

WATER PERFORMANCE STANDARDS

The goal of the water standards is that there be zero contamination of fresh groundwater¹ and surface waters.

PERFORMANCE STANDARD 1

1. Operators shall maintain zero direct or indirect intentional discharges of shale wastewater (including drilling, flowback and produced waters) to surface water except as provided by this Standard.
2. In order to facilitate comprehensive wastewater management programs that consider environmental, safety, health, and economic factors, Operators may send shale wastewater to a Centralized Waste Treatment facility (CWT) for treatment and discharge if the Operator demonstrates the following conditions are satisfied at the CWT:
 - a. The CWT has, and is in substantial compliance with, a NPDES discharge permit to treat and directly discharge shale wastewater;
 - b. The CWT meets or exceeds a CRSD shale wastewater effluent performance standard to be based on current best available technology designed to prevent the discharge of toxic pollutants in toxic amounts;
 - c. The CWT must use best available technology for all fluids discharged. Best available technology requires a combination of distillation and biological treatment, with the addition of reverse osmosis if CRSD determines based on further analysis that it provides protection necessary to ensure effluent quality. CRSD may authorize the use of different technologies or combinations of technologies that provide equivalent or superior treatment;
 - d. The CWT adheres to acceptance procedures designed to assure that the wastewater delivered by the Operator is compatible with the other wastes being treated at the facility, treatable by the treatment system, and consistent with the specific waste stream the facility was permitted to treat and discharge;
 - e. The CWT does not indirectly discharge wastewater from a CRSD Operator through a POTW.
3. An uncertified Operator must meet the following obligations prior to certification to this Standard and a certified Operator must meet the obligations prior to the use of a new CWT for discharge:
 - a. Operator shall review, compile, analyze, and deliver to CRSD, publicly available information pertaining to the CWTs performance and permit compliance to demonstrate that the CWT satisfies Part 2(a).

¹ “Fresh groundwater” is “water in that portion of the generally recognized hydrologic cycle which occupies the pore spaces and fractures of saturated subsurface materials.”

- b. In order to help assure the permit writer has all information necessary to consider establishing limits on all pollutants in the expected influent, the permitting agency shall be provided the current CRSD list of chemicals believed to occur in the region's wastewater.
 - c. In order to confirm the CWT is operating as intended, the Operator shall demonstrate to CRSD that testing at the CWT satisfies the Initial Confirmatory Testing Program or a facility-specific Protocol approved by CRSD.
 - d. In order to evaluate the potential for CWT effluent toxicity, Operator shall complete WET Testing pursuant to the WET Testing Program or an alternative facility-specific Protocol approved by CRSD.
4. For so long as the Operator delivers shale wastewater to a CWT:
- a. Operator shall conduct effluent monitoring as specified in the CRSD Ongoing Monitoring Program or facility-specific Protocol approved for that CWT by CRSD.
 - b. Every six months, Operator shall review, compile, analyze and deliver to CRSD publically available information about the CWT's performance and permit compliance.
 - c. Unless CRSD determines that ongoing WET testing is not necessary, Operator shall complete WET testing at a frequency to be determined in the WET Testing Program or facility-specific Protocol.
5. Operators may not initiate, and will immediately cease, deliveries to a CWT:
- a. If the CRSD Board determines that discharges from the CWT may increase the risk of harm to human health or the environment. This determination may take into account data and reports submitted to CRSD under this standard, deterioration in effluent quality, research to be sponsored by CRSD or by other parties, and/or any other data or available research.
 - b. That exhibits substantial non-compliance with its NPDES permit.

Deliveries shall not be resumed until the Operator demonstrates to the satisfaction of CRSD that appropriate corrective measures have been made.

6. Operator reporting under this standard shall be as follows:
- a. Data from all testing and any additional information gathering required under this standard, shall be analyzed, compiled, and submitted to CRSD by the Operator.
 - b. Where an operator discovers a potential non-compliance with an existing NPDES discharge permit as part of the monitoring and auditing requirements required under this Standard, the Operator shall immediately report such findings to the CWT, the permitting agency, and CRSD.

Note: This standard does not apply to nor prohibit disposal of wastewater by deep well injection.

Adopted: August 19, 2013; Amended: December 9, 2014

Technical Guidance Effluent Monitoring Programs Wastewater Discharge Standard No. 1

Background

This document provides supporting guidance for implementing the Initial Confirmatory Testing and Ongoing Monitoring Programs required in sections 3.c and 4.a respectively of Standard No. 1. The framework for both programs is presented in the following sections. Final Ongoing Monitoring Protocols specific to conditions and circumstances of the CWT being monitored will be developed by the technical subcommittee and provided to the Standards Committee for approval. In all instances of testing and monitoring, samples will be analyzed by a laboratory that is accredited by the National Environmental Accreditation Program (NELAP).

Initial Confirmatory Testing Program

As noted in the standard, confirmatory sampling of the effluent must be completed at any CWT used for discharge. Representative effluent samples will be collected at the monitoring point specified in the CWT's NPDES permit.

Prior to initiation of sampling activities, a sampling and analysis plan (SAP) shall be developed by the Operator for review and approval by CSSD. The SAP shall detail sample collection and handling procedures including applicable QA/QC samples (field duplicates, trip blanks, and equipment rinsate blanks) and analytical lab(s) selected to perform analysis (if multiple labs are proposed, analyses performed by each lab shall be specified).

Unless modified by CSSD in a facility-specific Protocol, the list of parameters included as part of the initial confirmatory sampling and associated analytical methods are identified in Attachment A. Attachment A may be revised as additional science and knowledge is developed relative to shale wastewater constituents and available and approved analytical methods.

Unless modified by CSSD in a facility-specific Protocol, a minimum of five sampling events will be conducted over an appropriate period (the default period shall be 10 days unless an alternative period is approved by CSSD in the SAP) in order to ensure that discharges sampled are representative of treated effluent typically discharged by the facility being tested. The type of samples collected (grab vs. 24-hour composite) for each sampling event will be based on the monitoring requirements specified in the NPDES permit.

Full laboratory data reports and a summary table of all analytical results will be provided to CSSD following conclusion of the sampling event. Additionally, a summary report will be provided demonstrating that all work was performed in accordance with the applicable testing Program or Protocol and identifying any changes to the field or laboratory protocols that may have resulted in a deviation from expected results, in particularly any QA/QC issues.

Ongoing Monitoring Program

Unless established otherwise in a facility-specific Protocol, all monitoring tests conducted under this subsection will occur on a semi-annual basis, beginning six months after results are finalized for the Initial Confirmatory Testing Program.

Until modified by CSSD, ongoing monitoring will follow the same sampling and analysis procedures as specified in the Initial Confirmatory Testing Program. This includes the list of parameters and associated analytical methods included in Attachment A.

Full laboratory data reports and a summary table of all analytical results will be provided to CSSD following conclusion of the sampling event. Additionally, a summary report will be provided demonstrating that all work was performed in accordance with the applicable testing Program or Protocol and identifying any changes to the field or laboratory protocols that may have resulted in a deviation from expected results, in particular any QA/QC issues.

**Technical Guidance
Effluent Monitoring Program
Wastewater Discharge Standard No. 1**

**Attachment A
Analytical Parameters and Analytical Methods**

Analysis	Method
TOC	EPA 415.1
Aldehydes	SW-846 8315
VOCs	SW-846 8260B with 20 non-interpretive TICs
SVOCs	SW-846 8270C with 25 non-interpretive TICs
Pentanoic and Hexanoic Acids	8270C-TLS (Library Search)
Organic Acids	SW-846 8015B (mod)
Alcohols	SW-846 8015B (mod)
Glycols	LC/MS/MS 8321AMOD
TPH C8-C40	SW-846 8015B (TPH)
30 ICP Metals	SW-846 6010B
Anions - Sulfate, Chloride, Fluoride, Bromide	EPA 300
Ammonia	EPA 350.2
TDS	SM 2540D
Ra 226 and Ra 228, dissolved, insoluble	EPA 903.1 and 904
Acrylamide	EPA 603
MBAS	Method SM 5540 C-2000
Mercury	Cold Vapor Method EPA 245.7
Nonylphenol	WS-MS-0010
Nitrite	SW-846 9056/A
Nitrate	SW-846 9056/A
Hexavalent Chromium	SM 3500-Cr B-2009
Total Strontium	EPA 200.7
Thallium	EPA 200.8

CSSD Whole Effluent Toxicity (WET) Test Program (Including a Modification for Low Ionic Content Effluents)

Standard WET Testing Program

Background

WET testing is used to identify effluent toxicity which may be caused by the aggregate and/or synergistic toxic effects of a mixture of pollutants and other water quality parameters. WET testing is required by CSSD Standard 1 in order to evaluate the potential for CWT effluent toxicity. WET testing is also required as a part of ongoing effluent quality monitoring for facilities operating under the standard unless CSSD determines ongoing WET testing is not necessary in a particular case. WET testing will be conducted every six months, beginning six months after results are finalized for the initial WET test, unless CSSD determines another timeline is appropriate.

Specifications

Acute and chronic toxicity tests will be completed using the water flea (*Ceriodaphnia dubia*) and fathead minnow (*Pimephales promelas*). An additional chronic test will be completed using the alga *Raphidocelis subcapitata* (formerly known as *Selenastrum capricornutum* and *Pseudokirchneriella subcapitata*). All testing will be conducted in accordance with the following EPA methods [EPA 2002a,b]:

- 2002.0 *Ceriodaphnia dubia*, acute
- 2000.0 Fathead Minnow, *Pimephales promelas*, acute
- 1002.0 *Daphnia*, *Ceriodaphnia dubia*, survival and reproduction
- 1000.0 Fathead minnow, *Pimephales promelas*, larval survival and growth.
- 1003.0 Green alga, *Selenastrum capricornutum* (renamed to *Raphidocelis subcapitata* and also may be referred to as *Pseudokirchneriella subcapitata*), growth.

Tests will be conducted at five effluent concentrations using a dilution factor of 0.5 (see, for example, EPA 2002b, p. 204). Testing will be conducted under laboratory specific quality control standard operating procedures (SOPs) which are in conformance with NELAC and US EPA guidelines, where applicable.

Modification for Low Ionic Content Effluents

Background

Some wastewater treatment processes, such as distillation and reverse osmosis, may create effluents that are toxic due to the absence of salts or ions required to support aquatic life (ionic imbalance toxicity [SETAC 2004]). Low ionic content effluents that are expected to fail the **Standard WET Testing Program** may be evaluated for toxicity using this modification. The ionic imbalance toxicity is addressed by adding simple salts to effluent samples prior to testing for whole effluent toxicity. This modification is intended to capture any additional toxicity that might be present due to effluent pollutants.

Modifying Effluents for Ionic Imbalance Toxicity

Prior to preparing test solutions, effluent samples will be modified by the addition of physiologically required ions as specified in the EPA moderately hard synthetic freshwater recipe [EPA 2002a, p. 32]. Otherwise, all other requirements outlined in this Standard WET Testing Program remain the same..

Reporting Requirements

The laboratory should provide the Operator with proof of proper accreditation. The laboratory will provide a final report specifying sampling and testing methods, test conditions, amended effluent and test solution properties, materials, results, statistical determination of organism survival and reproduction rates at the established effluent concentrations, any unforeseen laboratory protocol deviations, any results that indicate a potential effluent toxicity, and conclusions and recommendations based on results. . In the event results or laboratory conclusions indicate a potential effluent toxicity, the appropriate EPA guidance documents will be followed, unless CSSD establishes otherwise, and CSSD will assist as needed with detailing the proper procedures for ongoing analysis.

References

EPA 2002a, “Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms,” Method Manual EPA-821-R-02-012, Fifth edition, U.S. Environmental Protection Agency, Office of Water, Washington, DC , available at:
http://water.epa.gov/scitech/methods/cwa/wet/upload/2007_07_10_methods_wet_disk2_atx.pdf.

EPA 2002b, “Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms,” Method Manual EPA-821-R-02-013, U.S. Environmental Protection Agency, Office of Water, Washington, DC, Fourth edition, available at:
http://water.epa.gov/scitech/methods/cwa/wet/upload/2007_07_10_methods_wet_disk3_ctf.pdf.

SETAC 2004, “Whole Effluent Toxicity Testing: Ion Imbalance,” Technical Information Sheet, Society of Environmental Toxicology and Chemistry, Pensacola, FL, available at:
https://www.setac.org/resource/resmgr/publications_and_resources/tip-ion.pdf.