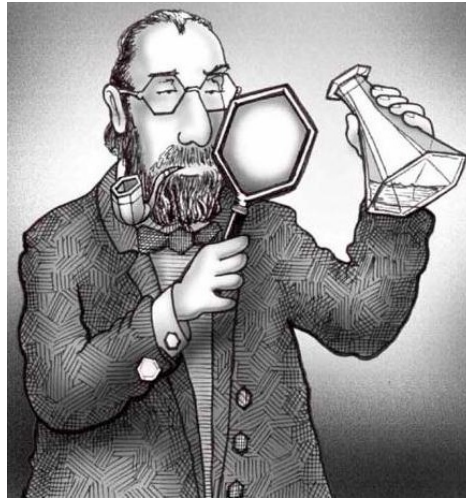


A wide-angle photograph of a large industrial facility, likely a refinery or chemical plant, with numerous tall distillation columns, complex piping, and storage tanks. The facility is situated near a body of water with mountains in the background. A semi-transparent reddish-brown banner is overlaid across the middle of the image, containing the title text.

Benzene Waste Operations NESHAP Auditing Workshop and Training

Steve Probst, 4C Marketplace
Calvin Niss, Trihydro
Ken Garing, Garing & Associates

Introductions



Let everyone know your name,
role within your company,
and one area of BWON that you would like to investigate in greater detail.

BWON for Experts

- **Daily Schedule**
 - 8 AM – 10 AM – Introductions, POWG, TAB
 - 10 AM – 11:30 AM – Audit Aspects of POWG, TAB
 - 11:30 AM – 12 Noon - Audit Prep/Questions
 - 12 Noon - 1 PM – Lunch
 - 1 PM – 2:30 PM – Waste Management Units
 - 2:30 pm – 3:00 PM – Common Violations
 - 3:30 PM – 5:30 PM – Q&A / Informal Discussion
- **Breaks (yes, we will have them!)**
- **Escape routes/restrooms/etc.**

What to Expect?

- **Answers to your Questions**
 - We'll answer as many as possible, but may table questions until the end of the day
- **Challenges to your Brain**
 - Less lecture, more discussion
 - “What If” Moments
 - Lots of working together to solve tasks and problems

Disclaimer

- **BWON is complex and every facility is different**
 - What's right for one facility may not be right for another!
 - Enforcement/interpretations may vary between regions/industries
- **Not every BWON question has a single best answer**
 - Interpretations are based on our experiences with BWON facilities, available literature and determinations, and discussions with US EPA
 - Only YOUR facility can determine its risk tolerance

All opinions expressed in this course should be reviewed for applicability to your facility.

BWON Audit Pre-Test

Test your BWON Audit Prep!



A pop quiz
already?!?
BOGUS!!

BWON for Experts Workshop

Agenda – Next Hour

- **BWON Essentials Refresher**
 - Fundamentals of TAB
 - Compliance Options
 - Control and Treatment Standards
 - Recordkeeping and Reporting
- **Question and Answer/Open Forum/Reception**

BWON for Experts Acronyms

- **BWON Basics**

- **NESHAPs** – National Emission Standards for Hazardous Air Pollutants
- **BWON** – Benzene Waste Operations NESHAPs (*aka FF, NESHAP FF*)
- **BQ** – Benzene Quantity
- **2BQ** – Annual exempt waste stream benzene quantity allowed under 2 Mg/yr compliance option
- **6BQ** – Uncontrolled benzene quantity allowed under 6 Mg/yr compliance option
- **TAB** – Total Annual Benzene Quantity
- **POG** – Point of Generation
- **FWAA** – Flow-weighted Annual Average

BWON for Experts Acronyms

- **Equipment**

- **WMU** – Waste Management Unit
- **CVS** – Closed Vent System
- **O/W Separator** – Oil-Water Separator
- **WWTP** – Wastewater Treatment Plant
- **EBU** – Enhanced Biodegradation Unit (*aka activated sludge plant*)

- **EOL** – End of Line
- **NSPS QQQ** – 40 CFR 60, Subpart QQQ (*Control Standards for Refinery Wastewater*)
- **NSPS Kb** – 40 CFR 60, Subpart Kb (*Control Standards for Storage Tanks*)

- **Regulations**

- **CD** – Consent Decree
- **R&V** – Review and Verification

Thumb Drive Resources

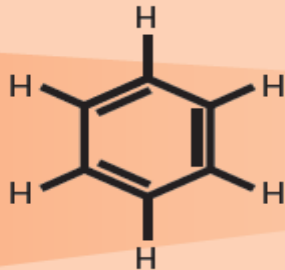
- Rule History and Background - Rule Proposals, Stays, Amendments, Preambles, etc
- Applicability Determinations
- FAQ Documents
- EPA Workshop Presentation Slides
- Proposed Rule Changes/Clarifications (*unpublished*)

BWON APPLICABILITY

AFFECTED
FACILITY

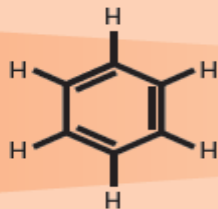
APPLICABILITY

REPORTING



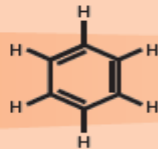
TAB > 10

OR



1 < TAB < 10

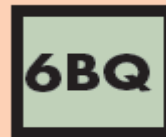
OR



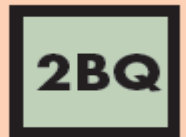
TAB < 1



+



or



(if no process changes)

BWON Rule Overview – 40 CFR 61, Subpart FF

Citation	BWON Rule Title(s)	What question is the section meant to answer?	Who does this section concern?
§ 61.340	Applicability.	Who is subject and by what time did they have to comply?	All subject facilities (refineries, chemical plants, TSDFs, coke by-product recovery plants).
§ 61.341	Definitions.	What do all these terms mean?	
§ 61.342	Standards: General.	Who is subject to the control options (2BQ or 6BQ), and what do those options require?	
§ 61.343-347, 349	Control and Treatment Standards for WMUs	What do you have to do to your WMUs to meet the requirements of a control option?	All facilities with TAB > 10 Mg/yr (2BQ or 6BQ facilities).
§ 61.348	Treatment Standards	What does your treatment device have to do to meet the treatment standard?	<u>Only</u> 2BQ facilities.
§ 61.350	Standards: Delay of repair.	How do I put off having to fix a leaking or damaged WMU component?	All facilities with TAB > 10 Mg/yr (2BQ or 6BQ facilities).
§ 61.351-3	Alternative Control Standards	What can I do if I don't like the control standards in §§61.343-347, or 61.349?	
§ 61.354	Monitoring of operations.	What do I have to watch to make sure my control and treatment devices are working correctly?	
§ 61.355	Test methods, procedures, and compliance provisions.	Can you tell me in excruciating detail how to calculate my TAB, 2BQ or 6BQ, conduct performance tests, and other items?	All subject facilities.
§ 61.356	Recordkeeping requirements.	What do I need to write down and keep?	
§ 61.357	Reporting requirements.	What do I need to write down and then mail to the US EPA?	
§ 61.358-9	Delegation of authority.	Who is responsible for administering this mess?	Regulators, lawyers, insomniacs.

BWON Applicability Determination

- Control and treatment standards potentially applicable to refineries, chemical plants, RCRA Treatment, Storage, and Disposal Facilities (TSDFs), and coke by-product recovery plants.
- Control and treatment standards applicability is based on the affected facility Total Annual Benzene Quantity (TAB).
- TAB is the total annual mass of benzene contained in certain wastes determined at the point of waste generation.

Fundamental BWON Questions

- What is the “TAB”?
- Where is the “Point of Generation”?
- What is a “waste” under BWON?



What is the TAB (besides a diet soda)?

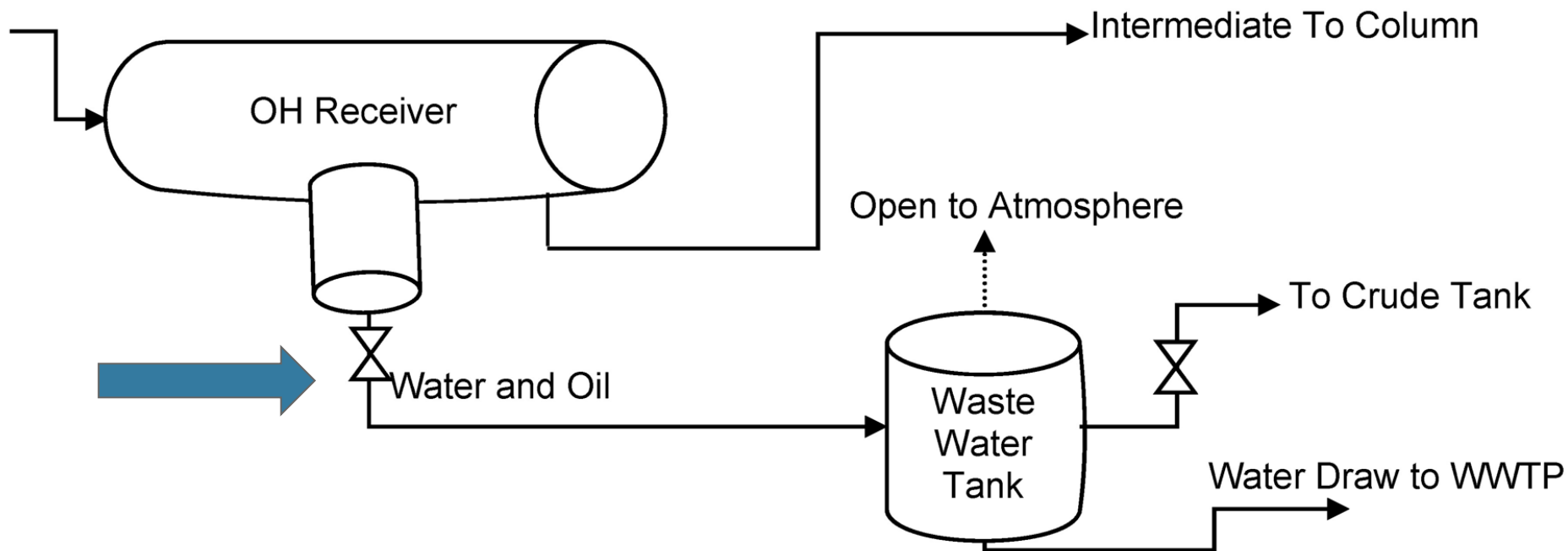
Defined in §61.342(a):

as the “sum of the annual benzene quantity for each waste stream at the facility that has greater than 10 percent water or that is mixed with water, or other wastes, at any time and the mixture has an annual average water content greater than 10 percent.”



Where is the “Point of Waste Generation”?

- The location where the TAB determination must be made
- Where a waste exits a piece of equipment that *is* integral to the process (*Process Vessel*) and prior to management or treatment in an operation or equipment that is *not* integral to the production process (*Waste Management Unit*)
- Location is prior to handling and treatment of a waste and before any opportunity for benzene losses
- *Defined in 40 CFR §61.341*



Where is the Point of Generation?

What is a “Waste” Under BWON?

- “Waste” is defined in §61.341 as any material that is “discarded” or “is being accumulated, stored, or physically, chemically or biologically treated prior to being discarded, recycled or discharged.”
- BWON definition of “waste” is different than that under RCRA. For example, recycled materials can still be considered wastes at their POG under BWON.
- Wastes are considered to be recycled once they are fed to a process as a feed stock, *or* are fed to a process feed tank. Prior to and during recycle, wastes are regulated by BWON. After recycle, wastes are no longer regulated by BWON.
- Remember that wastes in the form of a gas or vapor and fuel gas systems are not regulated by BWON!

When is a Waste Recycled to Process?

- If waste is introduced to a process feed vessel to a process unit

or

- If waste is introduced directly to the process itself
 - Why are facility slop oil recovery systems typically NOT considered process feed tanks?
 - What type of tanks in a refinery or chemical plant typically are considered process feed tanks?

When is a Waste Recycled to Process?

- Why are facility slop oil recovery systems typically NOT considered process feed tanks?
 - *Typically, slop oil recovery tanks do not directly feed process equipment and therefore cannot be considered to be process feed tanks. Some facilities use crude tanks as recovered oil tanks, which may directly feed the process.*
- What type of tanks in a refinery typically do count as process feed tanks?
 - *Crude feed surge drums, desalter water surge drums, crude storage tanks, gas oil tank (for FCC unit), high sulfur diesel tanks (for charging diesel hydrotreater units), etc.*

BWON Controls Applicability Thresholds

- **TAB < 1 Megagram per year (Mg/yr)**
No controls required, must report when changes may cause facility to exceed 1 Mg/yr threshold
- **1 Mg/yr < TAB < 10 Mg/yr**
No control required, annual TAB reporting
- **TAB ≥ 10 Mg/yr**
Control, treatment, and monitoring requirements applicable
 - *Note: 1 Megagram = 2205 pounds*

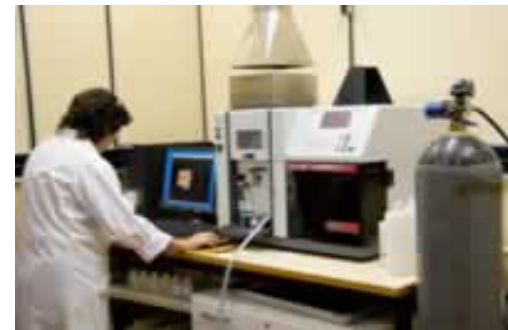
TAB Calculation Methodology

$$\text{TAB} = \sum_{i=1}^n (Q_i \times C_{\text{benzene},i})$$

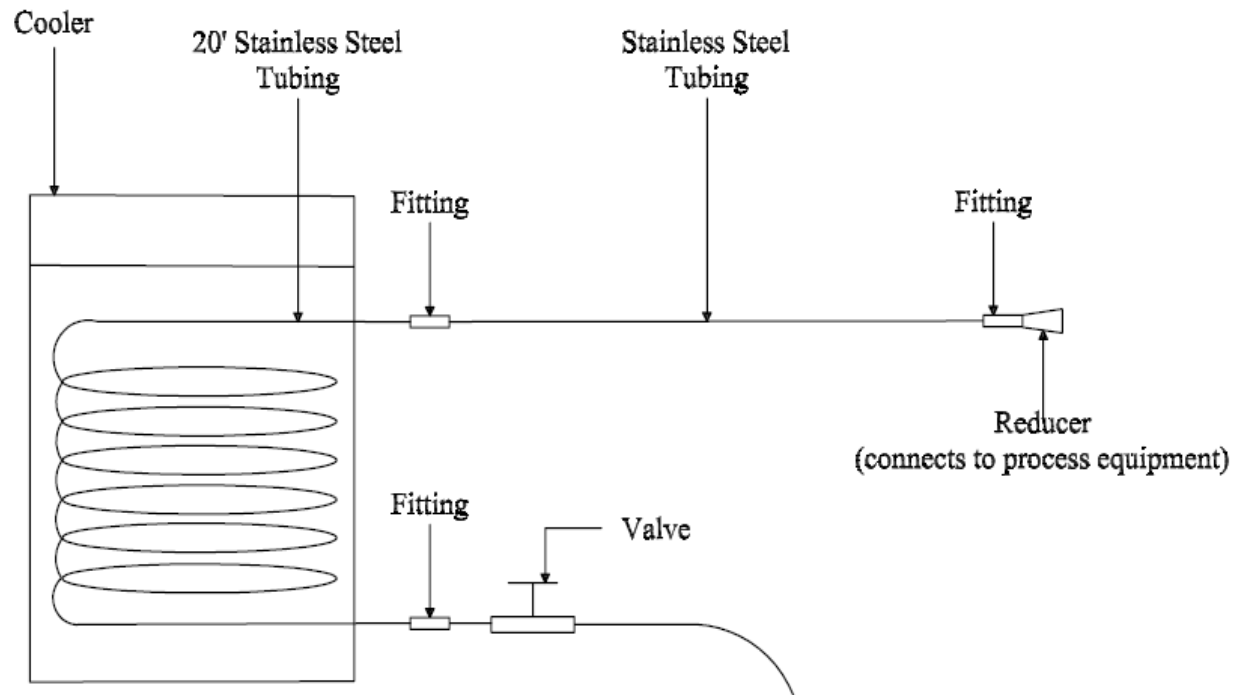
- TAB = total annual benzene (Mg/yr)
- Q = annual waste quantity (Mg/yr), calculated per §61.355(b)
- Cbenzene = flow weighted annual average benzene concentration, by weight (ppmw), calculated per §61.355(c)
- n = number of benzene streams containing > 10% water
(or commingle to become > 10% water)
- Includes both oil and aqueous phases for each waste stream

Determining Benzene Concentrations

- **Sampling per 40 CFR §61.355(c)(3)**
 - Three representative samples
 - Minimize exposure to atmosphere
 - Chill sample to less than 10°C (50°F)
 - “Sample coil”
 - Analyze sample per Methods 8020, 8021, 8240, 8260, 602, or 624
 - “Compliance samples” must follow this standard
 - EBU inlet sampling, treatment demonstrations



Example BWON Sample Cooler



Determining Benzene Concentrations

- **“Knowledge of the Waste” – §61.355(c)(2)**
 - Examples mentioned in BWON Rule:
 - Material balances
 - Records of chemicals purchases
 - Previous test results
 - Other Examples:
 - Sampling that doesn’t meet requirements of §61.355(c)(3)
 - Process modeling data
 - Product/intermediate specifications
 - Organic/Aqueous Interface Benzene Solubility Data
 - Source of data must be properly documented

Concentration Rule of Thumb

- If oil-phase concentration is known, but aqueous-phase is unknown:
$$\text{Aqueous Phase Benzene (ppmw)} = \text{Oil Phase Benzene (ppmw)} / 100$$
- The basis for this rule of thumb is based on the effective benzene solubility
- Generally a conservative estimate of aqueous-phase benzene concentration
- Not conservative estimate of oil-phase benzene if calculation is reversed
 - $\text{Oil Phase Benzene (ppmw)} = \sim 120 \times \text{Aqueous Phase Benzene (ppmw)}$
- Aqueous benzene concentrations not normally greater than ~1400-1600 ppmw

Determining TAB Waste Quantity

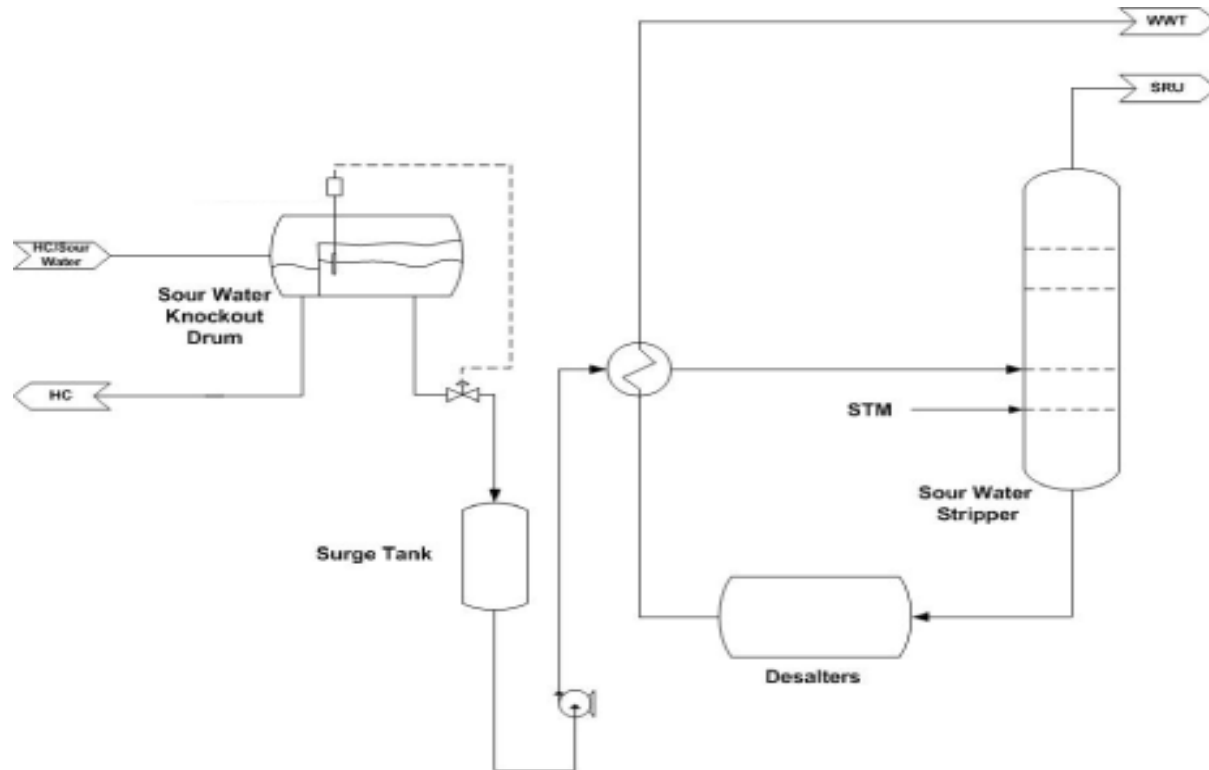
- Highest annual quantity of waste generated from past 5 years of historical records
- Maximum design capacity of the waste management unit
- Measurements that are representative of maximum waste generation rates
 - “Measurement” is not defined in BWON
 - In practice, may include less ‘traditional’ forms of measurement
 - “Bucket Test”, time required to fill a WMU of known size
- How are your TAB waste quantities determined?

TAB Accounting Exceptions

- Remediation wastes are *not* required to be included in the TAB calculation
- Waste generated by turnaround activities may be averaged over the turnaround cycle for TAB determination (*up to 5 years*)
- Waste streams that contain no benzene and have no potential to contain benzene are not counted towards the TAB or included in the TAB
- Streams containing less than 10% water by volume and do not mix with water or wastes to become greater than 10% water by volume are not counted towards the TAB
- Streams containing greater than 10 ppmw sulfur or ammonia and which are managed by a sour water stripper are counted at the *exit* of the stripper

Sour Water Exemption – A Closer Look

- Typical refinery sour water management system.



Sour Water Exemption – A Closer Look

- **Because TAB is calculated at the stripper outlet, BQ is much less than at POG.**
 - Some refineries suspected by US EPA to have utilized the sour water exemption to avoid triggering BWON control standards
 - Routing non-sour streams to stripper, strippers not optimized to remove H₂S/ammonia
- **Ensure streams for which sour water exemption is applied meet requirements.**
 - Greater than 10 ppmw sulfur (H₂S) or ammonia on a flow-weighted annual average
 - Streams must “require” treatment for sulfur or ammonia, and stripper designed to treat for those compounds
 - Does not necessarily require sampling of sour water streams, process knowledge OK.
- **BWON Preambles indicate that US EPA assumed refinery sour water systems were “inherently controlled” due to safety concerns.**
 - Some recent concern by US EPA that systems are not truly ‘controlled’
 - Use of sponge oils to control vapors from sour water tanks in lieu of venting to a control device or using a floating roof

BWON Compliance Options

- Facilities with a TAB of greater than 10 Mg/yr are required to control/treat benzene containing waste streams
- Compliance Options
 - 1 Mg/yr Target for Process Wastewater - (§61.342(d))
 - Not generally used
 - Segregate-and-Treat Option – 2 Mg/yr compliance option, or “2BQ” (§61.342(c)(2))
 - Treat-to-Target Option – 6 Mg/yr compliance option or “6BQ” (§61.342(e))

2BQ Compliance Option

- Control all non-exempt waste streams until treated or recycled.
- May select waste streams to exempt from control/treatment as long as the benzene quantity from those waste streams at the point of generation sums to less than 2 Mg/yr
- Less than 10 ppmw benzene streams exempt from control/treatment but do not count toward the 2 Mg/yr ledger;
 - Must demonstrate exemptions at least annually
- Uncontrolled waste must be counted at the point of waste generation or “POG”

2BQ Compliance Option

- Uncontrolled turnaround waste must be counted towards the 2BQ exempt waste stream total in the year generated (*no averaging allowed*)
- Uncontrolled remediation wastes must be counted towards the 2BQ exempt waste stream total
- Uncontrolled “organic” waste streams must be counted towards the 2BQ exempt waste stream total

6BQ Compliance Option

- Facility may select to control/treat streams as necessary as long as uncontrolled benzene quantity sums to less than 6 Mg/yr
 - No less than 10 ppmw benzene stream exemption
- The uncontrolled benzene quantity for each waste stream is counted at the point where it enters the first uncontrolled waste management unit
 - Point of 6BQ accounting may be located at POG, may be downstream of POG
- “Treated” wastes must be counted where they enter the first uncontrolled waste management unit or where they are sent offsite
- Wastes shipped offsite must be counted when the waste leaves the property unless documentation is provided by receiving facility that the waste is controlled until treated or recycled

6BQ Compliance Option

- Organic waste streams must be controlled until treated or recycled in accordance with §61.342(c)(1)
- The “classic” treatment standards/demonstrations do not apply to treatment at 6BQ facilities;
 - “Just Enough Treatment” or “Treat to Target”
- Benzene quantity (BQ) under the 6BQ option is considered a running total during the reporting year, compliance cannot be reestablished
- EPA’s favored compliance option
 - Easier to evaluate compliance
 - No less than 10 ppmw exemption

2BQ vs. 6BQ – Bucket Metaphor

- 2BQ gets two “buckets”
 - One bucket for all uncontrolled wastes *greater than* 10 ppmw with a size limit of 2 Mg/yr
 - One bucket for uncontrolled *less than* 10 ppmw that could be of “infinite” size
- 6BQ get one “bucket” for all uncontrolled waste regardless of concentration



Waste Stream Comparison Table

Stream Type		Included in TAB	Included in 6BQ	Included in 2BQ
Uncontrolled	<10 ppmw benzene	YES	YES	NO
	≥10 ppmw benzene	YES	YES	YES
Controlled		YES	At entrance to first uncontrolled WMU or when shipped offsite	NO
Remediation Wastes		NO	YES If uncontrolled	YES If uncontrolled and ≥ 10 ppmw benzene
<10% Water Stream	No water contact	NO	Controls are required	YES If uncontrolled and ≥ 10 ppmw benzene
	Commingles with water	YES	YES If uncontrolled	
Turnaround Waste		YES Can average over turnaround cycle	YES Counted in year waste is generated	YES Counted in year waste is generated if ≥ 10 ppmw benzene

What is Meant by “Control”?

- For a waste to be considered “controlled” it must be managed in controlled “waste management units” (WMUs) from the point of generation to treatment, recycle, or point of 6BQ accounting.
- Control requirements for each type of waste management unit and treatment processes are promulgated in §61.343 through §61.349.
- Controls generally include closed vent systems to control devices or floating roofs. (*control devices options include carbon, combustion controls, flares, etc.*)
- In addition to physical controls, initial and quarterly visual inspections and initial and annual Method 21 instrument leak detection monitoring must be performed on controlled WMUs.
(*See reference tables.*)

“WMU or Process Vessel”

- When was the vessel installed? Pre-rule, Immediately following rule, Part of capital project.
- What is the economic value of the material?
- How does the cost of the vessel compare to the cost of the material.
- What was the intent of the vessel?
- Was the material ever wasted?

BWON Waste Management Unit Control Standards

- Individual Drain Systems
- Tanks
- Oil-Water Separators
- Containers
- Surface Impoundments
- Treatment Devices
- Closed Vent Systems



Individual Drain System Standards

“Closed Drain Systems” under §61.346(a)

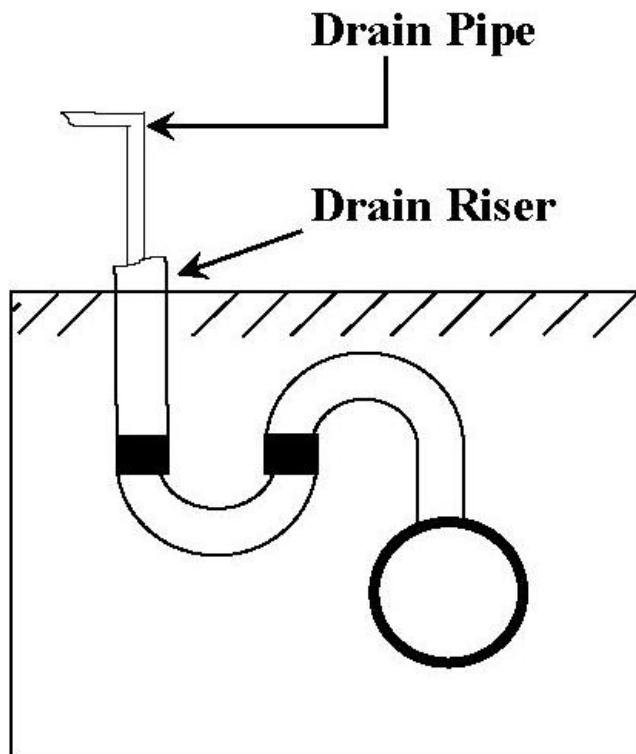
- Equip each drain system opening with a cover and closed-vent system that routes all organic vapors vented from the drain system to a control device.
- Must operate with no detectable emissions
- Each opening shall be maintained in a closed, sealed position
- May have openings if operated at less than atmospheric pressure and other specific requirements are met

Individual Drain System Standards

Water-sealed drain system - “alternative” standard §61.346(b)

- Each drain must be equipped with either:
 - Tightly sealed cap or plug, or
 - Water seal controls (p-trap) in vertical leg of drain
- Each junction box must be equipped with a cover with a tight seal that must be kept in place at all times
- Junction boxes may have a vent pipe at least 90 cm (3 ft) in height and not exceeding 10.2 cm (4 in) in diameter.
 - Vent pipe must either be:
 - Vented through a closed vent system to a control device, or
 - Equipped with a system to prevent the flow of organic vapors to the atmosphere during normal operation, and a flow indicator (e.g., *conservation vent with magnetic flow indicator*)

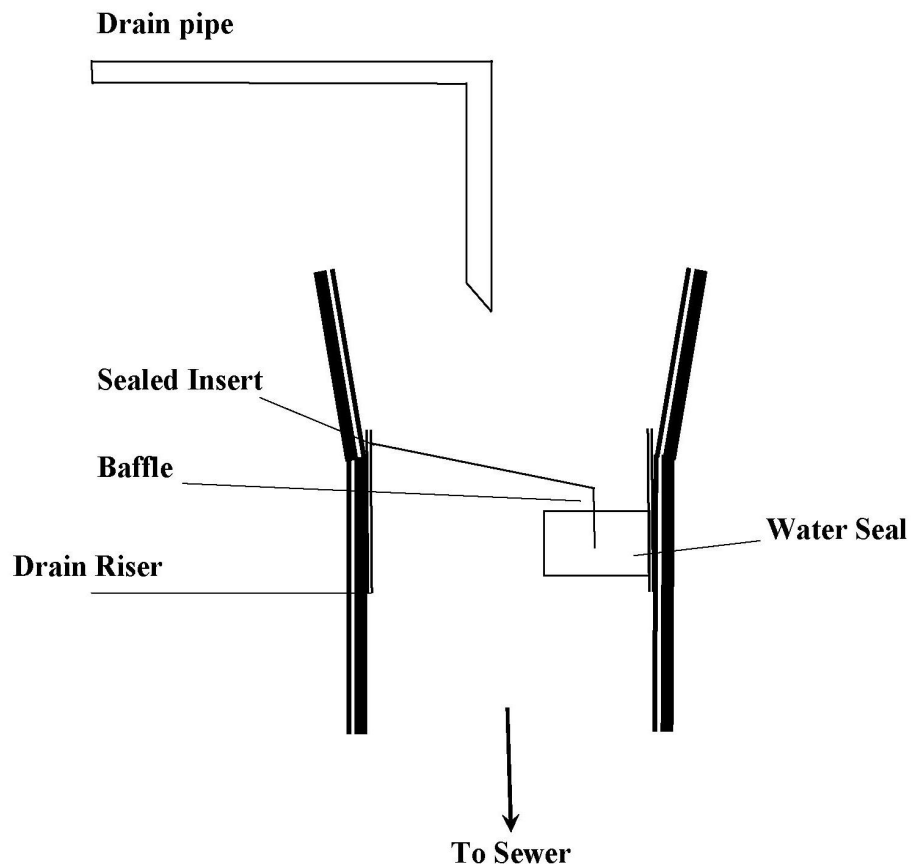
IDS Controls – Drain with Water Seal



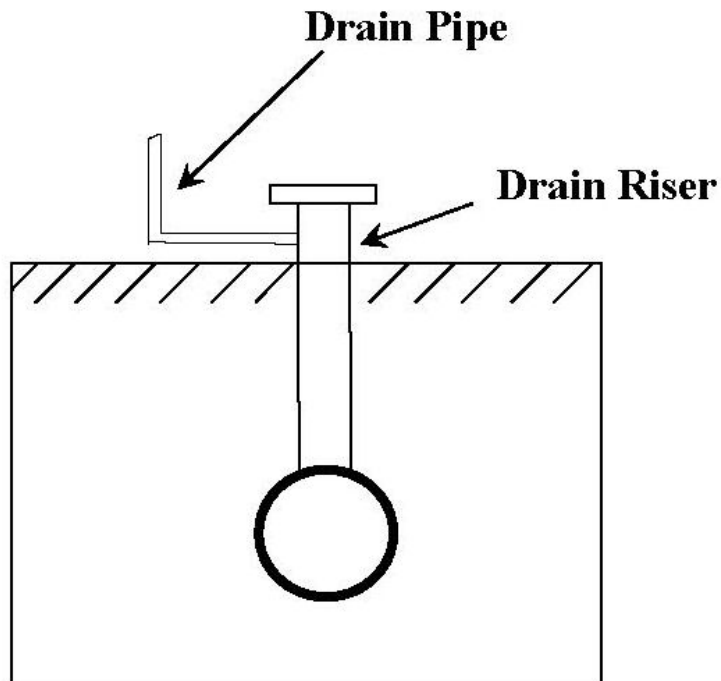
**P-Leg Seal
(Controlled)**



IDS Controls – P-Trap Insert



IDS Controls – Closed Drain



**Closed Drain
(Controlled)**



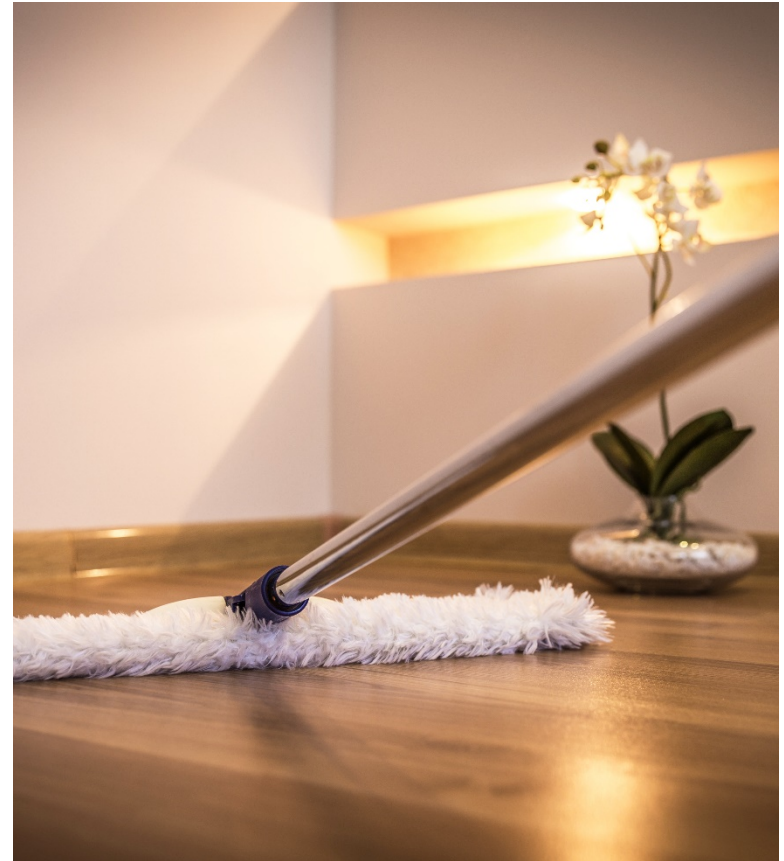
Audits

- First Impressions
- Comforting Knowledge
- Gonna Be Issues Ahead
- Common Issues
- Discussion/Questions



First Impressions

- Before on-site
- Refinery conditions/housekeeping
- Level of experience
- Who does what
 - Contractor
 - Operators
- Supplemental sampling





Tell me about
your program

How often do you
get in the field?

Who collects the samples?

Better Level of Comfort When:

- Was involved with CD negotiations
- TAB contains
 - Spills
 - Vacuum trucks
 - Remediation wastes
- Confirmation of TAB and compliance option via End-of-Line sampling
- Know operators by name

A Likely Problem When:

- I just inherited the program
- Can't find previous TABs
- Less than 5 streams on TAB
- Can't maneuver through electronic TAB
- Don't know the compliance Option
- Can't get to the process unit
- Don't know Shift Supervisor/



Recurring Issues

- Annual Report Submittals
 - Cut and paste
 - References/attachments
- Sample collection
 - Variability 5 orders of magnitude
 - Less than 10 ppb
- Streams greater than 0.05 mg/yr (CD)
- Deviation reporting

Recurring Issues (cont.)

- Deviation reporting
 - Inconsistent with other reports -
 - spills?
 - Carbon canisters, IDS
- Two phase samples
- End-of-line
- Equipment Shortcomings (this afternoon)

IDS Controls – Caps or Plugs

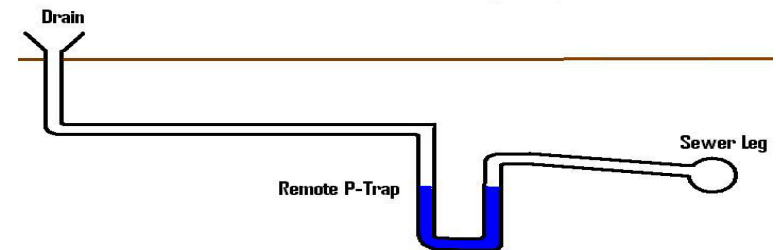


What If.....

A process unit supervisor notifies you that water traps in several old BWON drains in his process unit cannot be inspected visually because they are ‘running’ or horizontal p-traps.

Brainstorm

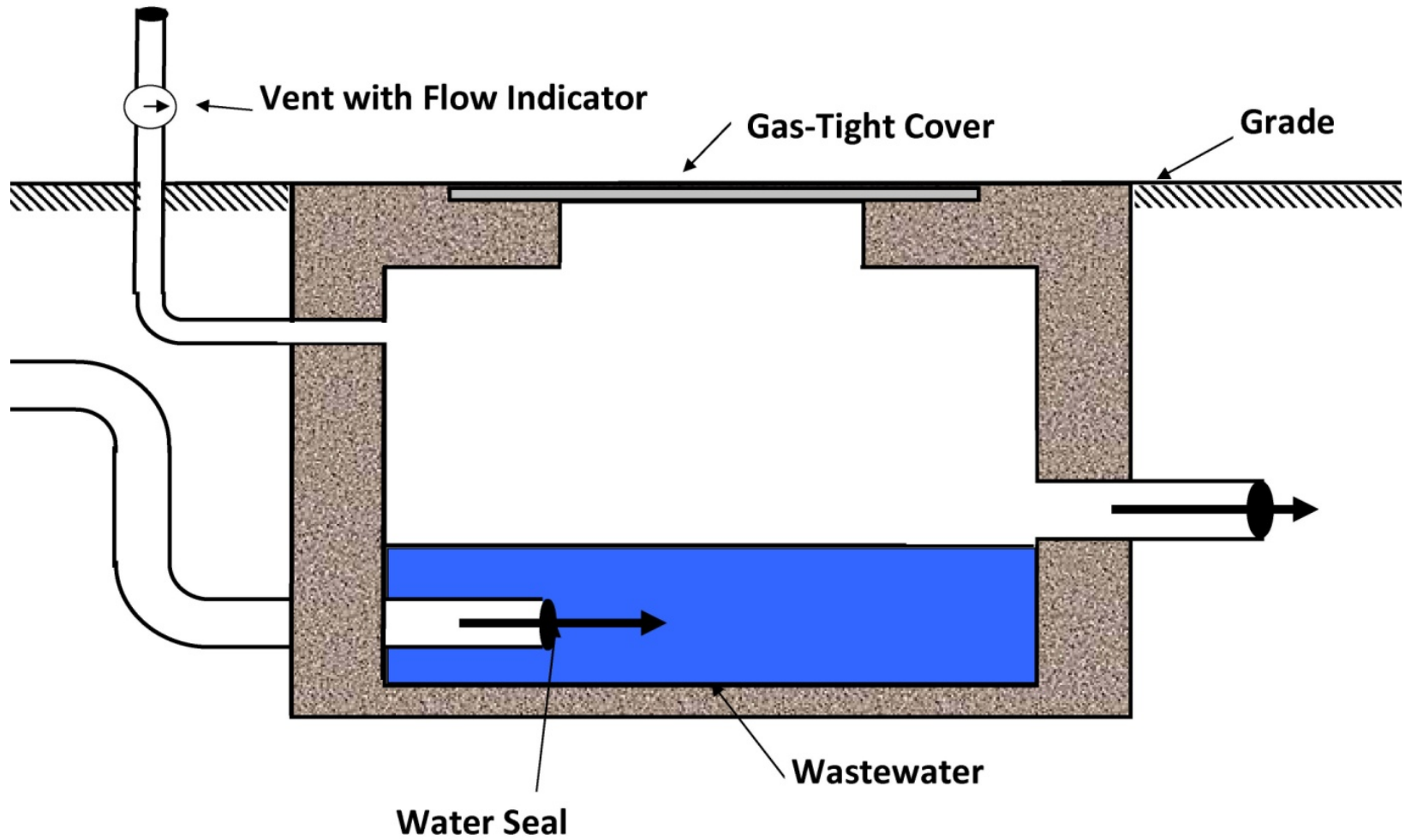
- What options do you have for ensuring these drains are controlled? What are some pros and cons for each option?
- What other aspects of your BWON program might this news prompt you to investigate?



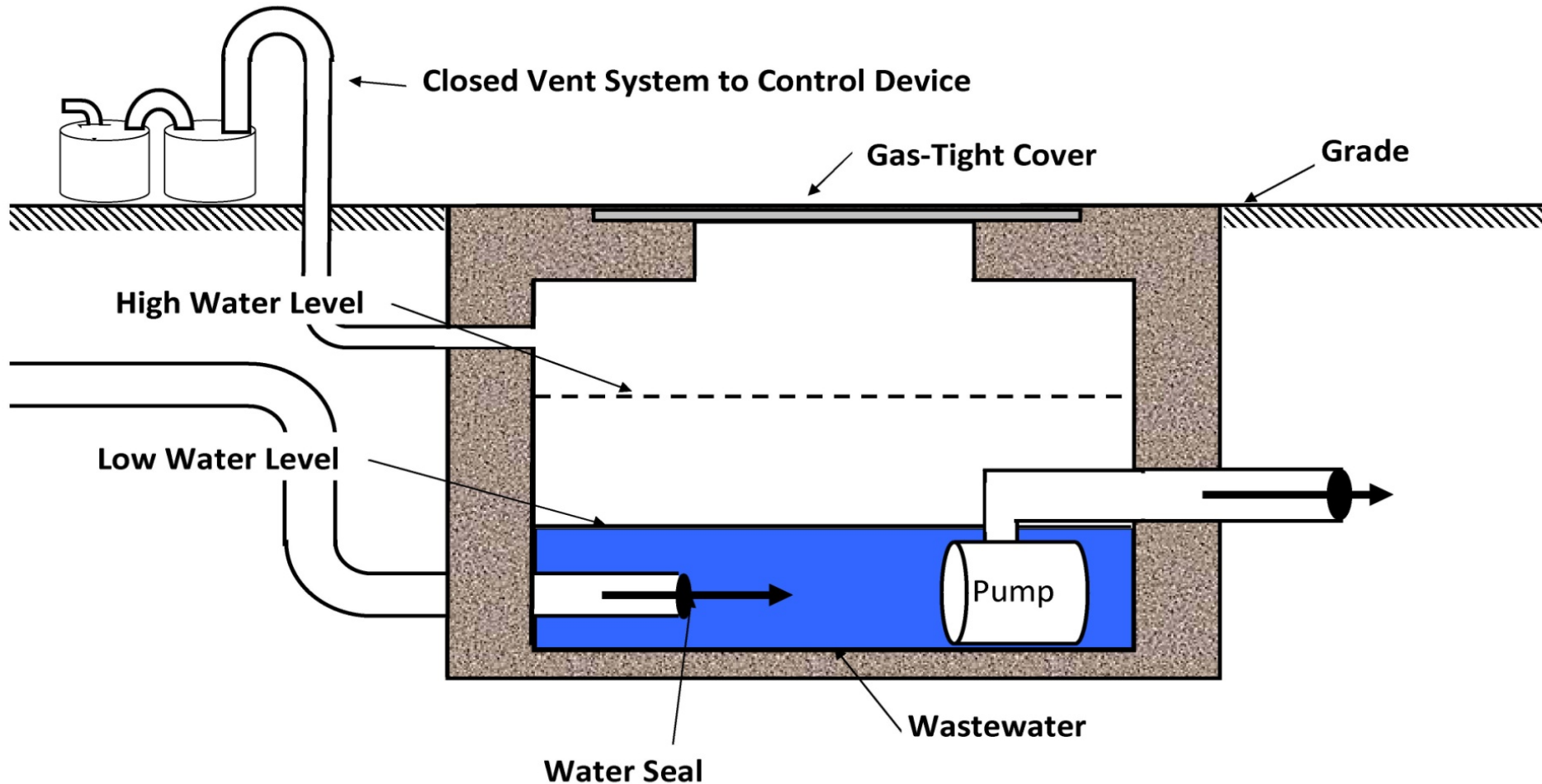
Brainstorm

- What options do you have for ensuring these drains are controlled?
What are some pros and cons for each option?
 - Use an extension (i.e. plumbers snake) with a water indicating paste, tape, or rag on the end.
 - Difficult, dirty, and time-consuming
 - Generates solid waste
 - If it is known that a trap exists, addition of water during every inspection can be used to meet this requirement.
 - Easy
 - Does not actually prove that water is being retained in the trap
 - Requires that some documentation of the existence of the trap be located and maintained
- What other aspects of your BWON program might this news prompt you to investigate?
 - There may be more areas in your BWON drain system that are questionable. This may be good justification for an internal or third party audit of your inspection and monitoring program.

Water Sealed Junction Box



Junction Box with Changing Level



Tanks

- Fixed roof (*or inside a total enclosure*) and all vapors must be vented through a closed vent system to a control device
 - Conservation vent allowed and no closed vent system to control device required if tank manages less than 10% water waste and size/vapor pressure requirements are met (see *below*)
- Internal floating roof and a fixed roof which meets the requirements of NSPS Subpart Kb - §60.112b(a)
- External floating roof meeting the requirements of NSPS Subpart Kb - §60.112b(a)(2).

Fixed-Roof Tank Standards

- Vapors must be routed through a CVS and control device
- Cover and all openings must be designed and operated with no detectable emissions.
- Openings must be kept closed, sealed, and properly gasketed except when it is necessary to use the opening for sampling, material removal, inspection, maintenance, or repair.
- Openings may remain open only if the cover and CVS and control device are operated at a pressure less than atmospheric and certain additional requirements are met.
- Alternate control technologies are allowed, but only with the approval of the Administrator.

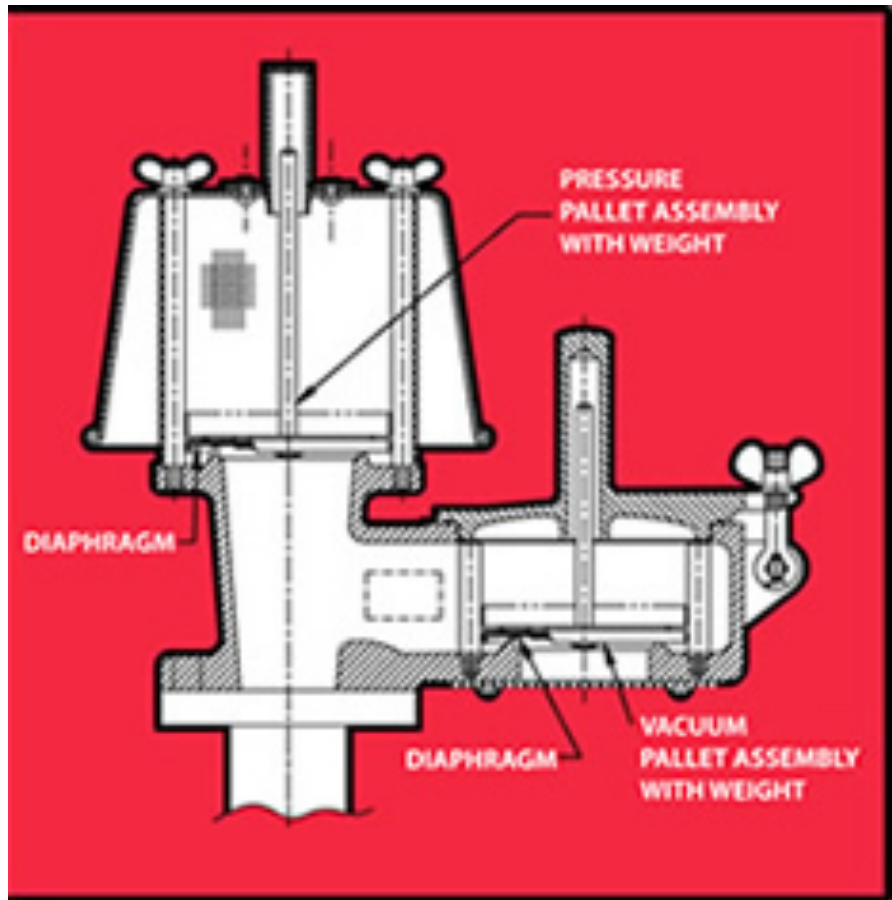
Fixed-Roof Tank Standards

- May also be equipped with devices that vent directly to the atmosphere (i.e., conservation vents) rather than closed vent systems routed to control devices provided that:
 - The waste managed in the tank is less than 10% water by volume, annual average

And:

- The waste managed in the tank either:
 - Has a maximum organic vapor pressure less than 0.75 psi
 - Has a maximum organic vapor pressure less than 4.0 psi and is managed in a tank having design capacity less than 40,000 gallons
 - Has a maximum organic vapor pressure less than 11.1 psi and is managed in a tank having a design capacity less than 20,000 gallons

Conservation Vent



Internal Floating-Roof Tank Standards

Internal floating roof (IFR) tanks must meet the following requirements:

- The IFR must rest or float on the liquid surface at all times except during initial fill and during those intervals when the tank is completely emptied
- When the IFR is resting on leg supports, filling, emptying, or refilling must be continuous and completed as quickly as possible

Each IFR must be equipped with one of the following closure devices between the tank wall and the edge of the FR:

- A foam- or liquid-filled seal mounted in contact with the stored liquid
- Two seals, one mounted above the other, so that each forms a continuous closure that completely covers the space between the wall of the tank and the edge of the IFR
- A mechanical shoe seal
 - All potential openings must be properly sealed and gasketed

External Floating-Roof Tank Standards

- A tank with an external floating roof must meet the following requirements.
- The EFR must be equipped with a closure device between the wall of the tank and the edge of the roof as follows:
 - The lower seal must be either a mechanical shoe or a liquid mounted seal. The seal must completely cover the annular space between the edge of the roof and the tank wall
 - The upper seal must completely cover the annular space between the roof edge and the tank wall
 - The EFR must float on the stored liquid at all times except during initial fill, and when the tank is emptied and subsequently refilled.
 - When the EFR is resting on leg supports, filling, emptying, or refilling must be continuous and completed as quickly as possible
 - All potential openings must be properly sealed and gasketed

Oil-Water Separators

Including:

- API Separators
- Corrugated Plate Interceptors
- Parallel-Plate Interceptors
- Dissolved Air Floatation (DAF) Separators
- Dissolved Nitrogen Floatation (DNF) Separators
- Vessels equipped with internal weirs/skimmers



Oil-Water Separators

- Includes the separating unit, forebay (and aftbay) and other separator basins, skimmers, weirs, grit chambers, sludge hoppers, and bar screens located directly after the individual drain system and prior to additional treatment units such as an air floatation unit, clarifier, or biological treatment unit.
- Control options include:
 - Fixed-roof cover vented through a CVS and control device
 - Floating Roof compliant with NSPS QQQ

Fixed-Roof Oil-Water Separator Standards

- Must be vented through a CVS and control device.
- Cover and all openings must be designed and operated with no detectable emissions.
- Openings must be maintained in a closed and sealed position at all times waste is in the separator, except when it is necessary to use openings for sampling, waste removal, inspection, maintenance, or repair.

Fixed-Roof Oil-Water Separator Standards

- Fixed-Roof Oil-Water Separators operating at less than atmospheric pressure may contain uncontrolled openings if:
 - The purpose of the opening is to provide dilution air to reduce the explosion hazard
 - The opening is designed to operate with no detectable emissions
 - As indicated by Method 21 reading of less than 500 ppmv above background, as determined initially and annually thereafter
 - The pressure is monitored continuously to ensure that the pressure in the oil-water separator remains below atmospheric pressure

Fixed-Roof Oil-Water Separator Standards

- BWON references NSPS QQQ standards in §60.693–2(a)
- The floating roof must be equipped with a closure device between the wall of the separator and the roof edge consisting of a primary and secondary seal
 - The primary seal must be a liquid mounted seal
 - The secondary seal must be above the primary seal and cover the annular space between the floating roof and separator edge
- Fixed-roof portions of oil-water separator must meet BWON standards, not NSPS QQQ!
 - Requires CVS to Control Device on fixed-roof sections of floating-roof oil-water separators

Containers

- Drums
- Frac (or Baker) tanks
- Barrels
- Tank trucks
- Vacuum trucks
- Roll-off boxes
- Barges
- Dumpsters
- Tank cars
- Dump trucks
- Ships



Container Standards

- Must be equipped with a cover designed to operate with no detectable emissions.
- Cover openings must be maintained in a closed, sealed position at all times that waste is in the container, except during waste loading, removal, inspection, or sampling.
- If the waste is pumped into the container, the waste must be transferred into a container by use of a submerged fill pipe within two pipe diameters of the bottom of the container.
- Treatment of a waste in a container, including aeration, thermal or other treatment, can only be performed if the container is vented to a CVS and control device.
- Containers with capacity less than 111 gallons and which meet DOT requirements under 49 CFR Part 178 are exempt from BWON monitoring requirements if vapor tight.

What If.....

During a stroll around your refinery one fine afternoon, you notice a maintenance crew loading waste into a frac tank. The frac tank, and three others next to it, are equipped with conservation vents. None of the frac tanks are equipped with carbon canisters.

Brainstorm

- Is this allowed for containers under the BWON?



Solutions

- **Are safety devices allowed for containers under the BWON?**
 - No specific allowance for safety devices on containers under BWON unless part of a closed-vent system to control device.
 - Safety devices are allowed under Container (MACT PP)
 - If one is assured the container, including the conservation vent/pressure release vent, will meet no-detectable emissions monitoring, this could be considered to be allowed under the BWON.
 - Or, possible to classify the container a fixed roof tank if it meets the <10% water, capacity, and vapor pressure limitations which allow for a conservation vent on a tank

Control Standards – Wastes Shipped Offsite

Control requirements for wastes shipped offsite for treatment, disposal, or recycle:

- Manage wastes in controlled WMU (i.e., containers) while onsite
 - Conduct all required visual inspections and Method 21 monitoring, including tanker trucks, railcars that will carry wastes offsite while on facility property
- Provide receiving facility with notification that waste contains benzene and must be managed in accordance with BWON requirements
 - Required for 2BQ facilities, strongly recommended for 6BQ facilities
 - Receiving facility should be able to demonstrate capability to control/treat BWON wastes
- 6BQ facilities must either:
 - Count waste towards 6BQ uncontrolled benzene quantity at point it leaves facility
 - Count waste towards 6BQ at first uncontrolled offsite WMU if documentation received from receiving facility showing benzene concentration at that point
 - Consider waste controlled if receiving facility provides documentation that waste was managed in BWON-controlled WMU until recycled, treated, or destroyed

Miscellaneous Waste Management Units

- Surface Impoundments
 - Man-made or natural basins, pits, ponds, lagoons.
 - Control standards are a cover and closed vent system to control device
 - Not typically found in BWON facilities
- Treatment units/equipment
 - Equipment used to remove or destroy benzene from a waste
 - Control standards are to follow the requirements for one of the other BWON WMUs
 - e.g., Stripper tower operates as a treatment unit, but follows relevant control standards for a fixed roof tanks

Closed Vent System Standards

- A system that is not open to the atmosphere and is comprised of piping, ductwork, connections, and, if necessary, flow-inducing devices that transport gas or vapor from an emission source to a control device
- Must vent to control device at all times that WMU or treatment system is operating
- On bypass lines that could divert the vent stream away from a control device, either:
 - Install a flow indicator to record when the vent stream is routed away from the control device
 - or-
 - Secure the bypass line with a car seal or a lock-and-key device and inspect monthly
- May be equipped with safety devices that vent directly to the atmosphere when the device to prevent physical damage to the vent system
(i.e., *conservation vent*)

Inspection and Monitoring

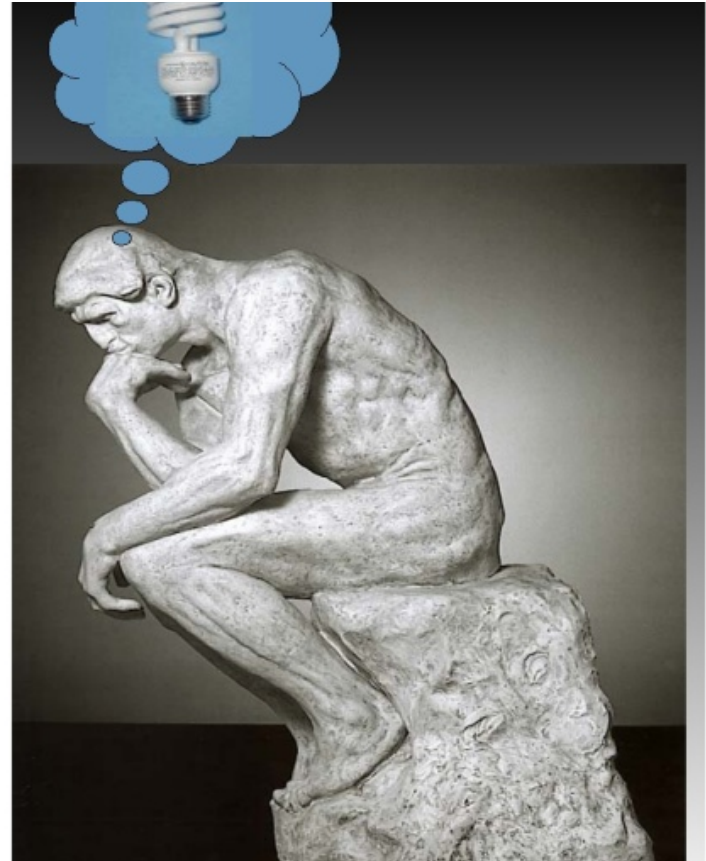
- **Initial and Quarterly Visual Inspections (QVI)**
 - AVO (audio, visual, olfactory)
 - Looking for signs of any POTENTIAL to leak
 - This covers ALL leak interfaces
- **Initial Annual No-Detectable Emissions (NDE) Monitoring**
 - Method 21 Instrument Monitoring
 - All leak interfaces in vapor space/vapor service
- **Other/Alternative Monitoring (i.e. IR Camera)**
 - Must be approved by Agency
 - Refer To Handout in Resources section of your Binder

Why is LDAR important for BWON?

- **BWON contains LDAR-type requirements for monitoring and inspection on “controlled” components of the waste and wastewater collection system**
 - Annual Method 21 monitoring on “components” in vapor service (a.k.a – “No-Detectable Emissions Monitoring”)
 - Quarterly Visual Inspections on all “components”
- **BWON inspection and monitoring has been a recent focus area during EPA audits**
 - EPA using infrared camera to identify leaks on BWON components
 - EPA has been finding deficiencies in BWON component inventory and equipment integrity

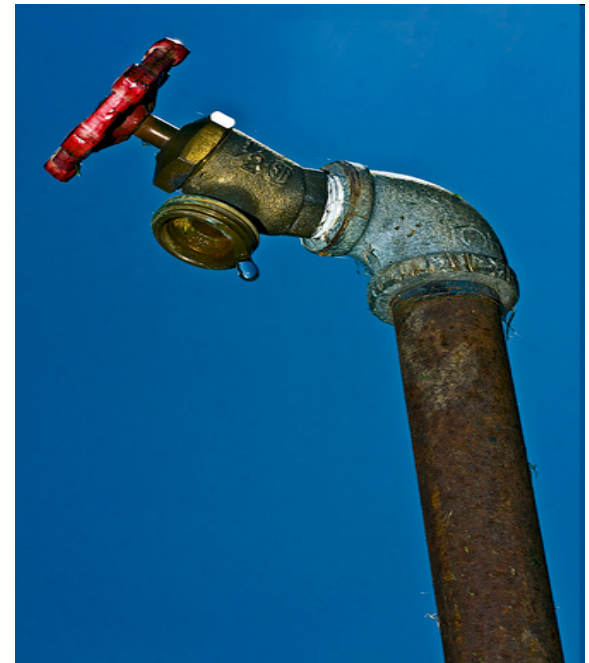
Other Potential LDAR and BWON Overlaps

- Carbon canister breakthrough monitoring
- Waste stream sampling
- Junction box sewer vent monitoring/inspections
- Closed vent system bypass inspections



How Do BWON “Components” Compare to LDAR’s?

- BWON doesn’t define component types, it uses the term “potential leak interfaces”
- BWON includes “non-traditional” components and does not provide exemptions based on component service
- Typical BWON components that may not be LDAR components
 - Drains
 - Manholes
 - Junction boxes
 - Hatches
 - Roof seams



How are BWON Inspection and Monitoring and Repair Requirements Different than LDAR?

- NDE (Method 21) monitoring only required annually.
- Annual NDE (Method 21) monitoring only required on components in vapor service.
- Visual inspections are required quarterly on all affected equipment.
- Must perform visual inspection on drains for presence of a water seal.
- LDAR closed-vent system requires initial Method 21 monitoring of all “potential leak interfaces” (*i.e., valves, connectors, etc.*) initially, and then visual inspections annually thereafter. Under BWON, closed-vent systems require initial and annual Method 21, as well as quarterly visual inspections.

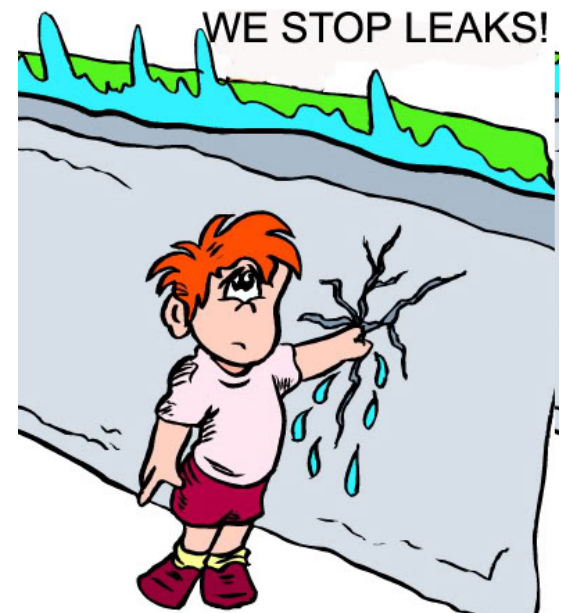
How are BWON Inspection and Monitoring and Repair Requirements Different than LDAR?

- BWON does not have an applicability threshold for VOC or HAP content; all controlled waste management units require inspection and monitoring (*e.g., equipment in wastewater service subject to BWON inspection and monitoring, but likely not subject to LDAR monitoring due to low VOC and/or HAP concentration*).
- Under BWON, repair schedule is generally only stated for first attempts, whereas the LDAR regulations specify first attempts and final repair deadlines.

**Note that BWON consent decrees typically increase monitoring frequency: increase water seal inspections to monthly and increase Method 21 monitoring on oil water separators to quarterly

What is Considered a Leak Under BWON?

- Leak threshold for Method 21 Monitoring = 500 ppmv for all leak interfaces.
- BWON uses the term “no-detectable emissions” or “NDE” to define leak threshold, different than LDAR term no-detectable emissions.
- Visual inspections focused on tight seals, sealed and latched hatches, covers, presence of cracks and gaps, water seals, well maintained gaskets, etc.



How Might LDAR Databases and Tagging be Used for BWON Inspection and Monitoring Program Management?

- Consider tagging BWON leak interfaces and build inspection/monitoring routes.
- Associate BWON rule to existing LDAR tags subject to BWON inspection and monitoring.
- Use data logger to manage, record, and document visual inspections and repairs.
- Use data logger to manage carbon canister monitoring.
- Use LDAR workflow to manage repair process.



What are Some BWON Inspection and Monitoring Program Challenges and Recommendations?

- Understanding what equipment is subject to BWON controls
- Defining what is considered a problem or leak during visual inspections; consider developing written procedures to ensure consistent interpretation
 - Water seals on drains
 - Caulking and gasketing on roof seams and access points
- Develop drawings or maps for drain systems and unburied sewer lines to identify BWON affected equipment
- Develop drawings that show leak interface on complex WMUs
- Managing and adjusting “status quo” on integrity of BWON-affected waste management units

Control Device Standards

- An enclosed combustion device must be designed and operated to meet one of the following standards:
 - Reduce the organic emissions vented to it by 95% wt or greater;
 - Achieve a total organic compound concentration of 20 ppmv (corrected to 3% O₂)
 - Provide a minimum residence time of 0.5 seconds at a minimum temperature of 1400 °F (760 °C) in the firebox of an incinerator, boiler, or process heater.
- Vapor recovery systems (e.g., carbon canister) must recover or control organic emissions with an efficiency of 95 weight percent or greater, benzene with an efficiency of 98 weight percent or greater.
- Flares must comply with the requirements of 40 CFR §60.18.
- Each CVS and control device in BWON service must be operated at all times when waste is managed in a unit vented to the control device.

Control Device Monitoring

- Regular monitoring of Control Device operating parameters is required
 - Flare pilot flame presence, combustion device temperature, vapor space pressure of equipment operated at less than atmospheric pressure.
- Carbon canisters are required to be regularly monitored for 'breakthrough' of VOCs
 - Monitoring frequency is daily or at 20% of design carbon breakthrough frequency, whichever is less frequent.
 - VOC or benzene breakthrough concentrations defined by 95% VOC/98% benzene reduction of vent stream to carbon canisters.
 - Design calculations form basis for monitoring frequency and breakthrough concentrations.
 - Carbon canister standards often enhanced by Consent Decree requirements.

2BQ Treatment Standards

- Treatment Options
 - Remove benzene to a level less than 10 ppmw without dilution
 - Remove 99 percent or more benzene on a mass basis
 - Use an Enhanced Biodegradation Unit (EBU)
 - Other options: Deep well injection, RCRA permitted combustion, POTW, etc.
- Treatment equipment must meet BWON control requirements in, except for enhanced biological treatment units
- Requires regular monitoring of treatment device operating parameters
 - e.g., Monthly sampling of benzene stripper outlet stream, EBU inlet stream, etc.
- The 6BQ compliance option does not require compliance with the treatment standards in §61.348

Enhanced Biodegradation Units (EBU)

- Activated sludge process that “is a suspended growth process that generates biomass, uses recycled biomass, and periodically removes biomass from the process.”
- Allowable treatment process for 2BQ if inlet stream is less than 10 ppmw benzene
- Under the 6BQ, controlled waste streams entering an EBU are not counted toward the 6BQ if combined EBU inlet stream is less than 10 ppmw benzene
- “Typical operating parameters”
 - Food to Microorganism Ratio = 0.05 to 1.0 kg BOD per kg biomass
 - Mixed Liquor Suspended Solids = 1 to 8 grams per liter
 - Residence Time (Q) = 3 to 36 hours

Enhanced Biodegradation Units (EBU)

- How does one determine if your facility's activated sludge plant meets the definition of an EBU?
 - Ensure that EBU is designed and operated correctly.
 - “Typical” parameter ranges are generally easy to meet if EBU is well-designed
 - No explicit rule requirement to monitor or keep records of F:M Ratio, MLSS, or Residence Time, but it is recommended that facilities test for these parameters and keep records in readily available location.
- US EPA has required more stringent testing of EBUs in a few cases
 - Driven by US EPA Regional mistrust of EBUs as effective biological treatment devices
 - Test for Fbio, DIAL studies, and other CD requirements

Treatment Standards and the 6BQ

- 6BQ Compliance Option does not require compliance with treatment standards of 40 CFR §61.348
 - No reference to §61.348 under 40 CFR §61.342(e)
 - Given that §61.342(e) presents the 6BQ as an alternative to the requirements in §61.342(c), the requirements of §61.342(c)(1)(i) would not apply to wastewater streams at 6BQ facilities, where §61.342(c)(1)(i) refers to the BWON treatment standards in §61.348
 - Per §61.355(k) and discussed in the January 1993 preamble to the rule, the 6BQ is calculated as the sum of the benzene quantity in waste streams as they enter the first uncontrolled waste management unit
 - “Controlled” means managed or treated in waste management units complying with §61.343, §61.344, §61.345, §61.346, and §61.347

Miscellaneous Treatment Options

- Use of Deep Well Injection with a final permit under 40 CFR part 270 and complies with the requirements of 40 CFR part 122
- Use of RCRA Hazardous Waste Incinerator with a final permit under 40 CFR part 270 and complies with the requirements of 40 CFR part 264, Subpart O
- Use of a industrial furnace or boiler burning hazardous waste for energy recovery with a final permit under 40 CFR part 270 and complies with the requirements of 40 CFR part 266, Subpart D
- The waste stream is treated in accordance with the Land Disposal Restrictions under 40 CFR parts 268 and the treatment process is designed and operated with a CVS and control device meeting the requirements of §61.349, or
- The waste stream is treated by a means or to a level that meets benzene-specific effluent limitations or performance standards in accordance with the Effluent Guidelines and Standards under 40 CFR parts 401–464 and the treatment process is designed and operated with a CVS and control device meeting the requirements of §61.349

What If.....

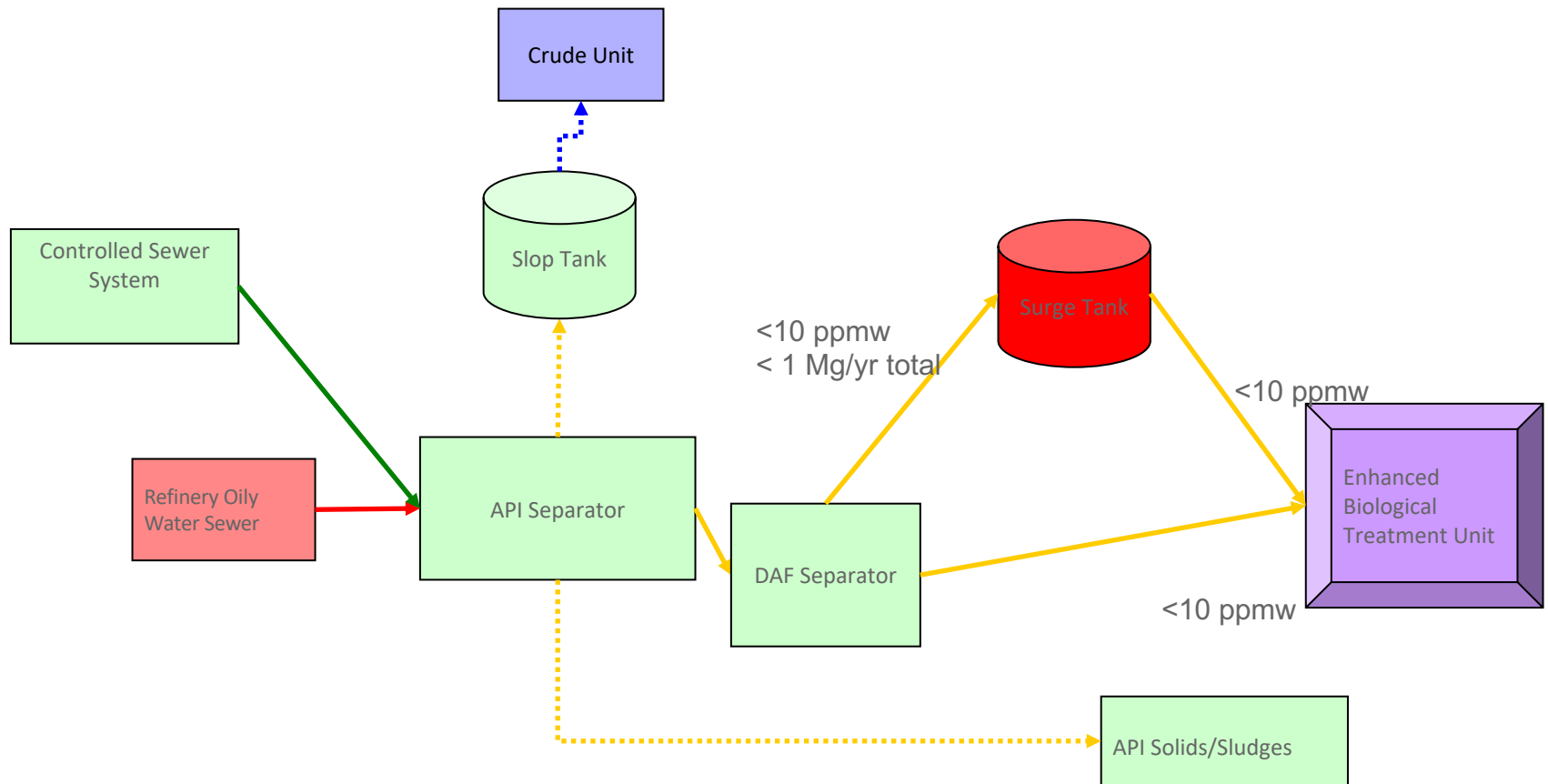
Your 2BQ facility manages combined wastewater in a controlled WWTP en route to an EBU. At one point, maintenance on your DAF forces you to bypass your wastewater through an uncontrolled tank before routing it back to the controlled WWTP train.

Brainstorm

- Is this scenario allowed under the 2BQ?
- What requirements must be met?
- How would this affect a 6BQ facility?



1 Mg/yr Exemption for Aggregated Wastes



What If.....

You operate a TSDF which receives benzene-containing carbon wastes from refineries and chemical plants. You manage this waste in containers prior to feeding it to your calcination process which reconverts it back into activated carbon.



Brainstorm

- How is TAB accounting for a TSDF different than that for a refinery or chemical plant?
- If your TSDF's TAB is less than 10 Mg/yr, are you still subject to BWON control and treatment requirements?

Solutions – TAB and Control Requirements for TSDFs

- The point of TAB accounting at a TSDF for wastes received from offsite is considered to be the property boundary of the TSDF.
 - *TSDFs would not be expected to contain many POGs within their facility boundary (but may contain points of 6BQ accounting).*
- Although a TSDF may have a TAB of less than 10 Mg/yr, it may be required to operate BWON-compliant controls if wastes are received from a controlled generating facility which expects the wastes to be controlled at the TSDF until treated or recycled. In this case, it is expected that the TSDF would follow equivalent control, treatment, inspection, monitoring, recordkeeping, and reporting requirements as a >10 Mg/yr facility.
 - *If waste becomes uncontrolled at some point in the TSDF process, report to 6BQ generating facilities the benzene concentration of waste at the point it becomes uncontrolled.*

What If.....



Your Environmental Manager comes to you one day and asks whether you should be inspecting and monitoring the various pieces of equipment in your sour water system per the BWON requirements for aboveground piping, tanks, etc.

Brainstorm

- What is your response to your Environmental Manager?
- What do you have to do to demonstrate your sour water system is 'enclosed', if anything?
- Does anything change if you know some of the waste streams managed in the system are not 'truly' sour? (*i.e., are not greater than 10 ppmw sulfur/ammonia*)

Suggestions

- What is your response to your Environmental Manager?
 - A new ADI response indicates that Sour Water Streams are to be treated similarly to any other BWON-controlled waste streams. One must ensure any equipment (tanks, etc.) in sour water service be maintained in an 'enclosed' manner according to the analogous BWON standard for that equipment. Inspection and monitoring of this equipment per BWON frequency is probably recommended based on new information from US EPA.
- What do you have to do to demonstrate your sour water system is 'enclosed', if anything?
 - All tanks or vessels must be "controlled" (vented to a flare, floating roof, etc.) similarly to what BWON would require, and the Stripper itself must be vented to a control device.
- Does anything change if you know some of the waste streams managed in the system are not 'truly' sour (i.e., are not greater than 10 ppmw sulfur/ammonia)?
 - Those streams must be considered uncontrolled or all equipment in the sour water system becomes BWON WMUs, with corresponding inspection and monitoring requirements. The sour water stripper itself may also have to be considered a treatment device if a 2BQ facility.

Reporting Requirements

- BWON Annual Report
 - Typically submitted by April 7th for the previous calendar year.
 - TAB waste stream information and estimate.
 - 6BQ or 2BQ uncontrolled/exempt waste stream list and benzene quantity estimate.
 - Report that summarizes all inspection and monitoring failures and the corrective actions taken.



Reporting Requirements

- BWON Quarterly Report
 - Typically submitted on a calendar quarter basis within 30 days of the end of the quarter
 - Certify that all inspection and monitoring has been completed.
 - Report any periods where control device/treatment device monitoring data was out of the regulatory range.
 - Flare pilot outages, EBU inlet sampling, benzene stripper outlet sampling
 - Report seal gap measurement on floating roof oil-water separators that were out of range.
 - Floating roof tank seal gap measurements (NSPS Kb) that are outside regulatory limits

What If.....

Your facility has always considered WSOS to be controlled. However, a facility audit finds that several containers were shipped/removed from the site prior to completing inspection and monitoring

Brainstorm

- How does this revelation affect your BQ, if at all?
- If not, how do you report this issue to US EPA?



Suggestions

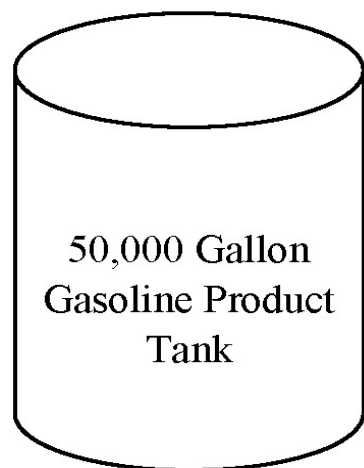
- How does this revelation affect your BQ, if at all?
 - Typically missing inspections should not change the control status, so there should be no effect on the BQ. However, if the containers were never inspected, it may be hard to justify calling the waste controlled.
 - NOTE: 6BQ facilities are required to control organic wastes (<10% aqueous)
 - Review that other inspections are occurring as required.
- If not, how do you report this issue to US EPA?
 - The missed inspections should be reported as deviations in your quarterly BWON report and Title V deviation reports.
 - Also, note that missed/improperly conducted inspections and monitoring are a notable piece of recent US EPA Consent Decree implementation audits.
 - The Agency may require you to change the control status.

TAB Calculation Exercise



See schematic hand out, refer to comparison table in student guide

Breakout Session Problem - Tank Water Draw



Water Draw



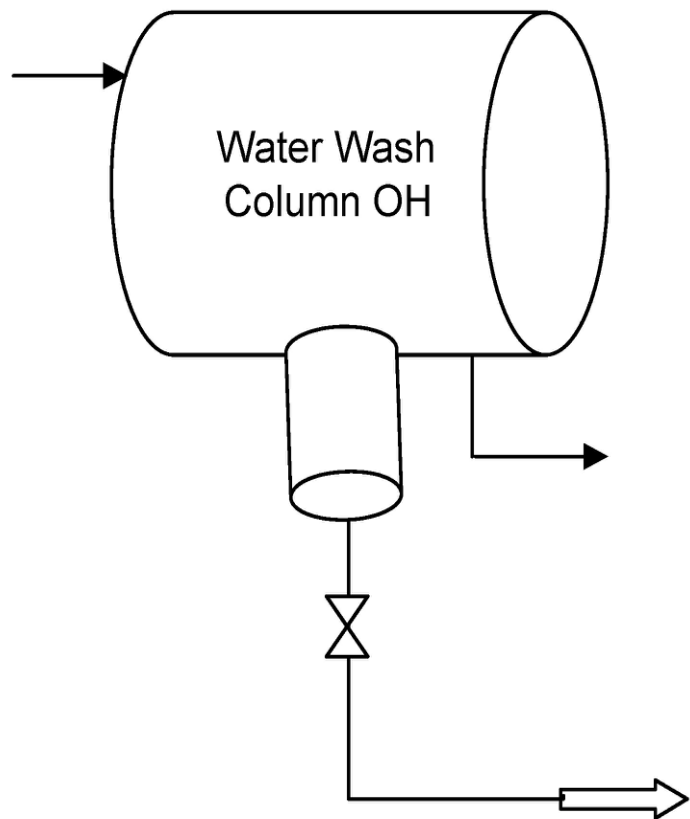
TO OPEN OILY-WATER SEWER

Gasoline Tank Water Draw:

- 5000 gallons per month of water is drawn from this tank on average.
- An additional 5% oil undercarry
- Gasoline Benzene Concentration: 15,000 ppmw
- 1 gallon water = 3.8 kg
- 1 gallon gasoline = 2.8 kg

1. What is the contribution to the TAB in Mg/yr?
2. What is the contribution to the uncontrolled benzene quantity (6BQ) in Mg/yr?
3. What is the contribution to the exempt waste stream quantity (2BQ) in Mg/yr?

Breakout Session Problem - Water Wash Column to SWS



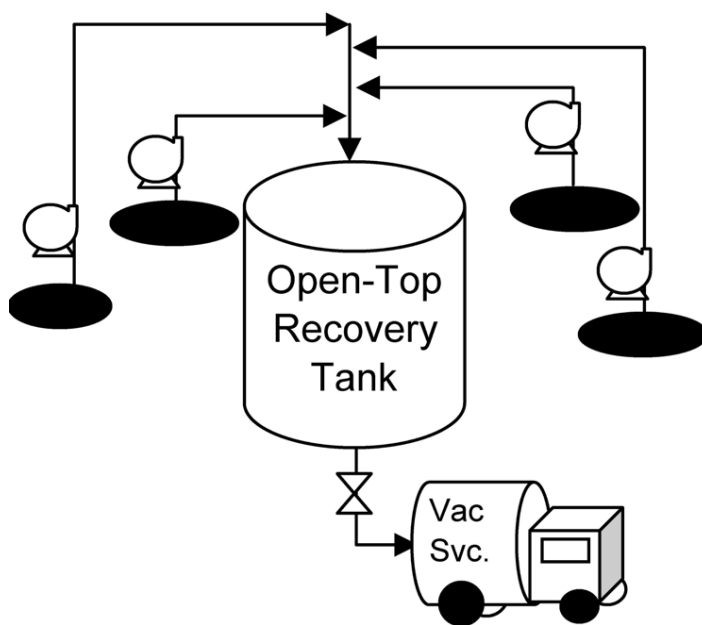
Water Wash Column Overhead Water Boot Drain:

- 5 gallons per day removed from water boot.
- 5% hydrocarbon undercarry
- FWAA sulfur concentration: 11.5 ppmw
- FWAA Hydrocarbon Benzene Concentration: 1,000 ppmw
- 1 gallon water = 8.34 lb, S.G. of hydrocarbon = 0.67

1. What is the contribution to the TAB from the Water Wash Column Water Boot Drain?
2. What is the contribution to the uncontrolled benzene quantity (6BQ)? What about 2BQ?

HARD-PIPED TO SOUR WATER STRIPPER

Breakout Session Problem - Groundwater Remediation



Groundwater Recovery System Data:

- Four recovery wells pumped at 1 gpm each for 50 hours per week through hard-piping to a recovery tank.
- Recovered groundwater includes 1% gasoline based on historical data from each well.
- Weathered Gasoline Benzene Concentration: 10,000 ppmw
- 1 gallon water = 3.8 kg, 1 gallon gasoline = 2.8 kg
- Groundwater is pumped to 50,000-gallon open-top recovery tank
- Tank is pumped out to uninspected, unmonitored vacuum truck every week.
- Vacuum truck off-loads at a hard-piped connection to BWON-compliant Slop Tank for recycle back to process.

1. What is the contribution to the TAB in Mg/yr?
2. What is the contribution to the uncontrolled benzene quantity (6BQ) in Mg/yr? What about 2BQ?

Discussion & Questions

Q&A

A 3D graphic featuring the letters 'Q&A' in a large, bold, yellow font. The letters are positioned in the center of the frame. Surrounding them are numerous dark gray, 3D question marks of varying sizes, some of which are partially obscured or cut off by the edges of the image. The background is a light gray surface with a subtle gradient, and the overall lighting creates soft shadows beneath the letters and question marks.