

Potential Water Treatment Plant Effluent Guidelines & their Impact on Water Utilities

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The disposal of residuals generated in water treatment plants has been left to state regulatory agencies and local municipal agencies with jurisdiction over their sewage collection system to regulate under the Clean Water Act (CWA). Water treatment plants' residuals are typically generated from raw water pretreatment processes (e.g. alum sludge); softening process using chemical additives such as lime (lime sludge); and spent filter backwash water if it is not recycled to the head of the treatment plant, which is regulated under the Safe Drinking Water Act's Filter Backwash Rule.

Other types of residuals generated are brine solution from ion exchange process, reject solution from membrane process (e.g. nanofiltration), and sludge cake and elutriate/centrate/filtrate from sludge dewatering process (e.g. belt filter press or centrifuge).

Water treatment plants currently discharge disposal into either a municipal sewer system or to surface water. Discharging to a municipal system falls under the jurisdiction of the local authority that owns and operates the collection system. The local authority issues an Industrial Pretreatment Program (IPP) permit under its sewer ordinance and/or a National Pollutant Discharge Elimination System (NPDES) permit to the water utility for the discharge. Surface water discharge falls under the jurisdiction of a state regulatory agency that has the authority to issue an NPDES permit under the CWA authority.

Both types of permit have requirements for the discharged effluents with specific numerical limits that must be met. Sludge cake resulting from sludge dewatering, normally is sent to a landfill. If it is gravity thickened only, the sludge can be land applied. Some water utilities dispose of the sludge directly to the sanitary sewer.

Brine and reject solutions can be discharged by either of the two disposal methods; however, due to the nature of this wastewater, the effluent limitations will have very stringent requirements. Deep well injection is another disposal option for brine solution, but it does not fall under the CWA authority and requires a substantial permitting process.

Future Regulatory Plan

Section 304(m) of the CWA mandates

and directs the U.S. Environmental Protection Agency (EPA) to develop and publish an Effluent Guidelines Plan every other year. The EPA must publish its preliminary plan for public comment as a part of the rulemaking process.

Effluent guidelines are national regulations for controlling the discharge of pollutants to surface waters of the United States, termed as direct dischargers "effluent guidelines" and to publicly owned treatment works, termed as indirect dischargers "pretreatment standards."

Pretreatment standards are governed under the IPP to ensure that such discharges into the sewer collection systems:

- ◆ will not cause any damage to the collection system (general prohibitive requirements);
- ◆ will not cause a wastewater treatment plant to be in violation of its NPDES permit's effluent limits due to pollutants pass-through, biological treatment inhibition, and/or insufficient treatment;
- ◆ will not create a problem for its biosolids management program (Part 503 of the CWA) or its IPP as stipulated in the NPDES permit of the publicly owned treatment works.

Effluent guidelines are technology-based and specific to an industry; the EPA writes them for all types of industrial discharges, including manufacturing, agricultural, and service industries. Effluent guidelines have been published, so far, for 56 industries, preventing the discharge of more than 690 billion pounds of pollutants annually. The effluent guidelines program is one of the EPA's most successful environmental protection programs, absolutely reversing the surface-water degradation that accompanied the industrialization of the country.

The EPA presented a notice of its final 2004 Effluent Guidelines Program Plan¹, as well as a description of the agency's review process. This notice presented the agency's 2004 annual review and contained, among other things, the industrial sectors identified for effluent guidelines rulemaking and a schedule for such rulemaking.

The final plan identified four new industries, including *Drinking Water Supply and Treatment*. It is important to note that in the *Standard Industrial Classification Manual* published by the Executive Office of the President's Office of Management and Budget (OMB), drinking water supply and treatment

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is listed as an industry with an Industry Group No. 494 and an Industry No. 4941 (termed Standard Industrial Classification [SIC] Code 4941), classified in the Transportation and Public Utilities category.

Based on information in the 1997 Economic Census, the EPA estimated that there are 3,700 drinking water treatment and supply facilities in the country. The EPA's primary source of wastewater data for any facilities is the agency's Permit Compliance System. This database contains information required by the NPDES permit program for major dischargers across the country.

While the Permit Compliance System data suggests that many drinking water supply and treatment facilities discharging directly under an NPDES permit into surface waters (termed direct dischargers) are not discharging pollutants in significant concentrations, it is possible that some facilities (SIC Code 4941) may be discharging non-trivial quantities of toxic non-conventional pollutants or non-compatible pollutants with domestic sewage, including nutrients such as nitrogen and phosphorus.

Because the EPA has limited discharge data for a limited number of these facilities, the agency has decided to identify the drinking water supply and treatment industry sector in the 2004 Effluent Guidelines Program Plan and to complete an effluent guidelines rulemaking for industry SIC Code 9451 within three years.

As a first step in such determination, the EPA will be gathering additional discharge data on this *point source category*. The EPA must determine whether a "regulatory action" is needed and "significant" and therefore

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subject to the OMB review and the requirements of Executive Order 12866 (58 FR 51735, October 1993). A “regulatory action” is defined to include any substantive action by an agency which is expected to lead to the promulgation of a final rule or regulation within the three-year period as stated above.

In order to determine the necessity to establish a new rule/regulation for effluent guidelines or pretreatment standards for water treatment plants (SIC Code 4941), the EPA will collect information from drinking water treatment facilities. This initiative or plan was published in 69 FR 53705 (September 2, 2004)². On July 5, 2005, the agency published a notice in 70 FR 38675 of its intent to collect such information³. The EPA, to meet its planned rulemaking in August 2007 (later postponed to December 2007), conducted several data collection activities. A draft technical survey was announced in 70 FR 38675 (July 5, 2005)³, which will be used to provide the agency with preliminary, technical, and environmental data needed to:

- ◆ quantify any adverse environmental impacts of residuals discharges from these facilities;
- ◆ evaluate the effectiveness of treatment technologies for residuals disposal;
- ◆ determine the incremental pollutant removals and compliance costs for various residuals management options the EPA might consider for the proposed rule.

The subject survey is very comprehensive and includes, in addition to technical data, a request for financial information about the utilities. Collected data will include information on the quality of the source water, finished water production, current residuals management techniques, and characterization of the residuals, or wastewaters.

The purpose of the survey is to collect information and data from facilities that

serve populations greater than 10,000. After the OMB approved the information collection request (EPA ICR No. 2176.01), the survey questionnaire was mailed on February 22, 2007, to about 620 water utilities⁴.

This information collection request is conducted under the authority of the CWA, Section 308 (called a “308 request”), 33 U.S.C. 1318. Response to a 308 request is mandatory. A valid information collection request must display an OMB control number as required by 40 CFR Part 9, showing that the OMB has approved the EPA to send the 308 request.

The EPA’s most recent timetable for the rulemaking was to publish the proposed rule in December 2007 and the final rule in September 2009. The final rule will become effective 30 days after its publication in the Federal Register. Compliance with the final rule is immediate for new sources. For existing sources with indirect discharge, IPP compliance is required within three years after the effective date and on the next NPDES permit renewal cycle for existing sources with direct discharge.

Proposed Rulemaking Elements

Because very little is known about residuals production and their management at water treatment plants, the EPA will go through these steps:

- ◆ Collection of financial, engineering and operational data
- ◆ Determination if effluent guidelines are warranted and, if so, their extent (based on environmental impacts and protection)
- ◆ Determination of management practices and best economically achievable control technologies
- ◆ Determination of benefits, costs and financial impacts

The EPA is targeting water treatment plants with all kinds of treatment processes, such as pretreatment (coagulation/flocculation/sedimentation); conventional filtration;

softening with lime/soda ash, ion exchange, or membrane; and membrane filtration and desalting. Several possibilities for regulation may result, such as:

- ◆ No need for any regulation
- ◆ Regulation of residuals with possibilities of:
 - ◆ No discharge (zero discharge) for all or selected water treatment plants based on treatment/residuals type and plant capacity
 - ◆ Waivers
 - ◆ Best available technology (BAT)
 - ◆ Discharge effluent limitations

The primary pollutants of concern in residuals the EPA will most likely address immediately are:

- ◆ Total suspended solids (TSS)
- ◆ Organic matters (TOC/COD) and chemicals
- ◆ Chemicals such as aluminum, iron, and manganese from the treatment processes
- ◆ Other chemical additives to the treatment processes such as chlorine residuals, polymer, lime, soda ash
- ◆ Metals such as arsenic

Potential Impacts

Depending on the final rule, it is expected that water treatment plant residuals management may range from modification of current practices to the addition of new management/treatment schemes. Also, modified or new monitoring and reporting of the residuals management will be required. As a result, the cost burden on water treatment plants could be significant for both capital and operation and maintenance (O&M).

As a requirement of the rulemaking, the EPA must develop cost analysis that will address the impact of the future rule on water utilities, including a zero discharge requirement. The agency is required under federal statute to show a cost/benefit analysis of a proposed regulation.

The American Water Works Association Research Foundation recently published a manual⁵ on water treatment residuals handling. It is an excellent resource for utilities on dealing with the management and engineering for water plant residuals disposal.

Summary

The potential federal regulation for water treatment plants’ effluent guidelines will impact water utilities to different degrees. The financial burden can range from monitoring cost to capital and O&M costs, depending on the source-water quality and the type of treatment employed for the production of potable water.

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Guidelines

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References

1. "Effluent Guidelines Biennial Plan", EPA, www.epa.gov/waterscience/guide/plan.html
2. U.S. Federal Register, 69 FR 53705, September 2, 2004
3. U.S. Federal Register, 70 FR 38675, July 5, 2005
4. "EPA Drinking Water Treatment Plant eSurvey", EPA, February 2006
5. "Water Treatment Residuals Engineering" American Water Works Association Research Foundation, 2006