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resources & energy

EPA's Proposed Effluent Limit Guidelines for Steam Electric Generating Units

A presentation for CIBO

By WorleyParsons

EcoNomics

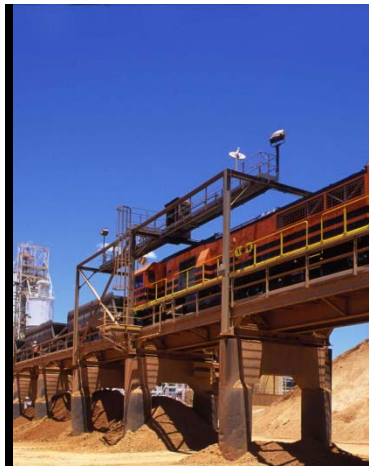
Agenda

- Introductions
- WorleyParsons - General
- WorleyParsons – Water & Wastewater
- Primer of Clean Water Act
- Proposed Effluent Limitations Guidelines
- Proposed Changes

WorleyParsons: Water & Wastewater

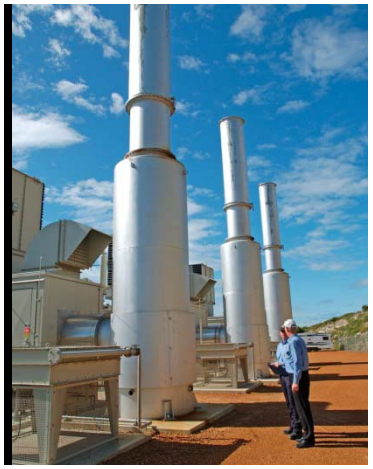
- Over 44,000 people strong
- Offices and projects around the world
- A project delivery company with significant experience in developing projects for clients
- Significant experience in water and wastewater engineering for our utility, commercial, and industrial customers

Organized into Four Customer Sector Groups



Infrastructure & Environment

Resource Infrastructure
Urban Infrastructure
Ports & Marine
Terminals
Water & Wastewater
Transport
Environment



Power

Advanced Coal
Coal
Gas
Nuclear
Renewable Energy
Power Networks

Minerals, Metals, & Chemicals

Base Metals
Coal
Chemicals
Ferrous Metals
Alumina
Aluminium
Iron Ore
Gas Cleaning

Hydrocarbons

Arctic
Gas Processing
Heavy Oil & Oil Sands
INTECSEA
LNG
Onshore Production & Enhanced Oil Recovery
Pipeline Systems
Offshore Topsides
Petrochemicals
Refining
Sulphur Technology
Unconventional Oil & Gas

Clean Water Act – A Primer

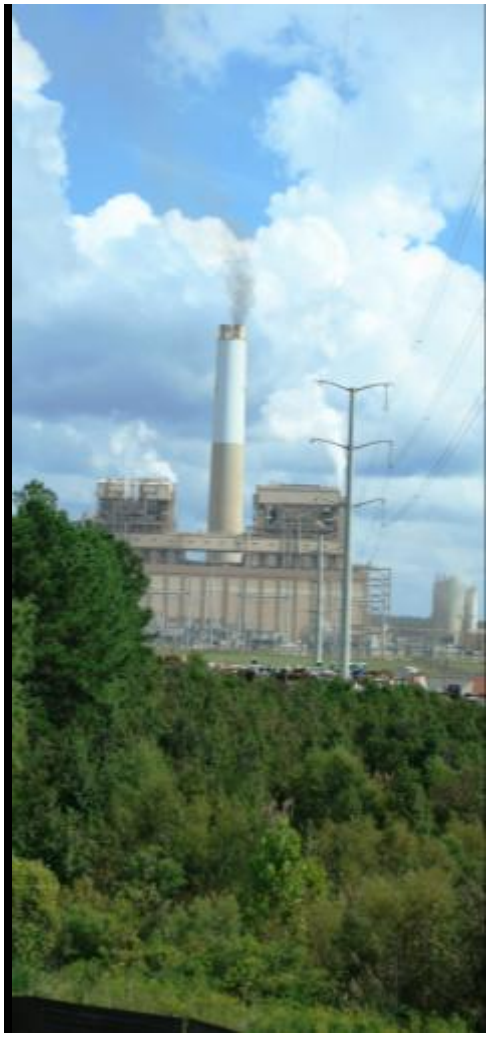
- Clean Water Act – CWA is the centerpiece for keeping our country's water resources clean
- Scientifically based limits for different industries and different types of wastewaters
- Updated regularly to keep up with science and technology
- Regulations are described in the Code of Federal Regulations (CFR)

Clean Water Act – A Primer
Titles and Parts

- Regulations are organized into titles and parts and subparts
- Wastewater regulations are in environmental title (Title 40)
- Effluent Limitations Guidelines for different industries appear in Parts 405 through 471
- So, 40 CFR Part 423 is the Effluent Limit Guidelines for the Steam Electric Generating Industry

Effluent Limitation Guidelines
40 CFR Part 423

- Applies specifically to Steam Electric Generating Units
- On the books, and regulating power plant effluent since 1982
  - However, it has not been revised since 1982
- EPA ordered to ensure water regulations reflect changes in science, technology, and air quality regulations
- New air quality regulations require technologies that have cleaned the air but often at the expense of the water
  - e.g., FGD scrubbers



Effluent Limitation Guidelines
Main Acronyms

- BPT - Best Practicable Control Technology Currently Available
- BCT - Best Conventional Pollutant Control Technology
- BAT - Best Available Technology Economically Achievable
- NSPS - New Source Performance Standards
- PSES - Pretreatment Standards for Existing Sources
- PSNS - Pretreatment Standards for New Sources

Effluent Limitation Guidelines
40 CFR Part 423

- 1982 version (current regulation)
- BPT for existing point sources: low volume wastewaters and fly ash transport waters and bottom ash transport waters is (daily max; monthly average):
  - TSS – 100 ppm; 30 ppm
  - O&G – 100 ppm; 15 ppm
- For metal cleaning wastewaters add:
  - Iron – 1ppm; 1 ppm
  - Copper – 1ppm; 1ppm
- BAT is focused on no PCBs and limited free chlorine in cooling tower water and non-contact cooling water
- NSPS is same as existing sources EXCEPT no discharge of fly ash transport water

Effluent Limitation Guidelines
What is an ELG?

- Industry specific controls and discharge limits on process wastewaters
- Specifies controls or discharge limits for existing processes that direct discharge to surface waters
  - e.g., right to the river
- Specifies controls or discharge limits for existing processes that indirect discharge to surface waters
  - i.e., though a publicly owned treatment plant
- Specifies controls or discharge limits for new sources that direct discharge to surface waters
- Specifies controls or discharge limits for new sources that indirect discharge to surface waters

Effluent Limitation Guidelines
What is NSPS?

- New Source Performance Standards (NSPS) is defined at Section 306 of the CWA
- NSPS reflect effluent reductions that are achievable based on the best available demonstrated control technology
- New sources have the opportunity to install the best and most efficient production processes and wastewater treatment technologies

Effluent Limitation Guidelines
What is PSNS?

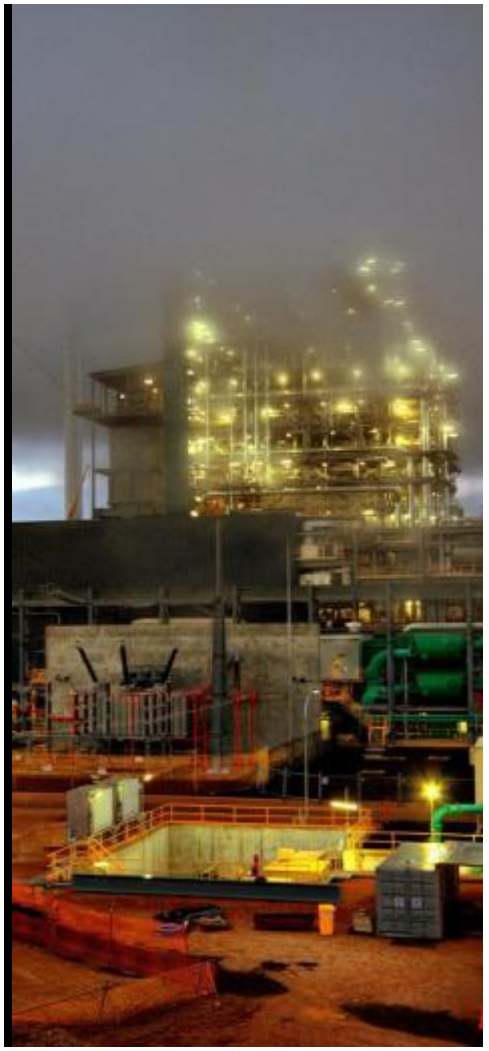
- Pretreatment Standards for New Sources (PSNS) is defined at Section 307(c) of the CWA
- PSNS are national, uniform, technology-based standards that apply to dischargers to publicly owned treatment works (POTWs) from specific industrial categories
  - i.e. indirect dischargers
- Designed to prevent the discharges of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs
- PSNS are to be issued at the same time as NSPS
  - The Agency considers the same factors in promulgating PSNS as it considers in promulgating NSPS

Effluent Limitation Guidelines
What is PSES?

- Pretreatment Standards for Existing Sources (PSES)
- Defined at Section 307(b) of the CWA
- Like PSNS, PSES are national, uniform, technology-based standards that apply to dischargers to POTWs from specific industrial categories
  - i.e., indirect dischargers
- Designed to prevent the discharge of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTW
- Comply with those standards by a specified date, *typically no more than three years after the effective date of the categorical standard*

Effluent Limitation Guidelines
What is BCT?

- Best Conventional Pollutant Control Technology (BCT) is defined at Section 304(b)(4) of the CWA
- 1977 amendments to the CWA required EPA to identify effluent reduction levels for conventional pollutants associated with BCT for discharges from existing industrial point sources
- Cost reasonableness is considered



Effluent Limitation Guidelines
What is BPT?

- Best Practicable Control Technology Currently Available (BPT) is defined at Section 304(b)(1) of the Clean Water Act (CWA)
- EPA sets Best Practicable Control Technology Currently Available (BPT) effluent limitations for conventional, toxic, and non-conventional pollutants
  - **Conventional pollutants:** BOD5, TSS, fecal coliform, pH, and any additional pollutants defined by the Administrator as conventional (e.g., O&G)
  - **Toxic Pollutants:** EPA has identified 65 pollutants and classes of pollutants as toxic pollutants, of which 126 specific substances have been designated priority toxic pollutants (Appendix A to part 403, reprinted after 40 CFR 423.17)
  - All other pollutants are considered to be non-conventional

Effluent Limitation Guidelines
BPT Factors

- EPA first considers the total cost of applying the control technology in relation to the effluent reduction benefits, then:
  - Age of the equipment and facilities
  - The processes employed and any required process changes
  - Engineering aspects of the control technologies
  - Non-water quality environmental impacts
    - including energy requirements
- Traditionally, EPA establishes BPT effluent limitations based on the average of the best performance of facilities within the industry of various ages, sizes, processes or other common characteristics

Effluent Limitation Guidelines
What is BAT?

- Best Available Technology Economically Achievable (BAT) is defined at Section 304(b)(2) of the CWA
- BAT represents the best available economically achievable performance of plants in the industrial subcategory or category
- The factors considered in assessing BAT include:
  - Cost of achieving BAT effluent reductions
  - Age of equipment and facilities involved
  - Process employed
  - Potential process changes
  - Non-water quality environmental impacts, including energy requirements

Effluent Limitation Guidelines
In Summary

Type of Sites Regulated	BPT	BCT	BAT	NSPS	PSES	PSNS
Existing Direct Dischargers	●	●	●			
New Direct Dischargers				●		
Existing Indirect Dischargers					●	
New Indirect Dischargers						●
Pollutants Regulated	**BPT**	**BCT**	**BAT**	**NSPS**	**PSES**	**PSNS**
Priority Pollutants	●		●	●	●	●
Nonconventional Pollutants	●		●	●	●	●
Conventional Pollutants	●	●		●		

EPA offers **4 preferred alternatives for 40 CFR Part 423**

- EPA offered 4 preferred alternatives for revising steam electric generating units process wastewater control
- Options differ in:
  - Number of waste streams covered
  - The size of the units controlled
  - And the stringency of the controls
- EPA projects different levels of pollutant reduction and cost associated with these alternatives

Proposed changes
Sec. 423.10 Applicability

- The provisions of this part expanded to apply to discharges resulting from the operation of a generating unit utilizing
  - Fossil-type fuel
    - Coal, oil, or gas
  - Nuclear fuel
  - Fuel derived from fossil fuel
    - Petroleum coke, synthesis gas
  - Both the combustion turbine and steam turbine portions of a combined cycle generating unit
- Preamble further states that it does not apply to industries that make power for their own use in manufacturing goods

Proposed changes
Existing Sources

- FGD systems will need to meet Se, Hg, As, and nitrate-nitrite limits prior to any kind re-use, co-mingling, or discharge
- Water no longer allowed to be discharged:
  - Flue Gas Mercury Control Ash wastewater
  - Fly Ash & Bottom ash transport water

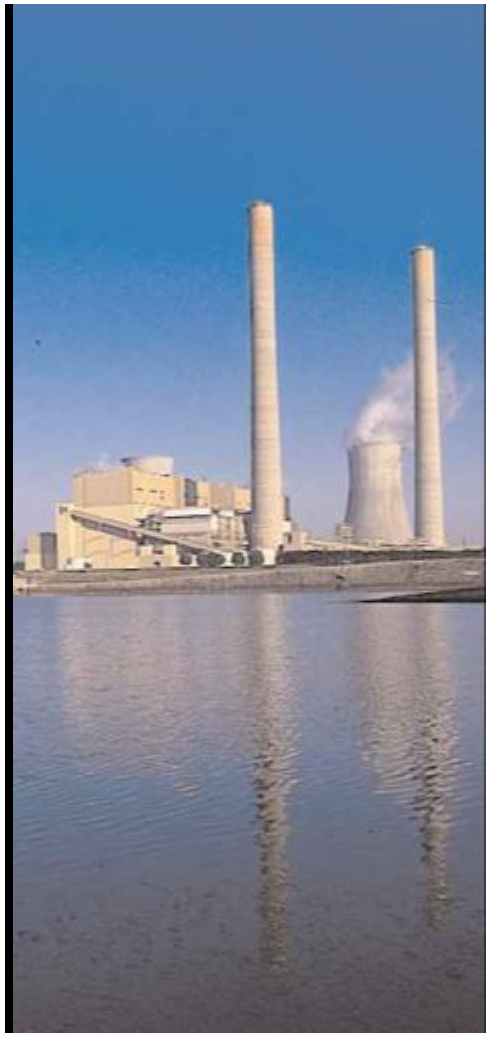
Note: Some options would allow bottom ash transport water to be discharged as long as it meets new BPT limits.

Proposed changes
New Sources

- Install BAT which is expected to be biological removal of Se (FGD Wastewater) and physical/chemical treatment for As, Hg, with biological for polishing
- Other metals will need to be removed from various waste streams (e.g., Cu, Iron)
- Specific wastewaters will have different BAT which could even include ZLD (i.e., flue gas mercury control systems)
  - This does not mean that you cannot use water, you just can not discharge it

Proposed changes for **Indirect Discharges**

- Generally, anything that would pass through a POTW will not be allowed to be discharged to the POTW
- Pretreatment requirements will be in place for Se, As, Hg, Fe, Cu, and others
- Effectively limits what a power plant can discharge to a POTW to organic material, TSS, and some oil & grease



Proposed changes
PSNS (to the POTW)

- Establish standards for mercury, arsenic, selenium, and nitrate-nitrite in discharges of FGD wastewater
- Maintain a “no discharge” standard for all pollutants in fly ash transport water, and establish a “no discharge” standard for bottom ash transport water and FGMC wastewater
- Establish standards for mercury, arsenic, selenium and TDS in discharges of gasification wastewater
- Establish standards for copper in discharges of nonchemical metal cleaning wastes
- Establish standards for mercury and arsenic in discharges of ash landfill leachate

Proposed changes
FGD Example Limits

- For example, proposed new limits for FGD wastewaters are:

Pollutant or Pollutant Property		BAT Effluent Limitations	
		Max for any 1 day	Average Daily Values for 30 Consecutive Days Shall Not Exceed
Arsenic, total	(ug/L)	8	6
Mercury, total	(ng/L)	242	119
Selenium, total	(ug/L)	16	10
Nitrate/nitrate as N	(mg/L)	0.17	0.13

Proposed changes
BAT

- Physical/Chemical Systems:
  - Arsenic and Mercury removal with chemical precipitation systems
- Anaerobic Biological Systems:
  - Se – really targeting dissolved Se

Proposed changes
Zero Discharge

- In the power industry we discuss “ZLD” or zero liquid discharge systems
- The ELGs are a little more loose with the term and discuss “Zero Discharge Limitations”
- The EPA says in the preamble:
  - “For fly ash discharges, bottom ash, and FGMC wastewater, under some proposed options, EPA is proposing to establish zero discharge limitations, which in effect directly control all pollutants of concern.”

Proposed changes
Comparison: Old vs. New

- BAT that includes anaerobic wastewater treatment systems and physical/ chemical systems when there was none before
- Identified a number of new wastewater streams (i.e., FGD wastewaters) to be managed
  - Before (current) fewer were identified
  - Metal cleaning wastewater streams and wet scrubber blowdown was considered as low-volume streams meaning it could be comingled and treated
  - Not anymore; now FGD blowdown must be treated separately
- Tighter limits for metals (Hg, As, Se) vs. none

Proposed changes
Comparison: Old vs. New (cont.)

- Chemical metal cleaning wastewaters:
  - TSS, O&G, Copper, Iron
  - Now adding non-chemical metal cleaning wastewaters
- Active management of surface water impoundments and landfill leachates in NPDES permits
  - Not identified previously

Proposed changes
Sample Collection and Analysis

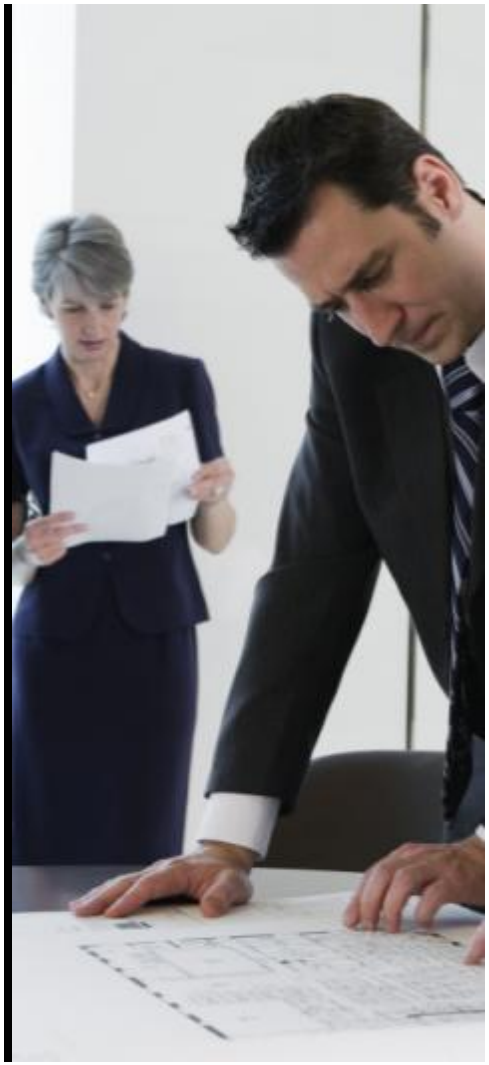
- Sample and Analysis Methods are Critical to Compliance
- Proposed regs describe new methods
- Low-level Hg testing is very difficult
- Requires **Sufficiently sensitive analytical method:**
  - **“**means a method that ensures the sample-specific quantitation level for the wastewater being analyzed is at or below the level of the effluent limitation”

Proposed changes
CCR Management Requirement

- Manage and Treat Leachate from Coal Combustion Residual (CCR) Landfills
- Manage and Treat Discharge from CCR Surface Impoundments
- “New” inspection requirements to appear in NPDES Permits
  - Annual inspections
  - Monitoring wells
  - Annual reports
- Coordinated with MSHA and other agencies responsible for integrity of dams, dikes, etc.

Proposed changes
Schedule to Implement

- EPA signs proposed rulemaking April 19, 2013
- 60 day comment period commences on publishing in FR (yet to occur)
- 40 CFR part 423 is required to be promulgated in July 2014
- The regulations need to be incorporated into permits beginning July 2017
- New permit conditions for existing sources would need to be met within three years of next permit cycle, starting from July 2017
  - EPA has proposed a voluntary program for more time to implement projects if you volunteer to install ZLD systems



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