SEWAGE AIR RELEASE VALVES:

HOW TO KEEP A NECESSARY EVIL FROM BECOMING UNNECESSARILY EVIL

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How Hard Could it Be?
Topics

- **What We’ll Talk About**
  - Best installation practices
  - Odor
  - Corrosion
  - Maintenance & Accessibility
  - Other “Deep Thoughts”

- **What We Won’t Talk (Much) About:**
  - Manufacturer Preferences
  - Sizing Philosophy
Good judgment comes from experience, and a lot of that comes from bad judgment.
- Will Rogers
Valve Options
The Perfect Force Main

- No High or Low Points
- Uphill Slope All the Way
- Pump Runs Continuously
- No Need for Air Valves!!
The Perfect Air Valve Installation

- Not in a Vault
- Easily Accessible
- In the Sunshine
- Totally “Vented”
- Near a Scenic Lake
- All Corrosion-Resistant Components

Photo Credit: Utility Engineering, Construction & Maintenance Magazine
The Real World
The Real World

STANDARD TYPE 'A' COVER

CEMENT MORTAR (IN STREETS ONLY)
RAM-NEK JOINT SEALER
SEWAGE AIR RELEASE VALVE W/BLOW-OFF VALVE

TOP SECTION OF STD. MANHOLE
1" BLOW-OFF VALVE

DOUBLE STRAP I.P. THREAD

2"X3" THREADED NIPPLE

MANHOLE FLOOR TO BE COVERED W/ 1/2" GRAVEL

FORCE MAIN

PROVIDE ARCH OPENINGS TO AVOID MANHOLE BEARING ON PIPE

NOTE: VALVE TO BE SET TO ONE SIDE OF MANHOLE TO FACILITATE MAINTENANCE.
The Air Valve Discharges into A Closed Manhole. H₂S Buildup!

You can’t isolate the air valve without crawling into the manhole! (That’s potentially deadly)

Unlined concrete and non-stainless components – Corrosion!

There’s no room to safely flush or maintain the air valve

Connecting hardware & piping easily corrodes
Odors

- Different for each valve
- Greater for intermittently-operated pipelines with long times between pump starts
- \( \text{H}_2\text{S} \) Levels during venting can be highly odorous – even deadly!
- Long pipelines with lots of settling and “dead time” can become mini digesters – methane and other gasses can vent. Fire hazards can occur in some situations.
- Odors may need to be treated if near populated areas
- “Real” odor treatment almost always involves above-ground features
Ignition Concerns

Carbon Type Auto Ignition Temperature Range (°F)

<table>
<thead>
<tr>
<th>Carbon Type</th>
<th>Temperature Range (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virgin</td>
<td>450</td>
</tr>
<tr>
<td>Catalytic</td>
<td>350-450</td>
</tr>
<tr>
<td>Impregnated (Caustic)</td>
<td>150-250</td>
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SAFETY CONSIDERATIONS
VAPOR PHASE CARBON ADSORPTION

When contaminated gas streams are treated with granular activated carbon, heat is released by the physical adsorption process. This exotherm is generated from the adsorption of both the gaseous contaminants and water vapor found in the untreated gas.

Additionally, certain reactive chemical compounds once adsorbed onto activated carbon undergo chemical oxidation or polymerization on the carbon surface. These reactions are also exothermic.

Since heat losses through the walls of most granular carbon adsorbers are very low, most of the heat generated is carried off in the exit gas stream. However, in extreme cases the heat generated is sufficient to cause a significant rise in the exit gas temperature and in the carbon bed itself. A safety issue develops if the temperature rise has potential to create an ignition hazard.

The degree of heat generation (exotherm) in any given carbon application can be predicted and is based on:

A) Gas flow rate.
B) The concentration of the gaseous contaminant.
C) The relative humidity of the gas.
D) The presence of certain reactive type compounds (e.g., various ketones, aldehydes, etc.)

A thorough understanding of the above process conditions will allow an assessment of the heat generating potential of an application. CARBTROL can assist in this analysis and, where warranted, can recommend process, operation or equipment changes to address safety concerns.
Odors
Odors
I've been snake-bit 27 times, to be exact.

Hey, that's what they do, okay? They're bein' a snake.
Corrosion

• Sewage air release valves release odorous, corrosive air. That’s what they do.
• If they vent into a sealed vault, everything in the vault is subjected to a corrosive atmosphere.
Accessiblity & Maintenance

• Sewage air release valves release odorous, corrosive air. That’s what they do.
• The interior of a vault can be unpleasant at best; deadly at worst.
• “Standard” cast iron manhole covers do not always allow enough room for a ladder, vent hoses, and tools. Consider oversizing the vault (6’ minimum diameter; larger for bigger pipelines), and using full-diameter locking covers where traffic loading isn’t needed.
• Isolation valves should ideally be accessible and operable from the ground surface.
• If you ever have to replace both the air valve and the isolation valve, how can it be done?
  • Consider isolation valves along the pipeline so portions of the pipeline can be opened without draining long stretches of line.
Replacing a Valve (And Vault) on a Large Force main

- The “real” cost isn’t the valve & vault – the real cost is the diversion of the flow to accommodate the work.
Enemies of Air Valves
Accessibility & Maintenance

• Almost all sewage air valves will occasionally get clogged with debris. They’ll occasionally get stuck “open”.
• Can you isolate the valve and drain the vault if the vault is full of “water”?
• All air valves will eventually discharge small debris. Consider removing screens and vacuuming manholes occasionally.
**Some Suggestions for a Better Installation**

- Don’t use unlined concrete vaults! Consider FRP or lined concrete.
- Use a lever-operated isolation valve that can be shut off from ground level.
- Discharge outside of the vault (refer to odor discussion!)
- Use stainless or PVC connections and hardware! Avoid DIP if possible.
- Make the vault and access opening larger for safer manned entry!
- On PVC pipe, use a tapping saddle – don’t use a DIP TEE!
Some Suggestions for a Better Installation & “Deep Thoughts”

“Highest” valves in the system will likely vent the most, and will be most likely to need combination valves.

Low valves in the system typically vent the least – sometimes not at all. Manual venting may be adequate sometimes.

How would you prevent the pipeline from draining if this valve was stuck open or corroded away? Consider in-line isolation valves.
Questions?

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