VaporLock™ Scrubber Technology for Reducing Activated Carbon Consumption and Cost for BWON Compliance

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The Trouble with Waste Water Systems

Difficult and Dynamic Systems Create Significant Issues for Traditional Controls

• Vent Stream Dynamic Characteristics:
  • Flowrates
  • Contaminate Variability
  • Water Content

System dynamics create significant issues for current BACT: activated carbon and thermal oxidizers/combustors.
VaporLock™ Technology

- Patented design providing homogenous contacting “Hydraulic Amalgamation” → Efficient Chemical Use
  - Proprietary recyclable chemistries for VOCs and benzene capture

- Designed for variability in flow and contaminate concentration

- Not intended to be a final emissions control device for VOCs

- Effectively reduces hydrocarbon concentrations allowing for effective and efficient carbon use…known as a “Carbon Extender”
Challenges with Carbon

- Design considerations are interdependent on:
  - Flow rates (bed design)
  - Contaminate loading (bed design)
- Improperly designed systems will lead to one of two issues **OR BOTH**
  - Mass transfer issues
  - Heat of sorption
- In many BWON WW applications these dynamics are impossible to avoid with carbon alone
Combustion Devices

- Designed for rich fuel environments
- Inefficient when extreme variability in flow and concentrations are observed
- Don’t operate well in humid conditions
- Can become HIGH OpX cost
Right Sizing Activated Carbon with the VaporLock™ Technology

Bridging the Gap Between Control Technologies

Control Technology Effectiveness Zone

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Main Sump - Case Study

- A customer was experiencing high amounts of carbon spend on a sump application.

- The customer had attempted multiple carbon designs, but none lowered down carbon usage.
  - Dual 200# carbon drums
  - Dual 2000# carbon vessels
  - Dual carbon beds
  - Triple 2000# carbon vessels
Main Sump - Case Study

The customer was experiencing fluctuations in the stream concentration and flow rate.

![Graph showing concentration levels for Benzene and Total VOCs](image)

![Graph showing flow rates](image)
Main Sump - Case Study

• Vapor Point determined that two VaporLock™ VOC units in series upstream of activated carbon would provide the best results.

• The Vapor Point system incorporated a mechanical venting system to move the vapors from the sump and through the system.
Main Sump - Case Study

![Graph showing ppm Benzene over time for Sump Outlet, Vapor Lock Outlet, and CAS Outlet from 1/15/09' to 2/9/09'. The graph illustrates the effectiveness of VaporLock™ Scrubber Technology for reducing Activated Carbon Consumption and Cost for BWON Compliance.](image-url)
Main Sump - Case Study

Benefits of VaporLock™ “Carbon Extender”

• Decreased carbon consumption by 80,000 lbs per month

• Recovered VaporSorb chemistry, reducing total waste

• Reduced BWON carbon monitoring frequency by 50%

• Yielded total hard dollar savings of $2.1MM per year
BWON Technology Summary

• Use of activated carbon or combustion devices can be best design when the vent gas is consistent in flow and concentration.

• Dynamic application challenges the effectiveness of control technologies for BWON applications costing your facility significant hard and soft dollars.

• VaporLock™ will reduce total VOCs and benzene allowing activated carbon to work effectively reducing unnecessary waste.
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