatment, storage, reuse, or disposal of waste?** If "Yes", indicate what type (i.e., hazardous, municipal (including infectious & chemotherapeutic), residual) and the amount to be treated, stored, re-used or disposed. (DEP/Use4x32)	☒	Yes	☐	No
	18.0.1 Type & Amount Residual waste 11.5 tons/day (Estimated)				
19.0	**Will your project involve the removal of coal, minerals, etc. as part of any earth disturbance activities?** (DEP Use/48y1)	☐	Yes	☒	No
20.0	**Does your project involve installation of a field constructed underground storage tank?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570)	☐	Yes	☒	No
	20.0.1 Enter all substances & capacity of each; separate each set with semicolons.				
21.0	**Does your project involve installation of an aboveground storage tank greater than 21,000 gallons capacity at an existing facility?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570)	☐	Yes	☒	No
	21.0.1 Enter all substances & capacity of each; separate each set with semicolons.				
22.0	**Does your project involve installation of a tank greater than 1,100 gallons which will contain a highly hazardous substance as defined in DEP's Regulated Substances List, 2570-BK-DEP2724?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570)	☐	Yes	☒	No
	22.0.1 Enter all substances & capacity of each; separate each set with semicolons.				

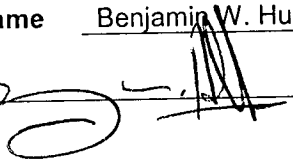
23.0 **Does your project involve installation of a storage tank at a new facility with a total AST capacity greater than 21,000 gallons?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570) ☒ Yes ☐ No

23.0.1 **Enter all substances & capacity of each; separate each set with semicolons.** Brine water (Five 600,000 gallon tanks) and treated brine water (Two 500,000 gallon tanks)

CERTIFICATION

I certify that I have the authority to submit this application on behalf of the applicant named herein and that the information provided in this application is true and correct to the best of my knowledge and information.

Type or Print Name Benjamin W. Hulburt

Signature 

President
Title

2/16/05
Date

CENTRAL PENNSYLVANIA WATER TREATMENT, LLC
NPDES PERMIT APPLICATION
ENGINEER'S REPORT

1.0 Introduction

Central Pennsylvania Water Treatment, LLC (CPWT) intends to construct a treatment facility for fracturing flow back water and produced water from the oil and gas industry. The proposed facility, which will discharge treated water to the West Branch of the Susquehanna, will be located in Wayne Township, Clinton County on a 20-acre leased parcel adjacent to McKinney Road. The location of the proposed facility is shown in Figure 1.

2.0 Characteristics of Fracturing Flow Back Water and Produced Water

As indicated in the Project Narrative, CPWT estimates that approximately 85 percent of the water to be treated will be flow back water from the Marcellus Formation, 10 percent will be produced water from the Marcellus Formation, and 5 percent will be produced water from the Devonian Formation. These components are represented respectively by the following samples in Appendix A: BAME #1 (Butler County); Washington (Washington County); and Frontier Club #2.

Although CPWT does not currently have any water quality data for wells completed in central Pennsylvania, the data in Appendix A are being relied upon as being representative of flowback water produced from central Pennsylvania wells. Flow back and produced water from the Marcellus Formation in central Pennsylvania is expected to contain elevated concentrations of settleable and suspended solids, total dissolved solids (TDS) and chloride. This is based on the analytical data in Appendix A. The following metals are also expected to be present: barium, iron, manganese, and strontium. For the available samples, benzene and toluene are the only volatile organics that were present above the laboratory reporting limit.

The presence of Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) at the levels detected was unexpected. BOD may be due to guar used in the initial development and construction of the wells.

Analytical data for the brine water samples reflect the following ranges: Total Dissolved Solids (TDS) 84,200 to 169,000 milligrams per liter (mg/l); chlorides 71,200 to 93,100 mg/l; and osmotic pressure 2,420 to 4,800 milliosmoles per kilogram (mOs/kg).

As indicated in the Project Narrative, relatively high total dissolved solids concentrations caused the laboratory reporting limits for a number of parameters to be higher than normal. Parameters affected included fluoride, sulfate, nitrate, nitrite, metals, and organics.

3.0 Proposed Treatment Processes

CPWT estimates that each Marcellus well will generate approximately 1,000,000 gallons of fracturing flow back water. As an example, a Marcellus well in Butler County required 950,000 gallons of water for fracturing, and 48% of that water was returned in one week. To respond to anticipated treatment demand, CPWT is requesting a discharge volume from the proposed treatment facility of 350 gallons per minute or 504,000 gallons per day. The treatment processes illustrated in Figure 2 will be sized to accommodate that volume.

The treatment processes will meet the following technology based effluent limitations developed for the oil and gas industry.

Parameter	Average Monthly (mg/l)	Instantaneous Maximum (mg/l)
Total Suspended Solids	30	60
Oils and Grease	15	30
Iron, Total	3.5	7.0
Acidity	Less than Alkalinity	
pH	6 to 9 Standard Units	

The design of treatment facilities will include the following:

a. Flow equalization to ensure optimum treatment efficiency of the facilities and minimization of water quality impacts.
b. Gravity separation and surface skimming, or equivalent technology, for oil and grease removal.
c. Chemical addition for pH control and metals removal, if necessary (a pH range of 8.0 - 8.5 is desirable).
d. Aeration, or equivalent technology, for reducing volatile petroleum hydrocarbons and oxidation for metals removal.
e. Settling (retention) or filtration for removal of solids, including oxidized metals.

The proposed treatment processes illustrated in the "Schematic Flow Diagram" (Figure 2) are based on available analytical data. The design of the treatment facility and required components will be determined upon completion of treatability studies. However, based on currently available information, the following treatment processes may be required. There will be three million gallons of storage capacity provided for incoming wastewater. The storage will be provided in either lined impoundments or lined tanks. Although not expected, provisions will be provided to skim or remove oil from incoming wastewater. Storage will be followed by oxidation with hydrogen peroxide or ozone if removal of BOD is required. If BOD removal is not required, aeration will be provided to remove volatile organics (i.e., benzene and toluene).

A treatment tank will be provided for pH adjustment, which may also result in the removal of some metals. Following pH adjustment, polymers will be added for removal of suspended solids

and metals. An inclined plate clarifier or other type of clarifier will be used to separate the solids from the treated water. Rapid sand filtration will be provided if additional clarification is necessary. Solids from the inclined plate clarifier will be pumped to a filter press, drum filter, or similar unit to remove water and create a dry sludge that can be taken to a landfill. One and a half million gallons of storage capacity will be provided for treated water. Storage may be in lined impoundments or lined tanks. Treatment components may be installed in parallel trains to transition from an initial volume to the permitted volume.

4.0 Mass Balance Calculations

According to Chapter 3 of PaDEP "Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits", conservative substances, such as TDS and chloride, are those which are mitigated primarily by natural stream flow dilution after entering receiving bodies of waters. A mass balance water quality model is commonly used to develop effluent limitations for conservative pollutants.

This methodology discussed in the Project Narrative was used in conjunction with the analytical data in Appendix A and the receiving stream flow and water quality data in Appendix B to determine resulting mass balance concentrations contained in Appendix C.

Mass balance calculations were performed for TDS, chloride, and osmotic pressure, as these are the conservative substances of concern with respect to the proposed discharge. TDS and chloride were evaluated at the nearest downstream public water supply from the proposed discharge location, while osmotic pressure was evaluated at the point where the proposed discharge will enter the West Branch of the Susquehanna (West Branch).

Based on information available to ARM, from the point where the proposed discharge will enter the West Branch, the nearest downstream public water supply intake is located in Milton, Pennsylvania. Consequently, with respect to the concentration of TDS and chloride relative to water quality standards, the evaluation point chosen for water quality design purposes was Milton.

Using the flowback/produced water quality data in Appendix A, in conjunction with flow data and water quality data for the West Branch at Milton (Appendix B), the mass balance tables contained in Appendix C were calculated. These calculations indicate that Water Quality Standards for TDS, chloride, and sulfate would be maintained at Milton at a treated wastewater discharge rate of 350 gallons per minute or 0.504 million gallons per day. Flow data ($Q_{7,10}$) for the West Branch at Milton was obtained from United States Geological Survey (USGS) "Low Flow Statistics for Pennsylvania Streams", Reference Gage 01553500 from the period 1962 to 1995. The flow ($Q_{7,10}$) for that period was 700 cfs or 314,181 gallons/minute. Water quality data for the West Branch is from USGS "Water Quality in Pennsylvania", Reference Gage 01553500, Lewisburg from the period 1970 to 2008.

In a similar manner, osmotic pressure was evaluated where the proposed discharge will enter the West Branch. At a wastewater discharge rate of 350 gallons per minute or 0.504 million gallons

per day, the calculated osmotic pressure for the West Branch (Appendix C) was 14 milliosmoles per kilogram compared to the Water Quality Standard of 50 milliosmoles per kilogram.

Data for osmotic pressure was not included in available data for the West Branch. However, using analytical data in Appendix A, a relationship was developed between TDS and osmotic pressure. An osmotic pressure of 50 milliosmoles per kilogram is approximately equivalent to a TDS concentration of 1,742 milligrams per liter.

5.0 Water Quality Criteria and Receiving Water Classification

The Pennsylvania Department of Environmental Protection (PaDEP) has developed water quality criteria and designated uses for surface waters in Pennsylvania. These criteria are intended to protect the designated water uses. The designated water use (Chapter 93 regulations) for the West Branch at the proposed discharge location is WWF or Warm Water Fishes.

6.0 Discharge Volume and Mass

Using available analytical data, it was determined, through the mass balance calculations contained in Appendix C, that a discharge volume of 504,000 gallons per day of wastewater could be discharged from the proposed treatment facility while maintaining Water Quality Criteria at Milton. Using total dissolved solids as an example, at a concentration of 169,000 mg/l and a flow of 0.504 million gallons per day, the mass discharge rate is 710,794 pounds per day.

The wastewater concentrations used in the mass balance calculations are based on three sets of analytical data. Analytical data for wells in central Pennsylvania may or may not be similar to existing data. Consequently, it is requested that consideration be given to establishing permit limits on a mass basis (pound per day), rather than a concentration basis (milligrams per liter). This is typical of permit limits established by the Department for BOD and other parameters in NPDES permits for municipal sewage treatment plants. The table which follows illustrates how various combinations of concentration and flow can result in the same mass discharge rate.

Discharge Total Dissolved Solids mg/l	Discharge Flow (MGD)	Discharge Total Dissolved Solids lb/day
100,000	1.17	710,794
169,000	0.504	710,794
200,000	0.426	710,794
300,000	0.284	710,794

7.0 Preparedness, Prevention, and Contingency (PPC) Plan

A Preparedness, Prevention, and Contingency (PPC) Plan has being prepared and is included with the application. It will be implemented upon construction of the facility.

8.0 Material Safety Data Sheets (MSDS)

As indicated previously, treatability studies are being conducted for removal of TSS and metals via polymer addition. Results of these studies have not been completed. However an MSDS is enclosed for each polymer that is being evaluated for treatment. Additionally, if required for BOD removal, hydrogen peroxide or ozone will be used for oxidation. An MSDS is included for hydrogen peroxide. Similarly, magnesium hydroxide and calcium hydroxide are being evaluated for pH adjustment. An MSDS is also included for each of these chemicals.

Applicant Name: Central Pennsylvania Water Treatment, LLC

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) APPLICATION FOR PERMIT TO DISCHARGE INDUSTRIAL WASTEWATER

Before completing this form, read the step-by-step instructions provided in this application package.

Related ID#s (If Known)				DEP USE ONLY
Client ID#		APS ID#		Date Received & General Notes
Site ID#		Auth ID#		
Facility ID#				

APPLICANT IDENTIFIER

Applicant/Operator Name

Is this an application for a:

☒ New permit

Complete the General Information Form (GIF) 8000-PM-IT0001 and attach to the front of the application.

☐ Permit Renewal

List the current NPDES Permit number PA_____

Complete the Client and Site Sections of the GIF and attach to the front of the application.

☐ Permit Amendment or Permit Renewal with Amendment

List the current NPDES Permit number PA_____

List the current WQM Permit number _____

Complete the GIF and attach to the front of the application.

GENERAL INFORMATION

1. SIC Code	NAICS Code	Corresponding SIC/NAICS Description
4953	***562219***	***Nonhazardous waste treatment and disposal facilities***

2. Is the facility required to obtain a stormwater NPDES permit for any listed SIC code?

☐ YES (Answer question 3 below.) ☒ NO (Skip question 3.)

3. Is the facility applying for permit exemption under the No Exposure rule? (See Instructions)

☐ YES ☒ NO

4. General Description and Nature of Business.

Treatment facility for fracturing and produced water from natural gas wells.

5. List all NPDES and WQM Permits issued by DEP for this facility.

Permit Type	Permit Number	Date Issued
New facility, initial application.		

6. ATTACH TOPOGRAPHIC MAP (See Instructions)

7. NUMBER OF OUTFALLS

a. Industrial Wastewater Only		**Complete Module 1 and associated Modules.**
b. Combined Industrial Wastewater and Stormwater	x	**Complete Module 1, associated Modules and Module 12 or Module 14 (if required).**
c. Stormwater Only		**Complete Module 12 or Module 14.**

8. OUTFALL LOCATION: Using the same Locational Data supplied on the General Information Form under Facility Information, list the latitude and longitude of the location to the nearest ten-thousandth of a second and the name of the receiving water of each outfall. Where available, the receiving stream width and depth should also be provided using actual measurements or topographic map and navigational charts.

OUTFALL NUMBER *(list)*	LATITUDE			LONGITUDE			RECEIVING WATER (Name)	LOW FLOW STREAM	
	Deg	Min	Sec	Deg	Min	Sec		Width (ft)	Depth (ft)
001	***41***	***8***	***53***	***77***	***22***	***36.5***	***West Branch of the Susquehanna***	***715***	***8***

9. Name of Nearest Downstream Potable Water Intake ***Milton*** Distance ***≈ 55*** miles

10. WHOLE EFFLUENT TOXICITY (WET) TEST RESULTS

Is there known or reason to believe that WET testing was conducted in the last 3 years on any of the facility's discharges, or on a receiving water in relation to a discharge? ☐ YES ☒ NO

If "YES," attach any information available on the purpose and nature of such testing, and the test results.

If "NO," all dischargers are still encouraged to perform WET testing. The DEP regional office may be contacted for appropriate protocols.

11. CONTRACTED ANALYTICAL ASSISTANCE

Did a contract laboratory or consulting firm perform any of the analysis required by this application?

☐ NO ☒ YES (Provide information below.)

Name	***Fairway Laboratories, Inc.***	Types of Analysis Performed:
Address	***2019 Ninth Avenue*** ***P.O. Box 1925*** ***Altoona, PA 16603***	***Group 1, Group 2, and Group 3 parameters***
Phone	***(814) 946-4306***	

Name		Types of Analysis Performed:
Address		
Phone	( )	

12. ADDITIONAL INFORMATION: (OPTIONAL)

Additional information may be attached to expand upon any response to any questions or call attention to any other information felt should be considered in establishing permit limitations for the proposed or existing facility. Check if additional sheets are attached. ☒ YES ☐ NO

Project narrative and mass balance calculations are attached.

COMPLIANCE HISTORY REVIEW

Is the facility owner or operator in violation of any DEP regulation, permit, order or schedule of compliance at this or any other facility? ☐ YES ☒ NO

If "YES," list each permit, order and schedule of compliance and provide compliance status. Use additional sheets to provide information on all permits.

Permit Program Permit No.

Brief Description of Noncompliance

Steps Taken to Achieve Compliance	Date(s) Compliance Achieved

Current Compliance Status ☒ In Compliance ☐ In Noncompliance

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 gathered and evaluated 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.

Benjamin W. Hulburt — **Name** (type or print legibly)

Signature

President & Chief Executive Officer — **Official Title**

7/16/08 — **Date**

(Use corporate or professional seal as appropriate.)

Taken, sworn, and subscribed before me, this 16th day of July 20 08

Notary Seal

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Theresa M. Corle, Notary Public
Patton Twp., Centre County
My Commission Expires June 22, 2012
Member, Pennsylvania Association of Notaries

Theresa M Corle

Applicant Name: Central Pennsylvania Water Treatment LLC

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

INDUSTRIAL WASTEWATER MODULE 1

Before completing this form, read the step-by-step instructions provided in Appendix 1.

APPLICANT NAME	*Central Pennsylvania Water Treatment, LLC*

1. Line Drawing. Attach a line drawing and water balance of flow through the facility. (See instructions) ***Figure 2***

2. OUTFALLS AND ASSOCIATED WASTEWATER TREATMENT TECHNOLOGIES ***001***

   Complete Module 2 identifying the treatment processes associated with each outfall.

3. SOURCES OF WASTEWATER ***Waste water from oil and gas wells.***

   Attach a separate Module 3 for every outfall.

   Indicate the number of Module 3s attached. ***1***

4. REQUIRED AND OPTIONAL ANALYSIS

   a. Summary of Required Analysis

Outfall Number	Discharge Contains (see Instructions)						Pollutants or Pollutant Groups which must be sampled for and analyzed	Required Number of Sample Events (see instructions)
	Process Waste	NCCW	Sanitary Waste	Misc. Waste	GW Cleanup	Stormwater		
001	☒	☐	☐	☐	☐	☒	***Group 1***	***3***
	☐	☐	☐	☐	☐	☐		
	☐	☐	☐	☐	☐	☐		
	☐	☐	☐	☐	☐	☐		
	☐	☐	☐	☐	☐	☐		
	☐	☐	☐	☐	☐	☐		

   b. Complete the modules for the Pollutant(s) or Pollutant Group(s) identified above. A separate module must be submitted for each process wastewater and combined (process wastewater and stormwater) outfall identified in the application. List the number of modules for each Pollutant Group submitted with this application.

1	Module 4 - Pollutant Group 1
1	Module 5 - Pollutant Group 2 - Metals
1	Module 6 - Pollutant Group 3 - Volatile
0	Module 7 - Pollutant Group 4 - Acids
0	Module 8 - Pollutant Group 5 - Base/Neutral
0	Module 9 - Pollutant Group 6 - Pesticides

c. Optional Site-Specific Data

Additional modules may be attached to provide any of the optional site-specific information discussed in Appendix 2. (The modules should be used to report intake water quality, upstream background or ambient water quality, and parameter-specific coefficient of effluent variability. Space is provided at the top of the module to provide description of sampling points used.)

Optional data is attached to application. ☐ YES ☒ NO

5. PREPAREDNESS, PREVENTION, AND CONTINGENCY (PPC) PLANNING.

Does the facility have a PPC plan? ☒ YES ☐ NO

Does the facility have any other related plans, such as a Pollution Incident Prevention (PIP) Plan, Spill Prevention Control and Counter Measure (SPCC) Plan or BMP Plan? ☐ YES ☒ NO

If "YES," identify and indicate date(s) implemented.

Type of Plan	Date Implemented
PPC Plan	***Will be implemented upon construction of treatment facility***

DEP may require the plan(s) be submitted with this application.

6. OTHER INFORMATION (OPTIONAL): Attach additional sheets describing any additional environmental pollution control programs which may affect the discharges which are underway or which are planned. Indicate whether each program is now underway or planned, and indicate the actual or planned schedules.

☐ MARK "X" IF DESCRIPTION OF ADDITIONAL INFORMATION IS ATTACHED

7. INFORMATION AND ANALYSIS OF EFFLUENT QUALITY FOR OTHER POTENTIALLY TOXIC POLLUTANTS

a. Information on Chemical Additives

(Read instructions carefully and use the tabular format to present the required information)

Outfall	Chemical Substance or Compound Trade Names or Specific Ingredients	Manufacturer Name and Address	Average & Maximum Usage Rate lbs/day	Concentration			Lowest Possible Analytical Detection Level (µg/L)	Whole Product 96 Hr LC50 (mg/L) and species[1]	Whole Product 48 Hr LC50 (mg/L) and species[1]
				In-system	Effluent	Units			
001	*None*								

(1) If LC50 Data for whole product is not available, data for the individual active ingredients may be provided.

b. Specific Substances which must be identified if Known or Expected to be Present

(Read instructions carefully and use the tabular format and additional pages, where necessary, to present the required information)

Outfall	Chemical Substance or Compound	Reason for Presence in Discharge	Average Effluent Concentration (µg/L)	Analytical Detection Level (µg/L)
001	***None***			

c. Are any Table 2 substances identified for which a spill reporting exemption is requested? ☐ YES ☒ NO

If "YES," complete the Hazardous Substance Table.

d. Any other toxic chemicals known or expected to be present in the discharge.

Report any additional significant detections in effluent samples on the Other Toxic Chemicals sheets.

Applicant Name: Central Pennsylvania Water Treatment, LLC

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

WASTEWATER TREATMENT TECHNOLOGIES
MODULE 2

APPLICANT NAME	*Central Pennsylvania Water Treatment, LLC*	
Outfall Number	Treatment Unit Description (list in sequence)	Method for Handling and Disposal of Solid or Liquid Residue Resulting from Treatment (list in sequence)
001	*Storage/Equalization & Oxidation*	*Skimmed or recovered oil will be recycled.*
	Feed Tank & pH Adjustment	*N/A*
	Flash Mixing & Flocculation	*N/A*
	Inclined Plate Clarifier	*Filter Press, Landfill*
	Rapid Sand Filter (If required)	*Filter Press, Landfill*
	Treated Water Storage Tanks	*N/A*

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

SOURCES OF WASTEWATER
MODULE 3

Before completing this form, read the step-by-step instructions provided in Appendix 1.

APPLICANT NAME	***Central Pennsylvania Water Treatment, LLC***
OUTFALL NUMBER	***001***

1. Process Wastewater

a. Describe process and type of wastewater.

Wastewater from oil and gas wells.

b. Production Rate.

Referring to the instructions in Appendix 1 for this question, complete a Module 15, Production Rate, for each process subject to an effluent limitation listed in 40 CFR Subchapter N (Parts 400-471). Indicate the number of completed Module 15s attached to this application. ***N/A***

c. Discharge Occurs. ***24*** hrs/day; ***7*** days/wk; ***365*** days/yr; ***12*** months/yr.
During which months? ***All 12 months***

Report the discharge rate as:

The maximum daily discharge rate.	***0.504***	MGD
The monthly average discharge rate. ***New discharge, monthly average not available.***	***Unknown***	MGD
The long-term average discharge rate. ***New discharge, long term average not available.***	***Unknown***	MGD

For batch discharges report:

Number of decant cycles.	***N/A***	Cycles/day
Length of each decant cycle.	***N/A***	MIN.
Average decant discharge rate.	***N/A***	GPM

2. All Other Wastewater Contributing to this Outfall

a. Describe the wastewater.

None

b. Source(s). ***N/A***

c. Discharge Occurs. ***N/A*** hrs/day; _____ days/wk; _____ days/yr; _____ months/yr.
During which months?

Report the discharge rate as:

The maximum daily discharge rate.	***N/A***	MGD
The monthly average discharge rate.	***N/A***	MGD
The long-term average discharge rate.	***N/A***	MGD

For batch discharges report:

Number of decant cycles.	***N/A***	Cycles/day
Length of each decant cycle.	***N/A***	MIN.
Average decant discharge rate.	***N/A***	GPM

3. Total Process, Miscellaneous Noncontact Cooling, and Sanitary Wastewater

a. Source(s). ***None***

b. Discharge Occurs. ***N/A*** hrs/day; _____ days/wk; _____ days/yr; _____ months/yr.

During which months?

Report the discharge rate as:

The maximum daily discharge rate.	***N/A***	MGD
The monthly average discharge rate.	***N/A***	MGD
The long-term average discharge rate.	***N/A***	MGD

4. Stormwater

Complete Module 12 or Module 14 for the stormwater contribution.

3800-PM-WSFR0008m Rev. 3/2006
Module 10

Applicant Name: Central Pennsylvania Water Treatment, LLC

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

HAZARDOUS SUBSTANCE TABLE
MODULE 10

Before completing this form, read the step-by-step instructions provided in Appendix 1.

APPLICANT NAME	**Central Pennsylvania Water Treatment, LLC**

1. Name of Table 3 Substance	2. Outfall	3. Amount Per Outfall			4. Origin and Source	5. Treatment Provided		
		Quantity lb/24 hrs	Frequency	Duration		a	b	c
						☐	☐	☐
								☐
								☐
								☐
								☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐
						☐	☐	☐

As indicated in Modules 4, 5, and 6, ammonia, benzene, phenols, and toluene have been detected in samples that are representative of the brine water to be treated at the proposed facility. The proposed treatment will include oxidation for BOD, and this oxidation should also oxidize these specific organic compounds. Discharge from the proposed treatment facility will be to proposed outfall 001.

Applicant Name: Central Pennsylvania Water Treatment, LLC
Outfall: 001

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

OTHER TOXIC CHEMICALS
MODULE 11

Before completing this form, read the step-by-step instructions provided in Appendix 1.

Applicant Name	***Central Pennsylvania Water Treatment, LLC***
Outfall Number	***001***

1. GC/MS "Five Peaks" pollutants (see Appendix 1)

Group Number (3 - 6)	Chemical Substance or Compound Name	MDL (µg/L)	Average Effluent Concentration (µg/L)	Maximum Effluent Concentration (µg/L)	No. Samples Positive / No. analyzed
3V	***Benzene***	***0.25 mg/l***	***<0.59 mg/l***	***0.88 mg/l***	***2/3***
25V	***Toluene***	***0.25 mg/l***	***<0.41 mg/l***	***0.84 mg/l***	***2/3***
					/

Analyses did not include Groups 4 through 6, as those analyses were not required for this type of discharge. Benzene and toluene were the only Group 3 parameters above laboratory reporting limits.

2. Other Chemicals

Substance	Reason for Presence in Discharge	Average Concentration (µg/L)	Indicate if Presence is Known (K) or Suspected (S)
N/A			

☐ If additional peaks were not available for one or more groups with the method used check here and attach an explanation of why the method was selected.

Provide additional sheets as necessary.

Applicant Name: Central Pennsylvania Water Treatment, LLC

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

STORMWATER
MODULE 12

Before completing this form, read the step-by-step instructions provided in Appendix 1.

APPLICANT NAME	Central Pennsylvania Water Treatment, LLC

1. Site Plan and Stormwater Runoff. Attach a copy of your facility's site plan. (See instructions)

   DEP strongly recommends the separation of stormwater and other wastewaters. ***(See Attached Project Narrative)***

2. Description of Potential Pollutant Sources and Controls ***(See Attached Project Narrative)***

   a. For each stormwater outfall, provide an estimate of the area (include units) drained to the outfall, and a list of potential pollutant(s) and sources for the outfall.

Outfall Number	Total Area Drained (provide units)	Potential Pollutant(s) and Sources
001	*20 acres*	***Wastewater storage will be in impoundments or tanks and treatment processes***
		will be in a building. Potential for stormwater contact should be minimal.

   b. Describe Best Management Practices and nonstructural controls used to prevent potential pollutants in stormwater.

   Wastewater storage will be in impoundments or tanks and treatment processes will be in a building. This should limit contact with stormwater.

   c. For each stormwater outfall, provide the location and description of existing structural control measures to reduce pollutants in stormwater runoff; and a description of the treatment the stormwater receives, including the schedule and type of maintenance for control and treatment measures and the ultimate disposal of any solid or fluid wastes other than by discharge.

Outfall Number	Control Measures
001	***This is a proposed facility. There are no existing structural controls.***

3. Non-stormwater Discharges

   a. All non-stormwater discharges from these outfall(s) are identified in the Industrial Wastewater section of this application for the outfall.

   ☒ YES ☐ NO

   b. Provide a description of the method used, the date of any testing, and the on-site drainage points that were directly observed during a test.

   This is a proposed facility, there has been no testing.

4. Significant Leaks or Spills

   Provide existing information regarding the history of significant leaks or spills of toxic or hazardous pollutants at the facility in the last 3 years, including the approximate date and location of the spill or leak, and the type and amount of material released.

   This is a proposed facility, there have been no spills.

5. PREPAREDNESS, PREVENTION, AND CONTINGENCY (PPC) PLANNING.

Does the facility have a PPC plan? ☒ YES ☐ NO

Does the facility have any other related plans, such as a Pollution Incident Prevention (PIP) Plan, Spill Prevention Control and Counter Measure (SPCC) Plan or Stormwater BMP Plan? ☐ YES ☒ NO

If "YES," identify and indicate date(s) implemented.

Type of Plan	Date Implemented
PPC Plan	***Will be implemented upon construction of facility***

DEP may require the plan(s) be submitted with this application.

6. Additional Stormwater Information Submission

a. Could all sampling be performed as required? ☐ YES ☒ NO (Explain below)

This is a proposed facility, no stormwater sampling was conducted.

b. Complete a Stormwater Sampling Data Table (Module 13) for each outfall containing stormwater. Indicate the total number of tables submitted. ***1***

Applicant Name: Central Pennsylvania Water Treatment, LLC
Outfall: 001

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

STORMWATER SAMPLING DATA TABLE
MODULE 13

Before completing this form, read the step-by-step instructions provided in Appendix 1.

APPLICANT NAME	***Central Pennsylvania Water Treatment, LLC***		
OUTFALL NUMBER	***001***	**REPRESENTATIVE OUTFALL NUMBER(S)**	***001***

1. Provide the results of at least one analysis for every pollutant in this table. See Appendix 1.

Pollutant	CAS Number (if available)	Maximum Values (include units) Grab Sample Taken During First 30 Minutes	Average Values (include units) Grab Sample Taken During First 30 Minutes	Number of Storm Events Sampled	Sources of Pollutants
Oil and Grease					
Biological Oxygen Demand (BODS)					
Chemical Oxygen Demand (COD)					
Total Suspended Solids (TSS)					
Total Kjeldahl Nitrogen					
Nitrate plus Nitrite Nitrogen					
Total Phosphorus					
pH (min./Max.)					

This is a proposed treatment facility. It has not yet been constructed. Therefore, no samples have been collected.

2. List each pollutant that is limited by an ELG which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). See the instructions for additional details and requirements.

Pollutant	CAS Number (if available)	Maximum Values (include units) Grab Sample Taken During First 30 Minutes	Average Values (include units) Grab Sample Taken During First 30 Minutes	Number of Storm Events Sampled	Sources of Pollutants

This is a proposed treatment facility. It has not yet been constructed. This application is for the initial NPDES permit.

3. List each pollutant shown in Table 3 and Pollutant Groups 1-6 that is known or believed to be present. (See Appendix 1.)

Pollutant	CAS Number (if available)	Maximum Values (include units) Grab Sample Taken During First 30 Minutes	Average Values (include units) Grab Sample Taken During First 30 Minutes	Number of Storm Events Sampled	Sources of Pollutants

This is a proposed treatment facility. It has not yet been constructed. Wastewater will be stored in tanks or lined impoundments, and treatment processes will be inside a building. Consequently, potential for stormwater contact should be minimal.

4. Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm (in minutes)	3. Total rainfall during storm event (in inches)	4. Number of hours between beginning of storm measured and end of previous measurable event	5. Maximum flow rate during rain event (gallons per minute or specify units)	6. Total flow from rain event (gallons or specify units	7. Season Sample Was taken	8. Form of Precipitation (rainfall, snowmelt)

This is a proposed treatment facility. It has not yet been constructed. Therefore, no samples have been collected.

5. Provide a description of the method of flow measurement or estimate.

This is a proposed treatment facility. It has not yet been constructed. Therefore, no samples have been collected.

3800-PM-WSFR0008c Rev. 3/2006
Checklist

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

APPLICATION FOR NPDES PERMIT FOR INDUSTRIAL DISCHARGERS

APPLICANT'S ✓ CHECKLIST

APPLICANT NAME	Central Pennsylvania Water Treatment, LLC

Please check the following list to make sure that you have included all the required information. Place a checkmark in the column provided for all items completed and/or provided.

Failure to provide all of the requested information will delay the processing of the application and may result in the application being placed on hold with no action, or will be considered withdrawn and the application file closed.

	Item	Check If Included	DEP Use Only
1.	General Information Form (8000-PM-IT0001)	☒	
2.	One original and (2) copies of application package submitted [original must be notarized]	☒	
3.	Additional copy for Erie and Allegheny counties (if required)	☐	
4.	Additional copy for the river basin commission (if required)	☐	
5.	Application Fee - $500	☒	
6.	Proper evidence of Act 14 municipality and county notification	☒	
7.	Proof of local newspaper public notice (for new and substantially changed discharges only)	☒	
8.	Topographic Map	☒	
9.	Industrial Wastewater - Module 1	☒	
10.	Wastewater Treatment Technologies - Module 2	☒	
11.	Sources Of Wastewater sheet(s) - Module 3	☒	
12.	Analysis Results Table(s) - Modules 4-9	☒	
13.	Hazardous Substance Table - Module 10	☒	
14.	Toxic Chemicals (Optional) - Module 11	☒	
15.	Stormwater (if required) - Module 12	☒	
16.	Stormwater Sampling Data Table (if required) - Module 13	☒	
17.	No Exposure Certification (if required) - Module 14	☐	
18.	Other:	☐	

APPENDIX A

Analytical Data

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group
1631 S Atherton St., Suite 101
State College PA, 16801
Project Manager: Kim Nelson

Project: REX ENERGY
Project Number: [none]
Collector: CLIENT
Number of Containers: 71

Reported: 06/12/08 10:45

Client Sample ID: 001 BAME BUTLER **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-01 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Metals by EPA 200 Series Methods						
Silver	<4.00	4.00	mg/l	05/12/08 12:21	EPA 200.7	rb
Aluminum	<50.0	50.0	mg/l	05/12/08 12:21	EPA 200.7	rb
Arsenic	<4.00	4.00	mg/l	05/12/08 12:22	EPA 200.7	rb
Boron	<100	100	mg/l	05/12/08 12:21	EPA 200.7	rb
Barium	137	10.0	mg/l	05/12/08 12:21	EPA 200.7	rb
Beryllium	<1.00	1.00	mg/l	05/12/08 12:21	EPA 200.7	rb
Cadmium	<2.00	2.00	mg/l	05/12/08 12:22	EPA 200.7	rb
Cobalt	<10.0	10.0	mg/l	05/12/08 12:22	EPA 200.7	rb
Chromium	<2.00	2.00	mg/l	05/12/08 12:22	EPA 200.7	rb
Copper	<10.0	10.0	mg/l	05/12/08 12:21	EPA 200.7	rb
Iron	<10.0	10.0	mg/l	05/12/08 12:21	EPA 200.7	rb
Mercury	<0.00200	0.00200	mg/l	05/13/08 15:27	EPA 245.1	rb
Magnesium	710	100	mg/l	05/12/08 12:20	EPA 200.7	rb
Manganese	<10.0	10.0	mg/l	05/12/08 12:21	EPA 200.7	rb
Molybdenum	<10.0	10.0	mg/l	05/12/08 12:22	EPA 200.7	rb
Nickel	<10.0	10.0	mg/l	05/12/08 12:22	EPA 200.7	rb
Lead	<2.00	2.00	mg/l	05/12/08 12:22	EPA 200.7	rb
Antimony	<2.00	2.00	mg/l	05/12/08 12:22	EPA 200.7	rb
Selenium	<4.00	4.00	mg/l	05/12/08 12:22	EPA 200.7	rb
Tin	<0.100	0.100	mg/l	05/12/08 13:44	EPA 200.7	rb

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 001 BAME BUTLER **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-01 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Metals by EPA 200 Series Methods						
Strontium	819	1.00	mg/l	05/12/08 12:23	EPA 200.7	rb
Titanium	<1.00	1.00	mg/l	05/12/08 12:21	EPA 200.7	rb
Thallium	<4.00	4.00	mg/l	05/12/08 12:22	EPA 200.7	rb
Zinc	<10.0	10.0	mg/l	05/12/08 12:22	EPA 200.7	rb
Metals (Dissolved) by EPA 200 Series Methods						
Iron, Dissolved	<10.0	10.0	mg/l	05/12/08 11:54	EPA 200.7	rb
Volatile Organic Compounds by EPA Method 8260B						
Acrylonitrile	<2500	2500	ug/l	05/12/08 17:44	EPA 8260B	wm
Acrolein	<12500	12500	ug/l	05/12/08 17:44	EPA 8260B	wm
Benzene	628	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Bromodichloromethane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Bromoform	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Bromomethane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Carbon tetrachloride	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Chlorobenzene	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Chloroethane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
2-Chloroethylvinyl ether	<12500	12500	ug/l	05/12/08 17:44	EPA 8260B	wm
Chloroform	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Chloromethane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 001 BAME BUTLER **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-01 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Volatile Organic Compounds by EPA Method 8260B						
Xylenes (total)	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
is-1,2-Dichloroethene	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
trans-1,3-Dichloropropene	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Dibromochloromethane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
1,1-Dichloroethane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
1,2-Dichloroethane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
1,1-Dichloroethene	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
trans-1,2-Dichloroethene	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
1,2-Dichloropropane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
cis-1,3-Dichloropropene	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Ethylbenzene	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Methylene chloride	<3500	3500	ug/l	05/12/08 17:44	EPA 8260B	wm
1,1,2,2-Tetrachloroethane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Tetrachloroethene	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Toluene	405	250	ug/l	05/12/08 17:44	EPA 8260B	wm
1,1,2-Trichloroethane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
1,1,1-Trichloroethane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Trichloroethene	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Trichlorofluoromethane	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm
Vinyl chloride	<250	250	ug/l	05/12/08 17:44	EPA 8260B	wm

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 001 BAME BUTLER **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-01 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Conventional Chemistry Parameters by SM/EPA Methods						
Acidity	-6.0	-10000	mg/l	05/08/08 17:01	SM2310B	jf
Total Alkalinity	98.0	10.0	mg/l	05/08/08 16:45	SM2320B	jf
Ammonia as N	76.7	1.00	mg/l	05/12/08 15:41	SM4500-NH3-D	rc
Biochemical Oxygen Demand	369	61.0	mg/l	05/08/08 07:00	SM5210B	mm
Cyanide (total)	<0.010	0.010	mg/l	05/13/08 08:01	SM 4500-CN-C+E	mm
Chemical Oxygen Demand	4380	300	mg/l	05/09/08 14:16	EPA 410.4	bw
Apparent Color	400	5.00	Color Units	05/08/08 11:09	SM 2120B	bl
Hexavalent Chromium	<2.0	2.0	mg/l	05/07/08 09:14	HACH 8023	mm
Cyanide (free)	<0.0100	0.0100	mg/l	05/13/08 08:01	SM 4500CN- G	mm
Total Hardness	23400	1.00	mg/l	05/09/08 15:30	SM2340C	cl
Methylene Blue Active Substances	<0.100	0.100	mg/l	05/08/08 12:30	SM5540C	cl
Nitrate as N	<500	500	mg/l	05/09/08 03:33	EPA 300.0	BW
Nitrite as N	<100	100	mg/l	05/09/08 03:33	EPA 300.0	BW
Oil & Grease	11.2	10.0	mg/l	05/12/08 16:51	EPA 1664A	rc
pH	6.36		pH Units	05/07/08 10:12	SM4500H+ B	vc
Phenolics	0.350	0.250	mg/l	05/13/08 15:07	EPA 420.1	cb
Phosphorus	<0.200	0.200	mg/l	05/08/08 11:45	EPA 365.3	cl

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 001 BAME BUTLER **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-01 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Conventional Chemistry Parameters by SM/EPA Methods						
Residual Chlorine - Total	0.020	0.010	mg/l	05/07/08 15:57	SM4500-Cl-G	bw
Total Dissolved Solids	84200	10.0	mg/l	05/07/08 10:00	SM2540C	cr
Total Suspended Solids	246	8.00	mg/l	05/07/08 11:00	SM2540D	cr
Sulfide	<1.00	1.00	mg/l	05/07/08 16:57	SM4500-S2-F	jf
Sulfite	2.90	1.00	mg/l	05/07/08 11:15	SM4500-SO3-B	bl
Total Kjeldahl Nitrogen	129	20.0	mg/l	05/13/08 16:18	SM4500NorgC	rc
Total Organic Carbon	120	25.0	mg/l	05/08/08 12:53	SM 5310C	bw
Miscellaneous Physical/Conventional Chemistry Parameters						
Osmotic Pressure	2420		milliosmols	05/11/08 00:00	Osmette	sub
Anions by EPA Method 300.0						
Bromide	533	100	mg/l	05/09/08 03:33	EPA 300.0	BW
Chloride	71200	25000	mg/l	05/09/08 22:48	EPA 300.0	BW
Fluoride	<500	500	mg/l	05/09/08 03:33	EPA 300.0	BW
Sulfate as SO4	<500	500	mg/l	05/09/08 03:33	EPA 300.0	BW
Physical Parameters by APHA/ASTM/EPA Methods						
Gross Alpha - Radiological Suite	960	536	pCi/L	05/12/08 09:15	EPA 900.0	sub
Gross Beta - Radiological Suite	<594	594	pCi/L	05/12/08 09:15	EPA 900.0	sub

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 001 BAME BUTLER **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-01 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Microbiological Parameters by APHA Standard Methods						
Fecal Coliforms	<9	9	CFU/100 ml	05/07/08 10:59	SM 9222D	je
Subcontracted Analyses						
Radium 226	180	18.7	pCi/L	05/28/08 14:20	EPA 903.0	sub
Radium 228	119	12.4	pCi/L	06/02/08 09:00	EPA 904.0	sub

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 002 WASHINGTON **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-02 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Metals by EPA 200 Series Methods						
Silver	<4.00	4.00	mg/l	05/12/08 12:27	EPA 200.7	rb
Aluminum	<50.0	50.0	mg/l	05/12/08 12:26	EPA 200.7	rb
Arsenic	<4.00	4.00	mg/l	05/12/08 12:27	EPA 200.7	rb
Boron	<100	100	mg/l	05/12/08 12:27	EPA 200.7	rb
Barium	39.0	10.0	mg/l	05/12/08 12:27	EPA 200.7	rb
Beryllium	<1.00	1.00	mg/l	05/12/08 12:27	EPA 200.7	rb
Cadmium	<2.00	2.00	mg/l	05/12/08 12:27	EPA 200.7	rb
Cobalt	<10.0	10.0	mg/l	05/12/08 12:27	EPA 200.7	rb
Chromium	<2.00	2.00	mg/l	05/12/08 12:27	EPA 200.7	rb
Copper	<10.0	10.0	mg/l	05/12/08 12:27	EPA 200.7	rb
Iron	151	10.0	mg/l	05/12/08 12:26	EPA 200.7	rb
Mercury	<0.00200	0.00200	mg/l	05/13/08 15:27	EPA 245.1	rb
Magnesium	1550	100	mg/l	05/12/08 12:26	EPA 200.7	rb
Manganese	<10.0	10.0	mg/l	05/12/08 12:27	EPA 200.7	rb
Molybdenum	<10.0	10.0	mg/l	05/12/08 12:27	EPA 200.7	rb
Nickel	<10.0	10.0	mg/l	05/12/08 12:27	EPA 200.7	rb
Lead	<2.00	2.00	mg/l	05/12/08 12:27	EPA 200.7	rb
Antimony	<2.00	2.00	mg/l	05/12/08 12:27	EPA 200.7	rb
Selenium	<4.00	4.00	mg/l	05/12/08 12:27	EPA 200.7	rb
Tin	<0.100	0.100	mg/l	05/12/08 13:47	EPA 200.7	rb

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 002 WASHINGTON **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-02 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Metals by EPA 200 Series Methods						
Strontium	2520	1.00	mg/l	05/12/08 12:28	EPA 200.7	rb
Titanium	<1.00	1.00	mg/l	05/12/08 12:27	EPA 200.7	rb
Thallium	<4.00	4.00	mg/l	05/12/08 12:27	EPA 200.7	rb
Zinc	<10.0	10.0	mg/l	05/12/08 12:27	EPA 200.7	rb
Metals (Dissolved) by EPA 200 Series Methods						
Iron, Dissolved	118	10.0	mg/l	05/12/08 11:59	EPA 200.7	rb
Volatile Organic Compounds by EPA Method 8260B						
Acrolein	<12500	12500	ug/l	05/12/08 18:21	EPA 8260B	wm
Acrylonitrile	<2500	2500	ug/l	05/12/08 18:21	EPA 8260B	wm
Benzene	882	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Bromodichloromethane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Bromoform	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Bromomethane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Carbon tetrachloride	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Chlorobenzene	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Chloroethane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
2-Chloroethylvinyl ether	<12500	12500	ug/l	05/12/08 18:21	EPA 8260B	wm
Chloroform	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Chloromethane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

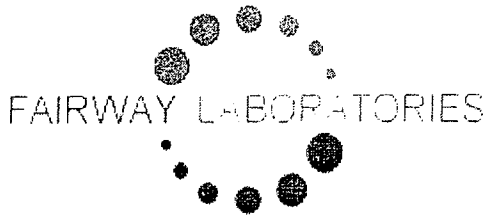
ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 002 WASHINGTON **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-02 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Volatile Organic Compounds by EPA Method 8260B						
Xylenes (total)	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
cis-1,2-Dichloroethene	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
trans-1,3-Dichloropropene	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Dibromochloromethane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
1,1-Dichloroethane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
1,2-Dichloroethane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
1,1-Dichloroethene	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
trans-1,2-Dichloroethene	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
1,2-Dichloropropane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
cis-1,3-Dichloropropene	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Ethylbenzene	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Methylene chloride	<1620	1620	ug/l	05/12/08 18:21	EPA 8260B	wm
1,1,2,2-Tetrachloroethane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Tetrachloroethene	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Toluene	840	250	ug/l	05/12/08 18:21	EPA 8260B	wm
1,1,2-Trichloroethane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
1,1,1-Trichloroethane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Trichloroethene	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Trichlorofluoromethane	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm
Vinyl chloride	<250	250	ug/l	05/12/08 18:21	EPA 8260B	wm

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax



ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 002 WASHINGTON **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-02 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Conventional Chemistry Parameters by SM/EPA Methods						
Acidity	420	-10000	mg/l	05/08/08 17:01	SM2310B	jf
Total Alkalinity	<10.0	10.0	mg/l	05/08/08 16:45	SM2320B	jf
Ammonia as N	87.6	1.00	mg/l	05/12/08 15:41	SM4500-NH3-D	rc
Biochemical Oxygen Demand	108	61.0	mg/l	05/08/08 07:00	SM5210B	mm
Cyanide (total)	<0.010	0.010	mg/l	05/13/08 08:01	SM 4500-CN-C+E	mm
Chemical Oxygen Demand	4760	300	mg/l	05/09/08 14:16	EPA 410.4	bw
Apparent Color	300	5.00	Color Units	05/08/08 11:09	SM 21020B	bl
Hexavalent Chromium	<2.0	2.0	mg/l	05/07/08 09:14	HACH 8023	mm
Cyanide (free)	<0.0100	0.0100	mg/l	05/13/08 08:01	SM 4500CN- G	mm
Total Hardness	83000	1.00	mg/l	05/09/08 15:30	SM2340C	cl
Methylene Blue Active Substances	0.208	0.100	mg/l	05/08/08 12:30	SM5540C	cl
Nitrate as N	<500	500	mg/l	05/09/08 03:51	EPA 300.0	BW
Nitrite as N	<100	100	mg/l	05/09/08 03:51	EPA 300.0	BW
Oil & Grease	<10.0	10.0	mg/l	05/12/08 16:51	EPA 1664A	rc
pH	4.67		pH Units	05/07/08 10:12	SM4500H+ B	vc
Phenolics	0.375	0.250	mg/l	05/13/08 15:07	EPA 420.1	cb
Phosphorus	0.220	0.200	mg/l	05/08/08 11:45	EPA 365.3	cl
Residual Chlorine - Total	<0.010	0.010	mg/l	05/07/08 15:57	SM4500-Cl-G	bw

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 002 WASHINGTON **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-02 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Conventional Chemistry Parameters by SM/EPA Methods						
Total Dissolved Solids	117000	10.0	mg/l	05/07/08 10:00	SM2540C	cr
Total Suspended Solids	58.0	4.00	mg/l	05/07/08 11:00	SM2540D	cr
Sulfide	<1.00	1.00	mg/l	05/07/08 16:57	SM4500-S2-F	jf
Sulfite	2.50	1.00	mg/l	05/07/08 11:15	SM4500-SO3-B	bl
Total Kjeldahl Nitrogen	110	20.0	mg/l	05/13/08 16:18	SM4500NorgC	rc
Total Organic Carbon	25.6	25.0	mg/l	05/08/08 13:10	SM 5310C	bw
Miscellaneous Physical/Conventional Chemistry Parameters						
Osmotic Pressure	3110		milliosmols	05/11/08 00:00	Osmette	sub
Anions by EPA Method 300.0						
Bromide	819	100	mg/l	05/09/08 03:51	EPA 300.0	BW
Chloride	71200	25000	mg/l	05/09/08 23:06	EPA 300.0	BW
Fluoride	<500	500	mg/l	05/09/08 03:51	EPA 300.0	BW
Sulfate as SO4	<500	500	mg/l	05/09/08 03:51	EPA 300.0	BW
Physical Parameters by APHA/ASTM/EPA Methods						
Gross Alpha - Radiological Suite	3420	530	pCi/L	05/12/08 09:15	EPA 900.0	sub
Gross Beta - Radiological Suite	772	495	pCi/L	05/12/08 09:15	EPA 900.0	sub
Microbiological Parameters by APHA Standard Methods						

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 002 WASHINGTON **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-02 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Microbiological Parameters by APHA Standard Methods						
Fecal Coliforms	<9	9	CFU/100 ml	05/07/08 10:59	SM 9222D	je
Subcontracted Analyses						
Radium 226	233	52.0	pCi/L	05/28/08 14:20	EPA 903.0	sub
Radium 228	55.4	12.4	pCi/L	06/02/08 09:00	EPA 904.0	sub

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 004 FRONTIER CLUB **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-04 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Metals by EPA 200 Series Methods						
Silver	<4.00	4.00	mg/l	05/12/08 12:37	EPA 200.7	rb
Aluminum	<50.0	50.0	mg/l	05/12/08 12:37	EPA 200.7	rb
Arsenic	<4.00	4.00	mg/l	05/12/08 12:38	EPA 200.7	rb
Boron	<100	100	mg/l	05/12/08 12:38	EPA 200.7	rb
Barium	116	10.0	mg/l	05/12/08 12:37	EPA 200.7	rb
Beryllium	<1.00	1.00	mg/l	05/12/08 12:37	EPA 200.7	rb
Cadmium	<2.00	2.00	mg/l	05/12/08 12:38	EPA 200.7	rb
Cobalt	<10.0	10.0	mg/l	05/12/08 12:38	EPA 200.7	rb
Chromium	<2.00	2.00	mg/l	05/12/08 12:38	EPA 200.7	rb
Copper	<10.0	10.0	mg/l	05/12/08 12:37	EPA 200.7	rb
Iron	333	10.0	mg/l	05/12/08 12:37	EPA 200.7	rb
Mercury	<0.00200	0.00200	mg/l	05/13/08 15:27	EPA 245.1	rb
Magnesium	2430	100	mg/l	05/12/08 12:36	EPA 200.7	rb
Manganese	37.6	10.0	mg/l	05/12/08 12:37	EPA 200.7	rb
Molybdenum	<10.0	10.0	mg/l	05/12/08 12:38	EPA 200.7	rb
Nickel	<10.0	10.0	mg/l	05/12/08 12:38	EPA 200.7	rb
Lead	<2.00	2.00	mg/l	05/12/08 12:38	EPA 200.7	rb
Antimony	<2.00	2.00	mg/l	05/12/08 12:38	EPA 200.7	rb
Selenium	<4.00	4.00	mg/l	05/12/08 12:38	EPA 200.7	rb
Tin	<0.100	0.100	mg/l	05/12/08 13:54	EPA 200.7	rb

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 004 FRONTIER CLUB **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-04 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Metals by EPA 200 Series Methods						
Strontium	587	1.00	mg/l	05/12/08 12:39	EPA 200.7	rb
Titanium	<1.00	1.00	mg/l	05/12/08 12:37	EPA 200.7	rb
Thallium	<4.00	4.00	mg/l	05/12/08 12:38	EPA 200.7	rb
Zinc	<10.0	10.0	mg/l	05/12/08 12:38	EPA 200.7	rb
Metals (Dissolved) by EPA 200 Series Methods						
Iron, Dissolved	273	10.0	mg/l	05/12/08 12:10	EPA 200.7	rb
Volatile Organic Compounds by EPA Method 8260B						
Acrylonitrile	<2500	2500	ug/l	05/12/08 15:37	EPA 8260B	wm
Acrolein	<12500	12500	ug/l	05/12/08 15:37	EPA 8260B	wm
Benzene	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Bromodichloromethane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Bromoform	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Bromomethane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Carbon tetrachloride	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Chlorobenzene	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Chloroethane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
2-Chloroethylvinyl ether	<12500	12500	ug/l	05/12/08 15:37	EPA 8260B	wm
Chloroform	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Chloromethane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 004 FRONTIER CLUB **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-04 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Volatile Organic Compounds by EPA Method 8260B						
Xylenes (total)	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
cis-1,2-Dichloroethene	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
trans-1,3-Dichloropropene	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Dibromochloromethane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
1,1-Dichloroethane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
1,2-Dichloroethane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
1,1-Dichloroethene	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
trans-1,2-Dichloroethene	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
1,2-Dichloropropane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
cis-1,3-Dichloropropene	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Ethylbenzene	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Methylene chloride	<1500	1500	ug/l	05/12/08 15:37	EPA 8260B	wm
1,1,2,2-Tetrachloroethane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Tetrachloroethene	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Toluene	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
1,1,2-Trichloroethane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
1,1,1-Trichloroethane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Trichloroethene	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Trichlorofluoromethane	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm
Vinyl chloride	<250	250	ug/l	05/12/08 15:37	EPA 8260B	wm

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 004 FRONTIER CLUB **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-04 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Conventional Chemistry Parameters by SM/EPA Methods						
Acidity	680	-10000	mg/l	05/08/08 17:01	SM2310B	jf
Total Alkalinity	56.0	10.0	mg/l	05/08/08 16:45	SM2320B	jf
Ammonia as N	17.6	1.00	mg/l	05/12/08 15:41	SM4500-NH3-D	rc
Biochemical Oxygen Demand	530	61.0	mg/l	05/08/08 07:00	SM5210B	mm
Cyanide (total)	<0.010	0.010	mg/l	05/13/08 08:01	SM 4500-CN-C+E	mm
Chemical Oxygen Demand	4440	300	mg/l	05/09/08 14:16	EPA 410.4	bw
Apparent Color	300	5.00	Color Units	05/08/08 11:09	SM 21020B	bl
Hexavalent Chromium	<2.0	2.0	mg/l	05/07/08 09:14	HACH 8023	mm
Cyanide (free)	<0.0100	0.0100	mg/l	05/13/08 08:01	SM 4500CN- G	mm
Total Hardness	77000	1.00	mg/l	05/09/08 15:30	SM2340C	cl
Methylene Blue Active Substances	3.52	2.00	mg/l	05/08/08 12:30	SM5540C	cl
Nitrate as N	<500	500	mg/l	05/09/08 04:27	EPA 300.0	BW
Nitrite as N	<100	100	mg/l	05/09/08 04:27	EPA 300.0	BW
Oil & Grease	11.4	10.0	mg/l	05/12/08 16:51	EPA 1664A	rc
pH	5.03		pH Units	05/07/08 10:12	SM4500H+ B	vc
Phenolics	0.700	0.500	mg/l	05/13/08 15:07	EPA 420.1	cb
Phosphorus	<0.200	0.200	mg/l	05/08/08 11:45	EPA 365.3	cl

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group
1631 S Atherton St., Suite 101
State College PA. 16801
Project Manager: Kim Nelson

Project: REX ENERGY
Project Number: [none]
Collector: CLIENT
Number of Containers: 71

Reported: 06/12/08 10:45

Client Sample ID: 004 FRONTIER CLUB **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-04 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Conventional Chemistry Parameters by SM/EPA Methods						
Residual Chlorine - Total	<0.010	0.010	mg/l	05/07/08 15:57	SM4500-Cl-G	bw
Total Dissolved Solids	169000	10.0	mg/l	05/07/08 10:00	SM2540C	cr
Total Suspended Solids	76.0	4.00	mg/l	05/07/08 11:00	SM2540D	cr
Sulfide	8.00	1.00	mg/l	05/07/08 16:57	SM4500-S2-F	jf
Sulfite	2.50	1.00	mg/l	05/07/08 11:15	SM4500-SO3-B	bl
Total Kjeldahl Nitrogen	35.3	20.0	mg/l	05/13/08 16:18	SM4500NorgC	re
Total Organic Carbon	119	25.0	mg/l	05/08/08 13:45	SM 5310C	bw
Miscellaneous Physical/Conventional Chemistry Parameters						
Osmotic Pressure	4800		milliosmols	05/11/08 00:00	Osmette	sub
Anions by EPA Method 300.0						
Bromide	1090	100	mg/l	05/09/08 04:27	EPA 300.0	BW
Chloride	93100	25000	mg/l	05/09/08 23:42	EPA 300.0	BW
Fluoride	<500	500	mg/l	05/09/08 04:27	EPA 300.0	BW
Sulfate as SO4	< 500	500	mg/l	05/09/08 04:27	EPA 300.0	BW
Physical Parameters by APHA/ASTM/EPA Methods						
Gross Alpha - Radiological Suite	<1280	1280	pCi/L	05/15/08 08:45	EPA 900.0	sub
Gross Beta - Radiological Suite	< 1570	1570	pCi/L	05/15/08 08:45	EPA 900.0	sub

FAIRWAY LABORATORIES
2019 Ninth Avenue
PO Box 1925
Altoona, Pennsylvania 16603
(814) 946-4306 (814) 946-8791 - Fax

FAIRWAY LABORATORIES

ARM Group	Project:	REX ENERGY	
1631 S Atherton St., Suite 101	Project Number:	[none]	**Reported:**
State College PA, 16801	Collector:	CLIENT	06/12/08 10:45
Project Manager: Kim Nelson	Number of Containers:	71	

Client Sample ID: 004 FRONTIER CLUB **Date/Time Sampled:** 05/01/08 11:00

Laboratory Sample ID: 8E07002-04 (Water)

Analyte	Result	Laboratory Reporting Limit	Units	Date / Time Analyzed	Method	Analyst
Microbiological Parameters by APHA Standard Methods						
Fecal Coliforms	< 17	17	CFU/100 ml	05/07/08 10:59	SM 9222D	je
Subcontracted Analyses						
Radium 226	301	22.3	pCi/L	05/26/08 10:45	EPA 903.0	sub
Radium 228	314	12.4	pCi/L	06/02/08 09:00	EPA 904.0	sub

APPENDIX B

Flow & Analytical Data for Receiving Waters

Low-Flow Statistics for Pennsylvania Streams

Developed by the U.S. Geological Survey for the Pennsylvania Department of Environmental Protection

Pennsylvania Low-Flow Statistics - Query Results

LOW-FLOW STATISTICS

[All flow statistics in cubic feet per second (ft^3/s)]

Mouse over or click on table headings to view definition of statistic

STREAM NAME: West Branch Susquehanna River **GAGE OR BRIDGE SITE:** bridge **REFERENCE GAGE:**[1] 01553500	**COUNTY:** Northumberland **USGS QUAD:** Milton	**LATITUDE:** 410450 **LONGITUDE:** 765153 **DRAINAGE AREA (sq. mi.):** 6590

Entire Period of Record [2]	$Q_{1,10}$	$Q_{7,10}$	$Q_{30,10}$	MEAN	MEDIAN	HARMONIC MEAN
1962-95	619	700	835	10570	6410	3850

FLOW DURATION TABLE (Probability of Exceedance)										
P5	P10	P20	P30	P40	P50	P60	P70	P80	P90	P95
33580	23480	15490	11100	8320	6410	4830	3530	2480	1590	1140

1 Reference Gage indicates which USGS gage was used in the computation of lowflow statistics for the specified locations

2 Period of Record for climatic year, April 1 through March 31

3 Period of record refers to pre-regulation conditions

4 Period of record refers to post-regulation conditions

** Statistic not computed due to insufficient data

RETURN TO PREVIOUS PAGE

RETURN TO START PAGE

Low-Flow Statistics for Pennsylvania Streams

Developed by the U.S. Geological Survey for the Pennsylvania Department of Environmental Protection

Pennsylvania Low-Flow Statistics - Query Results

LOW-FLOW STATISTICS

[All flow statistics in cubic feet per second (ft^3/s)]

Mouse over or click on table headings to view definition of statistic

STREAM NAME: West Branch Susquehanna River **GAGE OR BRIDGE SITE:** bridge **REFERENCE GAGE:**[1] 01551500	**COUNTY:** Lycoming **USGS QUAD:** Jersey Shore	**LATITUDE:** 411209 **LONGITUDE:** 771509 **DRAINAGE AREA (sq. mi.):** 5230

Entire Period of Record [2]	$Q_{1,10}$	$Q_{7,10}$	$Q_{30,10}$	MEAN	MEDIAN	HARMONIC MEAN
1962-95	491	557	660	8220	5100	3030

FLOW DURATION TABLE (Probability of Exceedance)										
P5	P10	P20	P30	P40	P50	P60	P70	P80	P90	P95
27420	19000	12300	8790	6640	5100	3880	2880	2000	1210	863

[1] Reference Gage indicates which USGS gage was used in the computation of lowflow statistics for the specified locations

[2] Period of Record for climatic year, April 1 through March 31

[3] Period of record refers to pre-regulation conditions

[4] Period of record refers to post-regulation conditions

** Statistic not computed due to insufficient data

RETURN TO PREVIOUS PAGE RETURN TO START PAGE

USGS 01553500 West Branch Susquehanna River at Lewisburg, PA

Data is taken from: http://nwis.waterdata.usgs.gov/nwis/qwdata
Northumberland County, Pennsylvania
Hydrologic Unit Code 02050206
Latitude 40°58'03", Longitude 76°52'36" NAD27
Drainage area 6,847.00 square miles
Gage datum 428.20 feet above sea level NGVD29

Sample Datetime	Dis-charge, cfs	Instan-taneous dis-charge, cfs	pH, water, unfltrd field, std units	pH, water, unfltrd lab, std units	Residue on evap. at 105degC wat flt mg/L	Residue Residue total non-filter-able, mg/L	Residue fixed non-filter-able, mg/L	Calcium water, fltrd, mg/L	Magnes-ium, water, fltrd, mg/L	Sodium, water, fltrd, mg/L	Potas-sium, water, fltrd, mg/L	Chlor-ide, water, fltrd, mg/L	Sulfate water, fltrd, mg/L	Iron, water, unfltrd recover -able, ug/L	Iron, water, fltrd, ug/L
1956-12-11	24900		6.3					10.0	3.50	2.80	1.20	2.8	31.0	0.0	
1957-01-11	4570		6.7					20.0	5.40	5.30	1.30	5.3	55.0	10	
1957-02-01	11700		6.5					14.0	4.50	3.10	1.00	3.3	41.0	10	
1957-07-02	2540		7.0					24.0	6.50	4.50	1.40	5.6	71.0	40	
1957-10-01	855		7.1					43.0	10.0	14.0	2.40	13.0	140	10	
1957-10-12	1280		7.5							15.0		12.0	104		
1957-11-12	2620		7.3							19.0		11.0	105		
1957-11-21	4500		6.9							9.00		6.0	52.0		
1957-11-23	2640		6.9							12.0		7.0	78.0		
1957-12-12	4060		6.5							8.30		6.4	80.0		
1957-12-21	29400		6.8					9.10	2.80	1.30	1.10	2.6	28.0	10	
1958-01-06	7650		6.8							5.10		4.1	45.0		
1958-01-23	10100		7.0							5.50		4.0	34.0		
1958-01-31	4710		7.1							5.30		5.0	48.0		
1958-02-16	4610		7.0							7.80		6.6	57.0		
1958-02-28	25500		6.7							3.20		2.8	33.0		
1958-03-11	14500		6.9							4.40		4.0	40.0		
1958-03-31	36900		6.2					8.90	2.70	1.60	1.10	2.2	27.0	50	
1958-04-07	39100		6.3							3.00		2.0	27.0		
1958-04-25	30300		6.4							3.70		2.1	35.0		
1958-05-16	9140		6.3							5.80		3.8	50.0		
1958-05-27	5590		6.7					21.0	6.90	5.70	1.60	5.2	63.0	10	
1958-06-12	9860		6.6							5.80		3.5	44.0		
1958-06-24	3900		6.6							7.10		5.0	66.0		
1958-07-07	8140		6.7					18.0	5.80	4.00	1.60	4.5	55.0	20	
1958-07-19	9800		6.7							4.80		4.0	53.0		
1958-07-29	14100		6.6							5.80		3.2	43.0		
1958-08-05	5900		7.0							7.80		5.2	66.0		
1958-09-01	4130		6.9					21.0	6.30	4.50	1.50	5.8	71.0	20	
1960-04-07	49000		6.5					6.90	2.60	2.00	0.90	2.0	24.0	20	
1960-04-27	7280		6.7							6.40		4.5	54.0	640	
1960-05-05	6430		6.7					15.0	5.20	3.50	1.50	3.6	50.0	20	
1960-06-02	19200		5.6					11.0	5.50	2.50	1.20	2.4	48.0	20	
1960-07-11	2980		6.3					19.0	8.00	4.20	1.50	3.8	72.0	20	
1960-08-09	4600		6.4					18.0	6.60	4.20	1.50	4.4	65.0	20	
1960-09-06	1230		6.8					28.0	10.0	9.70	2.00	7.6	89.0	20	
1960-10-05	1950		7.1					21.0	6.30	6.00	1.80	5.0	65.0	0.0	
1960-10-27	1800		7.7					30.0	9.90	7.50	2.00	6.9	82.0	0.0	
1960-12-06	2150		6.3							6.40		5.1	64.0		
1961-01-19	2100		7.0					29.0	8.90	14.0	2.00	6.0	103	100	
1961-03-02	42100		5.2					9.00	3.50	3.20	1.00	2.0	31.0	40	
1961-04-12	18400		6.3							1.80		2.0	37.0		
1961-05-23	14400		7.0					15.0	4.50	3.40	1.20	4.5	39.0	140	
1961-06-28	6060		6.1					17.0	6.20	4.70	2.00	3.0	65.0	0.0	
1961-08-01	3640		6.5					19.0	6.30	6.10	1.80	4.5	63.0	0.0	
1961-09-14	1850		6.1					31.0	11.0	7.50	2.60	5.0	117	0.0	
1961-10-05 12:00	1280		6.6							14.0		10.0	116		
1961-10-05 12:01	1280		6.9							11.0		10.0	116		
1961-10-05 12:02	1280		6.9							11.0		9.0	117		
1961-10-05 12:03	1280		6.8							10.0		9.0	112		
1961-10-05 12:04	1280		7.5							10.0		7.0	83.0		
1961-10-30	1110		7.0					36.0	11.0	10.0	3.40	9.0	92.0	0.0	
1961-12-04	3550		6.2					16.0	5.70	4.10	1.80	5.0	55.0	40	
1962-01-17	12200		9.1							6.00		4.0	37.0		
1962-03-28	37100		6.3					14.0	3.30	3.50	2.00	4.5	42.0	0.0	
1962-04-10	51700		5.2					7.80	4.00	1.50	1.00	4.0	30.0	0.0	
1962-05-10	8590		6.5					15.0	4.70	2.80	1.50	4.0	46.0	0.0	
1962-06-14	2550		6.7					31.0	1.90	16.0	2.10	5.5	76.0	10	
1963-01-22 00:03			0.6												
1963-10-16	603		6.8					37.0	14.0	14.0	2.20	16.0	126		
1963-11-26	1470		6.3							9.70		10.0	105		
1964-01-08	3900		6.3							9.40		9.0	93.0		
1964-02-19	4300		6.0							3.90		6.0	65.0		
1964-04-01	12800		6.2							4.60		3.2	50.0		
1964-05-12	9870		6.7							3.20		3.9	43.0		
1964-06-24	2500		6.3							4.40		7.9	89.0		
1964-08-08	2900		6.8							7.60		9.1	94.0		
1964-09-15	528		6.6							6.40		13.0	123		
1964-10-23	639		6.4							9.90		18.0	186		
1964-12-01	1860		6.1							9.70		18.0	164		
1965-01-07	6300		5.1							7.10		6.4	71.0		
1965-02-17	16400		5.7							4.10		3.0	34.0		
1965-03-30	20200		4.9							4.40		4.0	61.0		
1965-05-12	16100		6.1							4.40		3.8	37.0		
1965-06-22	2030		6.5							9.00		7.8	74.0		
1965-08-02 00:01	1330		7.5							9.00		11.0	67.0		
1965-08-02 00:02	1330		7.4							5.30		4.5	35.0		
1965-08-02 00:03	1330		7.6							4.10		3.5	17.0		
1965-09-30	1260		6.8							17.0		15.0	134		
1965-10-27	2910		6.0					25.0	8.80	6.20	1.70	10.0	995		

1965-12-07	4310	6.6							7.10		6.0	52.0			
1966-01-20	4170	6.2							7.10		5.0	50.0			
1966-03-01	15600	6.4							4.40		4.0	33.0			
1966-04-12	8980	6.1					16.0	6.00	3.80	1.00	4.0	61.0			
1966-05-23	23700	6.2					11.0	4.30	2.70	1.20	2.5	44.0			
1966-07-07	1690	6.7					30.0	11.0	7.80	1.80	9.0	99.0			
1966-08-17	1690	6.1							12.0		14.0	158			
1966-09-27	1870	7.0					30.0	10.0	8.50	2.00	10.0	87.0			
1966-11-08	1910	6.6					31.0	10.0	7.00	2.00	9.5	102			
1966-11-28 00:19		0.6													
1966-12-21	8280	5.7					15.0	5.20	2.80	1.10	5.0	55.0			
1967-01-31	13300	6.4					15.0	5.00	3.20	1.00	4.5	52.0			
1967-03-14	42600	5.5					13.0	4.80	2.80	1.60	5.6	44.0			
1967-04-27	14900	6.4					15.0	5.20	3.80	1.20	4.6	45.0			
1967-05-22 00:21		6.5													
1967-06-08	5410	7.0							7.10		5.5	55.0			
1967-07-19	3640	6.8					21.0	7.50	4.50	1.30	5.5	60.0			
1967-08-31	8110	7.1					25.0	8.30	5.00	1.50	5.0	76.0			
1967-10-06 13:25	7070	5.6					21.0	8.60			5.5	89.0			
1967-10-06 13:35	6970														
1967-10-06 13:40	7070	4.9					21.0	7.90			5.5	89.0			
1967-10-06 13:55		5.3					21.0	7.90			6.5	87.0			
1967-11-13 15:20	9370	6.2					13.0	5.60			4.0	51.0			
1967-11-13 15:25	9300	6.6					14.0	5.00			5.0	46.0			
1968-01-10 12:50	3100														
1968-01-10	3100	6.3					23.0	7.50			7.5	75.0			
1968-02-15 16:15	4100														
1968-02-15	4100	7.1					16.0	6.20			4.5	48.0			
1968-03-29 10:45	19200														
1968-03-29	19100	6.7					10.0	3.80			4.0	38.0			
1968-05-08 18:20	6430														
1968-05-08	6520	6.7					15.0	5.60			8.5	52.0			
1968-06-24 14:00	6630														
1968-06-24	6780	6.9					12.0	6.00			5.0	56.0			
1968-07-24 14:00	2100														
1968-07-24	2030	7.5					33.0	9.70			6.0	71.0			
1968-09-09 14:00	2790														
1968-09-09 14:01	2780	7.1					30.0	7.80			6.0	41.0			
1968-09-13 11:30	5860														
1968-12-10 14:00	12300	6.9					13.0	4.40			5.3	53.0			
1969-01-21 15:15	5270	6.9					22.0	8.00			8.0	86.0			
1969-02-25 14:35	4440	7.2					22.0	6.10			10.0	64.0			
1969-04-08 13:50	30800	7.3					10.0	3.20			5.9	36.0			
1969-05-22 11:50	23800	6.6					8.90	2.80			2.0	25.0			
1969-05-22 14:30	23800	6.8					10.0	2.80			3.3	28.0			
1969-06-23 14:20	3720	7.0					18.0	6.00			2.8	71.0			
1969-07-02 15:30	2280	7.8					23.0	6.40			9.0	59.0			
1969-07-15 16:30	2660	7.1					21.0	5.90			7.2	60.0			
1969-08-12 16:00	3180	7.0													
1969-08-12 16:30	3180	8.5													
1969-09-19 17:00	1220	7.4													
1969-09-23 00:30		0.7													
1969-09-23 13:30	1020	7.3					39.0	13.0			12.0	126			
1969-09-29 14:30	1060	7.7					40.0	11.0	7.00	2.50	12.0	90.0			
1969-10-23 16:00	1440	6.9				1	44.0	13.0			19.0	135			0.0
1969-11-12 14:30	8460	6.7					16.0	4.70	4.00	0.70	6.6	48.0			
1969-11-26 14:00	9300	6.8													
1969-12-17 12:40	14000	7.6					13.0	3.80	2.80	1.30	5.3	35.0			
1969-12-24 09:15	6530	5.6													
1970-01-27 13:30	8700	6.8					23.0	8.20	6.70	1.40	11.0	76.0			
1970-02-25 14:00	11800	5.9													
1970-03-10 14:45	12600	6.9					16.0	6.90	3.10	1.20	7.5	57.0			
1970-03-26 13:30	13800	6.3				12	17.0	6.40	6.00		7.9	54.0			140
1970-03-26 14:30															
1970-04-16 12:30	33300	6.2					12.0	4.90	2.00	0.80	5.0	38.0			
1970-04-22 16:05	16800	7.3													
1970-05-14 12:30	6600	6.8					18.0	6.50	4.30	2.20	7.2	58.0			
1970-06-09 13:40	6200	7.0													
1970-06-23 15:00	4170	6.8					25.0	7.90	4.50	1.80	6.8	67.0			
1970-07-16 10:30	4600	7.4													
1970-07-28 16:00	2900	7.8													
1970-08-20 14:00	1830	6.9					28.0	9.00	8.70	2.10	11.0	108			
1970-08-25 13:25	3560	7.3													
1970-09-23 11:45	2260	7.4					30.0	11.0	12.0		10.0	128			0.0
1970-09-23 11:45	2260	6.4				4	35.0	12.0	13.0	2.20	11.0	92.0			
1970-10-06 13:40	2000	7.6													
1970-10-14 10:50	11400	7.1													
1970-11-17 15:15	52200	6.5													
1970-11-23 14:15	20900	6.8					12.0	4.80			4.1	44.0			
1970-12-17 00:37	61700														
1970-12-17 17:30	17200	7.2													
1970-12-17 17:30	17200	6.3				11	15.0	6.20			0.3	57.0	1000		570
1971-01-07 12:00	16900	7.2					19.0	6.80	5.00	1.20	6.4	75.0			
1971-01-14 15:00	8320	7.2													
1971-02-26 16:30	36600	6.4													
1971-03-17 16:00	61700	6.3													
1971-03-17 16:00	61700	7.2				37	10.0	3.40			4.1	38.0	1100		40
1971-03-22 10:13	24500	6.5					12.0	4.80	3.40	1.40	5.7	41.0			
1971-04-23 16:00	9620	6.9													
1971-05-06 13:45	6960	6.8					15.0	5.20	3.10	1.10	4.0	44.0			
1971-05-20 17:00	11300	6.9													
1971-06-14 13:15	2980	7.0					21.0	5.40	5.00	2.00	7.5	48.0			
1971-06-16 15:00	6020	7.5													
1971-06-16 15:00	6020	6.9				24	18.0	6.50			8.1	72.0			20
1971-07-30 16:00	2180	7.7													
1971-08-05 11:00	3840	7.1					25.0	7.50	6.80	2.00	9.0	59.0			
1971-08-19 15:30	1100	8.9													
1971-09-07 14:15	963	7.3					42.0	14.0	12.0	2.70	13.0	121			

1971-09-23 14:30	8560		6.6												
1971-09-23 14:30	8560		6.5			8		24.0	7.30			7.4	85.0		20
1971-10-21 15:30	1670		8.0												
1971-10-28 11:30	6160		7.2					24.0	8.00	6.80	2.10	9.3	67.0		
1971-11-18 10:30	3260		7.1												
1971-11-30 17:00	5330		7.6					22.0	6.80	5.00	2.10	12.0	55.0		
1971-12-07 16:10	13400		6.8												
1971-12-07 16:10	13400		6.5			50		19.0	6.00			9.7	59.0		60
1972-01-12 15:00	12500		6.7					16.0	5.20	4.50	1.20	7.4	53.0		
1972-01-13 13:00	13200		6.2												
1972-02-16 14:55	9650		7.1					17.0	5.30	4.60	1.40	8.5	44.0		
1972-02-17 21:57	6260		7.5												
1972-02-28 11:45	5500														
1972-03-04 17:15	90800		6.6					9.00	3.00	2.70	1.40	4.9	30.0		
1972-03-28 10:30	19600		7.2												
1972-03-28 10:30	19600		6.4			8		10.0	3.60			4.0	36.0		100
1972-04-05 10:00	17300		6.2					12.0	3.70	2.80	0.80	4.8	35.0		
1972-04-18 10:00	80900		6.2												
1972-05-17	23500		6.3					11.0	3.70	2.70	1.00	3.5	37.0		
1972-05-24 09:30	15500		6.6												
1972-06-20 10:00	8390		7.1												
1972-06-20 10:00	8390		6.6			8		16.0	4.80			4.3	57.0		260
1972-07-26 10:00	8310		6.9												
1972-08-31 14:15	2020		7.6												
1972-09-28 14:15	2060		7.7												
1972-09-28 14:15	2060		7.0			2		36.0	11.0			9.1	98.0		20
1972-10-26 13:00	1670		8.0												
1972-10-26 13:00	1670														
1972-11-14 11:00	9780		6.9												
1972-11-14 11:00	9780														
1972-12-11 11:10	37000		6.5												
1972-12-11 11:10	37000		6.5			27		11.0	3.90			5.1	36.0		330
1973-01-25 13:00	12400		7.4												
1973-01-25 13:00	12400														
1973-02-22 13:30	8350		6.9												
1973-02-22 13:30	8350														
1973-03-29 13:30	14200		6.5			8		12.0	4.80			34.0	48.0		60
1973-04-12 13:00	22600		6.9												
1973-05-09 11:00	10900		6.6												
1973-05-09 11:00	10900														
1973-06-20 13:30	7300		7.0												
1973-06-20 13:30	7300		7.0					19.0	6.40	3.50	1.10	4.8	50.0		160
1973-08-07 12:30	3060		7.1												
1973-08-22 11:45	10300		7.5												
1973-09-19 12:30															
1973-09-19 12:30	7900		6.7										54.0	330	
1973-10-23 12:00		2860	6.5												
1973-11-28 12:50		19900	6.4												
1973-12-27 14:35		35200	6.8										31.0	1100	
1974-04-23 12:00		13000	6.7												
1974-05-30 11:00		6150	6.7												
1974-06-26 12:00		4570	6.9												
1974-11-22 12:15															
1975-01-08 13:20															
1975-01-08 13:20		10200	6.6												
1975-02-26 13:30															
1975-02-26 13:30		112000	6.6												
1975-03-20 12:00															
1975-03-20 12:00		40400	6.7												
1975-03-31 11:15															
1975-03-31 11:15		17800	6.5					11.0	4.00	2.30	0.90	3.9	38.0	520	30
1975-04-16 09:10															
1975-04-16 09:10		8310	6.7												
1975-05-21 13:00															
1975-05-21 13:00		14500	6.4												
1975-05-30															
1975-06-18 08:45															
1975-06-18 08:45		19300	6.8					11.0	4.10	2.10	1.20	4.0	35.0	700	60
1975-07-16 08:45															
1975-07-16 08:45		4650	7.1												
1975-07-28															
1975-08-27 14:15															
1975-08-27 14:15		2020	7.6												
1975-09-19 11:30															
1975-09-19 11:30		4830	7.4					19.0	6.50	4.10	1.40	4.1	54.0	70	< 10
1975-10-16 15:30															
1975-10-16 15:30		7300	6.7												
1975-11-19 12:20															
1975-11-19 12:20		13700	6.6												
1975-11-19															
1975-12-17 13:30															
1975-12-17 13:30		20100	6.8					15.0	5.50	2.90	1.00	4.4	48.0	330	< 10
1976-02-18 13:15															
1976-02-18 13:15		84700	6.2												
1976-02-19 10:00		82600													
1976-03-03 13:15															
1976-03-03 13:15		14600	6.2					14.0	4.70	25.0	1.10	6.1	42.0	480	< 10
1976-04-13 12:00															
1976-04-13 12:00		8380	6.7												
1976-04-13															
1976-05-05 13:40															
1976-05-14 10:15		4600	7.2												
1976-05-14															
1976-05-19															
1976-06-08 10:10															
1976-06-08 10:10		8620	6.5					12.0	4.50	2.80	1.30	4.2	34.0	230	30
1976-07-07 10:30															
1976-07-07 10:30		5160	6.8												

1976-08-03 12:00																	
1976-08-03 12:00		3660	7.5														
1976-08-03																	
1976-09-14 12:30									26.0	9.50	5.40	1.60	8.0	59.0	120	60	
1976-09-14 12:30		2120	7.9														
1976-10-14 12:00																	
1976-10-14 12:00		16600	6.7														
1976-11-09 10:00																	
1976-11-09 11:00																	
1976-11-11 10:00		9400	6.8														
1976-12-21 12:45									16.0	6.00	3.90	1.10	6.9	51.0	140	< 10	
1976-12-21 12:45		3800	6.6														
1977-02-02 13:45								3									
1977-02-02 13:45		6300	6.8						8.70	3.00	2.30	1.00	4.3	22.0	2400	30	
1977-03-15 15:00		55100	6.5														
1977-04-13 11:15		16100	6.6														
1977-05-11 13:30																	
1977-05-11 13:30		9340	6.8														
1977-06-22 08:50									27.0	9.20	6.50	1.80	9.5	69.0	250	< 10	
1977-06-22 08:50		3720	6.8														
1977-07-20 14:20																	
1977-07-20 14:20		9270	7.1														
1977-07-28																	
1977-08-18 11:45																	
1977-08-18 11:45		6560	7.4														
1977-09-13 14:30									31.0	10.0	6.80	2.10	9.0	61.0	1000	300	
1977-09-13 14:30		2240	7.9														
1977-09-30									13.0	4.70	2.90	1.30	4.4	37.0			
1977-10-27 09:30		15000	6.8														
1977-11-22 13:30									15.0	5.00	3.60	1.40	3.5	43.0			
1977-11-22 13:30		18800	7.1						12.0	3.90	3.00	1.20	5.6	36.0	680	< 10	
1977-12-07 11:00		20000	6.9														
1978-03-23 10:30									9.70	3.30	2.80	1.20	3.5	30.0	10000	20	
1978-03-23 10:30		77600	6.7						15.0	5.00	3.20	1.20	4.0	45.0			
1978-04-20 11:00		12500	6.8														
1978-05-16 11:00									10.0	3.60	2.20	1.30	2.5	31.0			
1978-05-16 11:00		81200	6.5														
1978-06-13 11:15									17.0	5.60	4.10	1.50	5.0	49.0	580	< 10	
1978-06-13 11:15		11600	7.2														
1978-06-22																	
1978-06-22									32.0	11.0	5.00	3.00	8.4	70.0			
1978-07-12 13:00		2590	7.9														
1978-08-22 10:30									33.0	10.0	6.00	1.70	8.9	66.0			
1978-08-22 10:30		2370	8.1														
1978-09-20 11:30									21.0	6.90	5.40	2.20	7.6	57.0			
1978-09-20 11:30		8880	7.1						29.0	11.0	7.50	1.80	12.0	78.0	190	20	
1978-10-17 11:45		6240	7.5														
1978-11-14 10:30									26.0	8.60	5.50	2.80	9.4	57.0			
1978-11-14 10:30		2770	7.7						11.0	4.00	3.00	1.40	4.4	38.0	4100	20	
1978-12-12 10:30		23600	6.7						15.0	5.30	5.20	1.70	9.2	40.0			
1979-01-24 14:30		13600	6.9														
1979-03-13 10:00									10.0	4.00	2.70	1.10	4.0	37.0	1400	90	
1979-03-13 10:00		40600	6.7														
1979-04-24 12:30									14.0	5.10	3.40	1.00	5.2	45.0			
1979-04-24 12:30		10700	6.8														
1979-05-16 11:00									17.0	6.10	4.00	1.20	5.7	56.0			
1979-05-16 11:00		12400	7.2														
1979-06-26 15:30									24.0	7.90	5.00	1.30	7.1	52.0	230	M	
1979-06-26 15:30		3150	7.9														
1979-07-24 16:00									31.0	9.40	6.40	1.40	8.2	63.0			
1979-07-24 16:00		2870	8.1														
1979-08-21 13:00									22.0	7.20	5.30	1.30	7.3	58.0			
1979-08-21 13:00		4040	7.3														
1979-09-11 14:30									18.0	5.40	4.50	2.00	5.6	40.0	460	30	
1979-09-11 14:30		9950	7.1						19.0	6.90	3.90	1.20	5.3	55.0			
1979-10-23 13:00		7260	7.2														
1979-11-06 13:00									17.0	6.00	3.70	1.30	4.7	42.0			
1979-11-06 13:00		16200	7.2						15.0	4.80	2.90	1.00	4.2	40.0	740	10	
1979-12-05 13:00		14000	7.5						18.0	5.70	3.90	1.10	5.3	43.0			
1980-01-08 14:00		6670	7.2						27.0	8.50	6.20	1.30	8.6	69.0			
1980-02-13 11:00		4420	7.2														
1980-03-18 10:00									15.0	4.20	4.50	1.90	7.6	33.0	3900	40	
1980-03-18 10:00		17100	7.1						12.0	4.10	2.40	1.00	3.9	37.0			
1980-04-08 09:45		23900	7.0														
1980-05-07 10:30									23.0	5.80	4.10	1.30	7.0	17.0			
1980-05-07 10:30		12700	7.3														
1980-06-04 09:40									17.0	6.00	4.20	1.10	5.2	50.0	520	10	
1980-06-04 09:40		6810	7.5														
1980-07-02 09:30									25.0	8.80	5.40	1.40	7.0	73.0			
1980-07-02 09:30		5480	7.3														
1980-08-06 10:00									30.0	11.0	7.30	1.70	9.5	95.0			
1980-08-06 10:00		3180	7.6														
1980-08-06																	
1980-09-03 10:00									32.0	11.0	7.30	1.80	11.0	82.0	100	30	
1980-09-03 10:00		1700	7.8						41.0	15.0	11.0	2.10	15.0	140			
1980-10-02 09:50		1260	7.8														
1980-11-05 09:30									27.0	9.90	11.0	2.20	11.0	96.0			
1980-11-05 09:30		1970	7.5	7.4					25.0	8.70	7.40	1.70	12.0	54.0			
1980-12-03 10:55		6520	8.3	6.5					29.0	11.0	8.00	2.00	12.0	91.0	120	100	
1981-01-13 12:20		4090	7.5	7.4					16.0	4.40	6.60	3.40	12.0	38.0			
1981-02-11 11:15		18900	8.0	6.9													
1981-03-04 09:30									13.0	5.10	3.20	1.10	5.0	43.0			
1981-03-04 09:30		20600	7.3	6.9					20.0	6.70	5.10	1.40	8.4	72.0			
1981-04-02 10:40		9070	7.0	7.5													
1981-05-07 09:30									12.0	4.20	2.80	1.70	4.7	39.0	470	< 10	
1981-05-07 09:30		14000	7.8	6.9													
1981-06-03 11:00									20.0	7.40	4.40	1.30	5.9	59.0			
1981-06-03 11:00		4650	7.2	7.2													

1981-07-08 11:20									19.0	5.70	3.40	1.50	5.3	46.0	140	< 10
1981-07-08 11:20		7530	7.7	7.2												
1981-08-05 10:30									23.0	7.50	5.00	1.50	7.3	63.0		
1981-08-05 10:30		3900	8.0	7.5												
1981-09-02 17:30									33.0	11.0	6.30	1.60	11.0	66.0	360	10
1981-09-02 17:30		1690	7.9	7.9					12.0	4.10	3.20	0.60	4.1	37.0		
1981-11-05 10:20		8840	7.8	7.3					19.0	6.40	4.90	1.00	7.3	53.0	130	M
1981-12-09 11:15		5440	7.3	7.4					11.0	3.50	2.90	1.40	5.5	34.0	5500	M
1982-03-16 11:00		48300	6.9	7.4					18.0	5.90	3.40	0.90	5.5	44.0		
1982-05-04 10:00		5950	7.4	7.5					20.0	6.40	3.40	1.20	5.4	51.0	1400	M
1982-06-29 10:00		6840	7.2	7.4					36.0	12.0	6.00	1.40	9.7	84.0	130	< 3
1982-08-31 10:45		1710	8.2	8.3					28.0	9.10	7.80	1.30	9.1	74.0		10
1982-11-17 09:15		3100	8.2	7.6					12.0	4.10	2.90	1.00	4.6	36.0		20
1983-03-30 10:00		18900	7.6	7.0					19.0	6.50	3.10	1.30	4.0	58.0		20
1983-05-20 09:00		13100	7.3	7.1					41.0	14.0	7.60	1.70	11.0	100		20
1983-08-30 11:25		1400	8.2	7.4					36.0	13.0	7.90	1.70	12.0	82.0		10
1983-11-02 10:45		1850	7.6	7.4					20.0	6.80	4.30	1.10	7.7	51.0		60
1984-03-07 10:15		9760	6.9	7.0					16.0	6.00	3.40	1.00	5.5	52.0		M
1984-05-03 12:00		17800	6.9	7.3					25.0	9.30	4.30	1.20	6.6	76.0		M
1984-09-05 10:30		4090	7.6	7.4												
1984-10-22 13:30		1870	8.0						18.0	7.20	4.50	1.50	5.6	63.0		20
1984-11-14 10:45		9720	7.4	7.0												
1984-11-20 10:30		5140	7.5													
1984-12-13 12:25		15700	7.5													
1985-01-18 12:30		5470	7.4													
1985-02-21 11:00		15700	7.3													
1985-03-06 10:30		12800	6.7	6.9					13.0	5.20	3.60	0.90	5.6	47.0		40
1985-03-21 11:30		12100	7.1													
1985-04-18 13:30		10900	7.3													
1985-05-09 11:15		8880	7.3													
1985-05-15 10:15		6510	7.0	7.3					19.0	7.00	4.10	1.20	6.0	57.0		3
1985-06-04 15:15		11200	7.4													
1985-07-02 11:30		2740	7.6													
1985-08-08 12:20		2150	7.8													
1985-09-03 13:30		3460	8.3													
1985-09-05 10:00		2600	7.8	6.8					31.0	11.0	7.70	1.90	12.0	84.0		6
1985-10-25 12:00		1890	8.0													
1985-11-05 09:30		2710	7.3	7.2					30.0	10.0	7.10	2.50	11.0	76.0		24
1985-11-05 11:15		2880	7.6													
1985-11-05 11:25		2910	7.5													
1985-11-05 11:35		2910	7.4													
1985-11-05 11:45		2930	7.5													
1985-11-05 11:50		2930	7.4													
1985-11-05 11:53		2960	7.4													
1985-11-05 12:00		2950	7.4													
1985-11-05 12:05		2960	7.2													
1985-11-05 12:10		2980	7.4													
1985-12-10 12:00		13400	7.0													
1986-01-15 12:50		3800	8.3						18.0	7.00	4.30	1.20	6.6	60.0		89
1986-03-05 09:00		10400	7.0	7.5												
1986-03-05 11:45		10400	7.0													
1986-03-13 16:04		33500	7.8													
1986-03-14 13:15		33200	7.9													
1986-03-15 11:35		89500	7.3													
1986-03-16 11:30		100000	7.2													
1986-03-17 11:51		70500	7.5													
1986-03-18 10:00		52500	8.1													
1986-03-19 11:00		42200	6.7													
1986-04-01 11:00		8880	7.2													
1986-04-30 10:15		9180	8.5						20.0	7.10	4.30	1.30	6.6	57.0		4
1986-05-08 09:00		5500	7.3	7.8												
1986-06-06 06:15		4450	7.2													
1986-06-06 12:30		9880	7.2													
1986-06-06 17:45		14800	7.5													
1986-06-06 21:15		16400	7.2													
1986-06-07 09:00		18500	7.0													
1986-06-07 14:45		20700	7.0													
1986-06-07 20:30		23800	7.2													
1986-06-08 01:40		24300	7.3													
1986-06-08 04:55		24300	7.0													
1986-06-09 11:30		20300	6.9													
1986-06-10 11:15		15900	6.8													
1986-06-11 10:30		12700	7.5													
1986-06-25 10:00		6440	7.0													
1986-07-24 11:00		11500	6.7													
1986-08-12 10:50		4280														
1986-09-04 09:00		1910	7.6													
1986-09-12 10:30		1590	7.9													
1986-10-08 12:45		12600														
1986-11-05 11:30		3410	8.0						15.0	5.50	3.60	1.30	5.7	45.0		10
1986-11-18 09:30		10800	7.0	7.6												
1986-11-21 20:00		25000	8.5													
1986-11-22 14:30		24200														
1986-11-23 15:15		23500														
1986-11-24 15:50		20800														
1986-11-25 16:00		21400	7.7													
1986-12-16 11:40		13500	7.0													
1987-01-14 14:00		6140	7.0													
1987-02-18 13:20		4800	8.0													
1987-03-19 12:00		9960	7.6													
1987-03-30 15:10		10400	8.3													
1987-04-04 00:00		29900	8.2													
1987-04-04 06:00		29100	8.5													
1987-04-04 18:30		31800	8.0													
1987-04-05 06:00		45300	7.2													
1987-04-05 18:00		47100	7.6													
1987-04-06 04:25		49300	7.7													
1987-04-06 12:30		51700	7.5													

1987-04-06 18:30	53000	7.3													
1987-04-07 13:30	53900	7.3						9.70	3.40	2.70	4.60	7.7	30.0		17
1987-04-08 09:30	50000	6.9	7.7												
1987-04-08 12:15	49300	7.7													
1987-04-09 11:00	43900	7.4													
1987-04-10 11:30	35400	7.7													
1987-04-13 13:00	21900	7.6													
1987-04-14 10:15	21300	7.8													
1987-04-28 13:00	12800	7.6													
1987-05-19 13:00	6420	7.8													
1987-05-27 10:57	5620	7.2													
1987-05-27 11:11	5620	7.4													
1987-05-27 11:25	5620	7.3													
1987-05-27 11:32	5620	7.3													
1987-05-27 11:37	5620	7.3													
1987-05-27 11:40	5620	7.3													
1987-05-27 11:46	5620	7.3													
1987-05-27 11:50	5620	7.3													
1987-05-27 11:55	5620	7.3													
1987-05-27 12:02	5620	7.3													
1987-05-27 12:05	5620	7.2													
1987-05-27 12:15	5620	7.2													
1987-05-27 12:19	5620	7.1													
1987-05-27 12:24	5620	7.3													
1987-05-27 12:30	5620	7.2													
1987-05-27 12:35	5620	7.6						20.0	7.00	5.10	1.70	6.6	58		8
1987-05-28 09:30	5630	7.2	7.7												
1987-06-08 13:00	5080	7.3													
1987-07-07 12:00	10600	7.2													
1987-08-04 10:50	2080	8.0													
1987-09-08 16:10	2410	7.8													
1987-09-08 21:45	2430	7.7													
1987-09-09 03:15	2460							19.0	5.80	5.40	2.00	7.4	48.0		26
1987-09-18 12:00	8140	7.0	7.3												
1987-09-18 13:05	8220														
1987-10-14 11:00	7500	7.4						20.0	7.60	5.20	1.60	7.0	61.0		6
1987-11-06 08:30	4270	6.4	8.1												
1987-11-17 10:30	5200	7.4													
1987-12-17 13:00	11500	6.4													
1988-01-28 10:50	6500	8.0													
1988-02-04 14:00	54500	6.2													
1988-02-04 18:00	53500	7.0													
1988-02-05 11:30	43200	7.1													
1988-02-06 14:00	32900	7.2													
1988-02-07 13:15	26200	7.2													
1988-02-08 12:45	24400	7.3													
1988-02-10 12:30	19100														
1988-02-17 12:45	9000	7.6													
1988-03-17 10:30	19700	7.6													
1988-04-12 12:00	12100	7.2						16.0	5.90	4.30	1.10	5.9	51.0		5
1988-04-15 10:00	8070	7.2	7.8												
1988-05-18 15:30	11300	8.1													
1988-05-19 11:00	24800	8.2													
1988-05-20 10:00	83000	8.2													
1988-05-21 12:00	68200	7.2													
1988-05-22 13:15	42300	7.5													
1988-05-23 10:00	35000	8.0													
1988-05-25 10:30	24400	7.9													
1988-06-01 11:40	9000														
1988-06-21 12:45	2200	8.1													
1988-07-11 11:45	790	8.9						35.0	12.0	7.40	2.00	9.6	74.0		33
1988-07-26 10:00	2380	7.7	8.2												
1988-08-18 12:00	730	8.2						20.0	6.10	5.50	1.70	7.2	47.0		21
1988-09-01 09:30	10200	6.9	7.4												
1988-09-16 11:45	2400	8.9													
1988-10-05 11:00	2750	8.2													
1988-11-16 10:55		7.4													
1988-11-16 11:00		7.4													
1988-11-16 11:05		7.4													
1988-11-16 11:10		7.4						19.0	6.30	5.80	1.40	6.8	53.0		12
1988-11-16 11:15	9320	7.4	7.2												
1988-11-16 11:20		7.5													
1988-11-16 11:30		7.5													
1988-11-16 11:35		7.5													
1988-11-16 11:40		7.5													
1988-12-06 09:20	4460	7.2													
1989-01-05 09:15	5950	7.3													
1989-02-02 08:45	6840	7.4													
1989-02-21 14:35	10000														
1989-02-22 10:40	14400														
1989-02-22 16:35	16700														
1989-02-23 09:40	23300														
1989-02-24 07:50	20700	6.8	7.4					14.0	5.20	4.60	1.30	7.5	49.0		8
1989-02-24 14:45	19000														
1989-02-25 15:30	14800														
1989-02-27 14:35	12100														
1989-03-16 09:00	6080	7.6													
1989-03-30 17:20	38600	7.5													
1989-03-31 12:00	64200	7.6													
1989-04-01 10:00	81600	6.8													
1989-04-02 11:00	65400	6.8													
1989-04-03 11:00	48900														
1989-04-04 15:40	38500	7.2													
1989-04-05 12:15	33200	7.4													
1989-04-07 10:06	29600	7.2													
1989-04-10 10:30	18600	6.5													
1989-04-12 11:15	13800	6.8													
1989-04-28 15:50	5470	7.2													

1989-05-02 13:30	6240	7.8												
1989-05-03 12:15	8140	8.0												
1989-05-04 12:50	10900	7.8												
1989-05-05 17:30	10600	7.7												
1989-05-07 12:50	28800	7.7												
1989-05-08 13:00	30700	7.8												
1989-05-09 12:25	33400	7.6												
1989-05-10 11:30	31300	7.5												
1989-05-11 12:30	51800	7.7												
1989-05-12 09:45	70500	7.5												
1989-05-14 06:45	48800	7.0												
1989-05-15 13:45	34400	7.8												
1989-05-17 11:10	59100	7.6												
1989-05-19 09:45	45100	7.7												
1989-05-21 09:50	27400	7.8												
1989-05-25 13:30		7.5												
1989-05-25 13:34		7.3												
1989-05-25 13:35		7.2												
1989-05-25 13:40		7.1												
1989-05-25 13:45		7.0												
1989-05-25 13:50		7.1												
1989-05-25 13:55		7.0							16.0	6.10	3.40	1.00	4.3	50
1989-05-25 14:00	17700	7.0	7.8											
1989-05-25 14:10		7.0												
1989-05-25 14:20		7.0												
1989-05-25 14:30		7.1												
1989-06-22 11:05	72900	7.8												
1989-06-23 11:35	51100	7.1												
1989-06-24 10:05	47300	7.4												
1989-06-26 11:20	30900	7.6												
1989-06-28 11:05	21000	8.0												
1989-06-30 12:25	18600	7.8												
1989-07-21 13:40	8110	7.0							32.0	11.0	6.70	1.50	9.3	86.0
1989-08-09 07:40	2430	7.5	7.7											
1989-09-12 10:10	1100	8.3												
1989-10-11 16:15	1600	8.6												
1989-10-19 18:10	6570	7.6												
1989-10-20 17:15	21200	7.5												
1989-10-21 10:30	30700	7.9												
1989-10-22 11:15	19100	7.7												
1989-10-23 16:30	12000	7.6												
1989-10-24 16:30	9200	7.7												
1989-11-06 07:19		7.9												
1989-11-06 07:20		7.9												
1989-11-06 07:25		7.8												
1989-11-06 07:30		7.7												
1989-11-06 07:40		7.6							21.0	7.20	6.60	1.30	7.7	60
1989-11-06 07:45	4100	7.7	7.7											
1989-11-06 07:50	4100	7.7												
1989-11-06 07:51		7.6												
1989-11-06 07:55		7.5												
1989-11-06 08:00		7.5												
1989-11-06 08:10		7.8												
1989-11-06 08:20		7.8												
1989-11-06 08:30														
1989-11-06 08:31														
1989-12-14 16:15	3840	7.8												
1990-01-24 12:15	23300													
1990-02-28 12:30	8550	7.7												
1990-03-14 13:20	9200	7.9							15.0	5.80	4.50	1.10	6.30	46.0
1990-04-02 16:05	7800	7.5	7.7											
1990-04-02 16:10	7800	7.5												
1990-04-24 12:30	9650	7.4												
1990-05-04 12:00	5470	7.7												
1990-05-17 12:50	25500	7.3												
1990-05-18 16:25	34000	7.2												
1990-05-19 14:40	32400	7.4												
1990-05-20 15:00	26600	7.5												
1990-05-21 14:25	21400	7.6												
1990-05-22 14:15	18700	7.7												
1990-05-23 12:10		7.4												
1990-05-23 12:15		7.2												
1990-05-23 12:20		7.2												
1990-05-23 12:30		7.2												
1990-05-23 12:45		7.2												
1990-05-23 13:00	15800	7.3												
1990-05-23 13:10		7.2							13.0	4.90	3.30	0.90	4.80	36.0
1990-05-23 13:14	15800	7.3	7.6											
1990-05-23 13:15		7.3												
1990-05-23 13:25		7.2												
1990-05-23 13:40		7.3												
1990-05-23 13:50		7.3												
1990-05-23 14:05		7.2												
1990-05-23 14:15														
1990-05-23 14:20														
1990-05-24 14:10	13600	7.8												
1990-06-26 11:00	5080	7.6												
1990-07-30 14:00	6580	7.5												
1990-08-14 13:00	5380	8.2							14.0	6.60	4.20	1.20	5.40	51.0
1990-08-31 16:45	10700	7.9	7.5											
1990-08-31 16:50	10700	7.9												
1990-09-26 12:30	8320	7.5												
1990-10-14 11:30	71200	7.6												
1990-10-15 10:45	50500	6.7												
1990-10-16 11:20	35300	6.4												
1990-10-17 11:10	26400	6.6												
1990-10-19 11:30	34900	7.2												
1990-10-20 07:45	35500	7.0												

1990-10-22 11:00	23100	7.7													
1990-10-24 16:00	71300	7.5													
1990-10-25 13:00	50400	7.7													
1990-10-26 12:30	39100	7.5													
1990-10-29 12:20	19500	7.2													
1990-11-15 12:55	17400														
1990-11-15 13:00	17400	7.4	7.5				15.0	5.10	3.80	1.00	4.50	51.0			14
1990-11-28 13:00	7960														
1991-01-15 12:45	8350	7.2													
1991-02-05 12:10	7760	7.7													
1991-03-04 15:30	38500														
1991-03-05 11:30	80400	6.8													
1991-03-06 04:00	70500	7.0													
1991-03-06 12:30	62300	6.7	7.0				9.80	3.30	2.70	1.10	4.10	29.0			28
1991-03-07 08:00	47400	7.0													
1991-03-08 08:00	39600	6.9													
1991-03-09 11:00	32900	6.8													
1991-03-10 11:15	27100	7.0													
1991-03-14 07:45	14300	6.7													
1991-04-16 11:00	8240	6.4													
1991-05-23 11:15	4260	7.8													
1991-05-28 07:58															
1991-05-28 08:00		7.6													
1991-05-28 08:10		7.6													
1991-05-28 08:20		7.5													
1991-05-28 08:30	3680	7.4	7.8				24.0	9.30	5.50	1.50	5.90	79.0			6
1991-05-28 08:35	3680														
1991-05-28 08:38		7.4													
1991-05-28 08:45		7.4													
1991-05-28 08:50		7.4													
1991-05-28 08:55		7.4													
1991-05-28 09:06		7.4													
1991-05-28 09:07		7.4													
1991-05-28 09:08		7.4													
1991-05-28 09:13		7.4													
1991-05-28 09:15		7.4													
1991-05-28 09:17															
1991-06-19 13:00	1670	8.3													
1991-07-25 13:30	1180	8.1													
1991-08-08 11:45	938	8.2													
1991-08-30 10:30															
1991-08-30 10:35		7.9													
1991-08-30 10:40		8.3													
1991-08-30 10:45		8.4													
1991-08-30 10:50	945	8.4	8.0				46.0	17.0	14.0	2.10	16.0	140			6
1991-08-30 10:52		8.4													
1991-08-30 10:55	945														
1991-08-30 11:00		8.2													
1991-08-30 11:05		8.5													
1991-08-30 11:10		8.3													
1991-08-30 11:12															
1991-09-18 12:00	858	8.1													
1991-10-10 07:00	1140	8.2													
1991-11-05 13:30	955	8.6													
1991-11-07 11:00															
1991-11-07 11:05		8.0													
1991-11-07 11:10		8.1													
1991-11-07 11:15		8.1													
1991-11-07 11:20		8.1													
1991-11-07 11:25		8.2													
1991-11-07 11:30	915	8.2	8.3				42.0	15.0	14.0	2.10	17.0	140			4
1991-11-07 11:35	915														
1991-11-07 11:40		8.1													
1991-11-07 11:45		8.2													
1991-11-07 11:50		8.2													
1991-11-07 11:55		8.1													
1991-11-07 12:00		8.1													
1991-11-07 12:05		8.0													
1991-11-07 12:10															
1991-12-12 11:15	5440	7.3													
1992-02-04 11:15	5320														
1992-03-18 11:15	12300	7.0													
1992-03-26 15:20	8090	8.1													
1992-03-27 13:00	32800	7.5													
1992-03-28 12:45	39500	7.5													
1992-03-30 12:00	29400	6.6	7.3				13.0	4.30	4.40	1.10	7.10	36.0			10
1992-03-30 12:05	29400														
1992-04-01 11:10	26600	7.5													
1992-04-06 10:30	18100	6.5													
1992-05-20 09:30															
1992-05-20 09:35		7.8													
1992-05-20 09:40		7.8													
1992-05-20 09:45		7.8													
1992-05-20 09:50		7.7													
1992-05-20 09:55		7.8													
1992-05-20 10:00	6430	7.4	7.4				19.0	7.10	4.70	1.10	6.90	58.0			9
1992-05-20 10:05	6430	7.4													
1992-05-20 10:06		7.8													
1992-05-20 10:07		8.0													
1992-05-20 10:10		8.0													
1992-05-20 10:15		7.9													
1992-05-20 10:20		7.8													
1992-05-20 10:22		7.7													
1992-05-20 10:25		7.7													
1992-05-20 10:30		7.8													
1992-05-20 10:35		7.8													
1992-05-20 10:40		7.6													
1992-05-20 10:42															

1992-06-19 10:50	2980	7.3												
1992-07-17 12:35	29500	7.3												
1992-07-18 15:05	27000	7.8												
1992-07-19 13:20	28900	7.5												
1992-07-30 13:30	8520	6.8												
1992-08-17 06:23														
1992-08-17 06:25		7.3												
1992-08-17 06:30		7.7												
1992-08-17 06:35		7.7												
1992-08-17 06:40		7.8												
1992-08-17 06:45		7.7												
1992-08-17 06:50		7.7												
1992-08-17 06:55		7.6												
1992-08-17 07:00	5880	7.7	7.4					18.0	6.00	4.10	1.20	6.50	51.0	8
1992-08-17 07:01		7.8												
1992-08-17 07:05	5880	7.8												
1992-08-17 07:06		7.8												
1992-08-17 07:10		7.7												
1992-08-17 07:15		7.6												
1992-08-17 07:20		7.8												
1992-08-17 07:22														
1992-09-16 10:01														
1992-09-16 10:05														
1992-09-16 10:10	6120	7.4												
1992-09-16 10:10														
1992-09-16 10:16														
1992-09-16 13:00	6110	7.7												
1992-10-14 11:30	5250	6.1												
1992-10-22 20:00														
1992-10-22 20:05														
1992-11-04 11:00	9570	7.6												
1992-11-05 11:45	14800	7.0												
1992-11-06 10:20	18400	5.9												
1992-11-08 11:50	14200	7.3												
1992-11-09 10:30	12600	6.1												
1992-11-18 11:00	15800	7.7												
1992-12-08 10:55	7670	6.7												
1992-12-21 10:35														
1992-12-21 10:45		7.1												
1992-12-21 11:15		7.8												
1992-12-21 11:50														
1992-12-21 12:05		7.8												
1992-12-21 12:20		7.6												
1992-12-21 12:25		7.5												
1992-12-21 12:55														
1992-12-21 13:00	21300	7.2	7.1					16.0	5.80	4.50	1.20	6.7	45.0	12
1992-12-21 13:01		7.5												
1992-12-21 13:10		7.6												
1992-12-21 13:30		7.4												
1992-12-21 13:35		7.4												
1992-12-21 14:00		7.4												
1992-12-21 14:25														
1992-12-21 15:05		7.2												
1993-01-05 15:15	29700	7.2												
1993-01-06 14:30	36400	7.2												
1993-01-07 11:20	35200	7.8												
1993-01-08 13:40	28400	7.2												
1993-01-27 11:00	14200	7.2												
1993-02-09 10:30	4960	7.4												
1993-03-24 11:45	16300													
1993-03-24 15:15	17100	7.7												
1993-03-25 10:00	19500	7.7												
1993-03-26 07:15	30600	7.4												
1993-03-26 12:40	32200	7.3	7.1					17.0	5.80	5.90	1.20	10.0	46.0	8
1993-03-27 08:15	43700	7.6												
1993-03-28 08:00	60800	7.7												
1993-03-29 07:45	92700	7.6												
1993-03-30 07:25	107000	7.5												
1993-03-31 06:55	116000	6.7												
1993-04-01 07:45	137000	6.8												
1993-04-02 07:35	144000	7.0												
1993-04-03 09:00	128000	5.5												
1993-04-04 10:22	97700	5.8												
1993-04-05 11:15	73900	6.7												
1993-04-07 09:35	51500	6.9												
1993-04-09 07:45	44500	7.5												
1993-04-22 10:10	47100	7.0												
1993-04-29 16:00	51000	7.1												
1993-05-05 10:10	18800	7.3												
1993-05-12 12:00	12700	7.1												
1993-05-26 14:01	5140	7.9	7.4					29.0	11.0	5.10	1.30	8.3	97.0	12
1993-06-15 11:30														
1993-06-15 11:40		7.5												
1993-06-15 11:55		7.8												
1993-06-15 12:05		8.4												
1993-06-15 12:10		8.3												
1993-06-15 12:15		8.0												
1993-06-15 12:25		7.8												
1993-06-15 12:30	3640	7.4	7.7					37.0	14.0	8.70	1.50	11.0	120	3
1993-06-15 12:35		7.5												
1993-06-15 12:40														
1993-06-15 12:45		7.5												
1993-06-15 13:05		8.0												
1993-06-15 13:15														
1993-06-15 13:25														
1993-06-15 13:45		7.4												
1993-06-17 15:20	2880	8.1												
1993-07-15 10:00														

1993-07-15 10:05															
1993-07-15 10:15															
1993-07-15 10:20															
1993-07-15 14:15		1470	8.2												
1993-08-17 11:10		1730	7.7												
1993-08-17 15:30		1730	8.3												
1993-09-22 15:15		1530	8.3												
1993-09-29 15:00		10300	7.2	7.6				34.0	13.0	8.50	1.60	12.0	110		6
1993-09-29 15:01															
1993-09-29 16:40			7.2												
1993-12-20 15:00		10300	6.8	6.9				17.0	6.20	3.60	1.30	9.50	52.0		22
1993-12-20 15:25															
1993-12-20 17:55			6.8												
1994-04-05 15:10		82200	6.7	6.7				9.90	3.90	1.80	0.80	3.50	31.0		11
1994-04-05 15:40															
1994-04-05 17:25			6.7												
1994-06-07 11:55		4560	7.9	7.0				23.0	8.70	5.40	1.30	7.50	67.0		6
1994-06-23 14:20		6140	7.4	6.9				16.0	5.80	3.90	1.20	5.90	47.0		17
1994-06-23 14:21			7.4												
1994-06-23 14:25															
1994-07-28 21:30															
1994-07-28 21:35															
1994-07-28 22:00															
1994-07-28 22:05															
1994-09-19 15:35		4830	8.0	7.3				24.0	8.60	5.70	1.30	9.00	66.0		19
1994-09-19 15:45															
1994-09-19 17:35			8.0												
1994-12-08 13:50		32700	7.0	6.7				11.0	3.60	2.50	1.10	4.30	29.0		38
1994-12-08 14:00															
1994-12-08 16:10			7.0												
1995-04-03 14:45															
1995-04-03 15:15			7.7												
1995-04-03 15:25			7.3												
1995-04-03 15:45			7.4												
1995-04-03 15:55			7.4												
1995-04-03 16:09			7.5												
1995-04-03 16:10		5640	7.3	7.2				18.0	6.30	4.70	1.10	8.00	51.0		26
1995-04-03 16:20			7.5												
1995-04-03 16:35															
1995-04-03 17:00			7.7												
1995-04-03 17:05			7.9												
1995-04-03 17:25			8.0												
1995-04-03 17:30															
1995-04-03 19:25			7.3												
1995-06-20 13:20		4750	7.3	6.9				19.0	6.20	4.70	1.20	7.90	51.0		13
1995-06-20 13:30															
1995-06-20 15:30			7.3												
1995-09-05 11:50		767	8.0	7.9				42.0	15.0	15.0	2.10	19.0	110		4
1995-09-05 12:05															
1995-09-05 13:25			8.0												
2002-04-24 11:00		10000	7.1	6.1	108	≤2							42.2	270	
2002-06-20 11:15		14800	6.9	6.6	102	28							42.1	1270	
2002-08-20 11:50		1030	8.0	7.7	260	6							98.7	70	
2002-11-21 11:30		14600	7.4	7.2	134	≤2							36.8	650	
2003-01-14 11:50		10000	6.5	7.2	138	6							53.1	520	
2003-03-25 10:45		50300	6.3	6.6	78	24							24.7	780	
2003-05-29 10:45		17000	7.0	7.0	98	12							36.0	700	
2003-07-17 09:40		3400	7.6	7.3	246	≤2							88.3	100	
2003-09-22 12:30		13100	7.2	7.3	156	6							55.1	470	
2003-10-09 13:00		9610	7.2	7.4	66	10							50.7	170	
2003-12-18 07:45		21500	5.8	7.2	120	2							35.2	490	
2004-02-19 09:30		4100	7.5	7.6	200	≤2							76.1	100	
2004-04-14 11:30		22300	7.3	7.2	112	54							34.7	2130	
2004-06-08 11:00		6900	7.2	7.0	148	4							52.4	140	
2004-08-16 11:00		8770	7.4	7.0	170	≤2							41.9	140	
2006-11-18 14:45															
2006-11-20 13:15															
2007-03-15 07:30															
2007-03-16 08:15															
2007-03-19 08:15															
2007-04-24 13:30		13700	7.5	7.4	116	6							38.1	180	
2007-04-24 13:40		13700													
2007-04-24 13:41		13700													
2007-06-19 10:30		2420	7.8	7.8	186	8							74.2	100	
2007-06-19 10:40		2420													
2007-06-19 10:41		2420													
2007-06-19 10:42															
2007-08-23 10:00		5260	7.8	7.7	202	18							96.3	1430	
2007-08-23 10:10		5260													
2007-08-23 10:11		5260													
2007-08-23 10:12															
2007-11-29 12:30			7.8	7.3	112	66							35.6	3440	
2007-11-29 12:40															
2007-11-29 12:41															
2008-03-13 12:30			6.7	7.3	66	2							32.1	490	
2008-03-13 12:40			6.7												
2008-03-13 12:41			6.7												
2008-03-13 12:42			6.7												
2008-05-22 12:10			7.7												
2008-05-22 12:11			7.7												
2008-05-22 12:12			7.7												

APPENDIX C

Mass Balance Calculations

CENTRAL PENNSYLVANIA WATER TREATMENT, LLC
WASTEWATER TREATMENT FACILITY

Mass Balance Calculation
West Branch of Susquehanna at McElhattan

	Discharge Water Concen. mg/l [4]	Discharge Water Mass lbs/day [4]	West Branch Concen. mg/l [4]	West Branch Mass lbs/day [4]	Combined Mass lbs/day [4]	Combined Flow Conc. mg/l [4]	Water Quality Standards mg/l [4]
Total Dissolved Solids, TDS	169,000	710,794	260	781,089	1,491,883	496	500/750
Chloride	93,100	391,567	19	57,080	448,647	149	250
Osmotic Pressure (milliosmols/kg) [4]	4,800	2,419	7	2,621	5,040	14	50
Sulfate	47	197.7	186	558,779	558,977	186	250

Flow Rates		
Brine Feed Water	350 gpm	0.504 Million gallons per day
West Branch	249,999 gpm	359.99856 Million gallons per day
Combined Flow	250,349 gpm	360.50256 Million gallons per day

[1] Discharge water concentrations are based on analytical data for fracturing and produced water from Marcellus and Devonian Formations of Pennsylvania.

[2] The flow ($Q_{7,10}$) of the West Branch of the Susquehanna at Jersey Shore is from United States Geological Survey (USGS) "Low Flow Statistics for Pennsylvania Streams". Data is for Reference Gage 01551500, Jersey Shore from the period 1962 to 1995. $Q_{7,10}$ for that period is 557 cfs or 249,999 gallons/minute.

[3] Water quality data for West Banch of Susquehanna is from USGS "Water Quality in Pennsylvania". Data is for Reference Gage 01553500, Lewisburg from the period 1970 to 2008.

[4] Osmotic pressure "Concentrations" are expressed in milliosmoles per kilogram, while "Mass" units are milliosmoles per kilogram million gallons per day. Water Quality Standard for Osmotic Pressure is 50 milliosmoles per kilogram. In cases where osmotic pressure data was not available, it is assumed that there are 0.0287 milliosmoles per kilogram per mg/l of TDS.

CENTRAL PENNSYLVANIA WATER TREATMENT, LLC
WASTEWATER TREATMENT FACILITY

Mass Balance Calculation
West Branch of Susquehanna at Milton

	Discharge Water Concen. mg/l	Discharge Water Mass lbs/day	West Branch Concen. mg/l	West Branch Mass lbs/day	Combined Mass lbs/day	Combined Flow Conc. mg/l	Water Quality Standards mg/l
Total Dissolved Solids, TDS	169,000	710,794	260	981,617	1,692,411	448	500/750
Chloride	93,100	391,567.4	19	71,734	463,301	123	250
Sulfate	47	197.7	186	702,234	702,431	186	250

Flow Rates		
Brine Feed Water	350 gpm	0.504 Million gallons per day
West Branch	314,181 gpm	452.42064 Million gallons per day
Combined Flow	314,531 gpm	452.92464 Million gallons per day

(1) Discharge water concentrations are based on analytical data for fracturing and produced water from Marcellus and Devonian Formations of Pennsylvania.

(2) The flow ($Q_{7,10}$) of the West Branch of the Susquehanna at Miton is from United States Geological Survey (USGS) "Low Flow Statistics for Pennsylvania Streams". Data is for Reference Gage 01553500, Milton from the period 1962 to 1995. $Q_{7,10}$ for that period is 700 cfs or 314,181 gallons/minute.

(3) Water quality data for West Banch of Susquehanna is from USGS "Water Quality in Pennsylvania". Data is for Reference Gage 01553500, Lewisburg from the period 1970 to 2008.

APPENDIX D

Material Safety Data Sheets

MATERIAL SAFETY DATA SHEET

Hydrogen Peroxide (8 to 20%)

MSDS Ref. No.: 7722-84-1-2
Date Approved: 04/30/2006
Revision No.: 7

This document has been prepared to meet the requirements of the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200; the Canada's Workplace Hazardous Materials Information System (WHMIS) and, the EC Directive, 2001/58/EC.

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Hydrogen Peroxide (8 to 20%)

GENERAL USE: Standard 8% is formulated with an inorganic tin-based stabilizer for high stability and long term storage. Suitable for industrial bleaching, processing, pollution abatement and general oxidation reactions. Technical grade contains an organic based stabilizer. It is particularly useful in chemical synthesis where the presence of inorganic residues is objectionable.

MANUFACTURER

FMC CORPORATION
FMC Peroxygens
1735 Market Street
Philadelphia, PA 19103
(215) 299-6000 (General Information)

FMC of Canada Ltd.
FMC Peroxygens
PG Pulp Mill Road
Prince George, BC V2N2S6
(250) 561-4200 (General Information)

EMERGENCY TELEPHONE NUMBERS

(281) 474-8750 (Plant: Pasadena, TX, US - Call Collect)
(250) 561-4221 (Plant: Prince George, BC, Canada - Call Collect)
(303) 595-9048 (Medical - U.S. - Call Collect)

For leak, fire, spill, or accident emergencies, call:
(800) 424-9300 (CHEMTREC - U.S.A.)
(613) 996-6666 (CANUTEC - Canada)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

- Clear, colorless, odorless liquid
- Oxidizer.
- Contact with combustibles may cause fire.
- Decomposes yielding oxygen that supports combustion of organic matters and can cause overpressure if confined.
- Extremely irritating to eyes, nose, throat and lungs.

POTENTIAL HEALTH EFFECTS: Extremely irritating to eyes, nose, throat and lungs. May cause skin irritation.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS#	Wt.%	EC No.	EC Class
Hydrogen Peroxide	7722-84-1	8 - 20	231-765-0	Xn, R22-41
Water	7732-18-5	80 - 92	231-791-2	Not classified

4. FIRST AID MEASURES

EYES: Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.

SKIN: Wash with plenty of soap and water. Get medical attention if irritation occurs and persists.

INGESTION: Rinse mouth with water. Dilute by giving 1 or 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.

INHALATION: Remove to fresh air. If breathing difficulty or discomfort occurs and persists, contact a medical doctor.

NOTES TO MEDICAL DOCTOR: Hydrogen peroxide at 8 to 20% concentration is an oxidant. Skin contact may be irritating; eye contact may be severely irritating. Treatment is by dilution and is symptomatic and supportive.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Flood with water.

FIRE / EXPLOSION HAZARDS: Product is non-combustible. On decomposition releases oxygen which may intensify fire.

FIRE FIGHTING PROCEDURES: Any tank or container surrounded by fire should be flooded with water for cooling. Wear full protective clothing and self-contained breathing apparatus.

FLAMMABLE LIMITS: Non-combustible

SENSITIVITY TO IMPACT: No data available

SENSITIVITY TO STATIC DISCHARGE: No data available

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES: Dilute with a large volume of water and hold in a pond or diked area until hydrogen peroxide decomposes. Dispose according to methods outlined for waste disposal.

Combustible materials exposed to hydrogen peroxide should be immediately submerged in or rinsed with large amounts of water to ensure that all hydrogen peroxide is removed. Residual hydrogen peroxide that is allowed to dry (upon evaporation hydrogen peroxide can concentrate) on organic materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

7. HANDLING AND STORAGE

HANDLING: Wear chemical splash-type monogoggles and full-face shield, impervious clothing, such as rubber, PVC, etc., and rubber or neoprene gloves and shoes. Avoid cotton, wool and leather. Avoid excessive heat and contamination. Contamination may cause decomposition and generation of oxygen gas which could result in high pressures and possible container rupture. Hydrogen peroxide should be stored only in vented containers and transferred only in a prescribed manner (see FMC Technical Bulletins). Never return unused hydrogen peroxide to original container, empty drums should be triple rinsed with water before discarding. Utensils used for handling hydrogen peroxide should only be made of glass, stainless steel, aluminum or plastic.

STORAGE: Store drums in cool areas out of direct sunlight and away from combustibles. For bulk storage refer to FMC Technical Bulletins.

COMMENTS: VENTILATION: Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into the work environment.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

Chemical Name	ACGIH	OSHA	Supplier
Hydrogen Peroxide	1 ppm (TWA)	1 ppm (PEL)	

ENGINEERING CONTROLS: Ventilation should be provided to minimize the release of hydrogen peroxide vapors and mists into the work environment. Spills should be minimized or confined immediately to prevent release into the work area. Remove contaminated clothing immediately and wash before reuse.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Use chemical splash-type monogoggles and a full-face shield made of polycarbonate, acetate, polycarbonate/acetate, PETG or thermoplastic.

RESPIRATORY: If concentrations in excess of 10 ppm are expected, use NIOSH/DHHS approved self-contained breathing apparatus (SCBA), or other approved atmospheric-supplied respirator (ASR) equipment (e.g., a full-face airline respirator (ALR)). DO NOT use any form of air-purifying respirator (APR) or filtering facepiece (AKA dust mask), especially those containing oxidizable sorbants such as activated carbon.

PROTECTIVE CLOTHING: Rubber or neoprene footwear (avoid leather). Impervious clothing materials such as rubber, neoprene, nitrile or polyvinyl chloride (avoid cotton, wool and leather). Completely submerge hydrogen peroxide contaminated clothing or other materials in water prior to drying. Residual hydrogen peroxide, if allowed to dry on materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

GLOVES: Liquid proof rubber or neoprene gloves. Thoroughly rinse the outside of gloves with water prior to removal. Inspect regularly for leaks.

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR:	Odorless
APPEARANCE:	Clear, colorless liquid
AUTOIGNITION TEMPERATURE:	Non-combustible
BOILING POINT:	102°C (216°F) (8% and 10%)
COEFFICIENT OF OIL / WATER:	Not available
DENSITY / WEIGHT PER VOLUME:	Not available
EVAPORATION RATE:	Above 1 (Butyl Acetate = 1)
FLASH POINT:	Non-combustible
FREEZING POINT:	-5°C (23°F) (8%); -6°C (21°F) (10%)
ODOR THRESHOLD:	Not available
OXIDIZING PROPERTIES:	Oxidizer
PERCENT VOLATILE:	100%
pH:	(as is) approx. 2.5 to 3.5
SOLUBILITY IN WATER:	(in H_20 % by wt) Above 1

SPECIFIC GRAVITY:	(H_2O=1) 1.06 @ 20°C/4°C (8%); 1.03 @ 20°C/4°C (10%)
VAPOR DENSITY:	(Air = 1): Not available
VAPOR PRESSURE:	31 mmHg @ 30°C (8%); 30 mmHg @ 30°C (10%)

COMMENTS:
pH (1% solution): 5.0 - 6.0

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Excessive heat or contamination could cause product to become unstable.
STABILITY:	Stable (heat and contamination could cause decomposition)
POLYMERIZATION:	Will not occur
INCOMPATIBLE MATERIALS:	Reducing agents, wood, paper and other combustibles, iron and other heavy metals, copper alloys and caustic.
HAZARDOUS DECOMPOSITION PRODUCTS:	Oxygen which supports combustion.

COMMENTS: Materials to Avoid : Dirt, organics, cyanides and combustibles such as wood, paper, oils, etc.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS: 8% hydrogen peroxide: Extremely irritating (washed) (rabbit)
8% hydrogen peroxide: Moderately irritating (unwashed) (rabbit)
10% hydrogen peroxide: Extremely irritating (rabbit)
[FMC Study Number: I84-851]

SKIN EFFECTS: 10% hydrogen peroxide: Slightly irritating after 4 hr. exposure (rabbit) [FMC Study Number: I89-1078]

DERMAL LD_{50}: 35% hydrogen peroxide: > 2,000 mg/kg (rabbit) [FMC Study Number: I83-746]

ORAL LD_{50}: 10% hydrogen peroxide: > 5,000 mg/kg (rat) [FMC Study Number: I89-1077]

INHALATION LC_{50}: 50% hydrogen peroxide: > 0.17 mg/l (rat) [FMC Study Number: I89-1080]

TARGET ORGANS: Eyes, nose, throat and lungs

ACUTE EFFECTS FROM OVEREXPOSURE: Extremely irritating to eyes, nose, throat and lungs. May cause skin irritation.

CHRONIC EFFECTS FROM OVEREXPOSURE: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for carcinogenicity of hydrogen peroxide in humans, but limited evidence in experimental animals (Group 3 - not classifiable as to its carcinogenicity to humans). The American Conference of Governmental Industrial Hygienists (ACGIH) has concluded that hydrogen peroxide is a 'Confirmed Animal Carcinogen with Unknown Relevance to Humans' (A3).

CARCINOGENICITY:

Chemical Name	IARC	NTP	OSHA	Other
Hydrogen Peroxide	Listed	Not listed	Not listed	(ACGIH) Listed (A3, Animal Carcinogen)

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION: Channel catfish 96-hour LC_{50} = 37.4 mg/L
Fathead minnow 96-hour LC_{50} = 16.4 mg/L
Daphnia magna 24-hour EC_{50} = 7.7 mg/L
Daphnia pulex 48-hour LC_{50} = 2.4 mg/L
Freshwater snail 96-hour LC_{50} = 17.7 mg/L
For more information refer to ECETOC "Joint Assessment of Commodity Chemicals No. 22, Hydrogen Peroxide." ISSN-0773-6339, January 1993

CHEMICAL FATE INFORMATION: Hydrogen peroxide in the aquatic environment is subject to various reduction or oxidation processes and decomposes into water and oxygen. Hydrogen peroxide half-life in freshwater ranged from 8 hours to 20 days, in air from 10-20 hrs. and in soils from minutes to hours depending upon microbiological activity and metal contaminants.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: An acceptable method of disposal is to dilute with a large amount of water and allow the hydrogen peroxide to decompose followed by discharge into a suitable treatment system in accordance with all regulatory agencies. The appropriate regulatory agencies should be contacted prior to disposal.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

PROPER SHIPPING NAME: Hydrogen Peroxide, aqueous solutions with

	not less than 8%, but less than 20% hydrogen peroxide
UN/NA NUMBER:	UN 2984
PACKING GROUP:	III
LABEL(S):	Oxidizer
PLACARD(S):	5.1 (Oxidizer)
ADDITIONAL INFORMATION:	DOT Marking: Hydrogen Peroxide, aqueous solution with not less than 8%, but less than 20% Hydrogen Peroxide, UN 2984 Hazardous Substance/RQ: Not applicable 49 STCC Number: 4918689 DOT Spec: stainless steel/high purity aluminum cargo tanks and rail cars. UN Spec: HDPE drums. Contact FMC for specific details.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

PROPER SHIPPING NAME:	Hydrogen peroxide, aqueous solution with not less than 8%, but less than 20% peroxide.

INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) / INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

PROPER SHIPPING NAME:	Hydrogen peroxide, aqueous solution with not less than 8%, but less than 20% peroxide(*).

OTHER INFORMATION:

(*) Air regulations permit shipment of Hydrogen Peroxide (8 - 20%) in non-vented containers for Air Cargo Only aircraft, as well as for Passenger and Cargo aircraft. HOWEVER, all FMC Hydrogen Peroxide containers are vented and therefore, air shipments of FMC H_2O_2 is not permitted. IATA air regulations state that venting of packages containing oxidizing substances is not permitted for air transport.

Protect from physical damage. Keep drums in upright position. Drums should not be stacked in transit. Do not store drum on wooden pallets.

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355, APPENDIX A):

Not listed

SECTION 311 HAZARD CATEGORIES (40 CFR 370):

Fire Hazard, Immediate (Acute) Health Hazard

SECTION 312 THRESHOLD PLANNING QUANTITY (40 CFR 370):

The Threshold Planning Quantity (TPQ) for this product, if treated as a mixture, is 10,000 lbs; however, this product contains the following ingredients with a TPQ of less than 10,000 lbs.:
None, (conc. <52%)

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)

CERCLA DESIGNATION & REPORTABLE QUANTITIES (RQ) (40 CFR 302.4):

Unlisted (Hydrogen Peroxide 8-20%); RQ = 100 lbs.; Ignitability

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA INVENTORY STATUS (40 CFR 710):

Listed

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

RCRA IDENTIFICATION OF HAZARDOUS WASTE (40 CFR 261):

Waste Number: D001

CANADA

WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM):

Chemical Name:	Hydrogen peroxide
Hazard Classification / Division:	Class C (Oxidizer), Class D, Div. 2, Subdiv. B
Ingredient Disclosure List:	Listed

INTERNATIONAL LISTINGS

Hydrogen peroxide:
China: Listed
Japan (ENCS): (1)-419
Korea: KE-20204
Philippines (PICCS): Listed

HAZARD, RISK AND SAFETY PHRASE DESCRIPTIONS:

Hydrogen Peroxide, (Index #008-003-00-9):

EC Symbols: Xn (Harmful)

EC Risk Phrases:	R22	(Harmful if swallowed.)
	R41	(Risk of serious damage to eyes.)
EC Safety Phrases:	S1/2	(Keep locked up and out of reach of children.)
	S3	(Keep in a cool place.)
	S17	(Keep away from combustible material.)
	S26	(In case of contact with eyes, rinse immediately with plenty of water and seek medical advice)
	S28	(After contact with skin, wash immediately with plenty of water and soap.)
	S36/37/39	(Wear suitable protective clothing, gloves and eye/face protection.)
	S45	(In case of accident or if you feel unwell, seek medical advice immediately - show the label where possible.)

16. OTHER INFORMATION

HMIS

Health	1
Flammability	0
Physical Hazard	1
Personal Protection (PPE)	H

Protection = H (Safety goggles, gloves, apron, the use of a supplied air or SCBA respirator is required in lieu of a vapor cartridge respirator)

HMIS = Hazardous Materials Identification System

Degree of Hazard Code:
4 = Severe
3 = Serious
2 = Moderate
1 = Slight
0 = Minimal

NFPA

Health	1
Flammability	0
Reactivity	1
Special	OX

SPECIAL = OX (Oxidizer)

NFPA = National Fire Protection Association

Degree of Hazard Code:
4 = Extreme

3 = High
2 = Moderate
1 = Slight
0 = Insignificant

REVISION SUMMARY:
This MSDS replaces Revision #6, dated April 05, 2005.
Changes in information are as follows:
Section 1 (Product and Company Identification)
Section 16 (Other Information)

FMC Logo - FMC Corporation Trademark

FMC Corporation believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be applicable where such product is used in combination with any other materials or in any process. It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Further, since the conditions and methods of use are beyond the control of FMC Corporation, FMC Corporation expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.

MATERIAL SAFETY DATA SHEET

Hydrogen Peroxide (20 to 40%)

MSDS Ref. No.: 7722-84-1-3
Date Approved: 04/27/2006
Revision No.: 10

This document has been prepared to meet the requirements of the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200; the Canada's Workplace Hazardous Materials Information System (WHMIS) and, the EC Directive, 2001/58/EC.

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Hydrogen Peroxide (20 to 40%)

ALTERNATE PRODUCT NAME(S): Durox® Reg. & LR 35%, Oxypure® 35%, Standard 27.5 & 35%, Super D® 25 & 35, Technical 35%, HTP 35%, OHP 35%, Chlorate Grade, 20%, Semiconductor Reg, Seg, RGS, RGS 2, RGS 3, 31%

GENERAL USE:

Durox® 35% Reg. & LR - meets the Food Chemical Codex requirements for aseptic packaging and other food related applications.

Oxypure® 35% - certified by NSF to meet NSF/ANSI Standard 60 requirements for drinking water treatment.

Standard 27.5 and 35% - most suitable grade for industrial bleaching, processing, pollution abatement and general oxidation reactions.

Semiconductor Reg, Seg, RGS, RGS 2, RGS 3, 31% - conform to ACS and Semi Specs. for wafer etching and cleaning, and applications requiring low residues.

Super D® 25 and 35% - meets US Pharmacopoeia specifications for 3% topical solutions when diluted with proper quality water. While manufactured to the USP standards for purity and to FMC's demanding ISO 9002 quality standards, FMC does not claim that it's Hydrogen Peroxide is manufactured in accordance with all pharmaceutical cGMP conditions.

Technical 35% - essentially free of inorganic metals suitable for chemical synthesis.

HTP 35% - specially formulated for aerospace equipment conditioning.

OHP 35% - specially formulated for OHP process, advanced oxidation, and activated peroxide applications

Chlorate Grade 20% - specially formulated for use in chlorate manufacture or processing.

MANUFACTURER

FMC CORPORATION
FMC Peroxygens
1735 Market Street
Philadelphia, PA 19103
(215) 299-6000 (General Information)

FMC of Canada Ltd.
FMC Peroxygens
PG Pulp Mill Road
Prince George, BC V2N2S6
(250) 561-4200 (General Information)

EMERGENCY TELEPHONE NUMBERS

(281) 474-8750 (Plant: Pasadena, TX, US - Call Collect)
(250) 561-4221 (Plant: Prince George, BC, Canada - Call Collect)
(303) 595-9048 (Medical - U.S. - Call Collect)

For leak, fire, spill, or accident emergencies, call:
(800) 424-9300 (CHEMTREC - U.S.A.)
(613) 996-6666 (CANUTEC - Canada)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

- Clear, colorless, odorless liquid
- Oxidizer.
- Contact with combustibles may cause fire.
- Decomposes yielding oxygen that supports combustion of organic matters and can cause overpressure if confined.
- Corrosive to eyes, nose, throat, lungs and gastrointestinal tract.

POTENTIAL HEALTH EFFECTS: Corrosive to eyes, nose, throat and lungs. May cause irreversible tissue damage to the eyes including blindness. May cause skin irritation.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS#	Wt.%	EC No.	EC Class
Hydrogen Peroxide	7722-84-1	20 - 40	231-765-0	Xn, R22-37/38-41
Water	7732-18-5	60 - 80	231-791-2	Not classified

4. FIRST AID MEASURES

EYES: Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.

SKIN: Wash with plenty of soap and water. Get medical attention if irritation occurs and persists.

INGESTION: Rinse mouth with water. Dilute by giving 1 or 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.

INHALATION: Remove to fresh air. If breathing difficulty or discomfort occurs and persists, contact a medical doctor.

NOTES TO MEDICAL DOCTOR: Hydrogen peroxide at these concentrations is a strong oxidant. Direct contact with the eye is likely to cause corneal damage especially if not washed immediately. Careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered. Because of the likelihood of corrosive effects on the gastrointestinal tract after ingestion, and the unlikelihood of systemic effects, attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. There is a remote possibility, however, that a nasogastric or orogastric tube may be required for the reduction of severe distension due to gas formation.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Flood with water.

FIRE / EXPLOSION HAZARDS: Product is non-combustible. On decomposition releases oxygen which may intensify fire.

FIRE FIGHTING PROCEDURES: Any tank or container surrounded by fire should be flooded with water for cooling. Wear full protective clothing and self-contained breathing apparatus.

FLAMMABLE LIMITS: Non-combustible

SENSITIVITY TO IMPACT: No data available

SENSITIVITY TO STATIC DISCHARGE: No data available

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES: Dilute with a large volume of water and hold in a pond or diked area until hydrogen peroxide decomposes. Hydrogen peroxide may be decomposed by adding sodium metabisulfite or sodium sulfite after diluting to about 5%. Dispose according to methods outlined for waste disposal.

Combustible materials exposed to hydrogen peroxide should be immediately submerged in or rinsed with large amounts of water to ensure that all hydrogen peroxide is removed. Residual hydrogen peroxide that is allowed to dry (upon evaporation hydrogen peroxide can concentrate) on organic materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

7. HANDLING AND STORAGE

HANDLING: Wear chemical splash-type monogoggles and full-face shield, impervious clothing, such as rubber, PVC, etc., and rubber or neoprene gloves and shoes. Avoid cotton, wool and leather. Avoid excessive heat and contamination. Contamination may cause decomposition and generation of oxygen gas which could result in high pressures and possible container rupture. Hydrogen peroxide should be stored only in vented containers and transferred only in a prescribed manner (see FMC Technical Bulletins). Never return unused hydrogen peroxide to original container, empty drums should be triple rinsed with water before discarding. Utensils used for handling hydrogen peroxide should only be made of glass, stainless steel, aluminum or plastic.

STORAGE: Store drums in cool areas out of direct sunlight and away from combustibles. For bulk storage refer to FMC Technical Bulletins.

COMMENTS: VENTILATION: Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into the work environment.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

Chemical Name	ACGIH	OSHA	Supplier
Hydrogen Peroxide	1 ppm (TWA)	1 ppm (PEL)	

ENGINEERING CONTROLS: Ventilation should be provided to minimize the release of hydrogen peroxide vapors and mists into the work environment. Spills should be minimized or confined immediately to prevent release into the work area. Remove contaminated clothing immediately and wash before reuse.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Use chemical splash-type monogoggles and a full-face shield made of polycarbonate, acetate, polycarbonate/acetate, PETG or thermoplastic.

RESPIRATORY: If concentrations in excess of 10 ppm are expected, use NIOSH/DHHS approved self-contained breathing apparatus (SCBA), or other approved atmospheric-supplied respirator (ASR) equipment (e.g., a full-face airline respirator (ALR)). DO NOT use any form of air-purifying respirator (APR) or filtering facepiece (AKA dust mask), especially those containing oxidizable sorbants such as activated carbon.

PROTECTIVE CLOTHING: For body protection wear impervious clothing such as an approved splash protective suit made of SBR Rubber, PVC (PVC Outershell w/Polyester Substrate), Gore-Tex (Polyester trilaminate w/Gore-Tex), or a specialized HAZMAT Splash or Protective Suite (Level A, B, or C). For foot protection, wear approved boots made of NBR, PVC, Polyurethane, or neoprene. Overboots made of Latex or PVC, as well as firefighter boots or specialized HAZMAT boots are also permitted. DO NOT wear any form of boot or overboots made of nylon or nylon blends. DO NOT use cotton, wool or leather, as these materials react RAPIDLY with higher concentrations of hydrogen peroxide. Completely submerge hydrogen peroxide contaminated clothing or other materials in water prior to drying. Residual hydrogen peroxide, if allowed to dry on materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

GLOVES: For hand protection, wear approved gloves made of nitrile, PVC, or neoprene. DO NOT use cotton, wool or leather for these materials react RAPIDLY with higher concentrations of hydrogen peroxide. Thoroughly rinse the outside of gloves with water prior to removal. Inspect regularly for leaks.

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR:	Odorless
APPEARANCE:	Clear, colorless liquid
AUTOIGNITION TEMPERATURE:	Non-combustible
BOILING POINT:	103°C/218°F (20%); 107°C/225°F (31%); 108°C/226°F (35%)
COEFFICIENT OF OIL / WATER:	Not available
DENSITY / WEIGHT PER VOLUME:	Not available
EVAPORATION RATE:	Above 1 (Butyl Acetate = 1)
FLASH POINT:	Non-combustible
FREEZING POINT:	-15°C/6°F (20%); -26°C/-15°F (31%); -33°C/-27°F (35%)
ODOR THRESHOLD:	Not available
OXIDIZING PROPERTIES:	Strong oxidizer
PERCENT VOLATILE:	100%
pH:	(as is) < / = 3.7
SOLUBILITY IN WATER:	(in H_2O % by wt) 100%
SPECIFIC GRAVITY:	1.07 @ 20°C/4°C (20%); 1.11 @ 20°C/4°C (31%); 1.13 @ 20°C/4°C (35%)
VAPOR DENSITY:	(Air = 1): Not available
VAPOR PRESSURE:	28 mmHg @ 30°C (20%); 24 mmHg @ 30°C (31%); 23 mmHg @ 30°C (35%)

COMMENTS:
pH (1% solution) @ 25°C: 5.0 - 6.0

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Excessive heat or contamination could cause product to become unstable.
STABILITY:	Stable (heat and contamination could cause decomposition)
POLYMERIZATION:	Will not occur
INCOMPATIBLE MATERIALS:	Reducing agents, wood, paper and other combustibles, iron and other heavy metals, copper alloys and caustic.
HAZARDOUS DECOMPOSITION PRODUCTS:	Oxygen which supports combustion.

COMMENTS: Materials to Avoid : Dirt, organics, cyanides and combustibles such as wood, paper, oils, etc.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS: 35% hydrogen peroxide: Extremely irritating/corrosive (rabbit) [FMC Study Number: I83-748]

SKIN EFFECTS: 35% hydrogen peroxide: Mildly irritating after 4-hour exposure (rabbit) [FMC Study Number: I83-747]

DERMAL LD_{50}: 35% hydrogen peroxide: > 2,000 mg/kg (rabbit) [FMC Study Number: I83-746]

ORAL LD_{50}: 35% hydrogen peroxide: 1,193 mg/kg (rat) [FMC Study Number: I83-745]

INHALATION LC_{50}: 50% hydrogen peroxide: > 0.17 mg/l (rat) [FMC Study Number: I89-1080]

TARGET ORGANS: Eyes, nose, throat and lungs

ACUTE EFFECTS FROM OVEREXPOSURE: Extremely irritating/corrosive to eyes and gastrointestinal tract. May cause irreversible tissue damage to the eyes including blindness. Inhalation of mist or vapors may be severely irritating to nose, throat and lungs. May cause skin irritation.

CHRONIC EFFECTS FROM OVEREXPOSURE: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for carcinogenicity of hydrogen peroxide in humans, but limited evidence in experimental animals (Group 3 - not classifiable as to its carcinogenicity to humans). The American Conference of Governmental Industrial Hygienists (ACGIH) has concluded that hydrogen peroxide is a 'Confirmed Animal Carcinogen with Unknown Relevance to Humans' (A3).

CARCINOGENICITY:

Chemical Name	IARC	NTP	OSHA	Other
Hydrogen Peroxide	Listed	Not listed	Not listed	(ACGIH) Listed (A3, Animal Carcinogen)

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION: Channel catfish 96-hour LC_{50} = 37.4 mg/L
Fathead minnow 96-hour LC_{50} = 16.4 mg/L
Daphnia magna 24-hour EC_{50} = 7.7 mg/L
Daphnia pulex 48-hour LC_{50} = 2.4 mg/L
Freshwater snail 96-hour LC_{50} = 17.7 mg/L
For more information refer to ECETOC "Joint Assessment of Commodity Chemicals No. 22, Hydrogen Peroxide." ISSN-0773-6339, January 1993

CHEMICAL FATE INFORMATION: Hydrogen peroxide in the aquatic environment is subject to various reduction or oxidation processes and decomposes into water and oxygen. Hydrogen peroxide half-life in freshwater ranged from 8 hours to 20 days, in air from 10-20 hrs. and in soils from minutes to hours depending upon microbiological activity and metal contaminants.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: An acceptable method of disposal is to dilute with a large amount of water and allow the hydrogen peroxide to decompose followed by discharge into a suitable treatment system in accordance with all regulatory agencies. The appropriate regulatory agencies should be contacted prior to disposal.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

PROPER SHIPPING NAME:	Hydrogen peroxide, aqueous solutions with not less than 20% but not more than 40% hydrogen peroxide
PRIMARY HAZARD CLASS / DIVISION:	5.1 (Oxidizer)
UN/NA NUMBER:	UN 2014
PACKING GROUP:	II
LABEL(S):	Oxidizer, Corrosive
PLACARD(S):	5.1 (Oxidizer)

ADDITIONAL INFORMATION:

DOT Marking: Hydrogen Peroxide, aqueous solution with not less than 20%, but not more than 40% Hydrogen Peroxide, UN 2014

Hazardous Substance/RQ: Not applicable

49 STCC Number: 4918775

DOT Spec: stainless steel/high purity aluminum cargo tanks and rail cars. UN Spec: HDPE drums. Contact FMC for specific details.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

PROPER SHIPPING NAME:

Hydrogen peroxide, aqueous solutions with not less than 20%, but not more than 60% hydrogen peroxide.

INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) / INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

PROPER SHIPPING NAME:

Hydrogen peroxide, aqueous solutions with not less than 20%, but not more than 40% hydrogen peroxide (*).

OTHER INFORMATION:

(*) Air regulations permit shipment of Hydrogen Peroxide (20 - 40%) in non-vented containers for Air Cargo Only aircraft, as well as for Passenger and Cargo aircraft. HOWEVER, all FMC Hydrogen Peroxide containers are vented and therefore, air shipments of FMC H_2O_2 is not permitted. IATA air regulations state that venting of packages containing oxidizing substances is not permitted for air transport.

Protect from physical damage. Keep drums in upright position. Drums should not be stacked in transit. Do not store drum on wooden pallets.

---

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355, APPENDIX A):

Not listed

SECTION 311 HAZARD CATEGORIES (40 CFR 370):

Fire Hazard, Immediate (Acute) Health Hazard

SECTION 312 THRESHOLD PLANNING QUANTITY (40 CFR 370):
The Threshold Planning Quantity (TPQ) for this product, if treated as a mixture, is 10,000 lbs; however, this product contains the following ingredients with a TPQ of less than 10,000 lbs.:
None, (conc. <52%)

SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372):
Not listed

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)

CERCLA DESIGNATION & REPORTABLE QUANTITIES (RQ) (40 CFR 302.4):
Unlisted (Hydrogen Peroxide 20-40%); RQ = 100 lbs.; Ignitability, Corrosivity

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA INVENTORY STATUS (40 CFR 710):
Listed

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)
RCRA IDENTIFICATION OF HAZARDOUS WASTE (40 CFR 261):
Waste Number: D001, D002

CANADA

WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM):

Product Identification Number:	2014
Hazard Classification / Division:	Class C (Oxidizer), Class D, Div. 2, Subdiv. B. (Toxic), Class E (Corrosive)
Ingredient Disclosure List:	Listed

INTERNATIONAL LISTINGS

Hydrogen peroxide:

China: Listed
Japan (ENCS): (1)-419
Korea: KE-20204
Philippines (PICCS): Listed

HAZARD, RISK AND SAFETY PHRASE DESCRIPTIONS:

Hydrogen Peroxide, (Index #008-003-00-9):

EC Symbols: Xn (Harmful)

EC Risk Phrases:	R22	(Harmful if swallowed.)
	R37/38	(Irritating to respiratory system and to skin.)
	R41	(Risk of serious damage to eyes.)
EC Safety Phrases:	S1/2	(Keep locked up and out of reach of children.)
	S3	(Keep in a cool place.)
	S17	(Keep away from combustible material.)
	S26	(In case of contact with eyes, rinse immediately with plenty of water and seek medical advice)
	S28	(After contact with skin, wash immediately with plenty of water and soap.)
	S36/37/39	(Wear suitable protective clothing, gloves and eye/face protection.)
	S45	(In case of accident or if you feel unwell, seek medical advice immediately - show the label where possible.)

16. OTHER INFORMATION

HMIS

Health	3
Flammability	0
Physical Hazard	1
Personal Protection (PPE)	H

Protection = H (Safety goggles, gloves, apron, the use of a supplied air or SCBA respirator is required in lieu of a vapor cartridge respirator)

HMIS = Hazardous Materials Identification System

Degree of Hazard Code:
4 = Severe
3 = Serious
2 = Moderate
1 = Slight
0 = Minimal

NFPA

Health	3
Flammability	0
Reactivity	1
Special	OX

SPECIAL = OX (Oxidizer)

NFPA = National Fire Protection Association

Degree of Hazard Code:

4 = Extreme
3 = High
2 = Moderate
1 = Slight
0 = Insignificant

REVISION SUMMARY:
This MSDS replaces Revision #9, dated April 05, 2005.
Changes in information are as follows:
Section 1 (Product and Company Identification)
Section 16 (Other Information)

Durox, Oxypure, Super D and FMC Logo - FMC Trademarks

FMC Corporation believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be applicable where such product is used in combination with any other materials or in any process. It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Further, since the conditions and methods of use are beyond the control of FMC Corporation, FMC Corporation expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.

GRAYMONT

MATERIAL SAFETY DATA SHEET

SECTION I - CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: **HIGH CALCIUM HYDRATED LIME**	**WHMIS – CLASSIFICATION: D2A / D2B: MATERIALS CAUSING OTHER TOXIC EFFECTS E: CORROSIVE MATERIAL**

MANUFACTURER'S AND SUPPLIER'S NAME:

GRAYMONT (NB) INC	4634, Route 880, Havelock, New Brunswick, E4Z 5K8.
GRAYMONT (QC) INC.	25, rue De Lauzon, Boucherville (Québec), J4B 1E7.
GRAYMONT (PA) INC.	965, East College avenue, Pleasant Gap, PA 16823
GRAYMONT (WESTERN CANADA) INC.	190 – 3025, 12 Street N.E., Calgary, Alberta, T2E 7J2
GRAYMONT (WESTERN US) INC.	3950 South, 700 East, Suite 301, Salt Lake City, Utah 84107

EMERGENCY TEL. No.: (613) 996 – 6666 CANUTEC (Canada) (800) 424 – 9300 CHEMTREC (US)

Chemical Name	Chemical Family	Chemical Formula
Calcium hydroxide	**Alkaline earth hydroxide**	**Complex mixture - mostly $Ca(OH)_2$**
Molecular Weight	Trade Name and Synonyms	Material Use
$Ca(OH)_2$ = 74.096	**Hydrated Lime, Lime, Slaked lime, Lime Putty, Lime Slurry, Milk of Lime, Calcium Hydroxide**	**Neutralization, Flocculation, Stabilization, absorption**

SECTION II - COMPOSITION AND INFORMATION ON INGREDIENTS

Hazardous Ingredients	Approximate Concentration (% by weight)	C.A.S. Number	Exposure limits (mg/m^3)					
			OSHA PEL	ACGIH TLV	RSST VEMP	MSHA PEL (Note 2)	NIOSH REL	NIOSH IDLH
(Complex Mixture)	**(% by weight)**		**(TWA) 8/40h**	**(TWA) 8/40h**	**(TWA) 8/40h**	**(TWA) 8/40h**	**(TWA) 10/40h**	
Calcium hydroxide	**92 to 100**	**1305-62-0**	**15 (tot dust) 5 resp dust**	**5**	**5**	**5**	**5**	**N/A**
Crystalline Silica, Quartz	**0.1 to 1**	**14808-60-7**	**10/(%SiO_2)+2 respirable silica dust**	**0.025 respirable silica dust**	**0.1 respirable silica dust**	**10/(%SiO_2)+2 respirable silica dust**	**0.05 respirable free silica**	**50**
Crystalline Silica, Quartz	**0 to 0.1 (Note 1)**	**14808-60-7**	**10/(%SiO2)+2 respirable silica dust**	**0.025 respirable silica dust**	**0.1 respirable silica dust**	**10/(%SiO2)+2 (respirable silica dust)**	**0.05 respirable free silica**	**50**

(Note 1): Concentration of crystalline silica in a series of lime products will vary from source to source. It was not detected on some samples (< 0.1% w/w). Therefore two ranges are being disclosed. **(Note 2)**: ACGIH TLV Version 1973 has been adopted by the Mine Safety Health Administration (MSHA) as the regulatory Exposure Standard.

SECTION III - PHYSICAL AND CHEMICAL DATA

Physical State Gas ☐ Liquid ☐ Solid ☑	Odor and Appearance **Slight earthy odor – Fine white powder**		Odor Threshold (p.p.m.) **Not applicable**	Specific Gravity **2.3 – 2.4**
Vapor Pressure (mm) **Not applicable**	Vapor Density (Air = 1) **Not applicable**	Evaporation Rate **Not applicable**	Boiling Point (°C) **Not applicable**	Melting Point (°C) **Not applicable**
Solubility in Water (20°C) **0.165g/100g Sat.soln**	Volatiles (% by volume) **Not applicable**	pH (25 °C) **Sat. soln $Ca(OH)_2$ 12.45**	Bulk Density (kg/m^3) **320 - 690**	Coefficient of water/oil distribution **Not applicable**

SECTION IV - FIRE OR EXPLOSION HAZARD DATA

Flammability

Yes ☐ No ☑ If yes, under which conditions?

Extinguishing Media

Calcium Hydroxide does not burn. Use extinguishing media appropriate to surrounding fire conditions.

Special Fire Fighting Procedures

Not applicable

Flash point (° C) and Method **Not applicable**	Upper flammable limit (% by volume) **Not applicable**	Lower flammable limit (% by volume) **Not applicable**
Auto Ignition Temperature (°C) **Not applicable**	TDG Flammability Classification **Non-flammable**	Hazardous Combustion Products **None**

Dangerous Combustion Products **None**

EXPLOSION DATA

Sensitivity to Chemical Impact **Not applicable**	Rate of Burning **Not applicable**	Explosive Power **Not applicable**	Sensitivity to Static Discharge **Not applicable**

SECTION V - REACTIVITY DATA

Chemical Stability Yes ☐ No ☑	If no, under which conditions?	**Absorbs carbon dioxide in the air to form calcium carbonate.**
Incompatibility to other substances Yes ☑ No ☐	If so, which ones?	**Boron tri-fluoride, chlorine tri-fluoride, ethanol, fluorine, hydrogen fluoride, phosphorus pentoxide; and acids (violent reaction with generating heat and possible explosion in confined area).**
Reactivity Yes ☑ No ☐	If so, under which conditions?	**Reacts violently with strong acids. Reacts chemically with acids and many other compounds and chemical elements to form calcium based compounds. Explosive when mixed with nitro organic compounds.**
Hazardous Decomposition Products		**Thermal decomposition at 540°C will produce calcium oxide and water.**
Hazardous Polymerization Products		**Will not occur.**

SECTION VI - TOXICOLOGICAL PROPERTIES

Route of Entry

☑ Skin Contact ☐ Skin Absorption ☑ Eye Contact ☑ Acute Inhalation ☐ Chronic Inhalation ☑ Ingestion

Effects of Acute Exposure to Product

Skin	**Severe irritation of mucous and skin, removes natural skin oils.**
Eyes	**Severe eye irritation, intense watering of the eyes, possible lesions, possible blindness when exposed for prolonged period. Eye-Rabbit-10mg/ 24 h – Severe.**
Inhalation	**If inhaled in form of dust, irritation of breathing passages, cough, sneezing.**
Ingestion	**If ingested: pain, vomiting blood, diarrhea, collapse, drop in blood pressure (indicates perforation of esophagus or stomach).**

Effects of Chronic Exposure to Product:

Contact dermatitis. Following repeated or prolonged contact, this product can cause redness, desquamation and fissures. This product may contain trace amounts of crystalline silica. Excessive inhalation of respirable crystalline silica dust may result in respiratory disease, including silicosis, pneumoconiosis and pulmonary fibrosis.

LD_{50} of Product (Specify Species and Route) **(Food grade $Ca(OH)_2$: 7340mg/kg) (Rats, ingestion)**	Irritancy of Product **Severe to moist tissues**	Exposure limits of Product **Unavailable**
LC_{50} of Product (Specify Species) **Unavailable**	Sensitization to Product **None**	Synergistic materials **None reported**

SECTION VI - TOXICOLOGICAL PROPERTIES (Cont'd)

☑ Carcinogenicity ☐ Reproductive effects ☐ Tératogenicity ☐ Mutagenicity

Calcium Hydroxide is not listed as a carcinogen by ACGIH, MSHA, OSHA, NTP or IARC. It may, however, contain trace amounts of Crystalline Silica listed carcinogens by these organizations.

Crystalline Silica, which inhaled in the form of quartz or crystobalite from occupational sources, is classified by IARC as (Group 1) carcinogenic to humans.

Silica, crystalline (Airborne particles of respirable size) is regulated under California's Safe Drinking Water and Toxic Enforcement Act of 1986. (Proposition 65).

NIOSH considers crystalline silica to be potential occupational carcinogen as defined by the OSHA carcinogen policy [29 CFR 1990].

NTP lists respirable Crystalline Silica as known to be human carcinogens based on sufficient evidence of carcinogenicity in humans.

ACGIH lists respirable Crystalline Silica (quartz) as suspected human carcinogen (A-2).

RSST lists respirable Crystalline Silica (quartz) as suspected human carcinogen.

SECTION VII - PREVENTIVE MEASURES

Personal Protective Equipment (PPE) **Wear clean, dry gloves, full length pants over boots, long sleeved shirt buttoned at the neck, head protection and approved eye protection selected for the working conditions.**

Gloves (Specify)	Respiratory (Specify)	Eyes (Specify)	Footwear (Specify)
Gauntlets Cuff style	**NIOSH approved (N/R/P95) dust respirator**	**ANSI, CSA or ASTM approved safety glasses with side shields. Tight fitting dust goggles should be worn when excessive (visible) dust conditions are present. Do not wear contact lenses without tight fitting goggles when handling this chemical.**	**Resistant to caustics**

Clothing (Specify)	Other (Specify)
Fully covering skin	**Evaluate degree of exposure and use PPE if necessary. After handling lime, employees must shower. If exposed daily, use oil, Vaseline, silicone base creme etc. to protect exposed skin, particularly neck, face and wrists.**

Engineering Controls (e.g. ventilation, enclosed process, specify)

Enclose dust sources; use exhaust ventilation (dust collector) at handling points, keep levels below Max. Concentration Permitted.

SECTION VII - PREVENTIVE MEASURES (Cont'd)

Leak and Spill Procedure

Limit access to trained personnel. Use industrial vacuums for large spills. Ventilate area.

Waste Disposal

Transport to disposal area or bury. Review Federal, Provincial and local Environmental regulations.

Handling Procedures and Equipment

Avoid skin and eye contact. Minimize dust generation. Wear protective goggles and in cases of insufficient ventilation, use anti-dust mask. An eye wash station and safety shower should be readily available where this material or its water dispersions are used. Contact lenses should not be worn when working with this chemical.

Storage Requirements

Keep tightly closed containers in a cool, dry and well-ventilated area, away from acids. Keep out of reach of children.

Special Shipment Information

Calcium Hydroxide is neither regulated by the Transportation of Dangerous Goods (TDG) Regulations (Canada) nor by the Hazardous Materials Regulations (USA).

SECTION VIII - FIRST AID MEASURES

Skin

Carefully and gently brush the contaminated body surfaces in order to remove all traces of lime. Use a brush, cloth or gloves. Remove all lime-contaminated clothing. Rinse contaminated area with lukewarm water for 15 to 20 minutes. Consult a physician if exposed area is large or if irritation persists.

Eyes

Immediately rinse contaminated eye(s) with gently running lukewarm water (saline solution is preferred) for 15 to 20 minutes. In the case of an embedded particle in the eye, or chemical burn, as assessed by first aid trained personnel, contact a physician.

Inhalation

Move source of dust or move victim to fresh air. Obtain medical attention immediately. If victim does not breathe, give artificial respiration.

Ingestion

If victim is conscious, give 300 ml (10 oz) of water, followed by diluted vinegar (1 part vinegar, 2 parts water) or fruit juice to neutralize the alkali. Do not induce vomiting. Contact a physician immediately.

General Advise

Consult a physician for all exposures except minor instances of inhalation.

SECTION IX - REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act of 1986 (SARA Title III). / The Emergency Planning and "Community Right-to-Know" Act (EPCRA). / Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). / Resource Conservation and Recovery Act (**RCRA**).

Component Calcium Hydroxide has been reviewed against the following regulatory listings:

- **SARA Section 302 – Emergency Planning Notification. Extremely Hazardous Substances (EHS) List and Threshold Planning Quantity (TPQ). (40 CFR, Part 355, Section 30) : Not listed.**
- **SARA Section 304 – Emergency Release Notification. Extremely Hazardous Substances (EHS) and Reportable Quantity (RQ) List. (40 CFR, Part 355, Section 40) : Not listed.**
- **SARA Section 311/312 – Hazard Categories (40 CFR, Part 370) : This product is regulated under CFR 1910.1200 (OSHA Hazard Communication) as Immediate (Acute) Health Hazards – Irritant.**
- **SARA Section 313 – Toxics Release Inventory (TRI). Toxic Chemical List (40 CFR, Part 372). Not listed.**
- **CERCLA – Hazardous Substance (40 CFR, Part 302): Not listed in Table 302.4.**
- **RCRA – Hazardous Waste Number (40 CFR, Part 261, Subpart D): Not listed.**
- **RCRA – Hazardous Waste Classification (40 CFR, Part 261, Subpart C): Not classified.**

CWA 311. - Clean Water Act List of Hazardous Substances.

Calcium Hydroxide has been withdrawn from the Clean Water Act (CWA) list of hazardous substances. (11/13/79) (44FR65400)

California Proposition 65.

Component Calcium Hydroxide does not appear on the above regulatory listing. This product may contain small amounts of crystalline silica. Silica, crystalline (Airborne particles of respirable size) is regulated under California's Safe Drinking Water and Toxic Enforcement Act of 1986. (Proposition 65)

Transportation - Hazardous Materials Regulations (USA) & Transportation of Dangerous Goods (TDG) Regulations (Can).

Calcium Hydroxide does not appear on the above regulatory listings

Toxic Substances Control Act (TSCA).

All naturally occurring components of this product are automatically included in the USEPA TSCA Inventory List per 40 CFR 710.4 (b). All other components are one the USEPA TSCA Inventory List. Calcium Hydroxide is exempt from reporting under the inventory update rule.

Canadian Environmental Protection Act (CEPA) – Substances Lists (DSL/NDSL).

Calcium Hydroxide appears on the Domestic Substances List (DSL).

ANSI/NSF 60 - Drinking Water Treatment Additives.

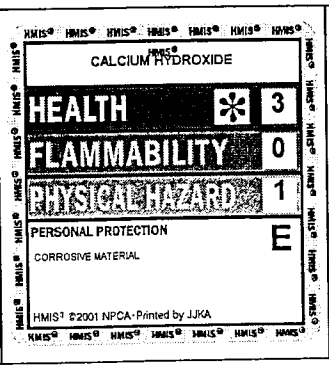
Hydrated Lime has been investigated with respect to elements identified by EPA as toxic and it has been classified for use in direct contact with drinking water. (in accordance with Standard ANSI/NSF 60). For a list of classified products, refer to Underwriters Laboratories Inc.'s Online Certifications Directory.

FDA - U.S. Food and Drug Administration, Department of Health and Human Services.

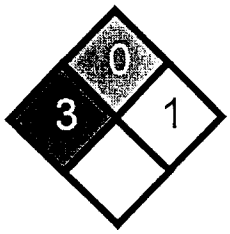
Calcium Hydroxide has been determined as "Generally Recognized As Safe" (GRAS) by FDA. See 21CFR184.1205. (CFR Title 21 Part 184 - - Direct food substances affirmed as generally recognized as safe).

SECTION X - OTHER INFORMATION

Hazardous Materials Identification System (U.S.)



National Fire Protection Association (U.S.)



WHMIS – Classification:

"E" Corrosive Materials.

Symbol:

WHMIS – Classification:

"D2A" and "D2B" Materials causing other toxic effects.

Symbol:

Additional Information/Comments:

The technical data contained herein is given as information only and is believed to be reliable. GRAYMONT makes no guarantee of results and assumes no obligation or liability in connection therewith.

Sources Used:

NFPA, NLA, TDG, CSST, RSST, (LSRO-FASEB), Hazardous Products Act, Environment Canada, Enviroguide, OSHA, ACGIH, IARC, NIOSH, CFR, NTP, HSDB, EPA SRS, Chemistry and Technology of Lime and Limestone (John Wiley and Sons, Inc.), Lime and Limestone (WILEY-VCH).

SECTION XI - PREPARATION INFORMATION

Prepared by:	Telephone number:	Date :
GRAYMONT (QC) INC. **Technical Services**	**(450) 449-2262**	**September 2006**

An electronic version of this MSDS is available at: www.graymont.com under the PRODUCTS section.

Date of Preparation: 20 JAN 2003

Review Date: 21 SEP 2007

Conforms to: O.S.H.A HCS - W.H.M.I.S

MSDS No. 110

1. Product and Company Identification

Manufacturer/Supplier:
AluChem, Inc.
1 Landy Lane
Reading, OH 45215 USA

Telephone: 513-733-8519
Fax: 513-733-3123
Emergency: 800-336-8519

AluChem of Jackson, Inc.
14782 Beaver Pike
Jackson, OH 45640 USA

Telephone: 614-286-2455
Fax: 614-286-2004
Emergency: 800-336-8519

Product Name: MAGNESIUM HYDROXIDE

Other Designations:
All ACMH-95 designations.

2. Composition / Information on Ingredients

CAS No.	Chemical or Component	% by weight
1309-42-8	Magnesium Hydroxide	95-100

Hazard Symbols: None listed.

Risk Phrases: None listed.

3. Hazards Identification

Emergency Overview:
White to off white powder or slurry with no odor. Inhalation of high concentrations of dusts of this substance may cause eye and upper respiratory tract irritation. This material is not flammable and does not support combustion. Primary routes of entry are inhalation, skin contact and eye contact.

Ingestion: May cause mild irritation.
Inhalation: May cause upper respiratory tract irritation.
Eye Contact: May cause mild irritation.
Skin Contact: May cause mild irritation.

Hazard Description
Medical conditions generally aggravated by exposure :
Asthma, chronic lung conditions or diseases and skin rashes.

Toxicological Data: See item 11.

Carcinogenicity: Not listed by IARC or NTP as a carcinogen.

4. First Aid Measures

Ingestion:
Do not induce vomiting. If swallowed, dilute by drinking large amounts of water. Consult a physician or other qualified medical personnel for further information and/or treatment.

Inhalation:
Remove to fresh air. Check for clear airway, breathing and presence of pulse. Provide cardiopulmonary resuscitation for persons without pulse or respirations. Consult a physician or other qualified medical personnel.

Eye Contact:
Flush eyes with ample amounts of water for at least 15 minutes. Consult a physician or other qualified medical personnel.

Skin Contact:
Wash with soap and water for at least 15 minutes. Consult a physician or qualified medical personnel if the condition persists.

5. Fire Fighting Measures

Fire / Explosion Hazards:
This product does not present fire or explosion hazards as supplied.

Extinguishing Media:
As deemed suitable by the environment.

Fire Fighting Equipment:
Respiratory and eye protection required for fire fighting personnel. Full protective equipment (Bunker Gear) and self-contained breathing apparatus (SCBA) should be used for all indoor fires and any significant outdoor fires.

6. Accidental Release Measures

Person-related Safety Precautions:
Avoid contact with skin and eyes.

Cleaning and Collecting Spills:
Vacuum or sweep material and place in a disposal container. Avoid dusting. Ensure adequate ventilation.

7. Handling and Storage

Handling:
Ensure good ventilation in all work areas.
Minimize dusting and dust accumulation.

Storage:
Store in dry, protected storage or in case of slurry product, then in closed and sealed containers.

MATERIAL SAFETY DATA SHEET
Magnesium Hydroxide

Date of Preparation: 20 JAN 2003 MSDS No. 110 Review Date: 21 SEP 2007

8. Exposure Controls and Personal Information

Exposure Guidelines:
1309-42-8 Magnesium Hydroxide

OSHA PEL	15mg/m^3 (total dust)	5 mg/m^3 (respirable fraction)

Respiratory Protection:
Use NIOSH approved respiratory protection in case of insufficient ventilation and where exposure guidelines may be exceeded.

Skin Protection:
Wear suitable gloves and long sleeve shirts to avoid skin irritation or injury.

Eye Protection:
Use of safety glasses with full side shields is always recommended. Where air turbulence may be present, goggles are also recommended.

9. Physical and Chemical Properties

Appearance:
White to off white, granular to fine powder or slurry

Molecular Formula:	$Mg(OH)_2$		
Molecular Weight:	58.32		
Physical State:	Solid	**Odor:**	None
Melting Point:	Decomposes 340°C (650°F)	**Vapor Pressure:**	Not applicable.
Boiling Point:	Not Determined.	**Vapor Density:**	Not applicable.
Flash Point:	Not Applicable.	**Evaporation Rate:**	Not applicable.
Solubility in Water:	Negligible (less than 0.1%)	**Oxidizing Properties:**	Not applicable.
Density:	2.3 g/cm^3	**Lower Flammable Limit:**	None.
Bulk Density:	775 kg/m^3 (48 lb/ft^3)	**Upper Flammable Limit:**	None.
pH - 20°C:	Not determined	**Odor Threshold:**	Not determined.
Autoignition:	Product is not self igniting.	**Partition Coefficient:**	Not applicable.
Danger of Explosion:	None present.		

MATERIAL SAFETY DATA SHEET
Magnesium Hydroxide
Date of Preparation: 20 JAN 2003 MSDS No. 110 Review Date: 21 SEP 2007

10. Stability and Reactivity

Stability: Product is stable when used in accordance with specifications.

Conditions to Avoid: Incompatible materials.

Incompatibilities with Other Materials: Strong acids and anhydrides; heat.

Hazardous Decomposition Products: Steam.

Hazardous Polymerization: Will not occur.

11. Toxicological Information

Acute Toxicity –
Primary Irritant Effect:
On the skin: Irritant to skin and mucous membranes.
On the eyes: Irritating effect.
Sensitization: No sensitizing effects known.

Additional Toxicological Information:

RTECS No.: OM3570000 – Magnesium Hydroxide

12. Ecological Information

General Notes:
Generally, no adverse conditions are anticipated, but may require compliance with governmental restrictions and permitting requirements prior to release.

13. Disposal Considerations

Product -
Recommendation: Collect in containers or covered dumpsters. If reuse or recycling is not possible, material may be disposed of at an industrial landfill, subject to local regulations and restrictions.

Uncleaned packaging -
Recommendation: Disposal must be made according to official regulations.

RCRA Status:
If discarded in its purchased form, this product would not be a hazardous waste either by listing or characteristic nor is it federally (USA) regulated. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal whether a material containing the product or derived from the product should be classified as a hazardous waste (40 CFR 261.20-24 or state equivalent in the USA).

MATERIAL SAFETY DATA SHEET
Magnesium Hydroxide
MSDS No. 110

Date of Preparation: 20 JAN 2003 Review Date: 21 SEP 2007

14. Transport Information

U.S. Department of Transportation (DOT):	Not regulated
U.S. Department of Transportation (DOT) Coast Guard Bulk Hazardous Material:	Listed (Magnesium Hydroxide slurry only)
Canadian TDGR Hazard Class and PIN:	Not regulated
Land Transport ADR/RID (cross-boarder):	Not regulated
Maritime Transport IMDG:	Not regulated
Marine Pollutant:	Not listed
Air transport ICAO-TI and IATA-DGR:	Not regulated
Placards:	Not applicable

15. Regulations

U.S. Federal Regulations:
TSCA Chemical Inventory Status: All components of this product are listed.
CERCLA Reportable Quantity:None.
SARA Title III:
Section 302 Extremely Hazardous Substances: None.
Section 304 Emergency Release Reporting: None.
Section 311/312 Hazardous Categories: None.
Section 313 Toxic Categories: None.
Clean Air Act of 1990 – Title VI: This material does not contain nor was it manufactured using ozone depleting chemicals.

Canadian Regulations:
WHMIS Classification: Not a controlled product.
DSL (Domestic Substance List): All components of this product are listed on the DSL.
NPRI (National Pollutant Release Inventory): Not subject to mandatory reporting requirements.
IDL (Ingredient Disclosure List): All components of this product are listed on the IDL.
Note: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (Canada) and this MSDS contains all the information required by the Controlled Products Regulations (Canada).

European Union Classification: (EINECS 215-170-3)
Warning Symbol: None.
Warning Word: None.
Risk Phrases: None.
Safety Phrases: None.
This product is not subject to identification regulations under EU Directives and the Ordinance on Hazardous Materials (GefStoffV).

USA State Regulations:
California Proposition 65: Not listed.

MATERIAL SAFETY DATA SHEET
Magnesium Hydroxide
MSDS No. 110

Date of Preparation: 20 JAN 2003 Review Date: 21 SEP 2007

16. Other Information

Hazard Ratings -
NFPA® Ratings: Health: **0** Flammability: **0** Reactivity: **0** Special: **0**
HMIS® III Codes : Health: **0** Flammability: **0** Physical Hazard: **0** PPE: *
*Note: PPE (Personal Protective Equipment) designation to be supplied by user depending upon use in their specific situation. HMIS guidelines do not permit this designation to be specified by the manufacturer/supplier – only by the end user.

Department Issuing MSDS:
Technical Services
AluChem, Inc.
1 Landy Lane
Reading, OH 45215 USA
Revision #1 Date: 20 JAN 2003 Supersedes 01 JAN 2002
All sections revised.

MATERIAL SAFETY DATA SHEET

Magnesium Hydroxide

Date of Preparation: 20 JAN 2003 MSDS No. 110 Review Date: 21 SEP 2007

ABBREVIATIONS:

ACGIH	American Conference of Governmental Industrial Hygienists
ADR	European Agreement Concerning the International Carriage of Dangerous Goods by Road
CAS	Chemical Abstract Service
CEPA	Canadian Environmental Protection Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	United States Code of Federal Regulations
CPR	Cardio-pulmonary Resuscitation
DOT	United States Department of Transportation
DSL	Canadian Domestic Substances List
EINECS	European Inventory of Existing Commercial Chemical Substances
EPA	United States Environmental Protection Agency
IDL	Canadian Ingredient Disclosure List
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IATA-DRG	International Air Transport Association – Dangerous Goods Regulations
ICAO	International Civil Aviation Organization
ICAO-TI	International Civil Aviation Organization – Technical Instructions on the Safe Transport of Dangerous Goods by Air
IMDG	International Maritime Dangerous Goods Code
IMO	International Maritime Organization
NDSL	Canadian Non-domestic Substances List
NIOSH	National Institute for Occupational Safety and Health (USA)
NTP	National Toxicology Program (USA)
OEL	Occupational Exposure Limit
OSHA	United States Occupational Health and Safety Administration
PIN	Product Identification Number
PPE	Personal Protective Equipment
RCRA	Resource Conservation and Recovery Act (USA)
RID	European Agreement Concerning the International Carriage of Dangerous Goods by Rail
RTECS	The Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendments and Reauthorization Act (USA)
TDGR	Transportation of Dangerous Goods Regulations
TLV	Threshold Limit Values
TSCA	Toxic Substances Control Act (USA)
TWA	Time Weighted Average

cm = centimeter, ft = feet, g = gram, in = inch, kg = kilogram, lb = pound, ml = milliliter,
> = greater than

ChemTreat, Inc.

MATERIAL SAFETY DATA SHEET

Section 1. Chemical Product and Company Identification

Product Name:	**ChemTreat P-8005L**
Manufacturer's Name:	ChemTreat, Inc.
Emergency Telephone Number:	(800) 424-9300
Address (Corporate Headquarters)	4461 Cox Road, Glen Allen, VA 23060
Telephone Number for Information:	(800) 648-4579
Date of MSDS:	May 24, 2006

Section 2. Composition/Hazardous Ingredients

Component	CAS Registry #	Wt. %
Sodium trithiocarbonate	534-18-9	10 - 30

Section 3. Hazards Identification

Emergency Overview: Clear red colored liquid; mild sulfur odor. Flash Point: 200°F.

Potential Health Effects:

Eyes: Will cause corrosive effects (burns or irreversible damage) to eyes.

Skin: Will cause corrosive effects (burns or irreversible damage) to skin.

Inhalation: Will cause corrosive effects (burns or irreversible damage) to lungs, upper respiratory tract, and nose.

Ingestion: Will cause corrosive effects (burns or irreversible damage) to mouth, throat, and digestive tract.

Chronic Effects/Carcinogenicity: No information on significant long-term effects.

Section 4. First Aid Measures

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention.

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, holding eyelids apart to ensure flushing of entire eye surface. Get medical attention.

Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Thoroughly wash or discard clothing and shoes before reuse.

Ingestion: If swallowed, do NOT induce vomiting. Give victim a glass of water or milk. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

Section 5. Fire Fighting Measures

Flammable Properties: Flash Point = 200°F

Suitable Extinguishing Media: Product is non-flammable as supplied. Use water, foam, carbon dioxide or dry chemical to extinguish fire.
Fire & Explosion Hazards: Product is non-flammable as supplied. Do not depend on ambient air for breathing air supply during fires. Fire may result into release of toxic gases such as oxides of carbon, sulfur and hydrogen sulfide.
Protective Equipment: Wear full protective clothing including a positive-pressure, NIOSH-approved, self-contained breathing apparatus.

Section 6. Accidental Release Measures

Small Spill: Construct temporary dikes of dirt, sand, or any readily available inert material to prevent spreading of the material. Wearing appropriate personal protective equipment, move the leaking container to a containment area or plug the leak. Absorb on inert material, then shovel up and dispose of according to local, state, federal regulations.
Large Spill: Construct temporary dikes of dirt, sand, or any readily available inert material to prevent spreading of the product. Wearing appropriate personal protective equipment, close or cap valves and/or block or plug hole in leaking container and transfer to another container for proper disposal.

Section 7. Handling and Storage

Do not get in eyes, or on skin and clothing. Wash thoroughly after handling. Avoid breathing mists. Do not ingest. Store at ambient temperatures. Keep container securely closed when not in use. Label precautions also apply to empty container. Recondition or dispose of empty containers in accordance with government regulations. For industrial use only.

Section 8. Exposure Controls/Personal Protection

Use protective equipment in accordance with 29 CFR 1910 Subpart I. Local exhaust ventilation should be sufficient to control airborne levels. Wear chemical splash goggles or safety glasses with full-face shield. Wear rubber gloves. Wash them after each use and replace as necessary. If conditions warrant, wear protective clothing such as boots, aprons, and coveralls to prevent skin contact. Maintain eyewash fountain and quick-drench facilities in work area.

Section 9. Physical and Chemical Properties

Appearance: Clear red colored
Boiling Point: ~ 212°F
Evaporation Rate: 1
Freezing Point: 10°F
Melting Point: N/A
Odor: Mild sulfur
pH: ~ 13.5
Physical state: Liquid
Solubility in Water: Complete
Specific Gravity: ~1.22
Vapor Density: N/D
Vapor Pressure: N/D
% VOCs: 0
Flash Point: 200°F

Section 10. Stability and Reactivity

Chemical Stability: Stable at normal temperatures and pressures.
Incompatibility: Mineral acids such as sulfuric, nitric & hydrochloric. Acidification releases flammable toxic gases.

Hazardous Decomposition Products: Thermal decomposition may release gases such as carbon disulfide. Combustion of dry film may release oxides of carbon & sulfur. A release of H2S gas is a result of acidification to some degree.
Hazardous Polymerization: Will not occur

Section 11. Toxicological Information

No information found.

Section 12. Ecological Information

Rainbow trout 96h LC50 = 7.5 mg/l
Daphnia Magna 48h LC50 = 38 mg/l

Section 13. Disposal Considerations

Dispose of as unlisted hazardous waste, characteristic of corrosivity, D002. Dispose of in accordance with local, state, and federal regulations.

Section 14. Transport Information (not meant to be all inclusive)

D.O.T. Shipping Name: Corrosive liquid, basic, inorganic, n.o.s.
Technical Shipping Name: (Sodium trithiocarbonate)
Hazard Class: 8 (corrosive); UN3266; PG III

Section 15. Regulatory Information (*Not meant to be all inclusive – selected regulation represented*)

TSCA Status: All ingredients listed
CERCLA Reportable Quantity: None
SARA Title III:
Section 302 Extremely Hazardous Substances: None
Section 313 Toxic Chemicals: None known
CALIFORNIA PROPOSITION 65: None known.

Section 16. Other Information

HMIS Hazard Rating:
Health: 3 Flammability: 0 Physical Hazard: 0 PPE: X (see note)

Note: PPE rating depends on circumstances of use. See Section 8 for recommended PPE.

SARA Hazard Categories – Section 311/312
Acute – Yes Chronic – No Fire – No Reactive – No Sudden Release – No

Prepared by: ChemTreat Regulatory Affairs

ChemTreat, Inc.

MSDS

MATERIAL SAFETY DATA SHEET

Section 1. Chemical Product and Company Identification

Product Name:	ChemTreat P816E
Product Use:	Water Clarification/Solids Conditioning Agent
Manufacturer's Name:	ChemTreat, Inc.
Emergency Telephone Number:	(800) 424–9300
Address (Corporate Headquarters):	4461 Cox Road Glen Allen, VA 23060
Telephone Number for Information:	(800) 648–4579
Date of MSDS:	April 18, 2008

Section 2. Hazard(s) Identification

Signal Word: **WARNING!**

Hazard Statement(s): May be harmful in contact with skin.
May be harmful if inhaled.
May be harmful if swallowed.

Precautionary Statement(s): No significant health risks are expected from exposures under normal conditions of use.

Section 3. Composition/Hazardous Ingredients

Component	CAS Registry #	Wt.%
Petroleum distillate hydrotreated light	64742–47–8	10–30
Alcohols (C10–16) ethoxylated	68002–97–1	1–5
Alcohols (C12–16) ethoxylated	68551–12–2	1–5

Section 4. First Aid Measures

Inhalation: Remove to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.

Eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

Skin: Wash with plenty of soap and water. Call a poison center or doctor/physician if you feel unwell.

Ingestion: DO NOT INDUCE VOMITING. Rinse mouth. Call a POISON

CENTER or doctor/physician if you feel unwell.

Notes to Physician: N/A

Additional First Aid Remarks: N/A

Section 5. Fire Fighting Measures

Flammability of the Product: Not flammable.

Suitable Extinguishing Media: Use extinguishing media suitable to surrounding fire.

Specific Hazards Arising from the Chemical: Use water spray to keep containers cool.

Protective Equipment: If product is involved in a fire, wear full protective clothing including a positive–pressure, NIOSH approved, self–contained breathing apparatus.

Section 6. Accidental Release Measures

Personal Precautions: Wear a self–contained breathing apparatus and appropriate Personal Protective Equipment (PPE).

Environmental Precautions: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains, and sewers.

Methods for Cleaning up: Contain and recover liquid when possible. Flush spill area with water spray.

Other Statements: None.

Section 7. Handling and Storage

Handling: Wear appropriate Personal Protection Equipment (PPE) when handling this product. Do not get in eyes, or on skin and clothing. Wash thoroughly after handling. Do not ingest. Avoid breathing vapors, mist or dust.
Material is very slippery if spilled.

Storage: Store away from incompatible materials (see Section 10). Store at ambient temperatures. Keep container securely closed when not in use. Label precautions also apply to empty container. Recondition or dispose of empty containers in accordance with government regulations.
For Industrial use only.
Do not store or handle in aluminum, zinc, copper, or their alloys.
Do not store below 50°F.

Do not store above 90°F.

Section 8. Exposure Controls/Personal Protection

Exposure Limits

Component	Source	Exposure Limits
Petroleum distillate hydrotreated light		N/E
Alcohols (C10–16) ethoxylated		N/E
Alcohols (C12–16) ethoxylated		N/E

Carcinogenicity Category

Component	Source	Code	Brief Description
Petroleum distillate hydrotreated light			N/E
Alcohols (C10–16) ethoxylated			N/E
Alcohols (C12–16) ethoxylated			N/E

Engineering Controls: Use only with adequate ventilation. The use of local ventilation is recommended to control emission near the source.

Personal Protection

Eyes: Wear chemical splash goggles or safety glasses with full–face shield. Maintain eyewash fountain in work area.

Skin: Maintain quick–drench facilities in work area.
Wear butyl rubber or neoprene gloves. Wash them after each use and replace as necessary. If conditions warrant, wear protective clothing such as boots, aprons, and coveralls to prevent skin contact.

Respiratory: If misting occurs, use NIOSH approved organic vapor/acid gas dual cartridge respirator with a dust/mist prefilter in accordance with 29 CFR 1910.134.

Section 9. Physical and Chemical Properties

Physical State and Appearance:	Liquid Emulsion, Straw, Cloudy
Specific Gravity:	1.0920
pH:	N/A
Freezing Point:	<–13°F
Flash Point:	>199.4°F
Odor:	Moderate
Melting Point:	N/D
Boiling Point:	>212°F
Solubility in Water:	Dispersible
Evaporation Rate:	N/D
Vapor Density:	N/D
Molecular Weight:	N/D

Viscosity:	2018
Flammable Limits:	N/A
Autoignition Temperature:	N/D
Density:	9.11 lb/ga
Vapor Pressure:	N/D
% VOC	N/D

Section 10. Stability and Reactivity

Chemical Stability: Stable at normal temperatures and pressures.

Incompatibility with Various Substances: Iron, Copper/copper alloys, Aluminum/aluminum alloys

Hazardous Decomposition Products: None known.

Possibility of Hazardous Reactions: None known.

Section 11. Toxicological Information

Chemical Name	Exposure	Type of Effect	Concentration	Species
ChemTreat P816E	Oral	LD50	>5000 mg/kg	Rat
	Inhalation	LC50	>20 mg/l	Rat
	Dermal	LD50	>2000 mg/kg	Rabbit

Comments: None.

Section 12. Ecological Information

Species	Duration	Type of Effect	Test Results
N/D			

Comments: Not tested.

Section 13. Disposal Considerations

Dispose of in accordance with local, state and federal regulations.
Not a RCRA–regulated hazardous waste when disposed in the original product form.

Section 14. Transport Information

DOT Classification

DOT Name:	COMPOUND, INDUSTRIAL WATER TREATMENT, LIQUID
Technical Name:	N/A
Hazard Class:	Not D.O.T. Regulated.
UN/NA#:	N/A
Packing Group:	N/A

Section 15. Regulatory Information

Inventory Status

United States (TSCA):	All ingredients listed.
Canada (DSL/NDSL):	All ingredients listed.

Federal Regulations

SARA Title III Rules

Sections 311/312 Hazard Classes

Fire Hazard:	No
Reactive Hazard:	No
Release of Pressure:	No
Acute Health Hazard:	Yes
Chronic Health Hazard:	No

Other Sections

Component	Section 313 Toxic Chemical	Section 302 EHS TPQ	CERCLA RQ
Petroleum distillate hydrotreated light	N/A	N/A	N/A
Alcohols (C10–16) ethoxylated	N/A	N/A	N/A
Alcohols (C12–16) ethoxylated	N/A	N/A	N/A

State Regulations

California Proposition 65: This product contains chemical(s) known to the State of California to cause cancer and/or to cause birth defects or other reproductive harm.

Special Regulations

Component	States
Petroleum distillate hydrotreated light	None
Alcohols (C10–16) ethoxylated	None
Alcohols (C12–16) ethoxylated	None

International Regulations

Canada

WHMIS Classification: N/A

Controlled Product Regulations (CPR): N/A

Section 16. Other Information

HMIS Hazard Rating

Health: 2
Flammability: 1
Physical Hazard: 0
PPE: X

Notes: The PPE rating depends on circumstances of use. See Section 8 for recommended PPE.
The Hazardous Material Information System (HMIS) is a voluntary, subjective alpha–numeric symbolic system for recommending hazard risk and personal protection equipment information. It is a subjective rating system based on the evaluator's understanding of the chemical associated risks. The end–user must determine if the code is appropriate for their use.

NSF: N/A

FDA: N/A

KOSHER: This product is certified by the Orthodox Union as kosher pareve.

FIFRA: N/A

Other: None

Abbreviations

Abbreviation	Definition
<	Less Than
>	Greater Than
ACGIH	American Conference of Governmental Industrial Hygienists
EHS	Environmental Health and Safety Dept
N/A	Not Applicable
N/D	Not Determined
N/E	Not Established
OSHA	Occupational Health and Safety Dept
PEL	Personal Exposure Limit
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TWA	Time Weight Average
UNK	Unknown

Prepared by: Regulatory Affairs Department

Disclaimer

Although the information and recommendations set forth herein (hereinafter "information") are presented in good faith and believed to be correct as of the date hereof, ChemTreat, Inc. makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will ChemTreat, Inc. be responsible for damages of any nature whatsoever resulting from the use or reliance upon information. No representation or warranties, either expressed or implied, of merchantability, fitness for a particular purpose, or of any other nature are made hereunder with respect to information or the product to which information refers.

MATERIAL SAFETY DATA SHEET

Section 1. Chemical Product and Company Identification

Product Name:	ChemTreat P891L
Product Use:	Water Clarification Agent
Manufacturer's Name:	ChemTreat, Inc.
Emergency Telephone Number:	(800) 424–9300
Address (Corporate Headquarters):	4461 Cox Road Glen Allen, VA 23060
Telephone Number for Information:	(800) 648–4579
Date of MSDS:	May 2, 2008

Section 2. Hazard(s) Identification

Signal Word: WARNING!

Hazard Statement(s): May be harmful in contact with skin.
May be harmful if inhaled.
May be harmful if swallowed.

Precautionary Statement(s): No significant health risks are expected from exposures under normal conditions of use.

Section 3. Composition/Hazardous Ingredients

Component	CAS Registry #	Wt.%
Aluminum chlorohydrate	12042–91–0	30–60

Section 4. First Aid Measures

Inhalation: Remove to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.

Eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

Skin: Wash with plenty of soap and water. Call a poison center or doctor/physician if you feel unwell.

Ingestion: DO NOT INDUCE VOMITING. Rinse mouth. Call a POISON CENTER or doctor/physician if you feel unwell.

Notes to Physician: N/A

Additional First Aid Remarks: N/A

Section 5. Fire Fighting Measures

Flammability of the Product: Not flammable.

Suitable Extinguishing Media: Use extinguishing media suitable to surrounding fire.

Specific Hazards Arising from the Chemical: None known.

Protective Equipment: If product is involved in a fire, wear full protective clothing including a positive–pressure, NIOSH approved, self–contained breathing apparatus.

Section 6. Accidental Release Measures

Personal Precautions: Use appropriate Personal Protective Equipment (PPE).

Environmental Precautions: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains, and sewers.

Methods for Cleaning up: Contain and recover liquid when possible. Flush spill area with water spray.

Other Statements: None.

Section 7. Handling and Storage

Handling: Wear appropriate Personal Protection Equipment (PPE) when handling this product. Do not get in eyes, or on skin and clothing. Wash thoroughly after handling. Do not ingest. Avoid breathing vapors, mist or dust.

Storage: Store away from incompatible materials (see Section 10). Store at ambient temperatures. Keep container securely closed when not in use. Label precautions also apply to empty container. Recondition or dispose of empty containers in accordance with government regulations.
For Industrial use only.
Protect from heat and sources of ignition.
Store in corrosive resistant container with a resistant inliner.

ChemTreat, Inc.

MSDS

Section 8. Exposure Controls/Personal Protection

Exposure Limits

Component	Source	Exposure Limits
Aluminum chlorohydrate		N/E

Carcinogenicity Category

Component	Source	Code	Brief Description
Aluminum chlorohydrate			N/E

Engineering Controls: Use only with adequate ventilation. The use of local ventilation is recommended to control emission near the source.

Personal Protection

Eyes: Wear chemical splash goggles or safety glasses with full–face shield. Maintain eyewash fountain in work area.

Skin: Maintain quick–drench facilities in work area.
Wear butyl rubber or neoprene gloves. Wash them after each use and replace as necessary. If conditions warrant, wear protective clothing such as boots, aprons, and coveralls to prevent skin contact.

Respiratory: If misting occurs, use NIOSH approved organic vapor/acid gas dual cartridge respirator with a dust/mist prefilter in accordance with 29 CFR 1910.134.

Section 9. Physical and Chemical Properties

Physical State and Appearance:	Liquid, Colorless, Clear
Specific Gravity:	1.3350
pH:	3.7
Freezing Point:	27°F
Flash Point:	N/D
Odor:	Mild
Melting Point:	N/A
Boiling Point:	212°F
Solubility in Water:	Complete
Evaporation Rate:	N/D
Vapor Density:	N/D
Molecular Weight:	N/D
Viscosity:	N/A
Flammable Limits:	N/A
Autoignition Temperature:	N/A
Density:	11.13 lb/ga
Vapor Pressure:	N/D
% VOC	0

Section 10. Stability and Reactivity

Chemical Stability: Stable at normal temperatures and pressures.

Incompatibility with Various Substances: Strong oxidizers, Strong bases

Hazardous Decomposition Products: Hydrochloric acid

Possibility of Hazardous Reactions: None known.

Section 11. Toxicological Information

Chemical Name	Exposure	Type of Effect	Concentration	Species
N/D				

Comments: None.

Section 12. Ecological Information

Species	Duration	Type of Effect	Test Results
Fathead Minnow	96h	LC50	>1000 mg/l
Ceriodaphnia dubia	48h	LC50	>2000 mg/l

Comments: None.

Section 13. Disposal Considerations

Dispose of in accordance with local, state and federal regulations.

Section 14. Transport Information

DOT Classification

DOT Name: COMPOUND, INDUSTRIAL WATER TREATMENT, LIQUID
Technical Name: N/A
Hazard Class: Not D.O.T. Regulated.
UN/NA#: N/A
Packing Group: N/A

Section 15. Regulatory Information

Inventory Status

United States (TSCA):	All ingredients listed.
Canada (DSL/NDSL):	All ingredients listed.

Federal Regulations

SARA Title III Rules

Sections 311/312 Hazard Classes

Fire Hazard:	No
Reactive Hazard:	No
Release of Pressure:	No
Acute Health Hazard:	Yes
Chronic Health Hazard:	No

Other Sections

Component	Section 313 Toxic Chemical	Section 302 EHS TPQ	CERCLA RQ
Aluminum chlorohydrate	N/A	N/A	N/A

State Regulations

California Proposition 65: None known.

Special Regulations

Component	States
Aluminum chlorohydrate	None

International Regulations

Canada

WHMIS Classification:	N/A
Controlled Product Regulations (CPR):	N/A

Section 16. Other Information

HMIS Hazard Rating

Health:	1
Flammability:	0
Physical Hazard:	0
PPE:	X
Notes:	The PPE rating depends on circumstances of use. See Section 8 for recommended PPE. The Hazardous Material Information System (HMIS) is a voluntary, subjective alpha–numeric symbolic system for recommending hazard risk and personal protection equipment information. It is a subjective rating system based on the evaluator's understanding of the chemical associated risks. The end–user must determine if the code is appropriate for their use.
NSF:	Certified to NSF/ANSI Standard 60 Maximum use rate for potable water – 250 mg/L
FDA:	N/A
KOSHER:	This product has not been evaluated for Kosher approval.
FIFRA:	N/A
Other:	None

Abbreviations

Abbreviation	Definition
<	Less Than
>	Greater Than
ACGIH	American Conference of Governmental Industrial Hygienists
EHS	Environmental Health and Safety Dept
N/A	Not Applicable
N/D	Not Determined
N/E	Not Established
OSHA	Occupational Health and Safety Dept
PEL	Personal Exposure Limit
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TWA	Time Weight Average
UNK	Unknown

Prepared by: Regulatory Affairs Department

ChemTreat, Inc.

MSDS

Disclaimer

Although the information and recommendations set forth herein (hereinafter "information") are presented in good faith and believed to be correct as of the date hereof, ChemTreat, Inc. makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will ChemTreat, Inc. be responsible for damages of any nature whatsoever resulting from the use or reliance upon information. No representation or warranties, either expressed or implied, of merchantability, fitness for a particular purpose, or of any other nature are made hereunder with respect to information or the product to which information refers.

APPENDIX E

Preparedness, Prevention, and Contingency (PPC) Plan

PREPAREDNESS, PREVENTION AND CONTINGENCY (PPC) PLAN
WATER TREATMENT FACILITY

Rex Energy Corporation
1975 Waddle Road
State College, Pennsylvania

Prepared for:

Rex Energy Corporation
1975 Waddle Road
State College, Pennsylvania 16803

By:

ARM Group Inc.
1631 South Atherton Street
Suite 101
State College, PA 16801

July 15, 2008

ARM Project 08165

Table of Contents

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 Purpose

The primary objective of this Plan, which has been prepared for the proposed treatment facility of Central Pennsylvania Water Treatment, LLC (CPWT), is to prevent spills and unauthorized releases through contingency planning as well as contain spills and releases should they occur. These procedures will prevent the discharge of chemicals, petroleum products, and/or other materials into or upon the navigable waters of the United States. This Contingency Plan addresses potential issues associated with construction of the facility as well as issues associated with operation of the treatment facility.

1.2 Location

The treatment facility will be located south of McKinney Road approximately 1.0 mile east of the intersection with McElhattan Drive in Wayne Township, Clinton County on a 20-acre parcel. The location of the treatment facility relative to the surrounding areas is shown in Figure 1, which is taken from the following United States Geological Survey (USGS) Lock Haven Quadrangle.

1.3 Plan Preparation Requirements

This Contingency Plan has been prepared in accordance with the requirements of the following regulatory program:

- Preparedness, Prevention and Contingency (PPC) Planning - Guidelines for the Development and Implementation of Environmental Emergency Response Plans (Pennsylvania Department of Environmental Protection [PADEP]).

Sections 1.0 through 6.0 of this Contingency Plan present the PPC Plan for the proposed treatment facility.

2.0 DESCRIPTION OF THE TREATMENT FACILITY

2.1 Description of the Industrial and Commercial Activity

The development and operation of natural gas production wells in the Marcellus Shale formation located in central Pennsylvania, specifically in Clinton and Lycoming Counties, will result in the generation of fracturing (flow back) and produced waters containing brine. CPWT intends to construct a facility in central Pennsylvania to treat this wastewater. A schematic flow diagram of possible treatment processes is illustrated in Figure 2. The proposed treatment facility may contain the following elements:

- five 600,000 gallon storage/equalization tanks for incoming wastewater;
- recovered oil tank;
- oxidation tank(s);
- pH adjustment & feed tank;
- flash mixing flocculation tank;
- inclined plate clarifier tank;
- rapid sand filter (if required); and
- three 500,000 gallon treated water storage tanks.

Construction of the treatment facility will begin as soon as permits are obtained. The proposed facility will discharge treated water to the West Branch of the Susquehanna River. The sludge will be transported to a permitted landfill for disposal.

2.2 Emergency Response Plans

This PPC Plan is the initial Plan prepared for CPWT facility, and will be modified following construction of the facility to reflect as-built conditions.

2.3 Material Inventory

Chemical and Petroleum Materials utilized or "stored" at the facility may include water treatment polymers, hydrogen peroxide, calcium hydroxide, and magnesium hydroxide. There may also be storage tanks for heating oil and diesel fuel and possibly an oil-filled transformer.

Ancillary construction, servicing and maintenance operations performed at the facility may also utilize liquid materials including other miscellaneous oils and chemicals. However, quantities of such materials should be minor and it is unlikely that such chemicals or oil would impact the environment or endanger public health and safety if accidentally released.

Oil in the form of gasoline, diesel fuel, antifreeze, motor oil, and hydraulic oil will be contained in mobile equipment.

2.4 Pollution Incident History

There is no pollution incident history as this will be a new facility.

2.5 Implementation Schedule for Plan Elements Not Currently in Place

Elements contained in the plan will be implemented during and after the facility is constructed.

3.0 DESCRIPTION OF PLAN IMPLEMENTATION BY CPWT

3.1 CPWT Personnel Responsible for Implementation

During construction of the facility, the Construction Superintendent shall have responsibility for implementation of the Plan. Management support and commitment is provided by CPWT, as evidenced by the attached Commitment of Manpower, Equipment and Materials (Appendix A).

Upon completion of construction activities, the Site Supervisor shall have responsibility for implementation of the Plan. Management support and commitment is provided by CPWT, as evidenced by the attached Commitment of Manpower, Equipment and Materials (Appendix A).

3.2 List of Emergency Response Coordinators

Emergency Response Coordinators (ERCs) for the facility will be established prior to construction and operation. Contact information will be provided as indicated below for any response activities:

ERC	Cell Phone	Home Phone
Construction Superintendent	To be Determined	To be Determined
Site Supervisor	To be Determined	To be Determined
Vice President of Land Administration	800-430-0295	

Each of the persons listed in the table will be familiar with the Plan, treatment facility, and operations that include the location and characteristics of the various chemicals and materials stored at the facility and the location of emergency response equipment and supplies. The ERCs will know the reporting obligations of CPWT in the event of a spill or release and have all necessary telephone numbers for reporting and summoning emergency services and outside spill response contractors. The ERCs are authorized to commit the necessary resources to carry out the provisions of this Plan in the event of a leak, spill, or other release which threatens the environment or human health and safety.

3.3 Duties and Responsibilities of the Emergency Response Coordinators

During an emergency, the ERC on the scene will direct all response efforts taken by the facility. The ERC will also act to facilitate actions that may be taken by or ordered by police, fire, or other emergency response personnel.

In the event of a spill of chemical or petroleum product, the employee first becoming aware of the spill will assume the roll of temporary spill coordinator until that person can notify the ERC. If the temporary spill coordinator is unable to notify the ERC, then he/she will assume the responsibility of implementing the emergency spill response procedures provided that he/she has been trained on the means of protecting the health and safety of spill response personnel and on the implementation of this Plan.

Upon becoming aware that an emergency situation has developed or may develop, the ERC will complete the following:

- Make a preliminary evaluation of the seriousness of the situation. In the case of a material spill, he/she will determine the hazard potential of a spill by determining at least the following factors:

  i.) The amount of material spilled;

  ii.) The extent of spreading;

  iii) Whether effective containment exists; and

  iv.) The source of the leakage/spill.

- Determine if a shutdown is required and order one if necessary.

- Determine if the facility must be evacuated and order if necessary.

- Summon the necessary people and deploy them to combat the emergency if appropriate.

- If the coordinator determines that emergency response services (fire, police, ambulance, etc.) must be summoned, he/ she will do so.

- If there has been a release of a reportable quantity of a substance, the PADEP and the National Response Center will be notified per procedures in Section 6.0.

During the emergency, the ERC will make periodic reevaluations of the situation. All steps consistent with employee safety will be taken to secure those portions of the facility that are not involved in the emergency and to contain, control, and correct the emergency situation.

After the emergency situation has been eliminated, the ERC will be responsible for ensuring that the site is cleaned up and for arranging for the proper disposal of any residue from the incident. The ERC will also prepare any post-incident reports that may be necessary.

3.4 Chain of Command

The ERC will determine the chain of command and notify the appropriate CPWT personnel.

4.0 SPILL LEAK RESPONSE

4.1 Pre-Release Planning

Spills or leaks may occur from the storage or process tanks, from handling or transferring operations, and during construction and maintenance activities.

Areas with a potential for spills or leaks have been analyzed, and prevention practices developed. In the following section, these areas are summarized, along with the nature of the potential spill or leak, and the prevention practices that have been developed and will be employed to deal with these potentials.

Storage Tanks

Potential - Spills or leaks from the storage tanks could occur due to rupture of the tank, act of nature, or being struck by mobile equipment.

Gallons potentially spilled:	Maximum 600,000 gallons.
Rate of flow:	1 to several gallons per minute.
Direction:	Any spills or leaks would most likely be contained in secondary containment. However, if secondary containment was breached, any spills or leaks would flow south toward the West Branch of the Susquehanna.

Prevention - To detect any potential problems with the outer walls of the tanks, regular visual inspections will be conducted.

Containment - The storage tanks will have secondary containment capable of containing 110 percent of the volume of brine water in the tank.

Process Tanks

Potential - Spills or leaks of treatment chemicals or wastewater being treated could occur due to rupture of the wall of the process tank or being struck by mobile equipment.

Gallons potentially spilled:	Maximum 250,000 gallons
Rate of flow:	1 to several gallons per minute.

Direction: Likely contained in immediate area of rupture or leak.

Prevention - To detect any potential problems with the outer walls of the process tanks, regular visual inspections will be conducted. Tanks will be protected to prevent contact by mobile equipment.

Containment - Process tanks will be located within a building. Potential spills will be contained within the building.

Mobile Equipment Fueling

Potential - Spills could result due to rupture of delivery hose or overfilling of the vehicle fuel tanks of construction vehicles.

Gallons potentially spilled: Maximum 50 gallons

Rate of flow: 1 to several gallons per minute.

Direction: Likely contained in immediate area of spill or leak.

Prevention - Employees will be present during fueling operations of mobile equipment to insure proper procedures are followed and adequate precautions are taken during the fueling operations.

The employee will be required to stay with the vehicle during fueling and to monitor the dispensing operation, and to immediately turn off the delivery pump if there is a rupture or leak in the delivery hose.

Containment - Any leaks or spills from the delivery hose will be contained with absorbent material.

Vehicle Fuel and Hydraulic Tanks

Potential - Spills could result if there was a rupture of the wall of vehicle fuel tanks.

Gallons potentially spilled: Maximum 100 gallons.

Rate of flow: 1 to several gallons per minute.

Direction: Likely contained in immediate area of rupture or leak.

Prevention - To detect any potential problems with the outer walls of the tanks, inspection of fuel tanks will be included as part of routine visual inspections conducted on equipment.

Containment - Any leaks or spills from the vehicle fuel tanks will be contained with absorbent material, or containers, if sufficient space exists to place the containers under the leaking tank.

Miscellaneous Material Handling Operations

Potential - Spills and leaks of material may also occur throughout the facility during routine handling and transfer operations. These spills could occur during handling of drums or small containers, transferring of chemicals between storage tanks and process tanks.

Gallons potentially spilled:	Maximum 55 gallons.
Rate of flow:	1 to several gallons per minute.
Direction:	Likely contained in immediate area of transfer or storage container.

Prevention - Transfer lines, pumps, drums and storage containers will be inspected on a regular basis to detect any potential problems. Employees will be trained in proper dispensing techniques, and procedures for handling chemicals and oils. Transfer lines, pumps, drums, and storage containers will be located away from stormwater drainage pathways.

Containment - Spills or leaks from material handling operations will be collected and contained using absorbent pads, oil dry, or by other appropriate means. Spills and leaks as a result of these activities are not likely to be of significant volume or duration and, therefore, should not impact facility personnel or operations beyond the immediate point of release. Spills and leaks of this nature will generally be limited to 55 gallons.

Disposal of Spill Related Materials

Residual material that is generated as a result of cleanup actions will be containerized and transferred off site for disposal.

4.2 Material Compatibility

The containers and material transfer equipment used at the facility will be compatible with the liquid materials being stored or transferred.

Some of the petroleum materials used at the facility may be flammable. CPWT will take precautions to keep storage areas in which these materials are handled or stored free of combustion and ignition sources.

4.3 Inspection and Monitoring Program

Storage tanks, process tanks, transfer lines, and other storage containers will be inspected on a

monthly basis. The inspection will consist of a detailed examination of the equipment and where applicable associated containment structures. These facilities will be examined for signs of mechanical damage, corrosion, erosion, leakage, wear, or other conditions that might result in or contribute to a leak or spill. Maintenance and replacement requirements will be established based on this monthly inspection and will be performed on an as-needed basis. Inspection records will be maintained for 3 years. A copy of the blank monthly inspection report form is contained in Appendix B.

Water collected in the containment structures will be observed prior to dewatering to insure that there is no petroleum material present in the water. Absorbent materials will be used to collect any petroleum materials observed prior to dewatering. When water is discharged, the incident will be recorded on the inspection form.

4.4 Preventive Maintenance

Storage Tanks, Process Tanks, and Transfer Equipment

Items of concern to this plan relative to preventative maintenance include the integrity of storage and process tanks and associated transfer equipment. No regular maintenance is required with respect to the storage component. Repairs will be made on an as-needed basis. A preventative maintenance schedule will be developed for transfer pumps.

Secondary Containment Structures

Maintenance of containment structures will consist primarily of repairing structural damage due to exposure to the elements and excessive wear. Any physical deterioration that is noted in the monthly inspections will be reported. Once the problem has been reported, repair work will be initiated and completed in a timely manner in order to reduce the potential for spills or leaks.

4.5 Housekeeping Program

Good housekeeping will involve the maintenance of open and unobstructed access around treatment and process tanks and associated transfer equipment. This will be done to ensure ready access for inspection and maintenance.

4.6 Security

The treatment facility will be located within a fenced area to prevent unauthorized access.

4.7 External Factor Planning

External factors will have little, if any, effect on the treatment facility. Outside storage tanks will be designed to withstand external forces.

4.8 Employee Training Program

Employees will be trained annually on the PPC Plan and/or associated contingency procedures.

5.0 COUNTERMEASURES

5.1 Countermeasures to be Undertaken by CPWT

As described in Section 4.0, spills or leaks may occur from storage and process tanks, transfer equipment, or other containers. Quantities of potential leaks will be extremely variable depending upon the cause and storage container involved. Spills or leaks from these operations will generally be limited to 55 gallons and should not migrate beyond the immediate area of the spill. This type of spill constitutes a Non-Emergency Spill (i.e., a spill that's controllable with no threat of entering the soil or water).

As a result, the first person on scene has the following responsibilities:

- Secure the source of the spill, if applicable.
- Quickly retrieve absorbent material(s) and contain the spill.
- Once the flow is restricted, clean up the remaining spill with absorbent material.
- Promptly remove spent absorbent materials and dispose of them properly in a designated container.
- Inform the Emergency Response Coordinator.

For a catastrophic tank failure to result in a major release, simultaneous failure of both a storage tank and the secondary containment would be required. Such a simultaneous failure is extremely unlikely. In the event of this type of Emergency Spill (i.e., uncontrollable and has reached or could reach soil and/or water) the following procedure will be executed:

- The first person on scene will assume the following responsibilities:
    - Secure the area, equipment, and personnel from injury or further damage.
    - Notify the Emergency Response Coordinator and/or other trained facility personnel.
    - Determine the following:
        - Exact source of the spill
        - Identity of material

- Amount spilled
- Direction of flow and extent of spreading.

- Upon arrival, the Emergence Response Coordinator will assume the following responsibilities:
    - Immediately ascertain the direct and indirect affects that the incident will have upon human health and the environment. Notify the agencies listed in Section 6.4 based on the criteria listed in Section 6.3.
    - Determine if facility personnel are capable of responding to the spill. Deploy personnel for response supplying personnel protective equipment and spill response equipment, as required. If outside assistance from contractors or fire department is necessary, contact immediately.
    - Contain the spill.
    - Stop the source of the spill and take reasonable precautions to prevent further spills or fires or explosions.
    - Monitor operations if they are interrupted due to the incident.
    - Clean up the spill. The spilled material and absorbent material should be placed in a designated container.
    - Coordinate efforts to provide for treating, storing, or disposing of residues, contaminated soil, etc.
    - Ensure that all emergency equipment is maintained and decontaminated properly.
    - Promptly submit required follow up reports to regulatory agencies.

5.2 Countermeasures to be Undertaken by Contractors

The following contractors are generally available on notice to respond to potential emergencies at facilities:

Petroclean North
501 Public Way
Warren, PA 16365
Telephone: (814) 726-1751

Weaverton Environmental Group
206 Weaverton Road
Canonsburg, PA 15317
Telephone: (724) 746-4850

Additional emergency response equipment and supplies may be obtained from the following organization:

Action Supply Products Inc.
Box 200, 107 Montour West Industrial Park
Imperial, PA 15126
Telephone: (724) 695-2721 or (800) 783-2721

The telephone numbers listed above are staffed 24 hours a day.

5.3 Internal and External Communications

Cell phones will be used for both internal and external communications and notifications in the event of an emergency.

5.4 Evacuation Plan for Installation Personnel

In the event of an emergency, the ERC will evaluate the circumstances and order personnel to evacuate if there is an obvious danger such as fire. If no danger is apparent, the ERC will order personnel in the area to await orders and take steps to secure the immediate area.

5.5 Emergency Equipment Available for Response

The following emergency equipment and supplies will be maintained at the site:

EMERGENCY EQUIPMENT	LOCATION
Absorbent Pads	Treatment Building
Chemical-Resistant Gloves	Treatment Building
Impervious Coveralls	Treatment Building
Shovels	Treatment Building
Fire-Extinguishers	Treatment Building
Oil Dry	Treatment Building

6.0 NOTIFICATION REQUIREMENTS

6.1 Internal Notifications

It will be the responsibility of each employee to report releases or threatened releases of oil or chemicals. When an employee observes a release or a condition which the employee believes may result in a release, the employee will immediately notify the ERC listed in Section 3.2 and give all known information for emergency response. Once the ERC is on scene, he/she will follow the procedure listed in Section 5.1.

To the extent possible, the ERC shall develop a contemporary record of all significant emergency events and the actions taken in response.

6.2 External Notifications

All releases which occur at the facility will be evaluated by the ERC or his/her designee, to determine if the release must be reported under Federal and State oil pollution guidelines. This evaluation will be conducted according to the requirements of:

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations (40 CFR 320)
- The Emergency Planning and Community Right-To-Know Act (EPCRA) regulations (40 CFR 355, 370, 372)
- USEPA Regulations on Oil Pollution Prevention (40 CFR 112)
- Oil Pollution Act of 1990 (OPA 90)
- Pennsylvania Storage Tank and Spill Prevention Act
- Other applicable Federal and State regulations.

6.3 Notification Criteria

Notification criteria are listed below. If the listed notification criteria are met, one of the ERCs will notify the entities listed in Section 6.4.

Oil

Any release of oil that enters a water course must be reported to the National Response Center (NRC), PADEP, PA Fish and Boat Commission, at a minimum. If outside assistance is required, the Local Emergency Planning Commission (LEPC) and State Emergency Response Commission (SERC) need to be notified. The PADEP must be notified of any oil release greater than 25 gallons, regardless of whether it reaches a water course.

Hydrogen peroxide

The NRC and PADEP must be notified if more than 1,000 pounds or 100 gallons of hydrogen peroxide with a concentration greater than 52 percent is released.

6.4 Local Emergency Response Agencies

National Response Center	**(800) 424-8802**
Pennsylvania Department of Environmental Protection (North Central Regional Office)	**(570) 327-3636 or (570) 327-3696 (after hours)**
Pennsylvania Fish & Boat Commission	**(814) 359-5250**
Clinton County Emergency Management Agency (If external assistance is required)	**(570) 893-4090**
Pennsylvania Emergency Management Agency (If external assistance is required)	**(800) 424-7362**

The following information should be provided in the notification report:

- Name of the person reporting the incident.
- Name and location of the installation.
- Phone number where the person reporting the spill may be reached.
- Date, time and location of the incident.
- A brief description of the incident, nature of the material or wastes involved, extent of any injuries, and possible hazards to human health or the environment.

- The estimated quantity of the materials or wastes spilled.
- The extent of contamination of land, water or air, if known.

6.5 Local Hospitals

Emergency Services in Lycoming County can be reached by dialing:

911

This number can be used to contact police, ambulance, and fire services.

Local hospitals in the area include the following:

Jersey Shore Hospital	**(570) 398-0100**
Susquehanna Health	**(570) 321-1000**

6.6 Follow-up Reports

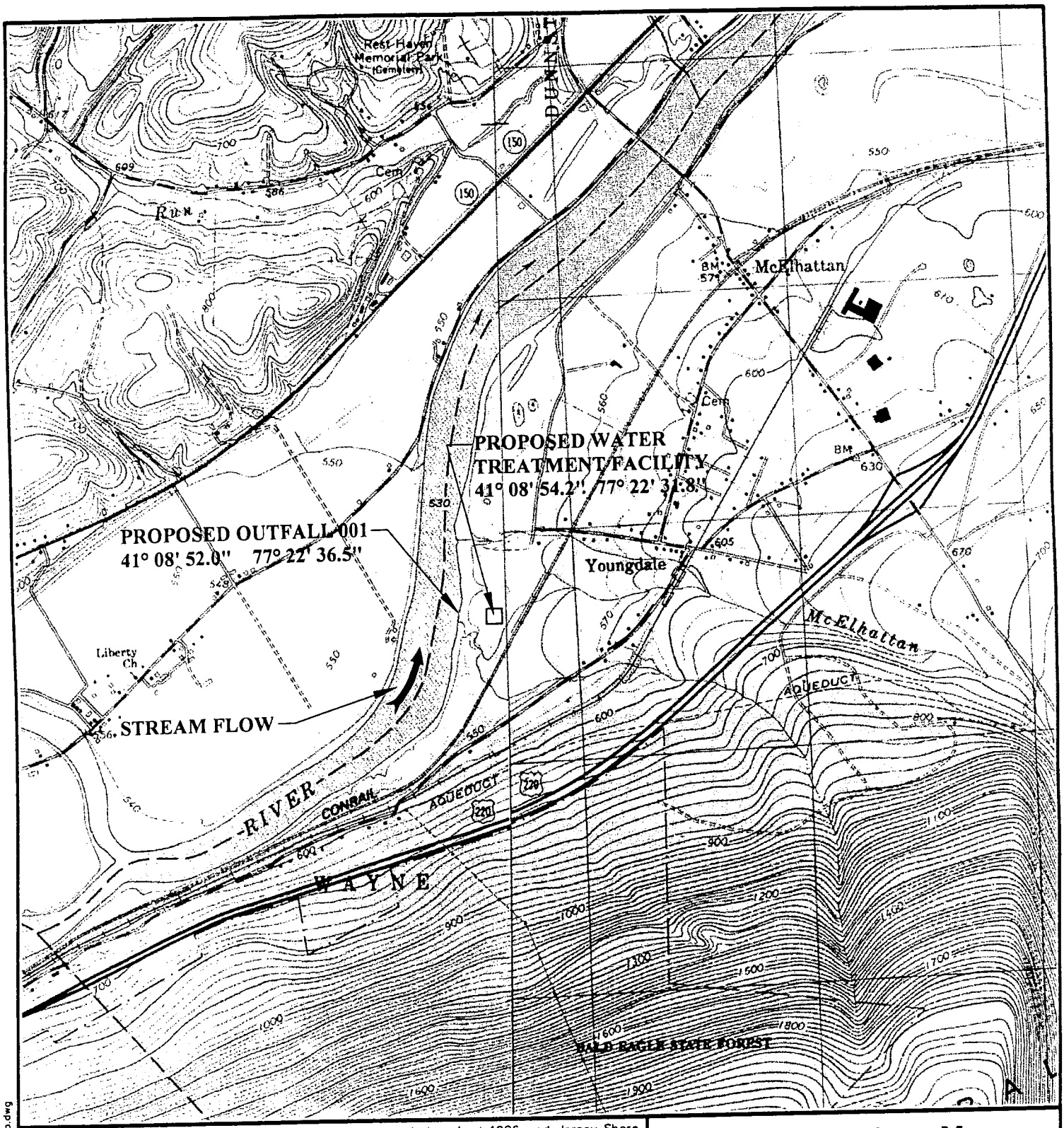
Within 15 days after the notification report, a follow-up report must be submitted to the PADEP and the Local Emergency Management Agency. This report is to be submitted by the ERC. The report shall include the following:

- Name, address and telephone number of the individual filing the report.
- Name, address, telephone number of the facility.
- Date, time and location of incident.
- A brief description of the cause of the incident.
- Estimated quantities, by weight or volume, or materials involved.
- An assessment of any contamination of land, water or air that occurred due to the incident.
- The estimated quantity and disposition of recovered materials that resulted from the incident.
- A description of actions the facility intends to take to prevent a similar occurrence in the future.

The ERC is responsible for maintaining records of spill events, for determining whether an event is reportable, and whether notification requirements have been triggered.

Figure 1

Site Location Map



Base map from Lock Haven USGS 7½ minute quadrangle photorevised 1986 and Jersey Shore USGS 7½ minute quadrangle dated 1994.

Site Location Map

Central Pennsylvania
Water Treatment, LLC
Wayne Township, Clinton County, Pa.

July 2008	Scale: 1" = 2000'	08165

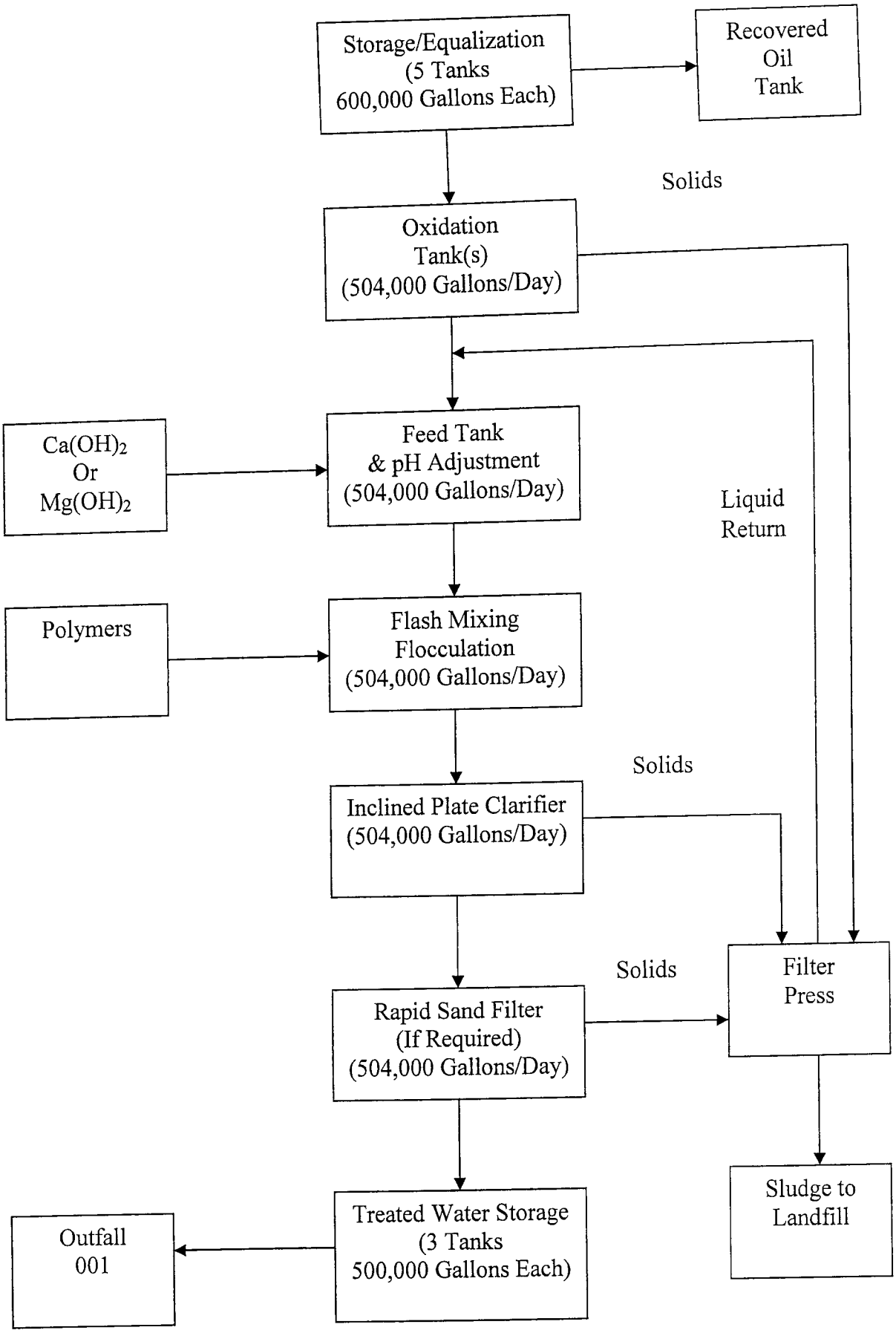
ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797

Figure 1

U:\08165 Re... ...rgy Water Treatment\...Dwg\sitemap.dwg

Figure 2

Schematic Flow Diagram


Storage/Equalization
(5 Tanks
600,000 Gallons Each)
Recovered
Oil
Tank
Solids
Oxidation
Tank(s)
(504,000 Gallons/Day)
Ca(OH)2
Or
Mg(OH)2
Feed Tank
& pH Adjustment
(504,000 Gallons/Day)
Liquid
Return
Polymers
Flash Mixing
Flocculation
(504,000 Gallons/Day)
Solids
Inclined Plate Clarifier
(504,000 Gallons/Day)
Solids
Filter
Press
Rapid Sand Filter
(If Required)
(504,000 Gallons/Day)
Sludge to
Landfill
Outfall
001
Treated Water Storage
(3 Tanks
500,000 Gallons Each)

Appendix A

Commitment of Manpower, Equipment and Materials

CENTRAL PENNSYLVANIA WATER TREATMENT, LLC

Commitment of Manpower, Equipment and Materials

MANAGEMENT APPROVAL: The Preparedness, Prevention and Contingency Plan described herein has been approved, and it is the policy of this facility to expend all available manpower, equipment and materials required to expeditiously control and remove any harmful quantity of chemicals or oil discharged from this facility.

Facility Manager: _____

Signature: _____

Date: _____

Appendix B

Inspection Form

TANK OR STORAGE AREA INSPECTION FORM

Central Pennsylvania Water Treatment

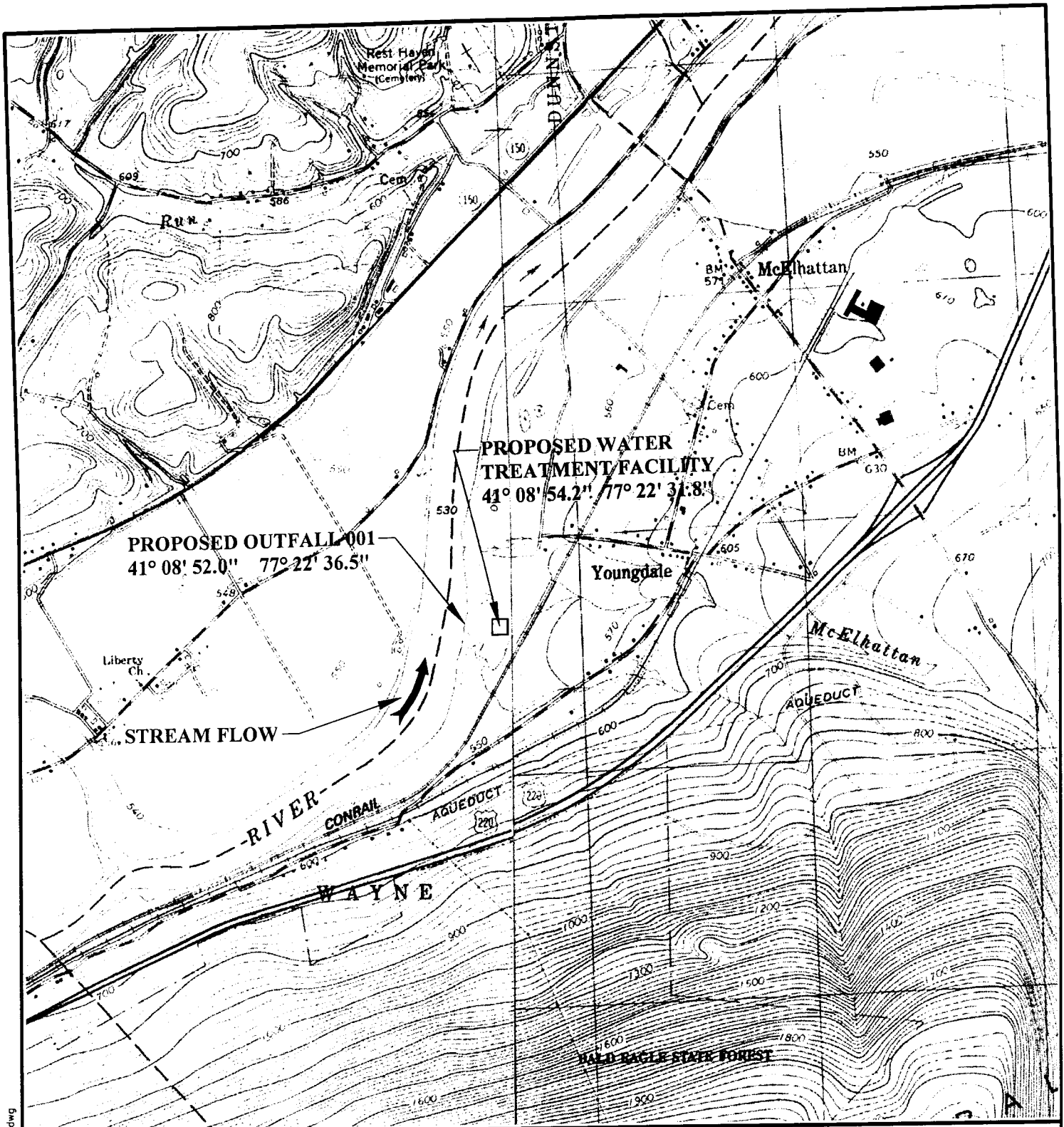
Date: _____ **Inspector:** _____ _____ **Routine Inspection**

_____ **Storm Event Inspection**

Inspection should include condition of tank surface; any evidence of spills or leaks around tank or storage container; and condition of containment structures. A determination should also be made as to whether dewatering of containment is required. If action or repair is required, such action should be noted in comments.

STORAGE IDENTIFICATION	CONTENTS	SIZE (Gallons)	CHECK √ (After Inspection)	COMMENTS

FIGURES



Base map from Lock Haven USGS 7½ minute quadrangle photorevised 1986 and Jersey Shore USGS 7½ minute quadrangle dated 1994.

Site Location Map

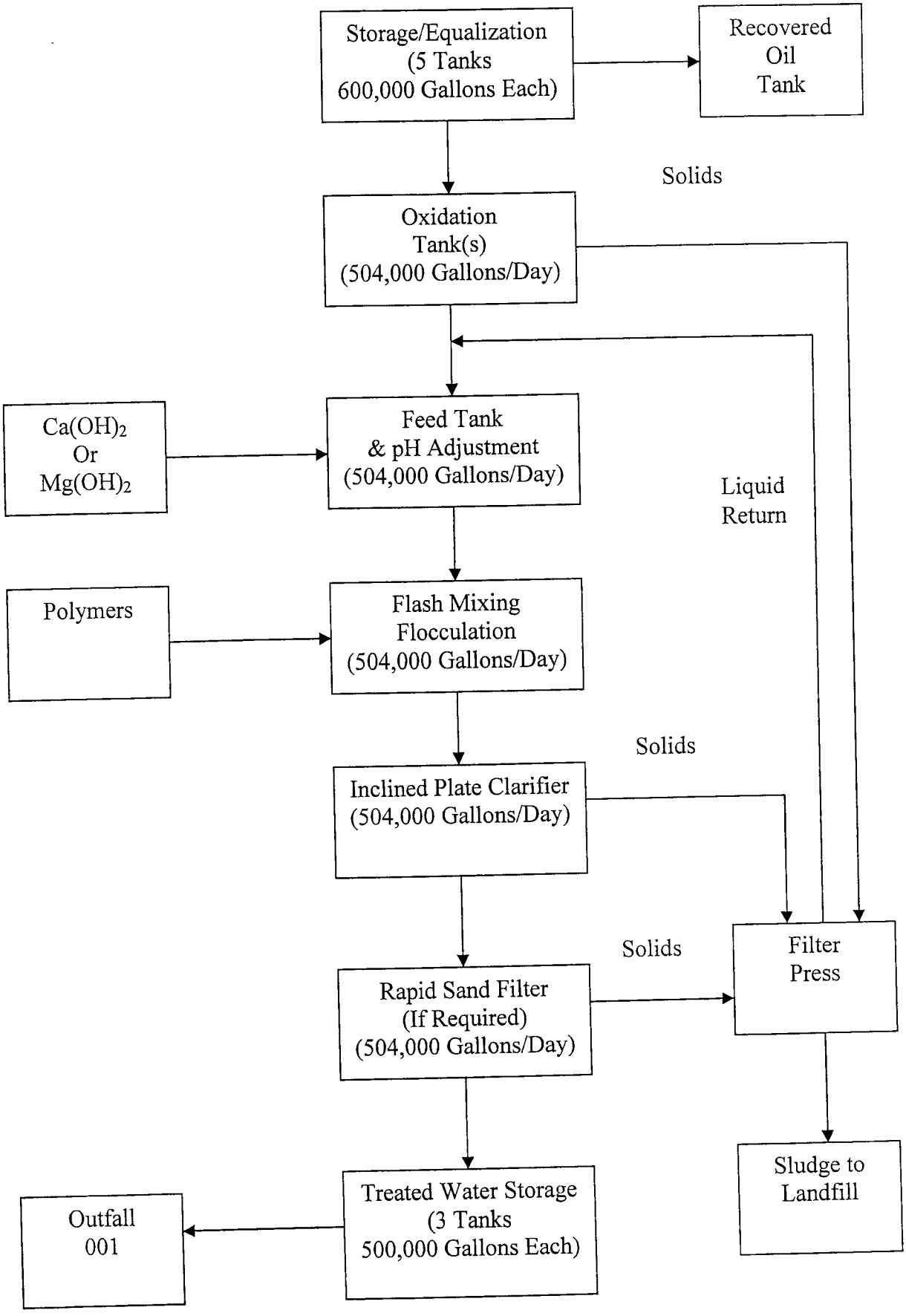
Central Pennsylvania
Water Treatment, LLC
Wayne Township, Clinton County, Pa.

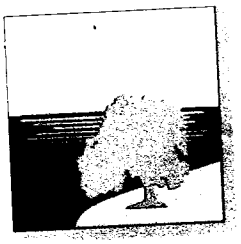
July 2008	Scale: 1" = 2000'	08165

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797

Figure 1

U:\08165 Rex Energy Water Treatment_Drwg\sitemap.dwg


Storage/Equalization
(5 Tanks
600,000 Gallons Each)
Recovered
Oil
Tank
Solids
Oxidation
Tank(s)
(504,000 Gallons/Day)
Ca(OH)2
Or
Mg(OH)2
Feed Tank
& pH Adjustment
(504,000 Gallons/Day)
Liquid
Return
Polymers
Flash Mixing
Flocculation
(504,000 Gallons/Day)
Solids
Inclined Plate Clarifier
(504,000 Gallons/Day)
Solids
Filter
Press
Rapid Sand Filter
(If Required)
(504,000 Gallons/Day)
Sludge to
Landfill
Treated Water Storage
(3 Tanks
500,000 Gallons Each)
Outfall
001



ARM Group Inc.

Earth Resource Engineers and Consultants

July 16, 2008

Mr. Ken Scott
Pennsylvania Department of Environmental Protection
Bureau of Oil and Gas Management
230 Chestnut Street
Meadville, PA 16335-3481

Re: NPDES Permit Application
Central Pennsylvania Water Treatment, LLC
ARM Project 08165

Dear Mr. Scott:

On June 26, 2008, Central Pennsylvania Water Treatment, LLC (CPWT) submitted an NPDES permit application for a proposed waste water treatment facility in Woodward Township, Lycoming County. That application has been withdrawn for the reasons outlined in a separate letter dated July 16, 2008. Enclosed is an application for a facility in Wayne Township, Clinton County that will replace the proposed Lycoming County facility. As you know, CPWT has also submitted an application for a facility in Rush Township, Centre County, which is designed to serve well locations in the Clearfield and Centre County area, while the proposed Clinton County facility is designed to serve sites in the Clinton and Lycoming County area.

The enclosed application is very similar to the applications submitted for the Lycoming County facility and the Centre County facility; the only changes being site specific information.

CPWT is aware that the assimilative capacity of the West Branch of the Susquehanna (West Branch) is limited with respect to chlorides and total dissolved solids based on water quality standards for chlorides and total dissolved solids at Milton, the first downstream public water supply. To maintain those water quality standards under $Q_{7,10}$ flow conditions, the maximum discharge rate of fracturing and produced water to the West Branch is approximately 0.504 million gallons per day (MGD). This is based on current analytical data for untreated fracturing flow back and produced water. Treatability studies have been conducted on samples of these waters, and treated samples are undergoing laboratory analysis. Results may indicate some reduction in the concentration of chloride and total dissolved solids as a result of treatment. In which case, the maximum discharge volume will be greater than 0.504 MGD.

1631 South Atherton Street • Suite 101 • State College, PA 16801
voice: (814) 272-0455 • fax: (814) 272-0467 • e-mail: info@armgroup.net

The permit application submitted for the Rush Township site and the enclosed application for the Wayne Township site each request a maximum discharge volume of 0.504 MGD. Based on existing analytical data from untreated samples, such a volume could not be discharged from each location, while maintaining water quality standards at Milton. However, as indicated previously, treatability studies may indicate some reduction in the concentration of chloride and total dissolved solids which could increase the maximum discharge volume. CPWT may also choose to install additional treatment processes, if such processes lower the concentration of total dissolved solids and chloride and enable higher discharge volumes while maintaining water quality standards. Accordingly, CPWT requests that PADEP evaluate each application independently, and if both can be issued, CPWT will work with PADEP to allocate the maximum discharge volume between the two proposed facilities.

CPWT realizes that the requested discharge volumes for these facilities exceed the assimilative capacity of the West Branch when the volumes are combined. However due to economies of scale associated with treatment plant construction and operation, CPWT is requesting the largest capacity possible at each facility to insure the facilities are feasible to construct and operate from an economic standpoint.

Enclosed please find an original and two copies of an NPDES permit application submitted on behalf of Central Pennsylvania Water Treatment, LLC (CPWT) for the proposed Clinton County facility. Also enclosed is a check for $500 made payable to the Commonwealth of Pennsylvania. As indicated previously, the proposed wastewater treatment facility in Wayne Township will be for fracturing flow back water and produced water from natural gas wells.

The mass balance calculations included with this application utilized the $Q_{7,10}$ flow when calculating the effect the proposed discharge would have on concentrations in the West Branch. Natural stream flows will normally exceed $Q_{7\text{-}10}$ more than 99 percent of the time. Accordingly, CPWT requests that PADEP consider seasonally higher discharge rates that are proportional to river flow levels monitored on a real time basis.

Publication of the required newspaper notice will begin during the week of July 21, 2008, and will continue to occur once a week for three additional weeks. Proof of publication will be provided following the last publication date.

Municipal notification letters were submitted to the Clinton County Commissioners and the Wayne Township Supervisors. Copies of those letters are included, and certified mail receipts will be forwarded upon return from the recipients.

An "Administrative Incompleteness Letter" was received for the Lycoming County application stating that "If it is intended to treat and discharge water from Marcellus Formation wells in central Pennsylvania, water quality data from at least one of these wells in the central Pennsylvania geographical area needs to be provided. Furthermore, to help

insure that the sampled water is representative of the wastewater to be treated, a composite sample should be collected throughout the course of a flow back event". To avoid a similar comment with respect to the Clinton County application, a response is being provided at this time.

CPWT is a wholly owned subsidiary of Rex Energy (Rex). Rex does not currently have any wells in central Pennsylvania, but it intends to drill wells in central Pennsylvania. Rex will try and obtain water samples from one of its competitors, but due to the competitive nature of the business, competitors may not want to share samples or analytical data. However, if a sample is obtained from another gas company for a Marcellus well in central Pennsylvania, the results will be forwarded to the Department as a supplement to the enclosed application. If a sample can be obtained from a competitor, it is highly unlikely that such a sample will be composited throughout the course of a flow back event.

While there may be some variability in analytical results from region to region and from well to well within a region, the analytical data provided should be similar to flow back water from the Marcellus formation in central Pennsylvania. Absent additional analytical data, CPWT requests that the Department evaluate the application based on the analytical data provided, as that data represents Marcellus flow back water, Marcellus produced water, and Devonian produced water. It is the intent of CPWT to design and construct a treatment facility that is able to accommodate a range of waste water characteristics and to meet discharge limits established by the Department.

If you have any questions after reviewing this information, please do not hesitate to contact me at (814) 272-0455 or by email at knelson@armgroup.net.

Respectfully submitted,

ARM Group Inc.

Kim A. Nelson

Kim A. Nelson, P.E.
Senior Engineer

Pennsylvania Department of Environmental Protection

230 Chestnut Street
Meadville, PA 16335-3481
July 23, 2008

814-332-6872
Fax: 814-332-6121

Northwest Regional Office

Kim A. Nelson, P.E.
ARM Group Inc.
2013 Sandy Drive – Suite 205
State College, PA 16803

Re: Administrative Incompleteness Letter
Central PA Water Treatment
NPDES Application No. PA0233617
Wayne Township, Clinton County

Dear Mr. Nelson:

The Department of Environmental Protection (DEP) has reviewed the above referenced application. We have determined that it does not contain the information, maps, fees, and other necessary documents and is administratively incomplete; therefore, the application must be revised. Upon your request, the application will be returned to you for revision and resubmittal.

The following list specifies the items which must be included in the resubmittal of your application or the submission of additional information. Please note that this information must be received within 30 days or DEP may return the application to you without action.

- Evidence that the municipality and county have received your notification such as dated and signed certified mail receipt.

- Public Newspaper Notice proof of publication.

- While the Department appreciates the competitive nature of the business, the Department is also confident that there are other companies that are actively drilling Marcellus wells in central Pennsylvania who are or will be looking for a practical means for handling their wastewater. The Department is also confident that it is impossible to properly permit or design a wastewater treatment facility without having representative sampling of the wastewater to be treated. Thus, as indicated in the administrative letter for the previously submitted application, if it is intended is to treat and discharge water from Marcellus Formation wells in central Pennsylvania, water quality data from at least one of these wells in the central Pennsylvania geographical area needs to be provided. To help insure that the sampled water is representative of the wastewater to be treated, a composite sample from a frac flow back event should be collected.

Also, in accordance with DEP's Money-Back Guarantee Program, the clock tracking the elapsed time for the review of your application has stopped while you prepare a response to this letter. The clock will start again when we receive all of the requested information.

If you have questions about your application, please contact Ken Scott at the above telephone number and refer to Application No. PA0233617.

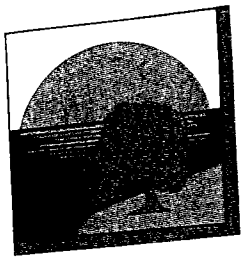
Sincerely,

Ruth Steel

Ruth Steel
Permits Clerk
Water Management

Enclosures

cc: Benjamin W. Hulburt, CEO
Robert J. Hawley, O & G Program Manager
Joe Umholtz, BOGM - RCSOB
Ken Scott, DEP Engineer
✓File



ARM Group Inc.

Earth Resource Engineers and Consultants

September 24, 2008

Mr. Dana Aunkst, P.E.
Director
Bureau of Water Standards and Facility Regulation
Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street
Harrisburg, PA 17101

Subject: NPDES/WQMP Permit Applications; Central Pennsylvania Water Treatment, LLC;
Wasteload Allocations – Susquehanna River Basin

Dear Mr. Aunkst:

I appreciated the opportunity to discuss the issue of wastewater management and wasteload allocations with you on Monday by telephone. It was good to chat with you again – it's been a few years since our work together in South Middleton Township. As I explained, our firm represents Central Pennsylvania Water Treatment, LLC (CPWT), a commercial waste water treatment company that intends to provide treatment of fracturing flow back and produced water from natural gas wells developed in Pennsylvania. The company is based in State College and is currently wholly owned by Rex Energy Corporation – a publicly traded energy company also based in State College. This company is home grown and is committed to environmental stewardship in its energy development, water and wastewater management activities.

Recognizing the shortfall in treatment capacity for these types of brines throughout the Appalachian Basin, CPWT has been implementing a strategy to develop a network of stationary treatment facilities throughout the state, specifically targeting the needs of the entire industry with respect to the drilling and development of Marcellus shale wells. The anticipated market demand for brine water treatment capacity is based largely on published and estimated projections of natural gas well drilling activity in Pennsylvania over the next five to ten years. Using information available from energy companies, combined with records of permits issued and pending, and projections based on land lease areas and well spacing assumptions, we project that demand for brine water treatment in Pennsylvania will reach perhaps 9 MGD in 2009, 16 MGD in 2010, and 19 MGD in 2011. The Susquehanna River Basin Commission has developed an estimate of 20 MGD. As you probably know, there have already been roughly 450 new gas well drilling permits for Marcellus wells issued so far this year in Pennsylvania, and many more in the queue for review and issuance.

On the basis of this need, CPWT has proposed to construct two water treatment facilities in the Susquehanna River - West Branch Basin; one to be located in Centre County (Moshannon Creek) and another in Clinton County (on West Branch). Part 1 NPDES/WQMP permit applications have been filed with the Department – the first being filed on May 29, 2008 (Moshannon Creek facility – Rush Township, Centre County) and the second being filed on July 15, 2008 (West Branch facility - Wayne Township, Clinton County). Each of these applications proposes the treatment of 500,000 gallons per day (gpd) and discharge of treated water to the receiving streams; they are scaled to accommodate the needs of the industry within about a 50-mile radius of the proposed treatment sites. They are also scaled to meet the needs of the many companies operating in the West Branch Basin, and sized to meet cost-effectiveness and equipment efficiency criteria. Plants that are too small will simply not be economical to construct and operate.

These initial permit applications are for physical-chemical treatment of these types of brines; the treatment process will remove/reduce suspended solids, iron, barium, and biochemical oxygen demand. Due to the proposed treatment methods, the process will also achieve a modest reduction in total dissolved solids (TDS) as a consequence of the physical-chemical treatment. In addition to the physical-chemical treatment, other treatment alternatives have been evaluated such as nanofiltration, reverse osmosis, evaporation/condensation and crystallization, and other methods. Microfiltration and nanofiltration seem to only provide modest reductions in TDS concentrations. And, the TDS concentration of most of the brine water will exceed the commercially feasible limit of reverse osmosis technology. Evaporation/condensation and crystallization are options that will continue to be evaluated, but they definitely pose cost-effectiveness, technological and regulatory challenges. In this regard, capital costs, energy costs, maintenance costs, brine concentrate, and corresponding hazardous waste by-product issues are potential drawbacks to some of the advanced treatment methods. These disadvantages, limitations and uncertainties are even more a concern with regard to the concept of portable treatment units.

Last week, we met with Robert J. Hawley, Environmental Program Manager, Water Management Program; L. Richard Adams, Watershed Management Program; and Lisa D. Houser, Permit Section, Water Management Program in Williamsport concerning the two applications that we have filed in Centre and Clinton counties. During that meeting, Department personnel stated that your office is responsible for developing a strategy to allocate the assimilative capacity of the West Branch of the Susquehanna among three applications that it has received as well as some number of other applicants (POTWs) and prospective applicants (unknown parties). In total, we heard that there are perhaps 15 or more of such current and prospective applicants. We also heard that the needs of those applicants range from as little as perhaps 25,000 gpd to as much as 500,000 gpd, as in our case. Likewise, we heard that the water quality characteristics and needs of those applicants vary considerably. Department personnel also indicated that your intention is also to reserve some capacity for future industrial users plus an added margin of safety to account for uncertainties.

Based on the brief discussion that you and I had on Monday, we were encouraged to hear you say that the Department would prefer to discourage POTWs from taking brine water into their biological treatment processes. That is very sensible, given the high stress and even toxic effects

that brines (e.g., chloride and barium concentrations) will have on biological treatment processes. Likewise, the same concerns apply with respect to the sludges that will be generated by these POTWs. For this reason, we would suggest that you refrain from committing any of the available assimilative capacity for brine in the watersheds to POTWs, at least for the long term. This is an important point, because that capacity should be reserved for facilities that are designed, operated, maintained and monitored to handle the unique characteristics of gas well brines.

In this regard, please consider economic feasibility factors associated with the construction and operation of a brine water treatment facility. There are many cost elements, and among the most significant are capital equipment, storage, land, labor, infrastructure, operating expenses, permitting, environmental monitoring, instrumentation and controls, engineering, financing, taxes, etc. Beyond these factors, please consider that a single vertical well may produce 1.5 million gallons (MG) of flowback water, and a single horizontal well may produce 5 MG of flowback. These operations require accessible and reliable outlets to handle these large quantities of water that for a single well occur over a continuous period of 10 to 15 days. This means that a single well requires outlet capacity of as much as 500,000 gpd. This exemplifies the need for treatment capacity being available on a 24/7 basis in the West Branch Basin – Susquehanna River of between 250,000 and 500,000 gpd. This is the logic that we went through when we selected site locations and proposed treatment capacities. The Commonwealth needs to have permitted capacity of this magnitude to meet the minimum market need and meet economic feasibility criteria.

On the basis of the preceding logic, we would encourage you to place importance upon the need to enable one or more entities to obtain sufficient capacity at one or more stationary plant locations where this emerging need can be met. By doing so, the Department will be meeting its environmental protection goals, while enabling there to be built cost-effective capacity to meet the near-term needs (i.e., next several years) of the industry – particularly those emerging for the western and northern Susquehanna River Basin. If, instead, you should allocate capacity to a relatively large number of applicants and prospective applicants, while holding back reserves for future applicants and to cover uncertainties, then it is unlikely that new capacity will be built. Consequently, it is likely that these waters, being derived from in-basin sources, will be transported and transferred to the Ohio River Basin to one of several existing and proposed "large" facilities in that watershed. In such case, the water will be lost from the originating basin (e.g., Susquehanna River Basin), not to mention the costs and potential environmental burdens associated with the corresponding truck traffic.

Therefore, on behalf of CPWT, we respectfully request your favorable consideration of our two pending applications for the design and construction of new brine water treatment capacity in the West Branch of the Susquehanna River Basin. We are prepared to move ahead in a most expedited manner to build this capacity and make it available to the industry throughout the region. This commitment on our part will go a long way toward allowing the Commonwealth and the region (north-central Pennsylvania) to realize the tremendous economic stimulus potential that the Marcellus gas play will bring to the citizens of this region. To our knowledge,

ours were the first two applications of this sort filed with the Department. For this reason, it only seems fair for ours to gain first approval at full capacity, particularly given our commitment to move ahead with immediate construction.

Thank you for the opportunity to have spoken to you about the issue of wasteload allocation, and particularly with respect to the scale and cost-effectiveness issues that need to be considered by the Department as you finalize your wasteload allocation policy. If you have any questions after reviewing this information, please do not hesitate to contact me. We would be pleased to provide you with additional supporting information, if that would be desired on the part of the Department.

Sincerely yours,

ARM Group Inc.

Ned E. Wehler, P.G.
Program Manager for Rex Energy

cc: Robert J. Hawley, PADEP – Williamsport – Water Management Program
L. Richard Adams, PADEP – Williamsport – Watershed Management Program
Lisa D. Houser, PADEP – Williamsport – Permit Section - Water Management Program
Melissa Hamsher, Rex Energy
Benjamin Hulburt, CEO, Rex Energy
Kim Nelson, P.E., ARM Group Inc.
Bryan M. Wehler, EIT, ARM Group Inc.

WAYNE TOWNSHIP BOARD OF SUPERVISORS

P. O. Box 217
McElhattan, PA 17748

PH: (570) 769-6008 FAX: (570) 753-8617

Dave Calhoun • Tom Chitwood • James Maguire

April 15, 2009

Pennsylvania Department of Environmental Protection
Northwest Regional Office
Bureau of Oil and Gas Management
230 Chestnut Street
Meadville, PA 16335 - 3481

Re: NPDES Permit Application
Central Pennsylvania Water Treatment, LLC
213 McKinney Road, McElhattan, PA
Site ID: 709006

Dear Sir or Madam:

The Board of Supervisors has reviewed the above referenced NPDES Permit Application submitted by Central Pennsylvania Water Treatment, LLC, for a wastewater treatment facility dated July 15, 2008. The Board received a copy of the Application after contacting the Williamsport Office of the PA Department of Environmental Protection earlier this year. The Application includes a copy of a Notice of Intent for Wayne Township, however, there is no record that the Notice of Intent was ever received by the Township. Therefore, the Board would like to provide comments on the Application at this time in accordance with Acts 67 and 68 which amended the Municipalities Planning Code:

- **Zoning** – The proposed facility is located in an Agricultural Zone as shown and described in the Wayne Township Zoning Ordinance. The proposed facility is not permitted in this zoning district. In order for this facility to be constructed at the proposed site, rezoning will be required. The Township has not received a request for rezoning as it might pertain to the proposed facility.

- **Land Development** – The proposed facility would require submission and approval of a Land Development Plan, with a Post Construction Stormwater Management Plan in accordance with the Wayne Township Subdivision and Land Development Ordinance and the Wayne Township Stormwater Management Ordinance.

- **Floodplain Management** – According to our records, the proposed facility is located within the floodway portion of Zone AE on the Wayne Township Floodplain Maps as issued by FEMA. Central PA Water Treatment, LLC's answer to question 5.0 under Coordination Information of its PA DEP General Information form is incorrect. It indicates that the project does not involve a floodway. In fact, as indicated previously, the proposed facility will be located within a floodway. Accordingly, the proposed facility must comply with the Wayne Township Floodplain Ordinance, and PA DEP and FEMA regulations.

If you have any questions or need additional information, please contact me at the above address or by telephone at (570) 769-6024.

Sincerely,

David W. Calhoun
Chairman

/dsm

C: Dennis Norman, P.E.
Paul D. Welch, Jr., Esq.

REG4FAC

PERMIT:	PA0110680	EXPIRATION:	03/31/2009	SW Appendix:	
CASENAME:	Wood-Mode, Incorporated			Rev Eng:	Sakiadis
ADDRESS:	One Second Street				
	Kreamer, PA	17833		TYPE:	IW
MUNICIPALITY:	Middlecreek Township			COUNTY:	Snyder
STREAM CLASS:	TSF	DRAINAGE LIST:	M	SIC:	2434

OUTFALL INFORMATION

PERMIT: PA0110680

APS#:	658715	DISCHARGE#:	001	TYPE:	IW
COMMENT:	UNTREATED COOLING/BOILER BLOWDOWN				
Qd MGD:	0.011	Q7-10 CFS:	11.78	WATER SHED#:	6A
USGS QUAD #:	5 16 3	QUADNAME:	FREEBURG	INCHES N/W:	9.9 11.8
STREAM CODE:	17701	STREAM NAME:	Middle Creek		
RIVER MILE:	7.55	ELEVATION:	458	DILUTION RATIO:	692.24892
Latitude 40° 48' 16" Longitude 76° 57' 39"		SHED NAME::	Penns - Middle Creeks		

CM 5/8

Mike R

To Chad Miller

April 17, 2009

To whom it may concern:

This is to notify you of my opposition to the proposed waste treatment facility related to the proposed gas drilling in Clinton County in general and Wayne Township specifically. There have been many concerns raised related to this proposal. We, the residents and property owners, are concerned about the following:

Possible health risks associated with radioactivity, brine, and other contaminants found in the sludge to be treated
Radioactivity and other health issues related to the drilling process
Location of the facility within a flood plain
Increased traffic burden on our local roads with a proposed 100 trucks of waste water per day
Concern over the size of these trucks on roads which are frequented by walkers, bicyclists and joggers
The fact that the proposed area is zoned agricultural
Profit over health and quality of living for residents
Conflict with the PA Wildlands recreational philosophy
Possible conflicts of interest

Sincerely,

Signature David K Berger

Printed Name David K Berger

Address 3147 Brookside Ln.
McElhattan PA 17748

Phone 570-660-2537

RECEIVED
APR 23 2009
OIL & GAS

Cn 5/8

Mike R. —

Apr. 13, 2009

To whom it may concern:

This is to notify you of my opposition to the proposed waste treatment facility related to the proposed gas drilling in Clinton County in general and Wayne Township specifically. There have been many concerns raised related to this proposal. We, the residents and property owners, are concerned about the following:

- Possible health risks associated with radioactivity, brine, and other contaminants found in the sludge to be treated
- Radioactivity and other health issues related to the drilling process
- Location of the facility within a flood plain
- Increased traffic burden on our local roads with a proposed 100 trucks of waste water per day
- Concern over the size of these trucks on roads which are frequented by walkers, bicyclists and joggers
- The fact that the proposed area is zoned agricultural
- Profit over health and quality of living for residents
- Conflict with the PA Wildlands recreational philosophy
- Possible conflicts of interest

Sincerely,

Signature Nancy A. Latta

Printed Name NANCY A. LATTA

Address 50 Old Bridge Rd.
Lock Haven Pa. 17745

Phone 769-7136

RECEIVED

APR 15 2009

OIL & GAS

Applicant Name: Pennsylvania Brine Treatment, Inc

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

ANALYSIS RESULTS TABLE POLLUTANT GROUP 1
MODULE 4

Before completing this form, read the step-by-step instructions provided in Appendix 1.

APPLICANT NAME: Pennsylvania Brine Treatment, Inc Rouseville Facility

- ☐ Outfall Number _____ (Show location of sampling point on Line Drawing)
- ☐ Intake Sampling Results - Optional (Specify Source: _____)
- ☐ Background Sampling Results - Optional (Specify Location of Sample: _____)
- ☒ Treatment Facility Influent Sampling Results (Show location of sampling point on Line Drawing)
- ☐ New Discharge (Basis for Information: _____)
- ☐ Bypass or Sewer System Overflow (Describe: _____)

POLLUTANT GROUP 1	1. LEVEL PRESENT					2. UNITS		3. Coefficient of Effluent Variability (CV)
	a. Maximum Daily Value		b. Average of Analysis		c. No. of Analysis	a. Concentration	b. Mass	
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				
Biochemical Oxygen Demand, BOD	NA							
Chemical Oxygen Demand, COD	NA							
Hardness ($CaCO_3$)	27,406	30,194			1	mg/l	#/day	
Total Suspended Solids, TSS	1,190	1,311			1	mg/l	#/day	
Total Dissolved Solids, TDS	180,700	199,080			1	mg/l	#/day	
Ammonia as N	4.32	4.8			1	mg/l	#/day	
Nitrate-Nitrite (as N)	NA							
Total Kjeldahl Nitrogen (TKN)	NA							
Phosphorus (as P), Total	NA							
Temperature winter	NA Value		Value					
Temperature summer	NA Value		Value					
pH	Min.	Max. 5.9			1	Standard units	Standard units	

1.a. Maximum Daily Value - Report the **highest** daily value or daily average value from the last year of data. Report both mass and concentration.

1.b. Average of Analysis - The average of all values within the last year and report both the mass and concentration.

1.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

Applicant Name: Pennsylvania Brine Treatment, Inc

POLLUTANT GROUP 1	Believed Absent	1. MDL Used* (µg/L)	2. EPA Method Number Used	3. Level Present					4. Units		5. Coefficient of Effluent Variability (CV)
				a. Max Daily Value		b. Average of Analysis		c. Number of Analysis			
				Concentration	Mass	Concentration	Mass		Concentration	Mass	
Color	☐			NA							
Fecal Coliform	☐			NA							
Fluoride	☐			NA							
Oil and Grease	☐	5,000	1664A	74.4	82			1	mg/l	#/day	
Bromide	☐	10,000	D1246-99	893	983			1	mg/l	#/day	
Chlorine, Total Residual	☐			NA							
Sulfate	☐	50,000	375.4	310	342			1	mg/l	#/day	
Sulfide	☐			NA							
Sulfite	☐			NA							
Surfactants	☐	2,000	SM5540C	5.39	5.9			1	mg/l	#/day	
Aluminum, Total	☐	100	200.7	9,530	10.5			1	ug/l	#/day	
Barium, Total	☐	50	200.7	17,620	19.41			1	ug/l	#/day	
Boron, Total	☐			NA							
Cobalt, Total	☐			NA							
Iron, Total	☐	100	200.7	130,330	143.6			1	ug/l	#/day	
Iron, Dissolved	☐	100	200.7	46,310	51.0			1	ug/l	#/day	
Manganese, Total	☐	50	200.7	13,940	15.4			1	ug/l	#/day	
Radioactivity (Total Alpha and Beta)	☐			NA							
Total Organic Carbon, TOC	☐			NA							
Radium, Total	☐			NA							
Magnesium	☐	5,000	200.7	1,005	1,107			1	mg/l	#/day	
Molybdenum	☐			NA							
Tin, Total	☐			NA							
Titanium, Total	☐			NA							

3. If other data is available (i.e., DMR data, etc.), the past year of data may be used to determine 3a, 3b, 3c, and 5.

3.a. Maximum Daily Value – Report the **highest** daily value or daily average value from the last year of data. Report both mass and concentration.

3.b. Average of Analysis – Determine the average of all samples taken within the past year. Report both mass and concentration.

3.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

* It is in the applicant's interest to achieve the lowest level of detection possible. This will minimize uncertainty and therefore the need for additional analysis or potential for establishing a large

Applicant Name:

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

ANALYSIS RESULTS TABLE POLLUTANT GROUP I
MODULE 4

Before completing this form, **read the step-by-step instructions provided in Appendix 1.**

APPLICANT NAME Pennsylvania Brine Treatment, Inc Rouseville Facility

- ☐ **Outfall Number** _____ (Show location of sampling point on Line Drawing)
- ☐ Intake Sampling Results - Optional (Specify Source: _____)
- ☐ Background Sampling Results - Optional (Specify Location of Sample: _____)
- ☒ Treatment Facility Influent Sampling Results (Show location of sampling point on Line Drawing)
- ☐ New Discharge (Basis for Information: _____)
- ☐ Bypass or Sewer System Overflow (Describe: _____)

POLLUTANT GROUP 1	1. LEVEL PRESENT				c. No. of Analysis	2. UNITS		3. Coefficient of Effluent Variability (CV)
	a. Maximum Daily Value		b. Average of Analysis			a. Concentration	b. Mass	
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				
Acidity	37	41			1	mg/l	#/day	
Alkalinity	84	93			1	mg/l	#/day	
Specific Conductance	114,000	NA			1	umhos/cm	NA	
Osmotic Pressure	2,540	NA			1	mOs/kg	NA	
Chloride	82,957	91,395			1	mg/l	#/day	
Sodium	28,883	31,820			1	mg/l	#/day	
Calcium	9,318	10,266			1	mg/l	#/day	
Lithium	12.0	13.2			1	mg/l	#/day	
Xylene	397	0.44			1	ug/l	#/day	

1.a. Maximum Daily Value - Report the highest daily value or daily average value from the last year of data. Report both mass and concentration.

1.b. Average of Analysis - The average of all values within the last year and report both the mass and concentration.

1.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

Applicant Name: Pennsylvania Brine Treatment, Inc

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

ANALYSIS RESULTS TABLE POLLUTANT GROUP 2
MODULE 5

Before completing this form, read the step-by-step instructions provided in Appendix 1.

APPLICANT NAME | Pennsylvania Brine Treatment, Inc Rouseville Facility

- ☐ **Outfall Number** _____ (Show location of sampling point on Line Drawing)
- ☐ Intake Sampling Results - Optional (Specify Source: _____)
- ☐ Background Sampling Results - Optional (Specify Location: _____)
- ☒ Treatment Facility Influent Sampling Results (Show location of sampling point on Line Drawing)
- ☐ New Discharge (Basis for Information: _____)
- ☐ Bypass or Sewer System Overflow (Describe: _____)

POLLUTANT GROUP 2 Metals		1. MDL Used* (µg/L)	2. EPA Method Number Used	3. Level Present					4. Units		5. Coefficient of Effluent Variability (CV)
				a. Max Daily Value		b. Average of Analysis		c. Number of Analysis			
				Concentration	Mass	Concentration	Mass		Concentration	Mass	
1M	Antimony, Total			NA							
2M	Arsenic, Total	100	200.7	0	0			1	ug/l	#/day	
3M	Beryllium, Total	50	200.7	0	0			1	ug/l	#/day	
4M	Cadmium, Total	50	200.7	0	0			1	ug/l	#/day	
5M	Chromium III			NA							
5M	Chromium VI	50	200.7	0	0			1	ug/l	#/day	
6M	Copper, Total	100	200.7	100	0.11			1	ug/l	#/day	
7M	Lead, Total	50	200.7	290	0.32			1	ug/l	#/day	
8M	Mercury, Total			NA							
9M	Nickel, Total	50	200.7	0	0			1	ug/l	#/day	
10M	Selenium, Total			NA							
11M	Silver, Total	100	200.7	0	0			1	ug/l	#/day	

3. If other data is available (i.e., DMR data, etc.), the past year of data may be used to determine 3a, 3b, 3c, and 5.

3.a. Maximum Daily Value – Report the highest daily value or daily average value from the last year of data. Report both mass and concentration.

3.b. Average of Analysis – Determine the average of all samples taken within the past year. Report both mass and concentration.

3.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

* It is in the applicant's interest to achieve the lowest level of detection possible. This will minimize uncertainty and therefore the need for additional analysis or potential for establishing a large

Applicant Name: Pennsylvania Brine Treatment, Inc

POLLUTANT GROUP 2 Metals		1. MDL Used* (µg/L)	2. EPA Method Number Used	3. Level Present				c. Number of Analysis	4. Units		5. Coefficient of Effluent Variability (CV)
				a. Max Daily Value		b. Average of Analysis					
				Concentration	Mass	Concentration	Mass		Concentration	Mass	
12M	Thallium, Total			NA							
13M	Zinc, Total	50	200.7	570	0.63			1	ug/l	#/day	
14M	Cyanide, Total			NA							
14M	Cyanide, Free			NA							
15M	Phenols, Total	5	420.1	171	0.19			1	ug/l	#/day	

3. If other data is available (i.e., DMR data, etc.), the past year of data may be used to determine 3a, 3b, 3c, and 5.

3.a. Maximum Daily Value – Report the highest daily value or daily average value from the last year of data. Report both mass and concentration.

3.b. Average of Analysis – Determine the average of all samples taken within the past year. Report both mass and concentration.

3.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

* It is in the applicant's interest to achieve the lowest level of detection possible. This will minimize uncertainty and therefore the need for additional analysis or potential for establishing a large number of effluent limits and/or monitoring requirements in the final NPDES permit.

Applicant Name: Pennsylvania Brine Treatment, Inc

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

ANALYSIS RESULTS TABLE POLLUTANT GROUP 3
MODULE 6

Before completing this form, read the step-by-step instructions provided in Appendix 1.

APPLICANT NAME Pennsylvania Brine Treatment, Inc Rouseville Facility

- ☐ **Outfall Number** _____ (Show location of sampling point on Line Drawing)
- ☐ Intake Sampling Results - Optional (Specify Source: _____)
- ☐ Background Sampling Results - Optional (Specify Location: _____)
- ☒ Treatment Facility Influent Sampling Results (Show location of sampling point on Line Drawing)
- ☐ New Discharge (Basis for Information: _____)
- ☐ Bypass or Sewer System Overflow (Describe: _____)

POLLUTANT GROUP 3 Volitales		1. MDL Used* (µg/L)	2. EPA Method Number Used	3. Level Present					4. Units		5. Coefficient of Effluent Variability (CV)
				a. Max Daily Value		b. Average of Analysis		c. Number of Analysis			
				Concentration	Mass	Concentration	Mass		Concentration	Mass	
1V	Acrolein			NA							
2V	Acrylonitrile			NA							
3V	Benzene	5	624/8260B	283.6	0.31			1	ug/l	#/day	
5V	Bromoform			NA							
6V	Carbon Tetrachloride			NA							
7V	Chlorobenzene			NA							
8V	Chlorodibromomethane			NA							
9V	Chloroethane			NA							
10V	2-Chloroethylvinyl Ether			NA							

3. If other data is available (i.e., DMR data, etc.), the past year of data may be used to determine 3a, 3b, 3c, and 5.

3.a. Maximum Daily Value – Report the highest daily value or daily average value from the last year of data. Report both mass and concentration.

3.b. Average of Analysis – Determine the average of all samples taken within the past year. Report both mass and concentration.

3.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

* It is in the applicant's interest to achieve the lowest level of detection possible. This will minimize uncertainty and therefore the need for additional analysis or potential for establishing a large number of effluent limits and/or monitoring requirements in the final NPDES permit.

POLLUTANT GROUP 3 Volitales		1. MDL Used* (µg/L)	2. EPA Method Number Used	3. Level Present					4. Units		5. Coefficient of Effluent Variability (CV)
				a. Max Daily Value		b. Average of Analysis		c. Number of Analysis			
				Concentration	Mass	Concentration	Mass		Concentration	Mass	
11V	Chloroform			NA							
12V	Dichlorobromomethane			NA							
14V	1,1-Dichloroethane			NA							
15V	1,2-Dichloroethane			NA							
16V	1,1-Dichloroethylene			NA							
17V	1,2 Dichloropropane			NA							
18V	1, 3-Dichloropropylene			NA							
19V	Ethylebenzene	5	624/8260B	40.5	0.04			1	ug/l	#/day	
20V	Methyl Bromide			NA							
21V	Methyl Chloride			NA							
22V	Methylene Chloride			NA							
23V	1,1,2,2-Tetrachloroethane			NA							
24V	Tetrachloroethylene			NA							
25V	Toluene	5	624/8260B	306.7	0.34			1	ug/l	#/day	
26V	1,2-Trans-dichloroethylene			NA							
27V	1,1,1-Trichloroethane			NA							
28V	1,1,2-Trichloroethane			NA							
29V	Trichloroethylene			NA							
31V	Vinyl Chloride			NA							

3. If other data is available (i.e., DMR data, etc.), the past year of data may be used to determine 3a, 3b, 3c, and 5.

3.a. Maximum Daily Value – Report the highest daily value or daily average value from the last year of data. Report both mass and concentration.

3.b. Average of Analysis – Determine the average of all samples taken within the past year. Report both mass and concentration.

3.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

* It is in the applicant's interest to achieve the lowest level of detection possible. This will minimize uncertainty and therefore the need for additional analysis or potential for establishing a large number of effluent limits and/or monitoring requirements in the final NPDES permit.

Applicant Name: Pennsylvania Brine Treatment, Inc

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

ANALYSIS RESULTS TABLE POLLUTANT GROUP 1
MODULE 4

Before completing this form, read the step-by-step instructions provided in Appendix 1.

APPLICANT NAME Pennsylvania Brine Treatment, Inc Rouseville Facility

- ☐ **Outfall Number** _____ (Show location of sampling point on Line Drawing)
- ☐ Intake Sampling Results - Optional (Specify Source: _____)
- ☐ Background Sampling Results - Optional (Specify Location of Sample: _____)
- ☐ Treatment Facility Influent Sampling Results (Show location of sampling point on Line Drawing)
- ☒ New Discharge (Basis for Information: PBT Franklin Facility)
- ☐ Bypass or Sewer System Overflow (Describe: _____)

POLLUTANT GROUP 1	1. LEVEL PRESENT				2. UNITS		3. Coefficient of Effluent Variability (CV)
	a. Maximum Daily Value		b. Average of Analysis		c. No. of Analysis	a. Concentration	b. Mass	
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				
Biochemical Oxygen Demand, BOD	310	473	267	399	3	mg/l	#/day	
Chemical Oxygen Demand, COD	42,000	53,943	29,735	43,669	4	mg/l	#/day	
Hardness ($CaCO_3$)	31,240	38,638	26,983	34,810	4	mg/l	#/day	
Total Suspended Solids, TSS	68	62	18	19	62	mg/l	#/day	
Total Dissolved Solids, TDS	190,800	235,986	129,000	166,839	4	mg/l	#/day	
Ammonia as N	69.4	62.2	48.2	61.0	4	mg/l	#/day	
Nitrate-Nitrite (as N)	0.2	0.3			1	mg/l	#/day	
Total Kjeldahl Nitrogen (TKN)	58.7	75.4	48.2	71.0	4	mg/l	#/day	
Phosphorus (as P), Total	NA							
Temperature winter	NA Value		Value					
Temperature summer	NA Value		Value					
pH	Min. 7.83	Max. 8.99			62	Standard units	Standard units	

1.a. Maximum Daily Value - Report the **highest** daily value or daily average value from the last year of data. Report both mass and concentration.

1.b. Average of Analysis - The average of all values within the last year and report both the mass and concentration.

1.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

Applicant Name: Pennsylvania Brine Treatment, Inc

POLLUTANT GROUP 1	Believed Absent	1. MDL Used* (µg/L)	2. EPA Method Number Used	3. Level Present					4. Units		5. Coefficient of Effluent Variability (CV)
				a. Max Daily Value		b. Average of Analysis		c. Number of Analysis			
				Concentration	Mass	Concentration	Mass		Concentration	Mass	
Color	☐			NA							
Fecal Coliform	☐			NA							
Fluoride	☐			NA							
Oil and Grease	☐	5,000	1664A	48.0	43.2	3.3	3.2	63	mg/l	#/day	
Bromide	☐	10,000	D1246-99	905	1,119	850	1,114	4	mg/l	#/day	
Chlorine, Total Residual	☐			NA							
Sulfate	☐	50,000	375.4	340	421	141	180	4	mg/l	#/day	
Sulfide	☐			NA							
Sulfite	☐			NA							
Surfactants	☐	2,000	SM5540C	39	35	26	32	4	mg/l	#/day	
Aluminum, Total	☐	100	200.7	0	0	0	0	4	ug/l	#/day	
Barium, Total	☐	50	200.7	49,420	44.31	15,784	19.14	7	ug/l	#/day	
Boron, Total	☐	100	200.7	14,000	21.4	5,673	8.5	4	ug/l	#/day	
Cobalt, Total	☐	100	200.7	0	0	0	0	4	ug/l	#/day	
Iron, Total	☐	100	200.7	5,640	4.9	722	0.7	62	ug/l	#/day	
Iron, Dissolved	☐	100	200.7	1,560	2.38	453	0.68	4	ug/l	#/day	
Manganese, Total	☐	50	200.7	2,770	4.38	938	1.32	4	ug/l	#/day	
Radioactivity (Total Alpha and Beta)	☐	Varies	900.0	<1,622	NA	<1,099	NA	4	pCi/L	NA	
Total Organic Carbon, TOC	☐			NA							
Radium, Total	☐			NA							
Magnesium	☐	5,000	200.7	997	1,576	835	1,065	4	mg/l	#/day	
Molybdenum	☐	100	200.7	0	0	0	0	4	ug/l	#/day	
Tin, Total	☐			NA							
Titanium, Total	☐			NA							

3. If other data is available (i.e., DMR data, etc.), the past year of data may be used to determine 3a, 3b, 3c, and 5.

3.a. Maximum Daily Value – Report the **highest** daily value or daily average value from the last year of data. Report both mass and concentration.

3.b. Average of Analysis – Determine the average of all samples taken within the past year. Report both mass and concentration.

3.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

* It is in the applicant's interest to achieve the lowest level of detection possible. This will minimize uncertainty and therefore the need for additional analysis or potential for establishing a large

Applicant Name:

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

ANALYSIS RESULTS TABLE POLLUTANT GROUP I
MODULE 4

Before completing this form, **read the step-by-step instructions provided in Appendix 1.**

APPLICANT NAME Pennsylvania Brine Treatment, Inc Rouseville Facility

- ☐ **Outfall Number** _____ (Show location of sampling point on Line Drawing)
- ☐ Intake Sampling Results - Optional (Specify Source: _____)
- ☐ Background Sampling Results - Optional (Specify Location of Sample: _____)
- ☐ Treatment Facility Influent Sampling Results (Show location of sampling point on Line Drawing)
- ☒ New Discharge (Basis for Information: PBT)
- ☐ Bypass or Sewer System Overflow (Describe: _____)

POLLUTANT GROUP 1	1. LEVEL PRESENT					2. UNITS		3. Coefficient of Effluent Variability (CV)
	a. Maximum Daily Value		b. Average of Analysis		c. No. of Analysis	a. Concentration	b. Mass	
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				
Acidity	47	63.1	3	4.1	17	mg/l	#/day	
Alkalinity	218	196	122	152	17	mg/l	#/day	
Specific Conductance	113,524	NA	102,893	NA	4	umhos/cm	NA	
Osmotic Pressure	2,740	NA	2,305	NA	4	mOs/kg	NA	
Chloride	98,000	70,290	60,983	65,221	62	mg/l	#/day	
Sodium	32,945	40,747	25,424	32,088	4	mg/l	#/day	
Calcium	11,006	13,612	9,429	12,184	4	mg/l	#/day	
Lithium	22.7	20.4	12.9	15.5	4	mg/l	#/day	
Xylene	267.27	0.42	151.41	0.21	4	ug/l	#/day	
Strontium	409	624	391	576	3	mg/l	#/day	

1.a. Maximum Daily Value - Report the highest daily value or daily average value from the last year of data. Report both mass and concentration.

1.b. Average of Analysis - The average of all values within the last year and report both the mass and concentration.

1.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

Applicant Name: Pennsylvania Brine Treatment, Inc

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

ANALYSIS RESULTS TABLE POLLUTANT GROUP 2
MODULE 5

Before completing this form, read the step-by-step instructions provided in Appendix 1.

APPLICANT NAME Pennsylvania Brine Treatment, Inc Rouseville Facility

- ☐ **Outfall Number** _____ (Show location of sampling point on Line Drawing)
- ☐ Intake Sampling Results - Optional (Specify Source: _____)
- ☐ Background Sampling Results - Optional (Specify Location: _____)
- ☐ Treatment Facility Influent Sampling Results (Show location of sampling point on Line Drawing)
- ☒ New Discharge (Basis for Information: PBT Franklin Facility)
- ☐ Bypass or Sewer System Overflow (Describe: _____)

POLLUTANT GROUP 2 Metals		1. MDL Used* (µg/L)	2. EPA Method Number Used	3. Level Present					4. Units		5. Coefficient of Effluent Variability (CV)
				a. Max Daily Value		b. Average of Analysis		c. Number of Analysis			
				Concentration	Mass	Concentration	Mass		Concentration	Mass	
1M	Antimony, Total			NA							
2M	Arsenic, Total	100	200.7	0	0	0	0	4	ug/l	#/day	
3M	Beryllium, Total	50	200.7	0	0	0	0	4	ug/l	#/day	
4M	Cadmium, Total	50	200.7	0	0	0	0	4	ug/l	#/day	
5M	Chromium III			NA							
5M	Chromium VI	50	200.7	0	0	0	0	4	ug/l	#/day	
6M	Copper, Total	100	200.7	267	0.2	106	0.1	17	ug/l	#/day	
7M	Lead, Total	50	200.7	0	0	0	0	4	ug/l	#/day	
8M	Mercury, Total	0.2	SM3112B	0	0	0	0	4	ug/l	#/day	
9M	Nickel, Total	50	200.7	0	0	0	0	4	ug/l	#/day	
10M	Selenium, Total	10	SM3113B	0	0	0	0	4	ug/l	#/day	
11M	Silver, Total	100	200.7	0	0	0	0	17	ug/l	#/day	

3. If other data is available (i.e., DMR data, etc.), the past year of data may be used to determine 3a, 3b, 3c, and 5.

3.a. Maximum Daily Value – Report the highest daily value or daily average value from the last year of data. Report both mass and concentration.

3.b. Average of Analysis – Determine the average of all samples taken within the past year. Report both mass and concentration.

3.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

* It is in the applicant's interest to achieve the lowest level of detection possible. This will minimize uncertainty and therefore the need for additional analysis or potential for establishing a large

Applicant Name: Pennsylvania Brine Treatment, Inc

POLLUTANT GROUP 2 Metals		1. MDL Used* (µg/L)	2. EPA Method Number Used	3. Level Present					4. Units		5. Coefficient of Effluent Variability (CV)
				a. Max Daily Value		b. Average of Analysis		c. Number of Analysis			
				Concentration	Mass	Concentration	Mass		Concentration	Mass	
12M	Thallium, Total			NA							
13M	Zinc, Total	50	200.7	0	0	0	0	4	ug/l	#/day	
14M	Cyanide, Total			NA							
14M	Cyanide, Free			NA							
15M	Phenols, Total	5	420.1	108	0.10	46.21	0.05	4	ug/l	#/day	

3. If other data is available (i.e., DMR data, etc.), the past year of data may be used to determine 3a, 3b, 3c, and 5.

3.a. Maximum Daily Value – Report the highest daily value or daily average value from the last year of data. Report both mass and concentration.

3.b. Average of Analysis – Determine the average of all samples taken within the past year. Report both mass and concentration.

3.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

* It is in the applicant's interest to achieve the lowest level of detection possible. This will minimize uncertainty and therefore the need for additional analysis or potential for establishing a large number of effluent limits and/or monitoring requirements in the final NPDES permit.

Applicant Name: Pennsylvania Brine Treatment, Inc

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

ANALYSIS RESULTS TABLE POLLUTANT GROUP 3
MODULE 6

Before completing this form, read the step-by-step instructions provided in Appendix 1.

APPLICANT NAME: Pennsylvania Brine Treatment, Inc Rouseville Facility

- ☐ Outfall Number _____ (Show location of sampling point on Line Drawing)
- ☐ Intake Sampling Results - Optional (Specify Source: _____)
- ☐ Background Sampling Results - Optional (Specify Location: _____)
- ☐ Treatment Facility Influent Sampling Results (Show location of sampling point on Line Drawing)
- ☒ New Discharge (Basis for Information: PBT Franklin Facility)
- ☐ Bypass or Sewer System Overflow (Describe: _____)

POLLUTANT GROUP 3 Volitales		1. MDL Used* (µg/L)	2. EPA Method Number Used	3. Level Present					4. Units		5. Coefficient of Effluent Variability (CV)
				a. Max Daily Value		b. Average of Analysis		c. Number of Analysis			
				Concentration	Mass	Concentration	Mass		Concentration	Mass	
1V	Acrolein			NA							
2V	Acrylonitrile			NA							
3V	Benzene	5	624/8260B	141	0.13	108.97	0.14	4	ug/l	#/day	
5V	Bromoform			NA							
6V	Carbon Tetrachloride			NA							
7V	Chlorobenzene			NA							
8V	Chlorodibromomethane			NA							
9V	Chloroethane			NA							
10V	2-Chloroethylvinyl Ether			NA							

3. If other data is available (i.e., DMR data, etc.), the past year of data may be used to determine 3a, 3b, 3c, and 5.

3.a. Maximum Daily Value – Report the highest daily value or daily average value from the last year of data. Report both mass and concentration.

3.b. Average of Analysis – Determine the average of all samples taken within the past year. Report both mass and concentration.

3.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

* It is in the applicant's interest to achieve the lowest level of detection possible. This will minimize uncertainty and therefore the need for additional analysis or potential for establishing a large number of effluent limits and/or monitoring requirements in the final NPDES permit.

Applicant Name: Pennsylvania Brine Treatment, Inc

POLLUTANT GROUP 3 Volitales		1. MDL Used* (µg/L)	2. EPA Method Number Used	3. Level Present					4. Units		5. Coefficient of Effluent Variability (CV)
				a. Max Daily Value		b. Average of Analysis		c. Number of Analysis			
				Concentration	Mass	Concentration	Mass		Concentration	Mass	
11V	Chloroform			NA							
12V	Dichlorobromomethane			NA							
14V	1,1-Dichloroethane			NA							
15V	1,2-Dichloroethane			NA							
16V	1,1-Dichloroethylene			NA							
17V	1,2 Dichloropropane			NA							
18V	1, 3-Dichloropropylene			NA							
19V	Ethylebenzene	5	624/8260B	25.90	0.03	17.87	0.02	4	ug/l	#/day	
20V	Methyl Bromide			NA							
21V	Methyl Chloride			NA							
22V	Methylene Chloride			NA							
23V	1,1,2,2-Tetrachloroethane			NA							
24V	Tetrachloroethylene			NA							
25V	Toluene	5	624/8260B	251.72	0.40	185.09	0.24	4	ug/l	#/day	
26V	1,2-Trans-dichloroethylene			NA							
27V	1,1,1-Trichloroethane			NA							
28V	1,1,2-Trichloroethane			NA							
29V	Trichloroethylene			NA							
31V	Vinyl Chloride			NA							

3. If other data is available (i.e., DMR data, etc.), the past year of data may be used to determine 3a, 3b, 3c, and 5.

3.a. Maximum Daily Value – Report the highest daily value or daily average value from the last year of data. Report both mass and concentration.

3.b. Average of Analysis – Determine the average of all samples taken within the past year. Report both mass and concentration.

3.c. A minimum of 3 Sampling Events required for process wastewater discharges, and a minimum of 1 Sampling Event for all other discharges, treatment facility influent, intake water and background.

* It is in the applicant's interest to achieve the lowest level of detection possible. This will minimize uncertainty and therefore the need for additional analysis or potential for establishing a large number of effluent limits and/or monitoring requirements in the final NPDES permit.