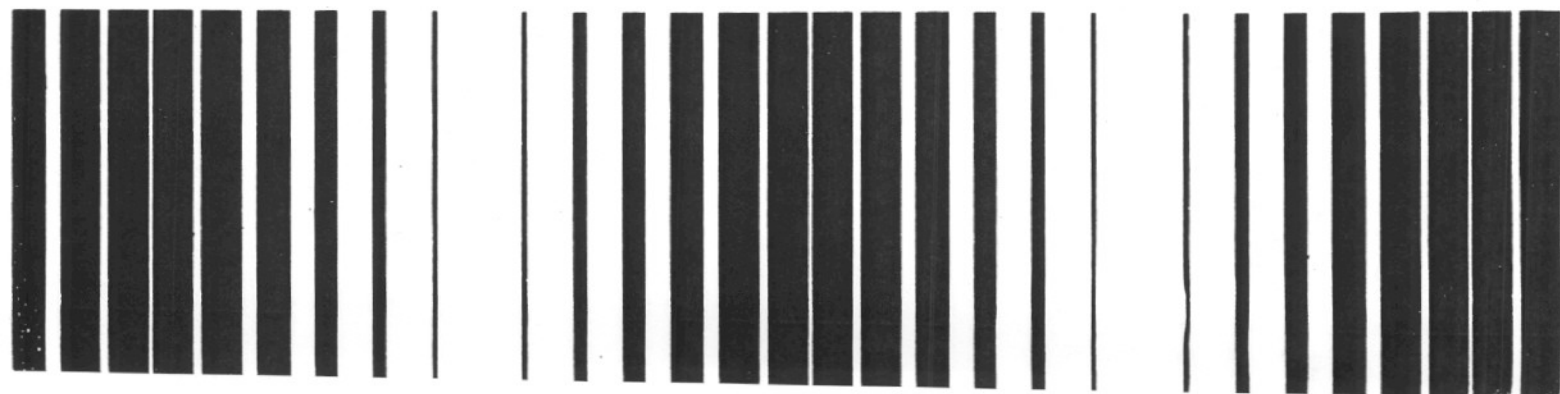




Workshop – Organic Air Emissions from Waste Management Facilities

Speaker Slide Copies and
Supporting Information
Volume 1



CASE STUDY

APPLICATION of BENZENE WASTE OPERATIONS NESHAP to WASTEWATER TREATMENT SYSTEMS

Presentation Slides

GENERAL STANDARDS

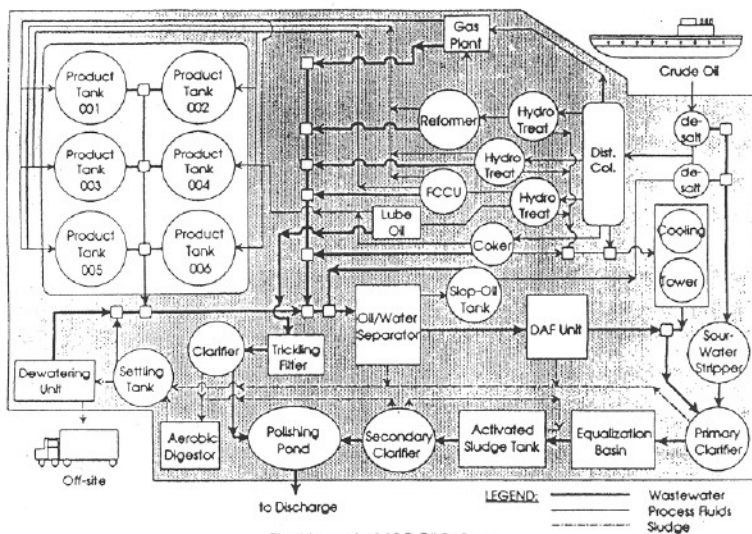
- Facilities with 10 Mg/yr or more total annual benzene in waste treat and control certain waste streams
- Treat identified waste streams to remove or destroy benzene
- Apply organic emission controls prior to and during treatment to achieve treatment requirements

WHAT ARE THE TREATMENT REQUIREMENTS?

- Reduce benzene concentration to less than 10 ppmw
- Remove or destroy benzene by 99% or more
- Dilution of wastes to meet requirements is prohibited
- Mixing of wastes is allowed to facilitate treatment in *"wastewater treatment system"* with special requirements

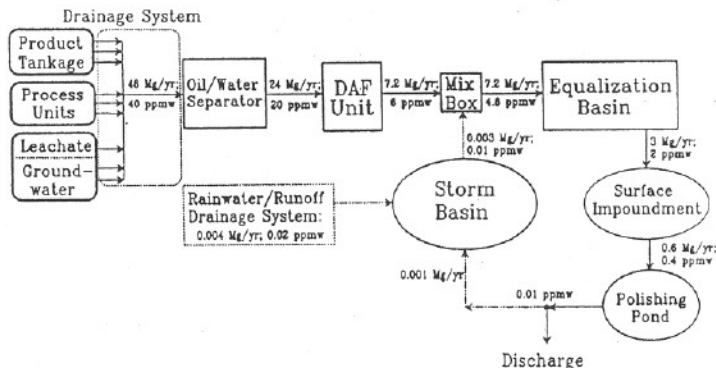
WHAT IS A "WASTEWATER TREATMENT SYSTEM"?

- ... a unit that ultimately discharges under NPDES permit
- Manages certain wastes:
 - Process wastewater
 - Product tank drawdown
 - Landfill leachate
 - Wastes mixed with any of these
- Typically includes:
 - Individual drain systems
 - Oil-water separators
 - Dissolved air floatation (DAF) units
 - Equalization tanks
 - Biological treatment units



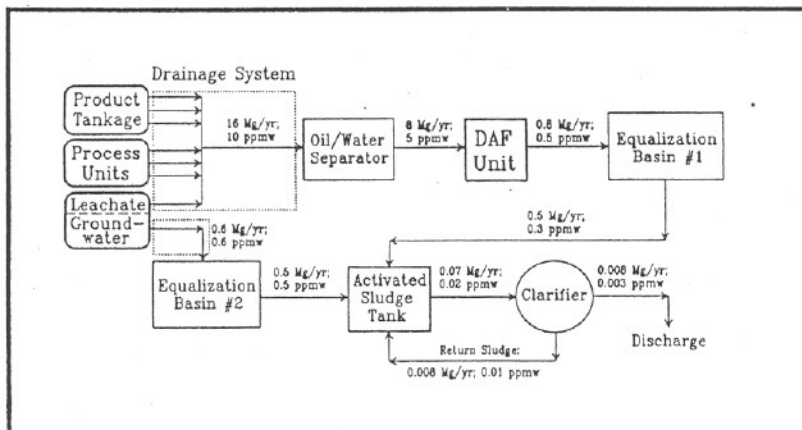
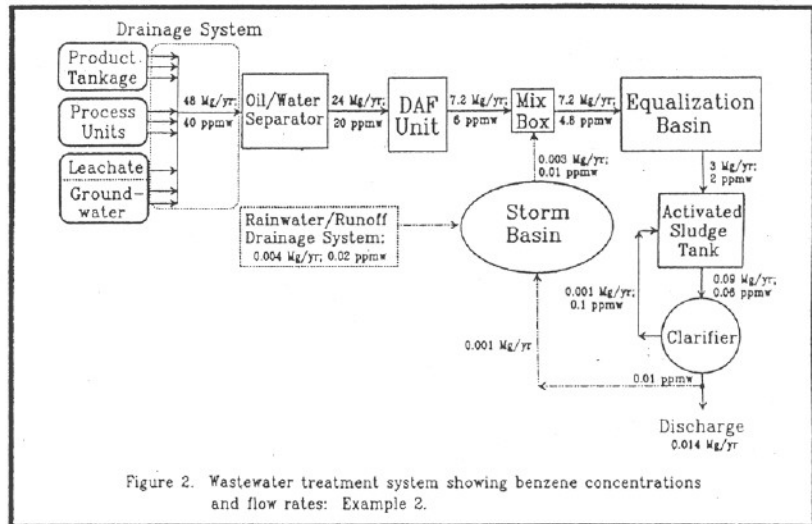
WHAT ARE THE SPECIAL REQUIREMENTS?

- All units comprising the wastewater treatment system must use organic emission controls except for those units where both the:
 - (1) Benzene concentration of wastewater entering unit is less than 10 ppmw benzene
 - and
 - (2) Total annual benzene quantity in wastewaters first entering all uncontrolled wastewater treatment system units facility-wide is less than 1 Mg/yr
- Benzene in wastewaters entering an "enhanced biodegradation unit" is excluded from the calculation of total annual benzene quantity



WHAT IS AN "ENHANCED BIODEGRADATION UNIT"?

- Wastewater treatment system unit that:
 - Uses a suspended growth process
 - Generates biomass
 - Uses recycled biomass
 - Periodically removes biomass
- Examples of processes not considered enhanced
 - Large, shallow biological impoundments
 - Attached growth processes such as trickling filters or rotating biological contactors



CASE STUDY

APPLICATION of BENZENE WASTE OPERATIONS NESHAP to WASTEWATER TREATMENT SYSTEMS

Presented at

U.S. Environmental Protection Agency
Workshop on
Air Emissions from Waste Management Facilities

CASE STUDY:
APPLICATION OF NATIONAL EMISSION STANDARD FOR BENZENE WASTE OPERATIONS
TO WASTEWATER TREATMENT SYSTEMS

OVERVIEW

This case study provides examples of the application of the National Emission Standard for Benzene Waste Operations (40 CFR 61 Subpart FF) to wastewater treatment systems. The standards for wastewater treatment systems that manage and treat aggregated or mixed waste streams are reviewed using some simple examples. Then, a case study problem is presented to illustrate the application of the standard to a "real world" wastewater treatment system at a petroleum refinery.

STANDARDS FOR WASTEWATER TREATMENT SYSTEMS

The Benzene Waste Operations NESHAP requires owners and operators of affected facilities at which the total annual benzene quantity from the facility waste is equal to or greater than 10 Mg/yr to remove or destroy benzene contained in certain waste streams using a treatment process or wastewater treatment system. Section 61.348 of the rule establishes the treatment standards for treatment processes or wastewater treatment systems. These standards require that if an owner or operator chooses to aggregate or mix waste streams to facilitate treatment in a wastewater treatment system, then the waste streams must be treated in a wastewater treatment system that meets special requirements. Each waste management unit that comprises the wastewater treatment systems at the facility must use the appropriate emission controls as specified under Sections 61.343 through 61.347 until both of the following conditions are met:

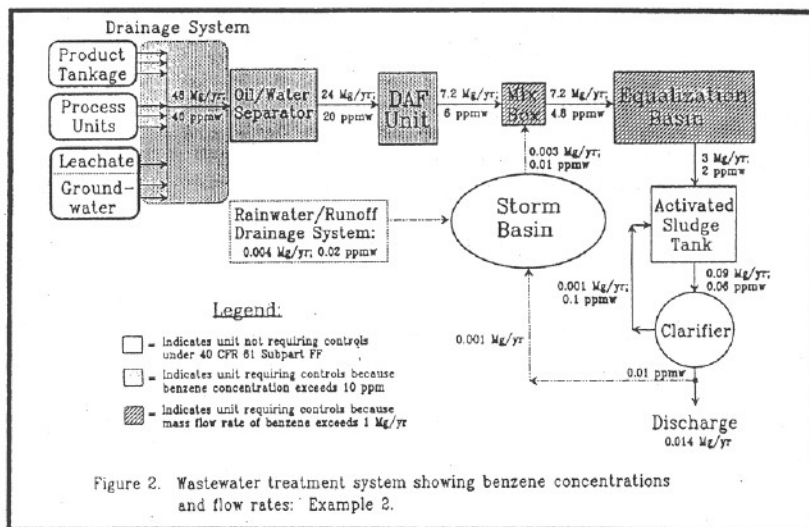
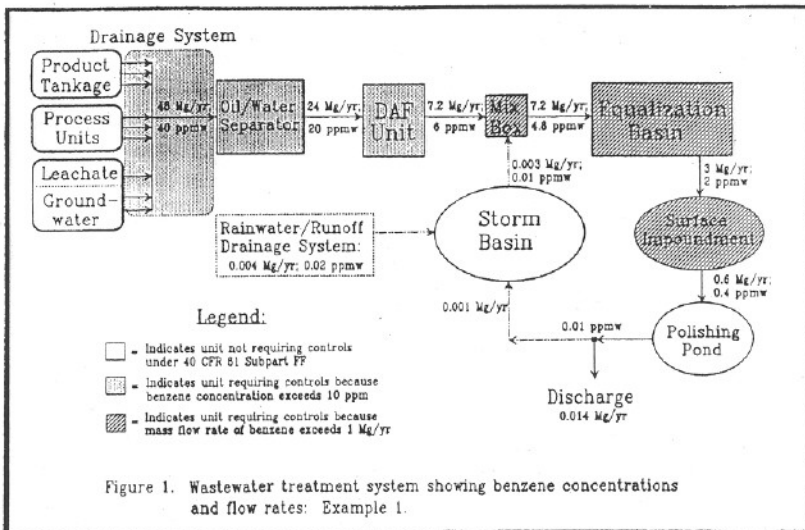
1. The waste entering an uncontrolled unit is less 10 ppmw benzene;
- and
2. The total facility-wide wastewater treatment system annual benzene quantity first entering any uncontrolled unit is less than 1 Mg/yr.

Application of Basic Standards

Figure 1 illustrates the application of the basic standards. The drainage system, the oil/water separator and the dissolved air flotation (DAF) unit shown in Figure 1 require controls because they receive waste with benzene concentrations of 10 ppmw or higher. The next three units require controls because, even though the benzene concentration is below 10 ppmw, the mass flow rate of benzene (i.e., the annual benzene quantity) entering the units is greater than 1 Mg/yr.

Enhanced Biodegradation Units

There is one major exclusion to the 1 Mg/yr benzene quantity limit. The rule excludes the benzene quantity entering an "enhanced biodegradation" unit from the total annual benzene quantity inventory for the wastewater treatment system if the enhanced biodegradation unit is the first exempt unit. Section 61.348(b)(2)(ii)(B) provides guidelines regarding operating conditions for what is defined as "enhanced biodegradation" unit. These guidelines basically describe the operation of a conventional activated sludge wastewater treatment process. Activated sludge systems with benzene concentrations of 10 ppmw or higher in any influent stream will still require controls, but, if the benzene concentration is less than 10 ppmw, the annual benzene quantity entering an activated sludge system does not count towards the 1 Mg/yr control limit. Therefore, if we replace the surface impoundment in Figure 1 with an activated sludge system (refer to Figure 2), no controls are then required after the equalization basin.



Multiple Wastewater Treatment Systems

It is important to point out that the 1 Mg/yr of benzene control limit pertains to the total annual benzene quantity of the facility's wastewater treatment system and not to the annual benzene quantity of a single waste stream. For example, referring to Figure 3, Equalization Basin #1 has an annual benzene quantity of 0.8 Mg/yr while the groundwater waste stream entering Equalization Basin #2 has an annual benzene quantity of 0.6 Mg/yr. In a single train system, these equalization basins would not require controls. However, the cumulative or total annual benzene quantities for the uncontrolled units in this dual train facility is 1.4 Mg/yr, which exceeds the 1.0 Mg/yr control limit. Therefore, one of the equalization basins in Figure 3 must be controlled. There is no requirement provided in the rule that determines which basin is controlled since controlling either basin reduces the total annual benzene quantity in the uncontrolled units to less than 1 Mg/yr. Therefore, in order to comply with the rule, the facility owner or operator can choose which of the equalization basins is controlled as is shown in Figures 3a and 3b. Note that, if Equalization Basin #2 is selected to be controlled, then the groundwater drainage system must also be controlled.

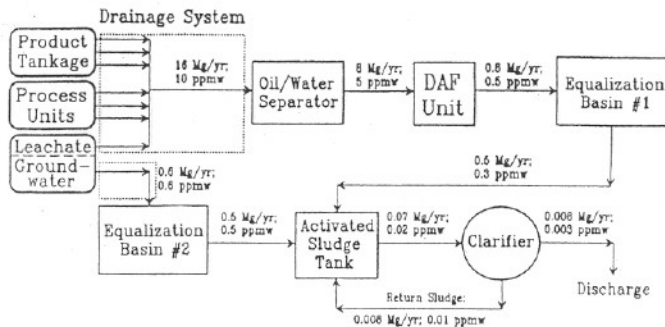
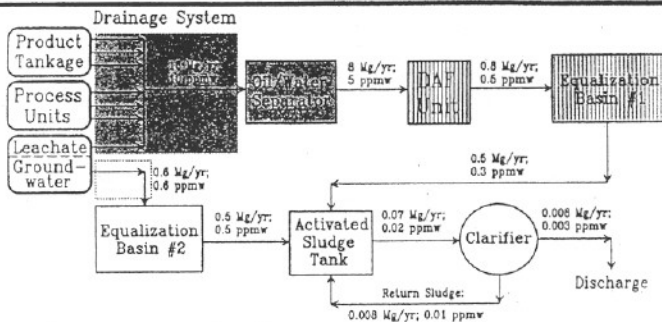


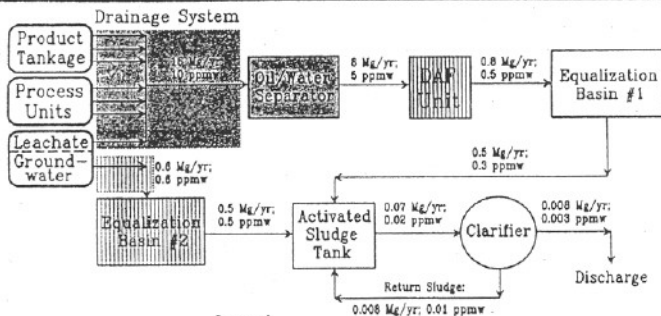
Figure 3. Wastewater treatment system showing benzene concentrations and mass flow rates. Example 3.



Legend:

- = Indicates unit not requiring controls under 40 CFR 61 Subpart FF
- = Indicates unit requiring controls because benzene concentration exceeds 10 ppm
- = Indicates unit requiring controls because benzene mass flow rate exceeds 1Mg/yr
- = Indicates unit requiring controls because facility-wide uncontrolled benzene quantity exceeds 1Mg/yr

Figure 3a. Wastewater treatment system showing benzene concentrations and mass flow rates. Example 3; Solution A.



Legend:

- = Indicates unit not requiring controls under 40 CFR 61 Subpart FF
- = Indicates unit requiring controls because benzene concentration exceeds 10 ppm

CASE STUDY

SITUATION

The ABC Oil Company operates a refinery that is determined to have a total annual benzene (TAB) quantity greater than 10 Mg/yr and, therefore, the refinery owner/operator is required to manage the benzene-containing waste streams in controlled units and treat the waste to comply with the National Emission Standard for Benzene Waste Operations (40 CFR 61 Subpart FF). As shown Figure 4, the refinery already operates an advanced wastewater treatment system capable of treating the refinery wastewater streams to meet the Section 61.348 treatment standards. As owner/operator of the ABC Oil Company you must now decide which of the units comprising your wastewater treatment system must use controls to comply with the standards.

PROBLEM

Identify which waste management units comprising the refinery wastewater treatment system require controls. Possible answers for each waste management unit are:

- a. No controls required
- b. Controls required: Benzene concentration entering the unit is 10 ppmw or more
- c. Controls required: TAB quantity entering the unit is 1 Mg/yr or more
- d. Controls required: Total TAB quantity managed in exempt wastewater treatment units at refinery is 1 Mg/yr or more

For each waste management unit shown in Figure 5, circle all correct answers (more than one answer may be correct for a particular unit).

- | | |
|-----------------------------|---------------|
| 1. Individual Drain Systems | a b c d |
| 2. Sour Water Stripper | a b c d |
| 3. Oil/Water Separator | a b c d |
| 4. DAF Unit | a b c d |
| 5. Primary Clarifier | a b c d |
| 6. Equalization Basin | a b c d |
| 7. Activated Sludge Tank | a b c d |
| 8. Secondary Clarifier | a b c d |
| 9. Trickling Filter | a b c d |
| 10. Clarifier | a b c d |
| 11. Polishing Pond | a b c d |

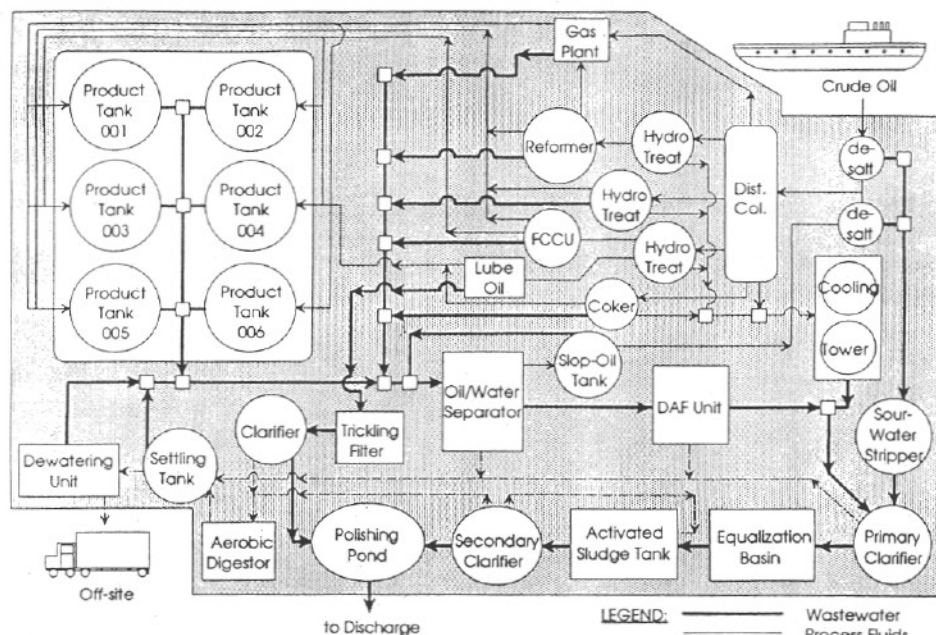


Figure 4. Plant lay-out of ABC Oil Refinery.

