

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Water Standards and Facility Regulation

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TITLE: Policy and Procedure for NPDES Permitting of Discharges of Total Dissolved Solids (TDS) -- *25 Pa. Code* §95.10

EFFECTIVE DATE: November 12, 2011

AUTHORITY: Pennsylvania Clean Streams Law (35 P.S. §§691.1 - 691.801). Pennsylvania Code, Title 25, Environmental Protection, Chapters 91 (Water Quality Provisions), 92a (NPDES Permitting, Monitoring and Compliance), 93 (Water Quality Standards), 95 (Wastewater Treatment Requirements), and 96 (Water Quality Standards Implementation).

POLICY: This guidance document provides guidance for the implementation of *25 Pa. Code* Chapter 95, §95.10, that establishes treatment requirements for discharges of Total Dissolved Solids (TDS).

PURPOSE: To provide guidance to the Department of Environmental Protection (DEP) staff regarding application of the requirements of §95.10 through NPDES permit actions related to discharges of TDS.

APPLICABILITY: This guidance applies to all discharges of wastewater in the Commonwealth of Pennsylvania subject to regulation under Chapter 92a (NPDES Permitting, Monitoring and Compliance) and Chapter 95 (Wastewater Treatment Requirements).

DISCLAIMER: The policies and procedures outlined in this guidance document are intended to supplement existing requirements. Nothing in the policies or procedures shall affect regulatory requirements.

The policies and procedures herein are not an adjudication or a regulation. There is no intent on the part of the Department to give these rules that weight or deference. This document establishes the framework, within which DEP will exercise its administrative discretion in the future. DEP reserves the discretion to deviate from this policy statement if circumstances warrant.

PAGE LENGTH: 31 pages

I. Introduction

The rivers and streams of Pennsylvania have limited assimilative capacity for TDS. Increasingly, TDS has become a statewide pollutant of concern and a threat to DEP's mission to prevent violations of water quality standards. Existing treatment practices for controlling pollutants in high-TDS wastewaters normally do not effectively remove TDS and its primary component solids, including sulfate and chloride. Instead, control of TDS and the associated adverse effects relies primarily on dilution of the wastewater by the receiving stream. Based on experience with the challenge in controlling sources of TDS, and recognizing that the emergence of the Marcellus Shale natural gas development play has increased that challenge, dilution can no longer be considered as the primary means to control TDS.

DEP has recognized the increased challenge and developed proactive measures: *25 Pa. Code* §95.10 was promulgated and became effective on August 21, 2010. The regulation establishes treatment requirements for new and expanding discharge loadings of TDS and related pollutants. The regulation exempts existing mass loadings of TDS from the treatment requirements, while new or expanding mass loadings of TDS are subject to the treatment requirements specified in the regulation.

Permits to discharge treated wastewater to surface waters are issued under the authority of both the Pennsylvania Clean Streams Law and the Federal Water Pollution Control Act through the National Pollutant Discharge Elimination System (NPDES). This policy and procedure implements the treatment requirements of §95.10 as they relate to the Pennsylvania Clean Streams Law. The provisions and requirements of §95.10 do not supplant or affect other requirements applicable to point sources contained in *25 Pa. Code* or Federal regulations.

Based on the provisions of §95.10, NPDES permit writers must be able to perform and document certain determinations:

- Identify discharges that have applicable requirements under §95.10.
- Identify discharges that are exempt from any treatment requirements under §95.10, as per the provisions of §95.10 (a).
- Identify and quantify existing mass loadings of TDS that are exempt from the treatment requirements of §95.10. According to §95.10 (a)(1), existing mass loadings are “the maximum daily discharge loads of TDS or specific conductivity that were authorized by DEP prior to August 21, 2010.” (This exemption applies only to the requirements of §95.10. All other applicable requirements are unaffected.)
- For proposed new and expanding mass loadings of TDS, determine when to apply the treatment requirements of §95.10 (b)(3) or (c) for facilities that are new, or which are expanding such that TDS loading is proposed to be increased. Determine appropriate permit conditions for the case where some loading from a discharge is existing mass loading, and some is expanding mass loading.
- Determine when a variance from the requirements of §95.10 (c) may be appropriate, how to apply and receive approval for the variance, and how to implement and document the variance conditions.

II. Definitions

Action Plan: A radiation protection action plan, developed and implemented as per *Final Guidance Document on Radioactivity Monitoring at Solid Waste Processing and Disposal Facilities*, DEP-ID: 250-3100-001, or in a manner at least as protective of the environment, facility staff and public health and safety and which meets all statutory and regulatory requirements.

AML: Average Monthly Limit (effluent limit).

BMP: Best Management Practice

- (i) Schedules of activities, prohibitions of practices, maintenance procedures and other management practices to prevent or reduce pollutant loading to surface waters of this Commonwealth.
- (ii) The term includes treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. The term includes activities, facilities, measures, planning or procedures used to minimize accelerated erosion and sedimentation and manage stormwater to protect, maintain, reclaim, and restore the quality of waters and the existing and designated uses of waters within this Commonwealth before, during and after earth disturbance activities.

CFS: Cubic Feet per Second [cfs] (flow).

CWT: Centralized Waste Treatment (industrial treatment facility).

DMR: Discharge Monitoring Report.

ELG: Effluent Limitation Guideline.

Existing mass loading: The TDS mass loading from a discharge that had been authorized by DEP prior to August 21, 2010, expressed in lb/day.

Expanding mass loading: The net increase in TDS mass loading, expressed in lb/day. It is equal to the total mass loading of TDS from an expanding discharge minus the existing mass loading, if any.

GUDI: Groundwater Under the Direct Influence (of surface water).

- (i) Any water beneath the surface of the ground with the presence of insects or other macroorganisms, algae, organic debris or large diameter pathogens such as *Giardia lamblia* and *Cryptosporidium*, or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity or pH which closely correlate to climatological or surface water conditions.
- (ii) The term does not include finished water.

IW: Industrial Wastewater (treatment facility).

MDL: Maximum Daily Limit (effluent limit).

MGD: Million Gallons per Day (flow).

Natural gas wastewater: Wastewater resulting from fracturing, production, field exploration, drilling, or well completion of natural gas wells.

New mass loading: The TDS mass loading from a new discharge, expressed in lb/day.

POTW: Publicly-Owned Treatment Works (sewage treatment plant).

TDS: Total Dissolved Solids.

WET: Whole Effluent Toxicity.

WQBEL: Water Quality-Based Effluent Limit.

WQN: Water Quality Network (instream sampling stations).

III. Policy

Discharge loadings of TDS authorized¹ by DEP, under NPDES permits or other authority that were issued or reissued prior to the effective date of §95.10 (August 21, 2010), are exempt from the treatment requirements of §95.10 until the net loading is to be increased. Only an increase in net TDS loading is considered to be a new or expanding discharge loading. Discharge loadings of TDS may be authorized by DEP without actual effluent limitations or monitoring requirements having been placed in an NPDES permit. In most cases, discharge TDS data (or in the case of mining operations, specific conductivity and sulfate data) are submitted with the sample results required for permit applications. Upon review of those data, DEP may determine that these loadings do not pose a threat to receiving water quality and thus limitations are not needed. In these cases, the TDS discharge has been authorized, but not limited. Therefore, if TDS (or conductivity) data have been reviewed by DEP as part of an application for an authorized discharge, the discharge loading of TDS has been authorized upon issuance of the permit (or other vehicle), regardless of whether there is an actual limitation or monitoring requirement. If the discharge is from an industry that is production-based, a currently-authorized discharge loading may not reflect past authorizations due to changes in product lines or current economic conditions. Therefore, §95.10 identifies the existing discharge loading of TDS as the maximum daily discharge loading authorized “prior to” August 21, 2010. This provision allows a discharger to have past authorized, or preexisting, TDS loadings considered as existing mass loadings.

Currently, authorized loadings of TDS, and its components such as sulfate and chloride, are considered to be the existing mass loadings, even if the facility typically has discharged at lower

¹ DEP’s interpretation of the term “authorization” as used in 25 Pa. Code Chapter 95 pertaining to the Wastewater Treatment Requirements final rulemaking can be found in a statement of policy available as DEP-ID: 385-0810-001 through DEP’s website at www.depweb.state.pa.us, keyword: eLibrary.

loadings than that authorized by its permit. If a facility applies for a net increase in its authorized TDS discharge loading, only the amount of the net increase in its authorized TDS loading will be considered as a new and expanding discharge of TDS subject to the requirements in this rule. Section 95.10 also clarifies that authorized loadings are not subject to the rule if they are merely being combined or relocated from one point in a watershed to another, so long as net mass loadings are not increased by the combination or relocation activity. Section 95.10 also clarifies that existing waste treatment facilities, such as POTWs and CWTs, that accept and treat wastes from other industries or sources under existing permit authorizations are not subject to this rule, so long as net mass loadings accepted and treated are not increased.

The provisions of §95.10 and this permitting guidance generally apply only to TDS loadings that originate in industrial or municipal wastewater that result from treatment processes (including chemical additions and reactions). If a discharge contains primarily TDS loadings that originate in industrial or municipal wastewater that result from treatment processes, then the treatment requirements of §95.10 apply to all of the TDS in the discharge. Examples of TDS loadings where the requirements of §95.10 generally do not apply are noncontact cooling water, or stormwater that does not come into contact with industrial materials and activities as described in §92a.32 (b). For stormwater that does come into contact with industrial materials and which is regulated under §92a.32(e), the provisions of §95.10 are applicable only to the extent that the stormwater has the potential to exceed 2,000 mg/L TDS.

The provisions and requirements of §95.10 and this permitting guidance do not supplant any other requirements applicable to NPDES permitting. All requirements regarding Water Quality-Based Effluent Limits (WQBELs); the results of any applicable final TMDL; applicable Effluent Limitation Guidelines or other technology-based limits; antidegradation requirements; or other requirements applicable under *25 Pa. Code* (including other sections of Chapter 95) or Federal regulations, remain fully applicable.

IV. General Considerations

Generally, no permit actions are required under this guidance until an NPDES permit is to be issued, reissued or amended. Generally, no treatment requirements are required until a new discharge is proposed or an existing discharge proposes a hydraulic expansion or a change of wastestream.

A new or existing discharge that treats wastewater other than natural gas wastewater may have no reasonable potential to exceed the 2,000 mg/L TDS concentration contained in §95.10 (c). While the treatment requirements of §95.10 (c) are applicable to such discharges, these discharges effectively are unaffected by the treatment requirements and there should be no permit actions applicable under this guidance for such discharges. These discharges exhibit the following characteristics: 1) TDS effluent concentrations are low compared to the 2,000 mg/L TDS concentration contained in the treatment requirements of §95.10 (c) (as a guideline, the TDS concentration should be less than 1,000 mg/L on a routine basis); and 2) there is no reasonable potential for the loading or concentration of TDS to increase to levels of concern under the provisions of §95.10. For instance, the discharge may be a POTW with no significant industrial inputs, or the discharge is a once-through cooling water discharge. There are no applicable requirements under this guidance for discharge loadings of TDS that have no reasonable potential to exceed the treatment requirements of §95.10 (c), provided that the discharge loading is associated with wastewater other than natural gas wastewater.

The provisions of §95.10 and this guidance generally apply only to the final discharge of process wastewater, not intermediate or internal points, except that process wastewater may not be diluted with stormwater or ambient water in order to meet the treatment requirements of §95.10. The provisions of §95.10 and this guidance apply to the composite TDS loading from the facility. Application of §95.10 applies to the sum total of outfalls covered by the permit, excluding any stormwater flows or discharges that contain TDS loadings where the requirements of §95.10 do not apply as described in Section III, Policy. Redistribution of the composite loading among discharges does not constitute an increased or changed loading. For instance, the relocation or combination of existing discharge points of existing mass loadings of TDS does not constitute a new or expanding mass loading unless the total mass loading of TDS is increased. Exemptions or requirements applicable to a discharge remain the same if the location or TDS loading distribution of outfalls changes, provided that mass loadings do not increase as per §95.10 (a)(1)(i), and no permit action has occurred that results in a new permit number. However, the relocation of outfalls, or the redistribution of loadings among those outfalls, has to be permissible under the conditions of the NPDES permit and all other applicable requirements.

Certain other requirements, unrelated to §95.10 requirements, are applicable through the NPDES program for discharges that receive or treat natural gas wastewater:

- a. For any facility that receives natural gas wastewater, where less than the full volume of natural gas wastewater received has been pretreated to the pollutant concentrations contained in §95.10 (b)(3)(iii), the facility should have a radiation protection Action Plan. Regulations at 25 *Pa. Code* §297.113 require that any wastewater treatment facility that treats residual waste develop and implement an RPAP. If those facilities operate under the Permit-by-Rule provisions of 25 *Pa. Code* §287.102, DEP requires those facilities to develop and implement an RPAP under the provisions of §287.102 (a)(6).
- b. For any facility that discharges treated natural gas wastewater, where less than the full volume of natural gas wastewater in effluent has been treated to the pollutant concentrations contained in §95.10 (b)(3)(iii), monitor and report requirements for radium 226/228 (combined) in pCi/L, gross alpha activity in pCi/L, and uranium in µg/L in effluent should be established in the permit. Monitoring frequency is as per established practice for toxic pollutants.
- c. For any facility that receives natural gas wastewater, where less than the full volume of natural gas wastewater received has been pretreated to the pollutant concentrations contained in §95.10 (b)(3)(iii), the treated effluent and the biosolids or other solid waste resulting from operation of the facility does not qualify for land application.
- d. WET testing for CWTs or other IWs that discharge treated natural gas wastewater, where less than the full volume of natural gas wastewater in effluent has been treated to the pollutant concentrations contained in §95.10 (b)(3)(iii), generally is recommended. WET testing for CWTs or other IWs that discharge treated natural gas wastewater, where the full volume of natural gas wastewater in effluent is treated to the pollutant concentrations contained in §95.10 (b)(3)(iii), generally is not recommended. A site-specific evaluation may be performed to determine the need for WET testing.

V. Existing Mass Loading of TDS

Integral to the implementation of §95.10 is the principle that existing, authorized mass loadings of TDS are exempt from any treatment requirements under §95.10. Section 95.10 (a)(1) effectively exempts any existing mass loading of TDS up to and including the maximum daily discharge loading for any existing discharge, provided that the loading was authorized prior to August 21, 2010. In addition, §95.10 (a)(7) sets a *de minimus* threshold value of 5,000 lb/d on an average annual basis, below which DEP will not consider the expanding mass loading as sufficient to trigger the treatment requirements. If there is a net increase in TDS loading of more than 5,000 lb/d above the previously authorized loading, treatment requirements may be required for certain discharges, but the treatment requirements are only applicable for the expanding mass loading (the wastewater associated with the portion of the loading in excess of the existing mass loading, as per §95.10 (a)(1)(ii)). Finally, applicable treatment requirements are different depending on whether the source wastewater is natural gas wastewater, or wastewater other than natural gas wastewater.

Existing mass loadings are tied to the NPDES permit number. They do not expire and may be carried forth through permit reissuances, and facility expansions and redesigns. However, existing mass loadings are terminated if an NPDES permit expires or is voided, or if the authorization was temporary for the purposes of technology demonstration or treatment feasibility. Existing mass loadings are terminated if DEP withdraws the authorization for a facility to treat TDS-laden wastewaters for cause, such as for improper operations or a repeated failure to meet permit conditions. Existing mass loadings are not portable or transferable, with some exceptions. Existing mass loadings transfer with the NPDES permit to any new owner. Existing mass loadings do not transfer with any action that requires a new NPDES permit number. As per §95.10 (a)(1)(i), existing mass loadings are not affected by any relocation of the affected outfall or outfalls.

Generally, existing mass loadings need be evaluated only at the point that an existing discharge proposes a hydraulic expansion or a change of wastestream. Existing mass loadings should be expressed on both an average daily and a maximum daily basis in order to conform with the requirements of §95.10 (a)(1) and (7). For the case where there is a discrepancy between the existing mass loading that was authorized (as determined from information or data submitted with the application, or effluent limits) and the existing mass loading that is observed (based on effluent data), and the permittee did not notify DEP of any change of wastestream as required based on §92a.24, the existing mass loading should be based on the TDS loading that was authorized by DEP prior to August 21, 2010.

A “change of wastestream” is an increased discharge or change of wastestream as described in 25 Pa. Code §92a.24, whereas a treatment facility wishes to begin accepting wastewater significantly different from wastewater as represented on previous permit applications. A CWT or other treatment facility requires DEP approval to begin accepting wastewater originating in the Marcellus Shale or other deep well formations. This wastewater exhibits a characteristic pollutant profile, including increased influent and effluent TDS concentration and loading, that qualifies as a change of wastestream. Increases in TDS or other pollutant loadings due to production increases unrelated to any expansion of the facility or fundamental change in the influent wastestream, or otherwise due to factors that have been considered in previous permit applications, are not a change in wastestream and may be included in the determination of existing mass loading for the facility.

The permit writer should determine the existing mass loading of TDS for a discharge. The general process to establish this should follow the procedure shown below, and relies primarily on existing effluent limits or application data to establish the existing mass loading. The existing mass loading determination should be performed using one of the following options in descending order of preference:

- a. If there are existing mass- or production-based TDS effluent limits, use these as the basis for the existing mass loading.
- b. If there are existing concentration-based TDS effluent limits, use the average concentration and average annual design flow to determine the average existing mass loading, and the maximum daily concentration and the maximum daily design flow (or other peak flow value) to determine the maximum existing mass loading.

NOTE: Loading (lb/day) = Flow (MGD) * Concentration (mg/L) * 8.34
 Loading (lb/day) = Flow (cfs) * Concentration (mg/L) * 5.4

- c. If no effluent limits for TDS are applicable, use TDS analysis data from the current and/or the prior permit applications as the basis for the average and maximum existing mass loading. Perform concentration/flow calculations as described above in subsection b. If no effluent limits for TDS are applicable, but monitoring and reporting through the DMR process has been performed, TDS analysis data from the DMRs also may be used as a basis for establishing the average and maximum existing mass loading. In general, the highest representative data may be selected from the average data values and the maximum data values that are available, provided that the representative data are consistent with DEP authorizations issued prior to August 21, 2010. In addition to TDS analytical data, the permit writer may consider the full design operating capacity of the production process, or authorized treatment process, as part of the previous authorization and a basis for determining the existing mass loading.
- d. For some discharges, neither application nor DMR data for TDS may be available. This should normally be limited to discharges of treated sewage below 0.1 MGD. In general, discharges of treated sewage below 0.1 MGD are not expected to be impacted by the treatment requirements of §95.10, but if necessary sampling of the discharge after August 21, 2010, may be performed to support the determination of average and maximum existing mass loading.

If neither application nor DMR data is available for a discharge that is not a discharge of treated sewage below 0.1 MGD, a site-specific evaluation should be performed to determine the appropriateness of sampling performed after August 21, 2010, to determine the average and maximum existing mass loading. The goal is to assure that any authorization of TDS loading is representative of DEP authorizations issued, either explicitly or implicitly, prior to August 21, 2010. Supplemental sampling may not be used as a basis to increase the existing mass load beyond that authorized prior to August 21, 2010, as determined based on application or DMR data. Supplemental sampling of a discharge may be most appropriate to characterize the variability of a discharge of TDS, thereby supplementing existing data from a previous application, or if no TDS data are available at all for some reason. Facilities that treat natural gas

wastewater are not eligible to use sampling performed after August 21, 2010, to determine the average and maximum existing mass loading.

If supplemental sampling is determined to be appropriate, the sampling plan should be designed to achieve representative results that characterize the average and maximum TDS mass loading, considering the frequency, duration, and seasonal and operational variation of the discharge. The suggested sampling plan in the preamble to the final rulemaking for Chapter 95, *Wastewater Treatment Requirements* (40 Pa.B. 4835, August 21, 2010), involving a minimum of 10 daily composite samples, representative of the discharge during normal operations and taken at least one week apart, had been intended as an example. It may be most appropriate for a continuous discharge exhibiting minimal seasonal variation.

DEP authorizations may be explicit or implicit through processes not specifically addressed in this guidance. Consult *Chapter 95 - Total Dissolved Solids, Statement of Policy Defining the Term "Authorization"* DEP ID: 385-0810-001. Authorizations issued under circumstances not addressed in this guidance should be evaluated on a case-by-case basis, including the determination of whether sampling is appropriate to establish the determination of average and maximum existing mass loading. The goal is to assure that any authorization of TDS loading is representative of DEP authorizations issued, either explicitly or implicitly, prior to August 21, 2010. Authorizations for TDS discharge loadings that were previously in effect but have been reduced due to production changes, economic conditions, or similar factors generally should still be considered valid. Authorizations for TDS discharge loadings that were previously in effect but have been reduced due to changes in water quality standards, implementation procedures, or similar programmatic factors generally should not be considered valid.

Examples of loading-related determinations and calculations are contained in Appendix B.

VI. Existing Discharges with TDS Loadings Authorized Prior to August 21, 2010

All discharges contain TDS in some quantity. If a discharge is new or proposing to expand, see Sections VII or VIII, as applicable. Otherwise, during the review of a permit application for permit reissuance, the permit writer should classify an existing discharge into one of the following classifications:

Unaffected: If the discharge treats wastewater other than natural gas wastewater and the permit writer determines that the discharge has no reasonable potential to challenge the TDS concentrations contained in §95.10 (c) (2,000 mg/L; as discussed in Section IV), this determination should be documented in the Fact Sheet. If there is some doubt, for instance if the effluent TDS concentration may exceed 1,000 mg/L often, or approach 2,000 mg/L on some occasions, establish monitor and report requirements for TDS as a permit condition. Otherwise, no permit actions are necessary.

Exempt: The discharge is exempt from any treatment requirements under §95.10. This is the case if the discharge is listed in §95.10 (a)(2) through (6) or (8). It is either a post-mining pollutional discharge from an abandoned mine site; a surface mining activity with one or more existing discharges subject to Chapter 87 Subchapter F, Chapter 88 Subchapter G, or Chapter 90 Subchapter F; a discharge from an active coal mining operation with an open pit dimension of less than 450,000 sq. ft. exposed at any time; a discharge from an erosion and sediment control

facility at a surface mining activity as defined in §86.1; existing mine drainage directed to a mine pool that is treated in accordance with applicable requirements of Chapters 91 through 96; or a discharge with applicable ELGs for TDS, sulfate, or chloride. A discharge with no applicable ELGs for TDS, sulfate, or chloride may qualify as Exempt if EPA determined during the ELG development process that a technology-based limitation for TDS, chloride, or sulfate is not necessary. Such a discharge will be evaluated upon formal request on a case-by-case basis, and the determination based on EPA's reasoning for not establishing a technology-based limitation.

If a discharge is determined to be exempt from any treatment requirements contained in §95.10, classify the discharge as Exempt and note this in the Fact Sheet. Monitor and report requirements for TDS, specific conductivity, sulfate, chloride, or any other pollutant of concern may be appropriate to resolve uncertainties, to provide data to support a water quality analysis, or for other reasons beyond the scope of §95.10. Monitoring frequency is as per established practice for toxic pollutants.

Authorized Load/No Increase: The discharge existed on August 21, 2010, and has a discharge loading of TDS that has been authorized by DEP prior to August 21, 2010. In addition, effluent concentrations of TDS are such that the discharge cannot be classified as Unaffected. §95.10 (a)(1) provides that the existing mass loading of TDS from POTWs and industrial facilities are exempt from any treatment requirements under §95.10 so long as overall TDS loadings from the facilities do not increase. Effectively, §95.10 (a)(7) defines an increase in TDS loading as one that exceeds 5,000 lb/d on an average daily basis, such that increases in TDS loading below this threshold do not trigger any treatment requirement. Additionally, it is clear in the preamble to the regulation that expanding mass loadings for a discharge will be evaluated only when the discharge proposes to expand or experiences a change in wastestream. As per §95.10 (a)(1)(i), relocations of outfalls, redistribution of loading from outfall to outfall, or consolidation of loading from outfall to outfall, do not affect the status of a discharge for the purposes of §95.10.

Document the determination that the discharge is classified as Authorized Load/No Increase in the Fact Sheet. Document whether the discharge treats natural gas wastewater or wastewater other than natural gas wastewater. Establish monitor and report requirements for TDS as per established practice for toxic pollutants. These data may be needed to support the determination of existing mass loading at some point. Alternatively, the permit writer may perform that determination as soon as sufficient data are available, including the first permit reissuance following August 21, 2010. If the discharge treats natural gas wastewater, establish monitor and report requirements for chloride, total barium, and total strontium. Monitoring frequency is as per established practice for toxic pollutants.

VII. New or Expanding Discharges Treating Natural Gas Wastewater

A new or expanding wastewater treatment facility that treats natural gas wastewater should fit into one of the listed classifications:

Non-Exempt (Natural Gas): This is a new discharge, or an existing discharge, that proposes to start receiving and treating natural gas wastewater. The discharge has no applicable exemption for an existing mass loading of TDS authorized by DEP prior to August 21, 2010. It may be a CWT, IW, or a POTW or other sewage treatment facility that proposes to accept natural gas wastewater and has not done so previously. This classification may also apply if an Authorized

Load/No Increase or Conditionally Non-Exempt (Natural Gas) discharge surrenders or otherwise becomes ineligible to retain its existing mass loading for any reason.

For a CWT or other IW, establish the permit conditions listed below, or the WQBEL or applicable technology-based limit, whichever is most stringent.

- a. TDS 500 mg/L as AML; 1,000 mg/L as MDL
- b. Chloride 250 mg/L as AML; 500 mg/L as MDL
- c. Total Barium 10 mg/L as AML; 20 mg/L as MDL
- d. Total Strontium 10 mg/L as AML; 20 mg/L as MDL
- e. Additional loading-based limits should be established as required by 40 CFR 122.45. Monitoring frequency as per established practices for toxic pollutants.

As per §95.10 (b)(3)(ii), a POTW or other sewage treatment facility is prohibited from receiving natural gas wastewater unless the wastewater is pre-treated to levels no less stringent than those listed above prior to the POTW or other sewage treatment facility receiving the wastewater. A Part C condition should be established to implement this requirement for any affected POTW or other sewage treatment facility.

Conditionally Non-Exempt (Natural Gas): An existing discharge, which may be an CWT or other IW, or a POTW or other sewage treatment facility, currently treats natural gas wastewater. The discharge proposes to increase its average daily discharge TDS loading by at least 5,000 lb/d. At this point, the discharge should be classified as Conditionally Non-Exempt (Natural Gas) and its existing mass loading should be established. A discharge is not classified as Conditionally Non-Exempt (Natural Gas) until the additional wastewater discharged (or proposed to be discharged) is at least 5,000 lb/d on an average annual basis. But once that threshold is exceeded, the full increase in excess of the existing mass loading is subject to the treatment requirements of §95.10 (b)(3) for the listed pollutants. If the discharge receives wastewater other than natural gas wastewater in addition to natural gas wastewater, the TDS resulting from both types of wastewater are handled identically for calculation and permitting purposes.

For all facilities and activities classified as Conditionally Non-Exempt (Natural Gas), concentration-based effluent limits should be established based on a mass balance between the natural gas wastewater representing the existing mass loading and the wastewater representing the expanding mass loading. This mass balance calculation should be performed for TDS to produce both an average monthly limit (AML) and a maximum daily limit (MDL). That calculation will result in certain effluent limits for those pollutants, and those effluent limits should be established in the permit. If the WQBEL or an applicable technology-based limit is more stringent, it would be applied in the permit instead of the calculated limit. As an additional requirement and as per §95.10 (b)(3)(ii), POTW or other sewage treatment facilities are prohibited from receiving natural gas wastewater unless the wastewater is pre-treated to levels no less stringent than those listed in §95.10 (b)(3)(iii)-(vii) (TDS 500 mg/L as AML; chloride 250 mg/L as AML; total barium 10 mg/L as AML; total strontium 10 mg/L as AML) prior to the POTW or other sewage treatment facility receiving the wastewater. As per §95.10 (a)(1)(ii), this

requirement applies only to the natural gas wastewater received by the POTW or other sewage facility in excess of the natural gas wastewater that was received by the POTW or other sewage facility at the time that the existing mass loading, if applicable, was established. A Part C permit condition should be established enforcing this requirement, but only for the natural gas wastewater associated with the expanding mass loading.

The ability to perform the necessary calculations is dependent on the minimum required data being available, including the design flow of the facility, the expanding flow increment, and pollutant concentration data sufficient to produce the average daily existing mass loading and the maximum daily existing mass loading. If one or more of these data values are not available, use best estimates or contact the Environmental Engineer Manager, NPDES Permits Section, in central office. Effluent limits for chloride, total barium, and total strontium should also be calculated and assigned in the permit. There should be monitoring data available for these pollutants for any discharge treating natural gas wastewater. The mass balance can be performed using the existing average concentration for each pollutant and the facility flow, mass-balanced with the required treatment concentration in §95.10 (b)(3) and the expanding flow increment. See Appendix B for example calculations.

VIII. New or Expanding Discharges Treating Wastewater other than Natural Gas Wastewater

A new or expanding wastewater treatment facility that treats wastewater other than natural gas wastewater should fit into one of the listed classifications (unless it secures a variance for TDS):

Unaffected: If the discharge treats wastewater other than natural gas wastewater and the permit writer determines that the discharge has no reasonable potential to challenge the TDS concentrations contained in §95.10 (c) (2,000 mg/L; as discussed in Section IV), this determination should be documented in the Fact Sheet. If there is some doubt, for instance if the effluent TDS concentration may exceed 1,000 mg/L often, or approach 2,000 mg/L on some occasions, establish monitor and report requirements for TDS as a permit condition. Otherwise, no permit actions are necessary. A discharge also may be classified as Unaffected if it generally does not represent a net increase in TDS loading.

Exempt: Determine if the discharge is exempt from any treatment requirements under §95.10. This is the case if the discharge is listed in §95.10 (a)(2) through (6), or (8). It is Exempt if it is a post-mining pollutional discharge from an abandoned mine site; a surface mining activity with one or more existing discharges subject to Chapter 87 Subchapter F, Chapter 88 Subchapter G, or Chapter 90 Subchapter F; a discharge from an active coal mining operation with an open pit dimension of less than 450,000 sq. ft. exposed at any time; a discharge from an erosion and sediment control facility at a surface mining activity as defined in §86.1; existing mine drainage directed to a mine pool that is treated in accordance with applicable requirements of Chapters 91 through 96; or a discharge with applicable ELGs for TDS, sulfate, or chloride. A discharge with no applicable ELGs for TDS, sulfate, or chloride may qualify as Exempt if EPA determined during the ELG development process that a technology-based limitation for TDS, chloride, or sulfate is not necessary. Such a discharge will be evaluated upon formal request on a case-by-case basis, and the determination based on EPA's reasoning for not establishing a technology-based limitation.

If a discharge is determined to be exempt from any treatment requirements, note this in the Fact Sheet. Monitor and report requirements for TDS, specific conductivity, sulfate, chloride, or any

other pollutant of concern may be appropriate to resolve uncertainties, to provide data to support a water quality analysis, or for other reasons beyond the scope of §95.10. Monitoring frequency is as per established practice for toxic pollutants.

Non-Exempt (Other): The discharge treats wastewater other than natural gas wastewater, and is a new discharge, or otherwise has no applicable existing mass loading of TDS. It discharges, or proposes to discharge, TDS at levels of concern (2,000 mg/L or greater), and has not secured a variance that would allow it to exceed 2,000 mg/L TDS and be classified as a discharge with Variance classification. Non-Exempt (Other) classification also would apply to an existing discharge with no existing mass loading that has proposed to expand its TDS loading to levels of concern. This classification may also apply if an Authorized Load/No Increase or Conditionally Non-Exempt (Other) discharge surrenders or otherwise becomes ineligible to retain its existing mass loading for any reason.

For all facilities and activities classified as Non-Exempt (Other), establish the permit conditions listed below, or the WQBEL or applicable technology-based limit, whichever is most stringent.

- a. TDS 2,000 mg/L as AML; 4,000 mg/L as MDL
- b. Additional loading-based limits should be established as required by 40 CFR 122.45. Monitoring frequency as per established practices for toxic pollutants.

Conditionally Non-Exempt (Other): An existing discharge, which may be an CWT or IW, or a POTW or other sewage treatment facility, currently treats wastewater other than natural gas wastewater. The discharge proposes to increase its average daily discharge TDS loading by at least 5,000 lb/d. At this point, the discharge should be classified as Conditionally Non-Exempt (Other) and its existing mass loading should be established. A discharge is not classified as Conditionally Non-Exempt (Other) until the additional wastewater discharged (or proposed to be discharged) is at least 5,000 lb/d on an average annual basis. But once that threshold is exceeded, the full increase in excess of the existing mass loading is subject to the treatment requirements of §95.10 (c) (2,000 mg/L for TDS).

For all facilities and activities classified as Conditionally Non-Exempt (Other), concentration-based effluent limits should be established based on a mass balance between the wastewater representing the existing mass loading and the wastewater representing the expanding mass loading. This mass balance calculation should be performed for TDS to produce both an average monthly limit (AML) and a maximum daily limit (MDL). That calculation will result in certain effluent limits for those pollutants, and those effluent limits should be established in the permit. If the WQBEL or an applicable technology-based limit is more stringent, it would be applied in the permit instead of the calculated limit.

The ability to perform the necessary calculations is dependent on the minimum required data being available, including the design flow of the facility, the expanding flow increment, and TDS concentration data sufficient to produce the average daily existing mass loading and the maximum daily existing mass loading. If one or more of these data values are not available, use best estimates or contact the Environmental Engineer Manager, NPDES Permits section, in central office. The mass balance can be performed using the existing average concentration for TDS and the facility flow, mass-balanced with the required treatment concentration (2,000 mg/L)

in §95.10 (c) and the expanding flow increment. Document all determinations and uncertainties in the Fact Sheet. See Appendix B for example calculations.

IX. Variances

Variance: If a variance is approved for a discharge, the discharge is subject only to the conditions of the variance as documented in the Fact Sheet. The applicable effluent limits should be established in Part A of the permit. Discharges that treat natural gas wastewater, in whole or in part, are not eligible for a variance.

A new or expanding discharge treats wastewater other than natural gas wastewater. The discharge proposes to increase its monthly average TDS discharge concentration to more than 2,000 mg/L, and the discharge flow is such that the increase in loading to surface waters will be greater than 5,000 lb/d. If the discharge has an existing mass loading, the existing mass loading will no longer be applicable if the variance is approved.

The applicant or permittee should submit all necessary information (see below) to the responsible permit writer. The permit writer should verify that the submission is complete and will satisfy the requirements for submission and approval of variance requests, and ensure that the variance request includes specific proposed effluent loading limits for TDS, both as an AML and an MDL. The permit writer also should make a recommendation for approval or denial, based on his or her assessment of the appropriateness of the variance, water quality considerations, applicable technology-based requirements, and the requirements of §95.10. A variance request by an applicant or a permittee should be based on the minimum loading of TDS necessary for the discharge to avoid costly and unnecessary treatment requirements. A variance request should not be based on the full available assimilative capacity of the receiving water. Variance requests should be submitted to regional management and the Environmental Engineer Manager, NPDES Permits Section, in central office, for joint approval. Variance requests not approved by central office are not considered valid and will not satisfy the requirements of §95.10. If the variance request is approved, document the terms of the variance and the approval in the Fact Sheet. Include the name of the approving managers and the date of the approval. (No forms or further documentation is required for variance processing or approval at this time. In the Order that accompanied the final-form Chapter 95 regulation, DEP specified that forms would be developed to support the variance process. However, upon further consideration, these forms may not be needed, and they will be developed only if DEP determines that they are needed to support the variance process.) For all variance conditions expressed as numeric effluent limits, establish the variance conditions in Part A where practicable.

Requirements for Submission of a Variance: A request for a variance to the requirements of §95.10 (c) should be submitted to DEP and be accompanied by the following information:

- a. An analysis of the applicant's existing discharge loadings of TDS, and the projected new discharge loadings associated with the proposed new and expanding mass loadings of TDS.

The analysis should include existing flow rates and loadings based on an annual average, monthly average, and maximum daily concentration. The analysis should also include proposed flow rates and loadings based on a monthly average and maximum daily basis, and a brief description of how the loadings were estimated or calculated.

- b. An analysis of the applicant's existing treatment facilities and the ability of those facilities to meet the requirements of §95.10 (c).

The applicant should describe the treatment facility, including major treatment process components, tank volumes and retention times. The description should include a comparison of the capacity of the treatment facility with the existing flow and loadings. The description should also include treatment chemicals and describe treatment reactions. Include a schematic diagram of the processes and chemical application points.

- c. An analysis of the upgrades necessary to bring the applicant's existing facility into compliance with the 2,000 mg/L discharge requirement and the estimated costs associated with such upgrades.

If the existing facility cannot meet the 2,000 mg/L limit for the new or expanding discharge, detail the upgrades that will be needed at the facility to allow the facility to meet the limit for the new and expanding discharge. Show a breakdown of the costs to upgrade the treatment facility. The cost data should show the annualized costs for the construction and operation of the treatment facility, expressed in both dollars per year and dollars per gallon treated. Include a basic schematic diagram of the treatment processes that would be required to treat the new or expanding mass loading to 2,000 mg/L.

- d. An analysis of the receiving stream's water quality for TDS at, or upstream from, the proposed point of discharge.

The data should be sufficient to allow DEP to analyze the effects of the existing and proposed discharge on the stream. In order to be sufficient, the water quality data should include, at a minimum, date sampled, sample results (mg/L), and stream flow during the sampling event.

Requirements for Approval of a Variance: A variance to the requirements of §95.10 (c) may be approved by DEP only under the following conditions:

- a. A watershed analysis conducted by DEP determines that such a variance will not result in a reduction of available assimilative capacity for TDS to less than twenty-five percent (25%) of the total available assimilative capacity at the next downstream point of water quality standards compliance. Available assimilative capacity must be calculated using design flow conditions as per §96.4 (g).
- i. The available assimilative capacity at the nearest point of TDS compliance should be calculated using a mass balance approach at the Q_{7-10} design flow condition. For TDS, that compliance point should be the first downstream potable water supply intake or GUDI source.
- ii. The existing instream TDS concentration at the first downstream compliance point, projected to the Q_{7-10} flow condition, should be established to support the analysis. (Since TDS concentration and stream flow typically are inversely related in Pennsylvania's rivers and streams, the TDS concentration at the Q_{7-10} flow condition is most appropriate.) Contact the Water Quality Standards

Division in central office if insufficient data are available from WQN stations or other sources.

- iii. The permit writer should document in the Fact Sheet the estimated available assimilative capacity at the first downstream compliance point, and compare it to the loading associated with the requested variance and the 25% requirement. Contact the NPDES Permits section in central office for if assistance is required.
- b. The resulting instream concentration of TDS at the point of discharge from the new or expanding loading will not violate water quality standards contained in Chapter 93.

The permit writer should run PENTOXSD for osmotic pressure and any other toxic pollutant of concern. Since it would not be reasonable to assume an existing instream concentration for osmotic pressure of zero, an existing instream osmotic pressure at the point of discharge, projected to the Q_{7-10} flow condition, should be established. If only TDS data are available, the following relationship to estimate osmotic pressure using TDS concentration is recommended:

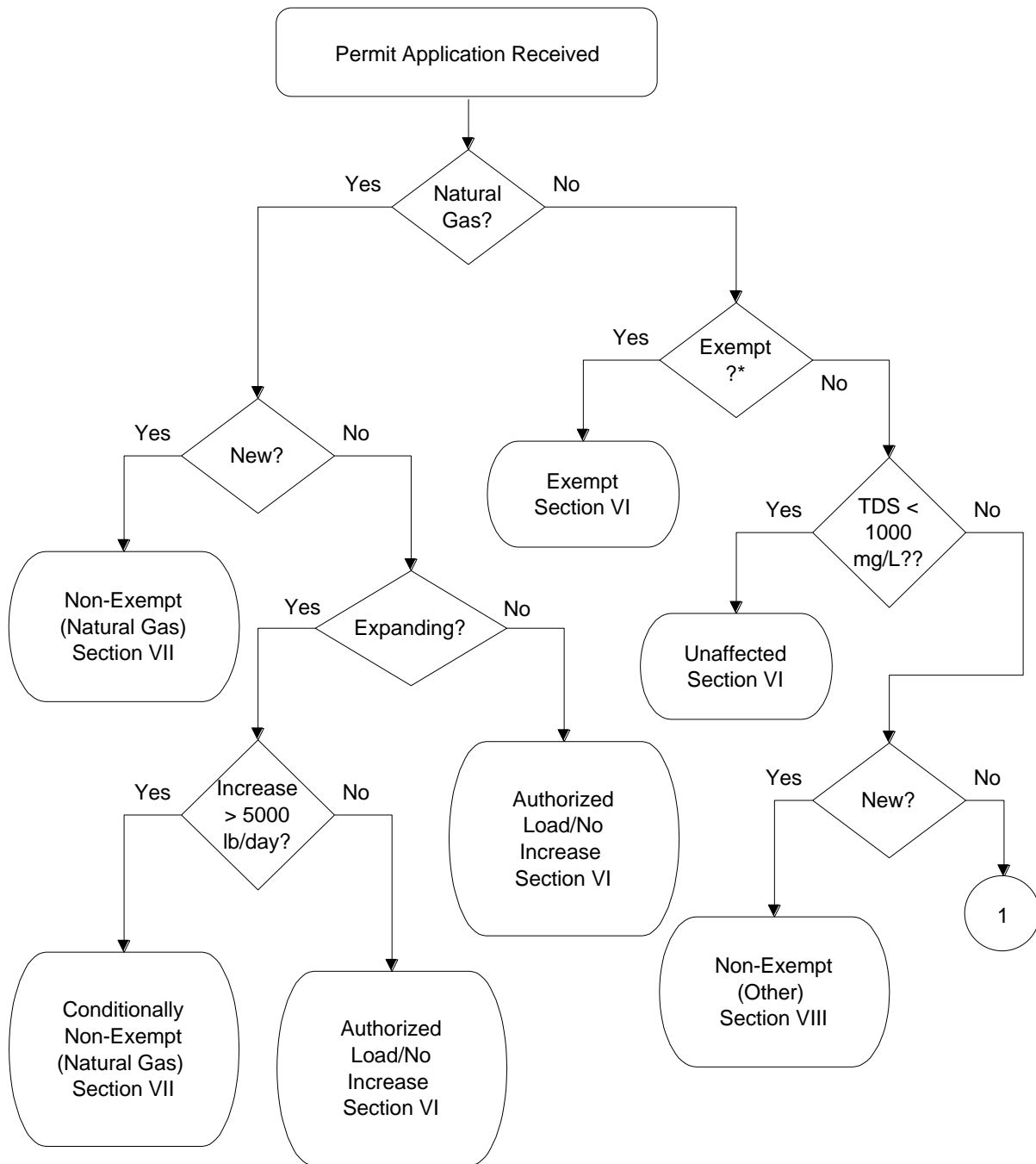
$$\text{Osmotic pressure (mOsm/kg)} * 34 = \text{TDS (mg/L)}$$

As an option to the above estimate, the permittee may choose to collect osmotic pressure data to characterize existing instream conditions. The samples should be collected over a range of flow conditions sufficient to establish the existing instream osmotic pressure at the point of discharge, projected to the Q_{7-10} flow condition.

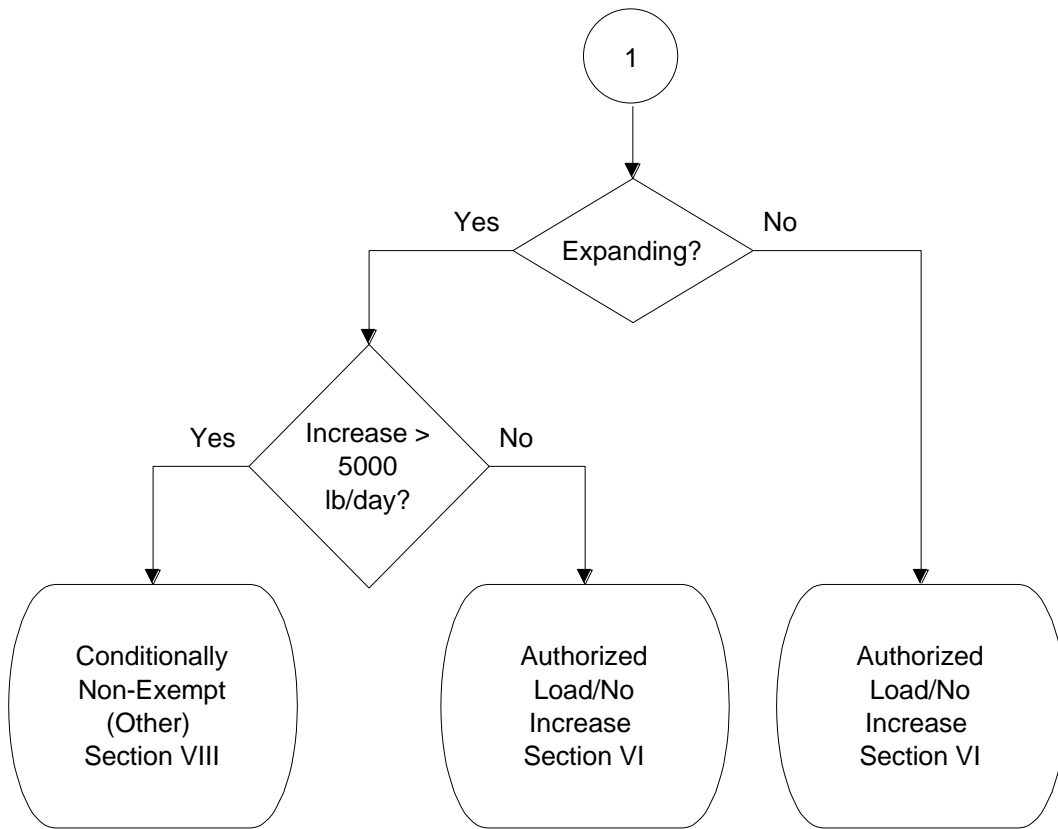
Based on the results of the analysis, establish an effluent limit in the permit for osmotic pressure in Part A (unless there is no reasonable potential for the discharge to challenge the effluent limit).

- c. Variance conditions should include a loading-based AML and MDL for TDS. Other permit conditions may be established as necessary for TDS and other pollutants, or based on a determination that other conditions are required for adequate control of the discharge loading. The conditions of the variance should be based on the minimum loading of TDS necessary for the discharge to avoid costly and unnecessary treatment requirements. A variance should not be based on the full assimilative capacity of the receiving water.
- d. Public notice of any approved variance should be performed. Since a variance should always be part of an NPDES draft permit, or an amended permit, the public notice process applicable to any draft or amended NPDES permit will satisfy the requirement for public notice of any variance that is approved.

Appendix A



* The discharge is classified as Exempt if it is listed in §95.10 (a)(2) through (6) or (8). It is either a post-mining pollutional discharge from an abandoned mine site; a surface mining activity with one or more existing discharges subject to Chapter 87 Subchapter F, Chapter 88 Subchapter G, or Chapter 90 Subchapter F; a discharge from an active coal mining operation with an open pit dimension of less than 450,000 sq ft exposed at any time; a discharge from an erosion and sediment control facility at a surface mining activity as defined in §86.1; existing mine drainage directed to a mine pool that is treated in accordance with applicable requirements of Chapters 91 through 96; or a discharge with applicable ELGs for TDS, sulfate, or chloride.



Appendix B

NOTE: Throughout all examples, apply the more stringent of any §95.10-based limits, WQBELs, or applicable technology-based limits or treatment requirements, as effluent limits.

Natural Gas Wastewater Examples

1. A 0.5 MGD CWT industrial facility treats natural gas wastewater as well as several other types of wastewater. There are no effluent limits for TDS or chloride, total barium, or total strontium. TDS has been monitored weekly via 24-hour composite sampling for 10+ years. There has been no monitoring of chloride, total barium, or total strontium, as these were not considered pollutants of concern in the past. Based on DMR data, the maximum monthly average concentration for the last three years was 48,000 mg/L in 2007, 69,000 mg/L in 2008, and 51,000 mg/L TDS in 2009. The maximum daily concentration was 64,000 mg/L in 2007, 82,000 mg/L in 2008, and 68,000 mg/L in 2009. Three sample results for TDS were submitted on the previous application for a permit, in 2004. These sample results were: 36,000 mg/L, 44,000 mg/L, and 49,000 mg/L. On the new application, there are additional sample results for TDS, similar to those submitted in 2004.
 - 1.1 *Scenario:* The permit is due for reissuance. *Permit actions:* Classify the facility as Authorized Load/No Increase, and document that determination in the Fact Sheet. Maintain existing monitoring for TDS, and establish monitoring requirements for chloride, total barium, total strontium, radium 226/228, gross alpha, and uranium. Establish a Part C condition that requires a radiation protection Action Plan. *Rationale:* Since this is an existing discharge with an existing mass load, the treatment requirements of §95.10 do not apply unless and until an expansion or a change of wastestream is proposed. Monitoring of chloride, total barium, and total strontium should be established because §95.10 establishes these pollutants as pollutants of concern for natural gas wastewater, and to provide a basis for any future WQBEL or mass balance calculations. Monitoring of radium 226/228, gross alpha, and uranium should be established because of the radiological concerns associated with solids in natural gas wastewater. A radiation protection Action Plan should be required for a CWT that accepts natural gas wastewater.
 - 1.2 *Scenario:* The discharge has applied for an expansion to a 0.75 MGD facility. As part of the proposed expansion, a new application has been submitted with sample results for TDS. These sample results are: 44,000 mg/L, 42,000 mg/L, and 37,000 mg/L (average value: 41,000 mg/L). *Permit actions:* Classify or reclassify the facility as Conditionally Non-Exempt (Natural Gas), and document that determination in the Fact Sheet. Maintain or establish monitoring requirements for chloride, total barium, total strontium, radium 226/228, gross alpha, and uranium. Maintain or establish a Part C condition that requires a radiation protection Action Plan. Calculate the mass balance effluent limits for TDS as described below. *Rationale:* The facility expansion is proposed as 0.25 MGD at an average discharge TDS concentration of 41,000 mg/L, which is equivalent to 85,485 lb/d (> 5,000 lb/d), so treatment requirements for TDS will be applicable and the discharge should be reclassified as Conditionally Non-Exempt (Natural Gas). Since this is an existing discharge with an existing mass loading, the treatment requirements of §95.10 (b)(3)(iii) apply only to the wastewater associated with the expanding mass loading. The objective is to establish effluent limits for TDS, chloride, total barium, and total strontium based on a mass balance calculation between the existing mass loading

and expanding mass loading. Since there is no basis for determining the existing mass loading of chloride, total barium, or total strontium, the best option is to establish monitoring requirements for these pollutants instead. Monitoring of radium 226/228, gross alpha, and uranium should be established because of the radiological concerns associated with solids in natural gas wastewater. A radiation protection Action Plan should be required for a CWT that accepts natural gas wastewater. The existing mass loading for TDS may be based on the highest values observed from the previous application or on recent DMRs.

The existing mass loading of TDS (average) is: $0.5 * 69,000 * 8.34 = 287,730$ lb/d
The existing mass loading of TDS (maximum) is: $0.5 * 82,000 * 8.34 = 341,940$ lb/d

The expanding mass loading of TDS (average) is: $0.25 * 500 * 8.34 = 1,043$ lb/d
The expanding mass loading of TDS (maximum) is: $0.25 * 1,000 * 8.34 = 2,085$ lb/d

Total mass loading (average): $287,730 + 1,043 = 288,773$ lb/d
Total mass loading (maximum): $341,940 + 2,085 = 344,025$ lb/d

Equivalent concentrations for total mass loading at 0.75 MGD:
 $288,773 / (0.75 * 8.34) = 46,200$ mg/L (AML)
 $344,025 / (0.75 * 8.34) = 55,000$ mg/L (MDL)

Effluent Limits: TDS AML: 46,200 mg/L, 288,773 lb/d
TDS MDL: 55,000 mg/L, 344,025 lb/d

A key point in this example is that the permit writer should determine an appropriate basis for the existing mass loading using best judgment and considering the requirements of §95.10. If application data from the previous permit cycle would support a higher existing mass loading, those data may be applied so long as the data are reasonably representative of recent operations, and no change in water quality standards or management expectations has occurred which may affect the validity of the original authorization. As a guideline, data older than 10 years (i.e. two permit cycles, or before the year 2000) should not be applied.

- 1.3 *Scenario:* Same as scenario 1.2, except that no DMR data for TDS are available. *Permit actions:* Same as scenario 1.2, except use the average of the 2004 application data to establish the average existing mass loading, and the maximum of the 2004 application data to establish the maximum existing mass loading.
- 1.4 *Scenario:* Same as scenario 1.2, except that there is a Part C condition limiting TDS loading to 180,000 lb/d. *Permit actions:* Same as scenario 1.2, except use 180,000 lb/d as the existing mass loading (average). Use application data, DMR data, or as a last resort a multiplier of 2.0 to establish the existing mass loading (maximum).
- 1.5 *Scenario:* Same as scenario 1.2, except that in the existing permit, TDS has a limit of 50,000 mg/L as an AML for TDS, and 75,000 mg/L as an MDL for TDS. Concentration-based limits for chloride, total strontium, and total barium also are in the permit. *Permit actions:* Same as scenario 1.2, except use $50,000 * 8.34 * 0.5 = 208,500$ lb/d as the TDS average existing mass loading. Perform similar calculations to

produce the TDS maximum mass loading, and all existing mass loadings for chloride, total strontium, and total barium. The expanding mass loadings for chloride, total strontium, and total barium should be based on the concentrations listed in §95.10 (b)(3)(iii).

2. A 0.25 MGD CWT industrial facility treats natural gas wastewater. There are no effluent limits for TDS or chloride, total barium, or total strontium. TDS has been monitored weekly via 24-hour composite sampling for 10+ years. There has been very limited monitoring of chloride, total barium, and total strontium based on DEP's recent request that the facility start monitoring these pollutants. Based on DMR data, the maximum monthly average concentration for the last three years is 48,000 mg/L in 2007, 59,000 mg/L in 2008, and 125,000 mg/L TDS in 2009. The maximum daily concentration in those three years was 64,000 mg/L in 2007, 82,000 mg/L in 2008, and 168,000 mg/L in 2009. Three sample results for TDS were submitted on the previous application for a permit, in 2004. These sample results were: 36,000 mg/L, 44,000 mg/L, and 49,000 mg/L. On the new application, there are additional sample results for TDS. These sample results are: 133,000 mg/L, 147,000 mg/L, and 184,000 mg/L (average value: 154,667 mg/L).

- 2.1 *Scenario: The discharge has applied for an expansion to a 0.5 MGD facility. Permit actions:* Classify or reclassify the facility as Conditionally Non-Exempt (Natural Gas), and document that determination in the Fact Sheet. Establish monitoring requirements for radium 226/228, gross alpha, and uranium. Establish a Part C condition that requires a radiation protection Action Plan. Calculate the mass balance effluent limits for TDS as described below. If there is a reasonable amount of data for chloride, total barium, or total strontium, calculate effluent limits in the same manner as those for TDS. Otherwise, establish monitoring requirements for chloride, total barium, and total strontium.
Rationale: The facility expansion is proposed as 0.25 MGD at an average discharge TDS concentration of 154,667 mg/L, which is equivalent to 322,480 lb/d (> 5,000 lb/d), so treatment requirements for TDS will be applicable and the discharge should be reclassified Conditionally Non-Exempt (Natural Gas). Since this is an existing discharge with an existing mass loading, the treatment requirements of §95.10 (b)(3)(iii) apply only to the wastewater associated with the expanding mass loading. The objective is to establish effluent limits for TDS, chloride, total barium, and total strontium based on a mass balance calculation of between the existing mass loading and expanding mass loading. If there is no basis for determining the existing mass loading of chloride, total barium, or total strontium, the best option is to establish monitoring requirements for these pollutants instead. The existing mass loading for TDS may be based on the highest values observed from the previous application or on recent DMRs. However, there is a complication in that in 2009, the CWT has been treating wastestreams with higher TDS concentrations than can reasonably be represented as loadings that have been authorized by DEP prior to August 21, 2010, and no notification of any change of wastestream was submitted prior to August 21, 2010. For this reason, the 2009 DMR data should not be used to establish the existing mass loading. Based on the permit writer's judgment, all other data are consistent with the 2004 application and are available to determine the existing mass loading. The highest average value is 59,000 mg/L and the highest maximum daily value is 82,000 mg/L.

The existing mass loading of TDS (average) is: $0.25 * 59,000 * 8.34 = 123,015$ lb/d
The existing mass loading of TDS (maximum) is: $0.25 * 82,000 * 8.34 = 170,970$ lb/d

The expanding mass loading of TDS (average) is: $0.25 * 500 * 8.34 = 1,043$ lb/d
The expanding mass loading of TDS (maximum) is: $0.25 * 1,000 * 8.34 = 2,085$ lb/d

Total mass loading (average): $123,015 + 1,043 = 124,058$ lb/d
Total mass loading (maximum): $170,970 + 2,085 = 173,055$ lb/d

Equivalent concentrations for total mass loading at 0.5 MGD:
 $124,058 / (0.5 * 8.34) = 29,750$ mg/L (AML)
 $173,055 / (0.5 * 8.34) = 41,500$ mg/L (MDL)

Effluent Limits: TDS AML: 29,750 mg/L, 124,058 lb/d
TDS MDL: 41,500 mg/L, 173,055 lb/d

Note that results from these mass balance calculations should be similar to those that would be obtained if the existing mass loading was simply distributed to the proposed new, higher hydraulic flow.

3. An application for a new 0.25 MGD CWT to treat natural gas wastewater has been received. Based on the application and discussions with the applicant, the facility will be designed to meet the treatment requirements of §95.10 (b)(3)(iii) (i.e. 500 mg/L TDS, 250 mg/L chloride, 10 mg/L total barium, and 10 mg/L total strontium). It is uncertain if the facility will even have a continuous discharge, or will sell or otherwise reuse the high-quality effluent.
 - 3.1 *Scenario: The permit is due for issuance. Permit actions:* Classify the facility as Non-Exempt (Natural Gas). At a minimum, establish effluent limits for TDS (500 mg/L as AML; 1,000 mg/L as MDL), chloride (250 mg/L as AML; 500 mg/L as MDL); total barium (10 mg/L as AML; 20 mg/L as MDL); and total strontium (10 mg/L as AML; 20 mg/L as MDL). Additional mass-based limits for these pollutants should be established as required by 40 CFR 122.45. Establish a Part C condition requiring a radiation protection Action Plan. *Rationale:* This facility should not be a significant source of TDS, but this is not certain until it is built and operated. As a discharge treating natural gas wastewater, it is not eligible for Unaffected classification in any case. Effluent limits should be established based on the provisions of §95.10 (b)(3)(iii). The CWT will receive raw natural gas wastewater, and consequently requires a radiation protection Action Plan. However, no radiological monitoring of the effluent should be required for facilities that will remove essentially all solids with associated radiological properties. Permit conditions for other possible pollutants of concern associated with hydro fracturing additives may be considered, but a treatment process designed to achieve the treatment requirements of §95.10 (b)(3)(iii) is likely to effectively remove all pollutants of concern. In any case, if the facility is built and operates as anticipated, the effluent limits can be reevaluated for the next permit cycle. The same rationale would apply to any expansion of the facility which will use treatment technology designed to achieve the provisions of §95.10 (b)(3)(iii).
4. A 0.75 MGD POTW or other sewage treatment facility treats sanitary wastewater, and receives natural gas wastewater at a variable rate, usually about 15,000 gal/d. Based on application data and limited recent sampling, the POTW TDS discharge concentration typically runs about 3,000 mg/L. There is no effluent limit or monitoring requirement in the permit for TDS or other

§95.10 pollutants of concern. The facility has been authorized to receive natural gas wastewater via letter approval from DEP in 2009. Although not specifically spelled out in the letter, the approval was understood to include Marcellus Shale-related wastewater. There was no flow or loading limit specified in the letter approval.

- 4.1 *Scenario: The permit is due for reissuance. Permit actions:* Classify the facility as Authorized Load/No Increase, and document that determination in the Fact Sheet. Establish monitoring requirements for TDS, chloride, total barium, total strontium, radium 226/228, gross alpha, and uranium. Establish a Part C condition requiring a radiation protection Action Plan. Establish a Part C condition limiting natural gas wastewater received to 15,000 gal/d. *Rationale:* Since this is an existing discharge with an existing mass load, the treatment requirements of §95.10 do not apply unless and until an expansion or a change of wastestream is proposed. Monitoring of chloride, total barium, and total strontium should be established because §95.10 establishes these pollutants as pollutants of concern for natural gas wastewater, and to provide a basis for any future WQBEL or mass balance calculations. Monitoring of radium 226/228, gross alpha, and uranium should be established because of the radiological concerns associated with solids in natural gas wastewater. TDS concentration in biological reactors in sewage treatment facilities should be limited to 4,000 mg/L or less to avoid inhibition of the biological treatment process. That does not seem to be an issue here, but the permit writer could consider limiting the maximum TDS concentration in the POTW effluent to 4,000 mg/L. The authorization to receive natural gas wastewater at 15,000 gal/d should be formalized in the permit. A radiation protection Action Plan should be required for any POTW that accepts natural gas wastewater (unless the wastewater has been pretreated as per §95.10 (b)(3)(iii)).
- 4.2 *Scenario: The discharge has applied for an expansion to a 1.25 MGD facility. Permit actions:* Same as scenario 4.1. *Rationale:* The facility expansion is proposed as 0.5 MGD at an average discharge TDS concentration of 3,000 mg/L, which is equivalent to 12,510 lb/d (> 5,000 lb/d), so treatment requirements for TDS normally would be applicable and the discharge should be reclassified Conditionally Non-Exempt (Natural Gas). However, the discharge proposes to increase only the sanitary flow and loading, and not the natural gas wastewater flow or loading, so the data may be misleading. The TDS concentration associated with the expanding flow will be lower, and may not exceed 5,000 lb/d. Even if it did exceed 5,000 lb/d, the intent of §95.10 is to establish treatment requirements only for natural gas or other high-TDS loadings, not sanitary wastewater where the TDS concentration is modest, and the proposed expansion of the POTW does not rise to the level of qualifying as an expanding mass loading under the provisions of §95.10. Therefore, the facility may retain an Authorized Load/No Increase status so long as the natural gas wastewater flow or loading is not proposed to increase. However, monitoring for all pollutants of concern should be established, the 15,000 gal/d authorization should be formalized, and the radiation protection Action Plan is still applicable.
- 4.3 *Scenario: The discharge proposes to accept additional natural gas wastewater for a total of 25,000 gal/d. Permit actions:* Classify the facility as Conditionally Non-Exempt (Natural Gas), and document that determination in the Fact Sheet. Establish effluent limits for TDS as described below. Establish monitoring requirements for chloride, total barium, total strontium, radium 226/228, gross alpha, and uranium. Establish a Part C

condition requiring a radiation protection Action Plan. Establish a Part C condition limiting natural gas wastewater received to 25,000 gal/d, with minimum 10,000 gal/d to be pretreated to the concentrations specified in §95.10 (b)(3)(iii) before the POTW receives the additional wastewater. *Rationale:* The discharge proposes to accept 10,000 gal/d of additional natural gas wastewater. No TDS concentration is specified, but it may not be needed. Based on the existing discharge concentration of 3,000 mg/L, and assuming a TDS concentration of 400 mg/L in the sanitary wastewater, the natural gas wastewater that has been authorized has an influent concentration of about 130,000 mg/L. An additional 10,000 gal/d of this natural gas wastewater would be equivalent to 10,842 lb/d (> 5,000 lb/d), so treatment requirements for TDS will be applicable and the discharge should be reclassified Conditionally Non-Exempt (Natural Gas). As per §95.10 (b)(3)(ii), the treatment requirements of §95.10 (b)(3)(iii) apply only to the natural gas wastewater that the POTW receives, and the Part C condition should be established to enforce this requirement, which is a treatment requirement specified under the Clean Streams Law. The existing and the expanding wastewater flows should be received separately to allow for independent tracking and enforcement of the Part C condition. Additionally, TDS effluent limits also are required to satisfy the requirements of §95.10 in regard to expanding mass loadings of TDS. There may be several ways to develop this limit - one method is shown here.

The existing mass loading of TDS (average) is: $0.75 * 3,000 * 8.34 = 18,765$ lb/d
 The existing mass loading of TDS (maximum) is: $0.75 * 4,000 * 8.34 = 25,020$ lb/d

The expanding mass loading of TDS (average) is: $0.01 * 500 * 8.34 = 42$ lb/d
 The expanding mass loading of TDS (maximum) is: $0.01 * 1,000 * 8.34 = 83$ lb/d

Total mass loading (average): $18,765 + 42 = 18,807$ lb/d
 Total mass loading (maximum): $25,020 + 83 = 25,103$ lb/d

Equivalent concentrations for total mass loading at 0.75 MGD:
 $18,807 / (0.75 * 8.34) = 3,007$ mg/L (AML)
 $25,103 / (0.75 * 8.34) = 4,013$ mg/L (MDL)

Effluent Limits: TDS AML: 3,007 mg/L, 18,807 lb/d
 TDS MDL: 4,013 mg/L, 25,103 lb/d

Note that results from these mass balance calculations should be similar to those that would be obtained if the existing mass loading was simply distributed to the proposed new, higher hydraulic flow.

- 4.4 *Scenario:* The discharge proposes to expand to 1.25 MGD and also to accept additional natural gas wastewater for a total of 25,000 gal/d. *Permit actions:* Same as scenario 4.3, except that an additional allowance may be made for the TDS loading associated with the expanding flow increment of sanitary wastewater. For example, $0.5 * 400 * 8.34 = 1,668$ lb/d could be added to the total mass loading (average and maximum) prior to calculating the AML and the MDL.

A key point is that, once the treatment requirements of §95.10 are determined to be applicable in part or in whole, a basis for an effluent limit for TDS should be established.

5. A 2.25 MGD POTW or other sewage treatment facility treats sanitary wastewater, and proposes to start receiving and treating natural gas wastewater at a variable rate up to 1% of the flow of the POTW. The POTW has submitted a complete application for a permit amendment. Based on application data and limited recent sampling, the natural gas wastewater has been characterized at concentrations up to 175,000 mg/L TDS, and other data on many potential pollutants of concern has been submitted.

5.1 *Scenario: You are processing the permit amendment. Permit actions:* Classify the facility as Non-Exempt (Natural Gas). Insert a Part C condition requiring all natural gas wastewater to be pretreated to the concentrations listed in §95.10 (b)(3)(iii) prior to the POTW receiving the wastewater for additional treatment. Establish monitoring requirements for TDS in the POTW effluent. *Rationale:* The POTW proposes to start accepting natural gas wastewater after August 21, 2010, and the proposed expanding mass loading exceeds 5,000 lb/d, so the treatment requirements of §95.10 (b)(3)(iii), as implemented by §95.10 (b)(3)(ii), are fully applicable and the facility should be reclassified as Non-Exempt (Natural Gas). The Part C condition should be established to implement the requirements of §95.10 (b)(3)(ii). This case may be an exception to the normal requirement that, once the treatment requirements of §95.10 are determined to be applicable in part or in whole, a basis for an effluent limit for TDS and other pollutants of concern should be developed. The Part C condition should alleviate any concern with TDS or any other pollutant of concern associated with natural gas wastewater. Monitoring requirements for TDS should be established as a check to assure that TDS discharge concentrations remain in the normal range and do not increase significantly. Monitoring requirements for other pollutants of concern may be considered, but a pretreatment process designed to achieve the treatment requirements of §95.10 (b)(3)(iii) is likely to effectively remove all pollutants of concern. No radiological monitoring or Action Plan is required because the solids with associated radiological properties have been removed in the pretreatment process.

5.2 *Scenario: Same as scenario 5.1, except that the POTW proposes to accept raw natural gas wastewater, but will limit the natural gas wastewater to 5,000 lb/d TDS on an average annual basis. Permit actions:* Classify the facility as Authorized Load/No Increase. Insert a Part C condition requiring all natural gas wastewater received to be monitored and reported: daily flow, TDS concentration, and TDS loading, not to exceed 5,000 lb/d. Establish monitoring requirements for TDS, chloride, total barium, total strontium, radium 226/228, gross alpha, and uranium in the POTW effluent. Establish a Part C condition requiring an radiation protection Action Plan. *Rationale:* The POTW proposes to start accepting natural gas wastewater after August 21, 2010, so the treatment requirements of §95.10 (b)(3)(iii), as implemented by §95.10 (b)(3)(ii), would normally be fully applicable. However, since the POTW will limit the expanding mass loading to the 5,000 lb/d threshold, the treatment requirements of §95.10 (b)(3)(iii), as implemented by §95.10 (b)(3)(ii), are not applicable unless and until the expanding mass loading of natural gas wastewater exceeds 5,000 lb/d. The Part C condition is necessary to enforce the loading limit, and the facility should be classified as Authorized Load/No Increase from §95.10 treatment requirements. Monitoring of TDS, chloride, total barium, and total strontium should be established for the POTW effluent because §95.10 establishes these pollutants as pollutants of concern for natural gas wastewater. TDS concentration in biological reactors in sewage treatment facilities should be limited to 4,000 mg/L or

less to avoid inhibition of the biological treatment process. That does not seem to be an issue here, but the permit writer could consider limiting the maximum TDS concentration in the POTW effluent to 4,000 mg/L. Monitoring of radium 226/228, gross alpha, and uranium should be established because of the radiological concerns associated with solids in natural gas wastewater. A radiation protection Action Plan should be required for any POTW that accepts natural gas wastewater (unless the wastewater has been pretreated as per §95.10 (b)(3)(iii)).

6. A 0.25 MGD CWT treats natural gas wastewater. The facility has a previously determined existing mass loading of 150,000 lb/d, reflecting a discharge concentration of about 72,000 mg/L TDS. The record supports these determinations (there are sufficient available data). The CWT now proposes to discharge 0.7 million lb/d without expanding their discharge flow, a loading equivalent to a discharge concentration of 336,000 mg/L TDS.

- 6.1 *Scenario: You are processing the permit amendment. Permit actions:* Classify the facility as Conditionally Non-Exempt (Natural Gas). Establish monitoring requirements for radium 226/228, gross alpha, and uranium. Establish a Part C condition that requires a radiation protection Action Plan. Calculate the mass balance effluent limits for TDS as described below. If there is a reasonable amount of data for chloride, total barium, or total strontium, calculate effluent limits in the same manner as those for TDS. Otherwise, establish monitoring requirements for chloride, total barium, and total strontium.
Rationale: The facility expansion is proposed to exceed 5,000 lb/d. Since this is an existing discharge with an existing mass loading, the treatment requirements of §95.10 (b)(3)(iii) apply only to the wastewater associated with the expanding mass loading. However, no associated increase in flow has been proposed. This is a scenario not directly addressed in §95.10, but the same principle may be applied: the treatment requirements should be applied to that portion of the wastewater associated with the expanding TDS loading. The objective is to establish effluent limits for TDS, chloride, total barium, and total strontium based on a mass balance calculation of between the existing mass loading and expanding mass loading. If there is no basis for determining the existing mass loading of chloride, total barium, or total strontium, the best option is to establish monitoring requirements for these pollutants instead.

The existing mass loading of TDS (average) is: 150,000 lb/d

The existing mass loading of TDS (maximum) is: 182,000 lb/d

The expanding mass loading of TDS (average) is: $700,000 - 150,000 = 550,000$ lb/d

The expanding mass loading of TDS (maximum) is: $775,000 - 182,000 = 593,000$ lb/d

Total mass loading (average): $150,000 + 0.25 * (550/700) * 8.34 * 500 = 150,820$ lb/d

Total mass loading (max): $182,000 + 0.25 * (593/775) * 8.34 * 1,000 = 183,595$ lb/d

Equivalent concentrations for total mass loading at 0.25 MGD:

$150,820 / (0.25 * 8.34) = 72,335$ mg/L (AML)

$183,595 / (0.25 * 8.34) = 88,055$ mg/L (MDL)

Effluent Limits: TDS AML: 72,335 mg/L, 150,820 lb/d

TDS MDL: 88,055 mg/L, 183,595 lb/d

Note that results from these mass balance calculations are only slightly more than the existing mass loadings and the associated concentrations. This makes sense because expanding mass loadings are severely constrained under §95.10.

Wastewater Other than Natural Gas Examples

7. A 1.0 MGD facility, which may be an industrial facility or a POTW or other sewage facility, treats wastewater other than natural gas wastewater. There are no significant industrial indirect sources, and none are projected. Application data are 420, 310, and 395 mg/L TDS.
 - 7.1 *Scenario:* The permit is due for reissuance. *Permit actions:* Classify the facility as Unaffected in regard to the requirements of §95.10 in the Fact Sheet. *Rationale:* This facility is not a significant source of TDS. The TDS concentration is less than 1,000 mg/L and, based on the best judgment of the permit writer, the discharge has no reasonable potential to challenge the TDS concentration (2,000 mg/L) that is established as the treatment requirement in §95.10 (c). If that determination changes in some subsequent permit cycle, the discharge can be reclassified as Non-Exempt (Other) or apply for a variance. If TDS discharge concentrations were higher but still well below 2,000 mg/L, monitoring requirements for TDS may be considered.
 - 7.2 *Scenario:* The discharge has applied for an expansion to a 1.5 MGD facility. *Permit actions:* Same as scenario 7.1. *Rationale:* Same as scenario 7.1. Even if the proposed expansion will increase the TDS loading by more than 5,000 lb/d, the discharge continues to have no reasonable potential to challenge the TDS concentration (2,000 mg/L) that is established as the treatment requirement in §95.10 (c).
 - 7.3 *Scenario:* A new indirect discharge will add 6,500 lb/d TDS, increasing the TDS discharge concentration to a maximum of 580 mg/L. *Permit actions:* Same as scenario 7.1. *Rationale:* Same as scenario 7.1. Even if the proposed expansion will increase the TDS loading by more than 5,000 lb/d, the discharge continues to have no reasonable potential to challenge the TDS concentration (2,000 mg/L) that is established as the treatment requirement in §95.10 (c).
8. A food production IW has an existing permit for an average design flow of 0.75 MGD, but currently flows at an average flow rate of 0.5 MGD since one production line is mothballed due to reduced demand. In previous years, the discharge flowed close to full design flow when all three production lines were active. Based on application data, the TDS discharge concentration is about 3,000 mg/L, and there are no monitoring requirements or effluent limits for TDS.
 - 8.1 *Scenario:* The permit is due for reissuance. *Permit actions:* Classify the facility as Authorized Load/No Increase, and document that determination in the Fact Sheet. Establish a monitoring requirement for TDS. *Rationale:* Since this is an existing discharge with an existing mass load, the treatment requirements of §95.10 do not apply unless and until an expansion or a change of wastestream is proposed. Monitoring of TDS should be established because §95.10 establishes TDS as a pollutant of concern, and the discharge is a significant source of TDS. It generally exceeds the 2,000 mg/L threshold concentration established in §95.10 (c).

- 8.2 *Scenario: Product demand is increasing, and the facility notifies DEP of its intent to activate the third production line and resume full operations (three product lines for total facility flow close to 0.75 MGD). Permit actions: Same as scenario 8.1. Rationale: Since the facility is still operating within its originally authorized load, the initiation or resumption of full operations does not qualify as an expanding mass loading for the purposes of §95.10.*
- 8.3 *Scenario: Increased product demand is projected, and the facility wants to expand by 0.25 MGD to a total of 1.00 MGD to accommodate a new, fourth production line. Permit actions: Classify the facility as Conditionally Non-Exempt (Other), and document that determination in the Fact Sheet. Establish effluent limits for TDS as described below. Rationale: The facility expansion is proposed as 0.25 MGD at an average discharge TDS concentration of 3,000 mg/L, which is equivalent to 6,255 lb/d (> 5,000 lb/d), so treatment requirements for TDS will be applicable and the discharge should be reclassified Conditionally Non-Exempt (Other). Since this is an existing discharge with an existing mass loading, the treatment requirements of §95.10 (b)(3)(iii) apply only to the wastewater associated with the expanding mass loading. The existing mass loading for TDS may be based on the highest values observed from the previous application or on recent DMRs. In this case, only application data are available. The average value is 3,000 mg/L and the highest value is 3,720 mg/L. The existing mass loading should be established based on the full design capacity of the system prior to the expansion, using the design flow rather than the actual flow. This is because the full design capacity constitutes the previously authorized load, regardless of whether that full design capacity has been used or not.*

The existing mass loading of TDS (average) is: $0.75 * 3,000 * 8.34 = 18,765$ lb/d
 The existing mass loading of TDS (maximum) is: $0.75 * 3,720 * 8.34 = 23,269$ lb/d

The expanding mass loading of TDS (average) is: $0.25 * 2,000 * 8.34 = 4,170$ lb/d
 The expanding mass loading of TDS (maximum) is: $0.25 * 4,000 * 8.34 = 8,340$ lb/d

Total mass loading (average): $18,765 + 4,170 = 22,935$ lb/d
 Total mass loading (maximum): $23,269 + 8,340 = 31,609$ lb/d

Equivalent concentrations for total mass loading at 1.0 MGD:
 $22,935 / (1.0 * 8.34) = 2,750$ mg/L (AML)
 $31,609 / (1.0 * 8.34) = 3,790$ mg/L (MDL)

Effluent Limits: TDS AML: 2,750 mg/L; 22,935 lb/d
 TDS MDL: 3,790 mg/L; 31,609 lb/d

In this case, where TDS in the effluent depends on production, concentration-based limits may be optional. The discharge is eligible to apply for a variance.

- 8.4 *Scenario: Increased product demand is projected, and the facility wants to expand by 0.25 MGD to a total of 1.00 MGD to accommodate a new, fourth production line. However, a more efficient process will be installed on the new production line such that the TDS concentration in wastewater from the new production line will not exceed 1,700 mg/L. Permit actions: Same as scenario 8.1. Rationale: The facility expansion is*

proposed as 0.25 MGD at an average discharge TDS concentration of 1,700 mg/L, which is equivalent to 3,545 lb/d (< 5,000 lb/d), so this is not an expanding mass loading and treatment requirements for TDS will not be applicable. The discharge should therefore be classified as Authorized Load/No Increase. Document in the Fact Sheet that any subsequent expansion that exceeds 1,455 lb/d (5,000-3,545) would trigger treatment requirements and cause the discharge to be reclassified as Conditionally Non-Exempt (Other).

8.5 *Scenario: Same as scenario 8.3, except that there is a Part A loading limit of 25,000 lb/d as an AML and 40,000 lb/d as an MDL in the existing permit. Permit actions: Same as scenario 8.3, except use 25,000 lb/d as the existing mass loading (average) and 40,000 lb/d as the existing mass loading (maximum).*

9. An IW has a permitted flow of 1.25 MGD, but normally flows at 0.75 MGD or less, due to production improvements made several years ago. TDS concentration in the discharge is 1,750 mg/L, and the facility proposes to expand by 0.6 MGD. The current permit has no TDS concentration or mass limits in their permit.

9.1 *Scenario: You are processing the permit amendment. Permit actions: Classify the facility as Authorized Load/No Increase, and document that determination in the Fact Sheet. Establish a monitoring requirement for TDS. Rationale: Since this is an existing discharge with an existing mass load, the treatment requirements of §95.10 do not apply unless and until an expansion or a change of wastestream is proposed. The discharge involves TDS concentrations high enough for reasonable potential to be established, and the proposed expansion is $0.6 * 1,750 * 8.34 = 8,757$ lb/d (> 5,000 lb/d). However, the discharge is already operating consistent with the treatment requirements of §95.10 (c), and any calculated limit based on a mass balance will not be meaningful. Monitoring of TDS should be established because §95.10 establishes TDS as a pollutant of concern, and the discharge is a significant source of TDS. It has the potential to challenge the 2,000 mg/L threshold concentration established in §95.10 (c). Maintain the Authorized Load/No Increase classification for the discharge unless and until it proposes to discharge at > 2,000 mg/L TDS.*

10. A 0.7 MGD POTW or other sewage treatment facility treats sanitary wastewater, and receives industrial indirect wastewater other than natural gas wastewater. Based on application data, the POTW TDS discharge concentration typically runs about 1,200 mg/L. There is no effluent limit or monitoring requirement in the permit for TDS. As a smaller POTW, no pretreatment program is applicable. Based on conversations with the permittee, the industrial indirect discharge typically is 10,000+ mg/L TDS.

10.1 *Scenario: The permit is due for reissuance. Permit actions: Classify the facility as Authorized Load/No Increase, and document that determination in the Fact Sheet. Establish monitoring requirements for TDS in the POTW effluent. Rationale: Since this is an existing discharge with an existing mass load, the treatment requirements of §95.10 do not apply unless and until an expansion or a change of wastestream is proposed. The discharge involves indirect sources and TDS concentrations of sufficient concern for reasonable potential to be established, such that monitoring of TDS should be established in the permit. The TDS concentration of the indirect discharge is not meaningful to any*

requirements under §95.10, except insofar as it affects the TDS concentration in the final effluent.

11. A steam electric power generation station or other industrial facility uses a closed-cycle cooling system with cooling tower blowdown of 12 MGD. The discharge contains 1,100 to 2,400 mg/L TDS. The current permit does not include any limits for TDS.
 - 11.1 *Scenario:* The permit is due for reissuance. *Permit actions:* Classify the facility as Unaffected in regard to the requirements of §95.10, and document that determination in the fact sheet. *Rationale:* Section 95.10 applies only to net loadings of TDS as described in the preamble to the final rulemaking. The primary source of TDS in blowdown is natural, and the closed-cycle cooling system merely concentrates the natural concentrations of TDS, so it does not represent a net increase in TDS loading. This applies whether the source of makeup water is from public supply, groundwater or surface water. Non-contact cooling water discharges, including blowdown, generally do not have any applicable requirements under §95.10.
 - 11.2 *Scenario:* The discharger has applied for a permit amendment for an expansion of cooling tower blowdown to 15 MGD after August 21, 2010. *Permit actions:* Same as scenario 11.1. The size or timing of the discharge is not relevant.
12. An IW upgrades or changes its production line to produce a new or different product, or otherwise changes its existing production line or chemical additives. The facility has an existing mass loading previously established as 42,100 lb/d. The total TDS discharged remains at less than 42,100 lb/d, or any additional TDS is less than 5,000 lb/d.
 - 12.1 *Scenario:* The permit is due for reissuance. *Permit actions:* Classify the facility as Authorized Load/No Increase, and document that determination in the Fact Sheet. Maintain the existing mass loading of 42,100 lb/d, and maintain or establish permit conditions for TDS against that loading. *Rationale:* Since this is an existing discharge with an existing mass loading, the treatment requirements of §95.10 apply only when an increase in net TDS loading exceeds 5,000 lb/d. Proposed changes to the facility or its operation do not trigger the §95.10 treatment requirements unless they exceed this threshold. If the facility had not been previously evaluated for compliance with §95.10, the permit writer should classify the facility as Authorized Load/No Increase, determine the existing mass loading, and establish appropriate permit conditions against the loading.

Variance

13. An industrial facility has been proposed on the Clarion River near Millcreek, PA. The discharge is proposed as 0.15 MGD with TDS concentration not to exceed 10,000 mg/L as an average loading and 12,000 mg/L as a maximum daily loading. To avoid expensive treatment, the discharge has applied for a variance. All of the required information has been submitted by Hess Engineers, Inc. The first downstream compliance point for evaluation is the potable water supply intake at Clarion on the Clarion River.
 - 12.1 *Scenario:* You are processing the variance. *Permit actions:* Since the variance has been approved, classify the facility as Variance for the purposes of §95.10, and document that determination in the Fact Sheet. Establish the variance conditions in the permit as

described below. Since this variance should be subject to public notice, describe in the Fact Sheet how the applicant has justified the variance by satisfying the conditions of §95.10 (d) and (e), and how DEP determined that approval was justified. *Rationale:* The applicant has submitted complete information sufficient to meet the requirements for a variance under §95.10 (d) and (e), and both NWRO and central office management have approved the variance after performing a watershed-based analysis at the next downstream potable water supply intake, and evaluating local water quality impacts. This process is described below:

Hess Engineers used water quality data from WQN station 822 (Clarion River at Cooksburg, PA) to evaluate upstream existing TDS concentrations. The consultant concluded that existing instream TDS concentrations “are generally less than 225 mg/L.” No supplemental data were collected. In its review and analysis, DEP agreed that WQN 822 data are sufficiently representative of conditions at Millcreek, and a flow dependent relationship for TDS was established. Based on a linear regression for data from WQN 822, the following relationship was established:

$$\text{TDS (mg/L)} = -47.766 \cdot \ln(\text{stream flow [cfs]}) + 477.08$$

The Q_{7-10} flow at WQN 822 is 105 cfs, at Millcreek is 112 cfs, and at Clarion is 119 cfs. Using the developed relationship, the existing TDS concentration at WQN 822 is estimated as 255 mg/L at the Q_{7-10} condition. The total available assimilative capacity at Clarion, PA is:

$$\begin{aligned} \text{Average:} & \quad (500-255) * 119 \text{ cfs} * 5.4 = 157,437 \text{ lb/d} \\ \text{Maximum:} & \quad (750-255) * 119 \text{ cfs} * 5.4 = 318,087 \text{ lb/d} \end{aligned}$$

However, we may not exceed 75% of total available assimilative capacity, so subtract 25% of the total assimilative capacity from the total available loading:

$$\begin{aligned} \text{Average:} & \quad 157,437 - (.25 * 119 * 500 * 5.4) = 77,112 \text{ lb/d} \\ \text{Maximum:} & \quad 318,087 - (.25 * 119 * 750 * 5.4) = 197,600 \text{ lb/d} \end{aligned}$$

available loading to avoid exceeding 75% of total assimilative capacity at Clarion, PA.

The proposed average loading is $0.15 * 10,000 * 8.34 = 12,510 \text{ lb/d}$, which is less than 77,112 lb/d and may be accommodated. The proposed maximum loading is $0.15 * 12,000 * 8.34 = 15,012 \text{ lb/d}$, which is less than 197,600 lb/d and may be accommodated. Also, a PENTOXSD analysis for the discharge indicates that there is no reasonable potential to exceed the osmotic pressure WQBEL at the point of discharge.

The variance conditions should be specified as 12,510 lb/d as an AML and 15,012 lb/d as an MDL.