



— *Making a difference, together* —

Annapolis Water Reclamation Facility Odor Control Progress Update

April 23, 2025



DPWandYOU.com

Introductions



Meeting Outline

- Phase II Upgrade Project Progress Update
- Odor Control Project Progress
- MDE Permit Appeal Discussion
- Summary of Findings by Toxicologist
- Updated Schedule & Next Steps

Annapolis WRF Website Updates



Annapolis WRF Update webpage:

<http://aacounty.org/annapolisWRFodor>

Sign up for updates!

Sign up for updates!

Get news from Anne Arundel County DPW related to ongoing projects at the Annapolis Water Reclamation Facility.

* Email

First Name

Last Name

Street

City

State/Province

Postal Code

By submitting this form, you are consenting to receive marketing emails from: AACO DPW Customer Relations, 44 Calvert Street, Annapolis, MD, 21401, US. You can revoke your consent to receive emails at any time by using the [SafeUnsubscribe@](#) link, found at the bottom of every email. [Emails are serviced by Constant Contact.](#)

Sign up!

Phase II Upgrade - Current Construction Project



- Excavating for underground pipe for the new clarifier
- Concrete structure pouring/pumping is scheduled
 - Approx. 6 weeks from now
- Dewatering the excavation site.
 - The dewatering activity is monitored, reported and in compliance with and MDE standards



Odor Control Improvements - Progress Update

- Continuous monitoring has been initiated
 - First report will be posted on website by May 9th
- Grit/screen scrubber repair has been completed
 - Awaiting pumps to be shipped for chemical feed system for the scrubber
 - Contractor will be starting onsite in early May
- Design for the Odor Control Improvements has been progressing
 - Schematic design phase has been completed
 - Areas of focus are the influent pumping station, grit/screen building, primary clarifiers and gravity sludge thickeners

Denitrification Mudwell Update

- **Phase 1 - Remove, Replace and Reduce**
 - Remove existing grit from tank
 - Replace the broken valve to provide a better flushing process
 - Reduce the size of the mudwell to allow less grit to settle
- **Phase 2 - Cover, Coat and Control**
 - Cover the remaining mudwell area
 - Coat the mudwell area to allow for better cleaning
 - Odor control unit to treat air from under covers



Air Scour Silencer Update

- Silencer has arrived!!!
- Installation is scheduled for mid-May
 - Need to pour concrete pad and install support structure



MDE Permit Appeal

- AACo disagrees with MDE that air quality requirements belong in a wastewater discharge permit (NPDES)
- Vague permit language
 - Where did the 30 ppb limit originate from?
 - Where should the monitors be located?
 - How many monitors are required?
 - What are the compliance requirements?
- No other wastewater NPDES permit controlled by MDE has this language included



DPW & YOU

— *Making a difference, together* —

Summary of Findings from Toxicologist



DPWandYOU.com

What is Hydrogen Sulfide (H₂S)?

- Colorless, flammable gas
- Naturally produced by bacteria
- Common air contaminant at wastewater treatment plants
- Focus of this health evaluation due to:
 - Odor
 - Toxicity

Odor vs. Toxicity

Odor threshold:

- The lowest concentration of a substance necessary to smell an odor

Nuisance Odors:

- Unpleasant smell that is annoying enough to affect life quality

Toxicity:

- The concentration at which inhalation becomes dangerous or harmful

Hydrogen Sulfide = H₂S

Background is ~ 0.1-0.3 ppbv

Odor Threshold

- 0.5-300 ppbv

Nuisance Odors

- Headache
- Nausea
- Stress
- Sleep disturbance

Toxic Effects

- Irritation
- Cardiovascular
- Neurological

Health Risk Assessment

- Tool to determine need for corrective action
- Evaluates *exposure* relative to toxic levels
- Assessment of **potential** health effects from a contaminant

Does **not** tell us if exposure has caused or definitely will cause health effects

WHO

WHAT

WHERE

WHEN

HOW

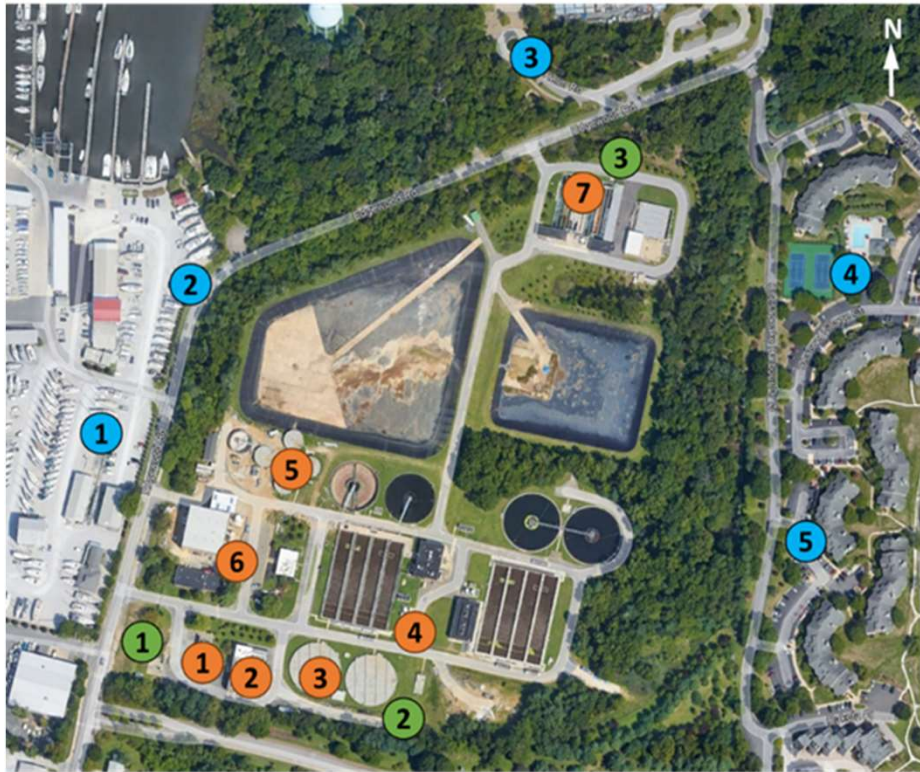
Hydrogen Sulfide (H₂S) Air Monitoring

Monitors placed within the plant facility at the plant processes measure H₂S in Parts Per Million (ppm)



Higher sensitivity monitors placed along the plant fence line and in the community measure H₂S in Parts Per Billion (ppb)

Monitoring Map



Legend:

Locations within WRF (PPM)

- ① Wet well (Influent & Effluent (2))
- ② Headworks (Building Space & Effluent (2))
- ③ Primary Clarifier Launderers
- ④ Odor Control to Blowers
- ⑤ Gravity Sludge Thickeners
- ⑥ Solids Facility
- ⑦ Denite Filters Mudwell

Fenceline locations (PPB)

- ① Septic Hauler Discharge/West
- ② South
- ③ Denite Filter Backwash Area / North

Neighborhood Locations (PPB)

- ① Marina- Store Front
- ② Marina- Fenceline
- ③ Maritime Museum
- ④ Chesapeake Harbor - Near pool/tennis courts
- ⑤ Chesapeake Harbor along roadway - East



DPW & YOU

Neighborhood Monitoring Data

- July 1 – August 13, 2024
- Five Locations

Table 2. Neighborhood Hydrogen Sulfide Air Monitoring Results: Summer

Monitoring Location	Detection Frequency ^a	Range of Concentrations (ppbv)	Average Concentration ^b (ppbv)	Maximum Daily Average Concentration (ppbv) ^c
Maritime Museum	1%	0 - 16	0.08	0.99
Marina Storefront	5%	0 - 48	0.38	4.03
Marina Fenceline	4%	0 - 41	0.25	1.57
Chesapeake Harbor (pool/tennis)	3%	0 - 61	0.24	1.9
Chesapeake Harbor (roadway)	2%	0 - 20	0.10	1.1

a) Number of detected readings divided by the total number of readings, expressed as a percentage.

b) Average concentration across all readings during the entire monitoring period

c) The highest level among all the average daily (24-hour) concentrations.



Estimating Exposure

- Exposure can be short-term or long-term
- Air concentration is adjusted by time, frequency, duration

H₂S Air Concentrations

- Exposure levels change throughout the day and across the monitoring period
- Time-weighted average (TWA) concentration used to estimate exposure
- Treated non-detect (zero) results two ways:
 - Unmodified
 - Substituting background levels (0.33 ppbv)

Toxicity Benchmarks

LONG-TERM

US EPA Reference Concentration

- 0.002 mg/m³, or 1.4 ppbv



SHORT-TERM

US EPA Acute Exposure Guideline Level:

- 0.460 mg/m³ or 330 ppbv

ATSDR Minimal Risk Levels

- 0.097 mg/m³ or 70 ppbv – Acute
- 0.028 mg/m³ or 20 ppbv - intermediate



Estimating Health Risk

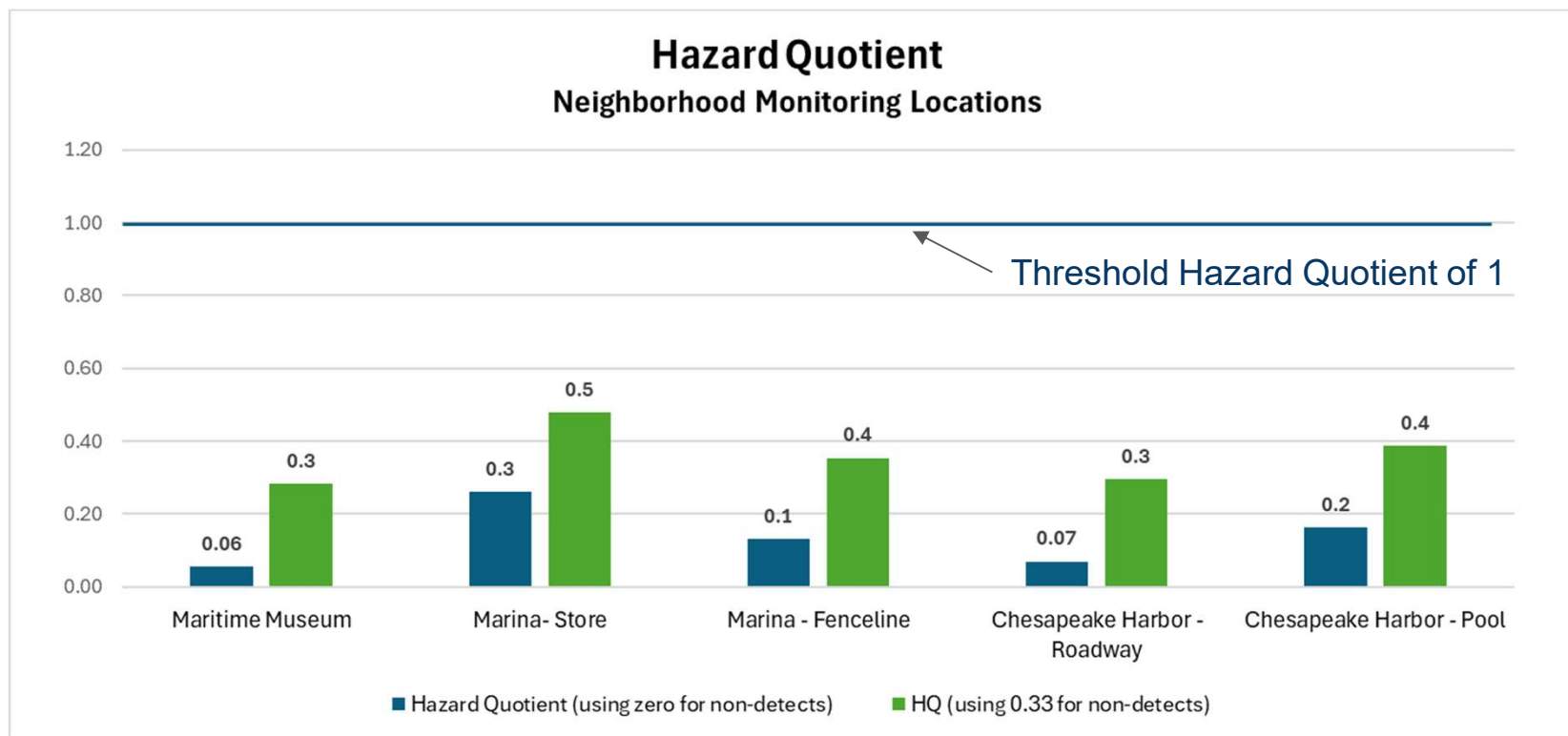
$$\text{Hazard Quotient (HQ)} = \frac{\text{Average Daily Exposure}}{\text{Reference Concentration}}$$

How much
you're exposed

Safe air
concentration

Threshold:
HQ = 1

Neighborhood Results



WRF Worker Evaluation

- Hydrogen sulfide concentrations were detected more frequently and at higher levels within WRF compared to neighborhood
- The WRF is subject to state and federal regulations on worker safety
 - Training, right-to-know, monitoring and controls
 - Most locations that were monitored are not frequented by workers
 - H₂S monitors in select locations triggered at 10,000 ppbv
- Detected levels were compared to various safety standards and guidelines

Conclusions of the Health Risk Assessment

- Hydrogen sulfide was infrequently detected at neighborhood monitoring locations
- Detected levels were occasionally above odor thresholds
 - Detected levels may cause nuisance odors
- Detected levels are not expected to cause toxic or long-term effects
- WRF is in the design stages to update the odor control systems throughout the plant
- Worker safety is subject to state and federal regulations and guidelines
 - H₂S monitoring will continue as part of safety protocols



— *Making a difference, together* —

Updated Schedule & Next Steps



DPWandYOU.com

Anticipated Schedule

Task	Timeframe
Start Grit/Scrubber Chemical Feed Repair	Early-May
Start Air Scour Silencer Installation	Mid-May
Start Mudwell Construction Phase 1	Late Spring / Early Summer 2025
Start Mudwell Construction Phase 2	Late Summer 2025
Detailed Design	Now thru Winter 2025
Start Bidding & Award Process	Early 2026
Start Construction	Summer 2026
Finish Construction	Late 2027



Next Steps

- Summary of monitor readings will be posted monthly on Annapolis WRF webpage
- Continue the design processes for the odor control improvements needed for the influent pumping station, grit/screen building, primary clarifiers and gravity sludge thickeners
- Start repair for mudwell improvements
- Install the silencer on the air scour
- Finish repair to grit/screen odor scrubber



Questions



Contact Information

Chris Biggerstaff
DPW Senior Engineer
410-222-3191
pwbigg14@aacounty.org

For Water/Sewer Emergencies:

Utility Operations Dispatch Center
410-222-8400



Annapolis WRF Update webpage:

<http://aacounty.org/annapolisWRFodor>

Capital Project Goals (X764281)

- Monitor air quality at individual processes to identify and prioritize needs
- Determine level of odor control needed at each process
- Evaluate and develop improvements to existing operational processes to minimize odors
- Establish scope and cost for the design/construction project

Capital Project Goals (S802389)

- Provide continuous monitoring within the surrounding community through end of construction
 - A monthly report will be posted on the Annapolis WRF website
- Design the needed improvements needed for the odor control
 - Odor units shall treat odorous gases using best available technologies

Agency	Exposure Limit	Value (ppbv)
Occupational Safety and Health Administration (OSHA)	OSHA Permissible Exposure Limit (PEL)	20,000
National Institute for Occupational Safety and Health (NIOSH)	Immediately Dangerous to Life and Health (IDLH)	100,000
	Recommended Exposure Limit (REL)	10,000
American Conference of Governmental Industrial Hygienists (ACGIH)	Threshold Limit Value, time- weighted average (TLV-TWA)	1,000
	Threshold Limit Value, short-term exposure limit (TLV-STEL)	5,000