



Emissions from Bulk Petroleum Storage Facilities

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Bureau of Air Quality

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

Protecting Maine's Air, Land and Water

Agenda

- Air Quality Monitoring in Portland and South Portland
- Air Emissions Licensing Overview
- Emissions from Bulk Petroleum Storage Facilities



Initial Monitoring Planning Meeting

May 23, 2019

- City of South Portland's stated monitoring objective:
“Is the air safe to breathe?”
- Initial monitoring focus to be on measuring VOCs
- “Not targeting an industry, we're protecting a community”
 - There are a variety of VOC sources in the City
- Monitoring effort to consist of two phases:
 - An immediate “grab” sampling phase done by citizens
 - Fixed 24-hour sampling sites phase, operated by DEP staff
- One fixed 24-hour sampling site in each district
(i.e. five sites, plus one “floater” sampling system)



Phase 1: Grab Sampling - Completed

- Citizen training session on June 10, 2019
- 6 canisters made available each week for 12 weeks (June 10 – September 9)
 - 5 assigned to citizen volunteers
 - 1 assigned to S.P. Fire Department
 - 72 canisters in total
- 56 valid samples analyzed by DEP Air Lab
- 12 samples were invalid
- Data shared with ME CDC and South Portland residents

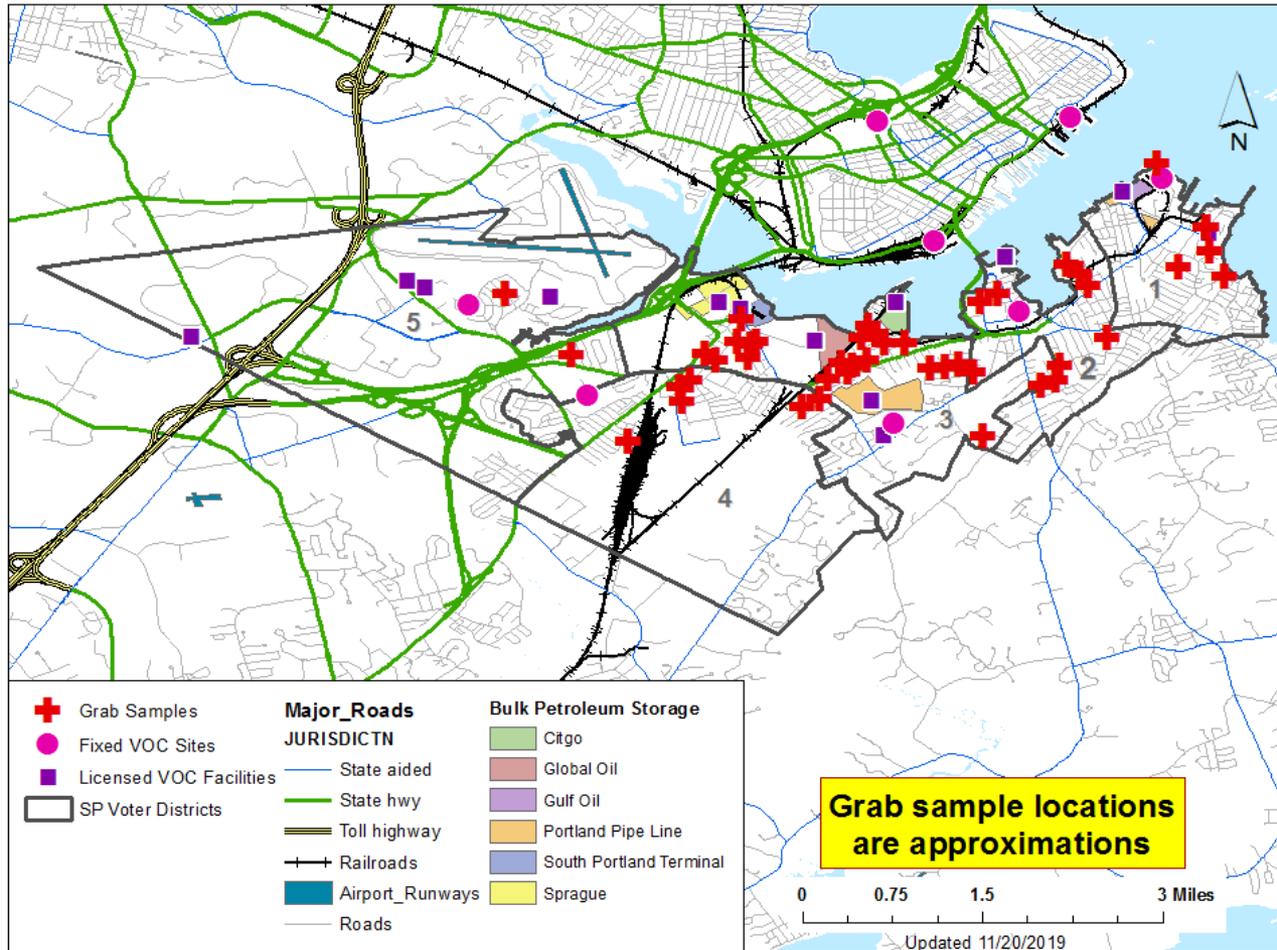
A photograph of a sample collection form. The form is white with black text. It has the following fields:
ME09381
ME09381
Sample Date: _____
Sample Start Time: _____ AM / PM
Sample End Time: _____ AM / PM
Comments:
Relinquished By: _____ Date: _____
Received By: _____ Date: _____

Purposes of Grab Sampling Effort

- Opportunity for citizens to become involved
- A means of correlating odor incidents as observed by the public with VOC data
- Can help to inform the adequacy of the initial 24-hour site locations and potential “hot spots”
- Grab sample data is not appropriate to use for any comparison to longer term average levels, guidelines or standards for health assessments

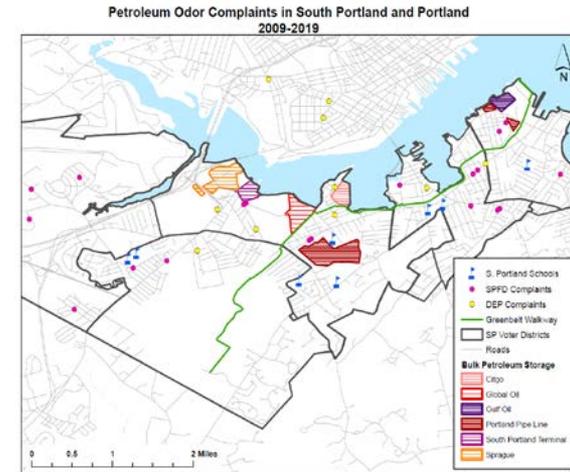


Map of All Grab Sampling Locations



Phase 2: Fixed 24-Hour Sampling - Ongoing

- 5 sites established and operating in South Portland (one per district)
- 2 sites established and operating in Portland (along with existing long-term Deering Oaks site)
- Sites are collecting samples every 6 days (SIP calendar schedule)
- DEP will continue to continue operate this 8-site network for an additional full year (November 2021)
- Samples analyzed by DEP Air Lab
- Data shared with ME CDC and South Portland residents on a monthly basis

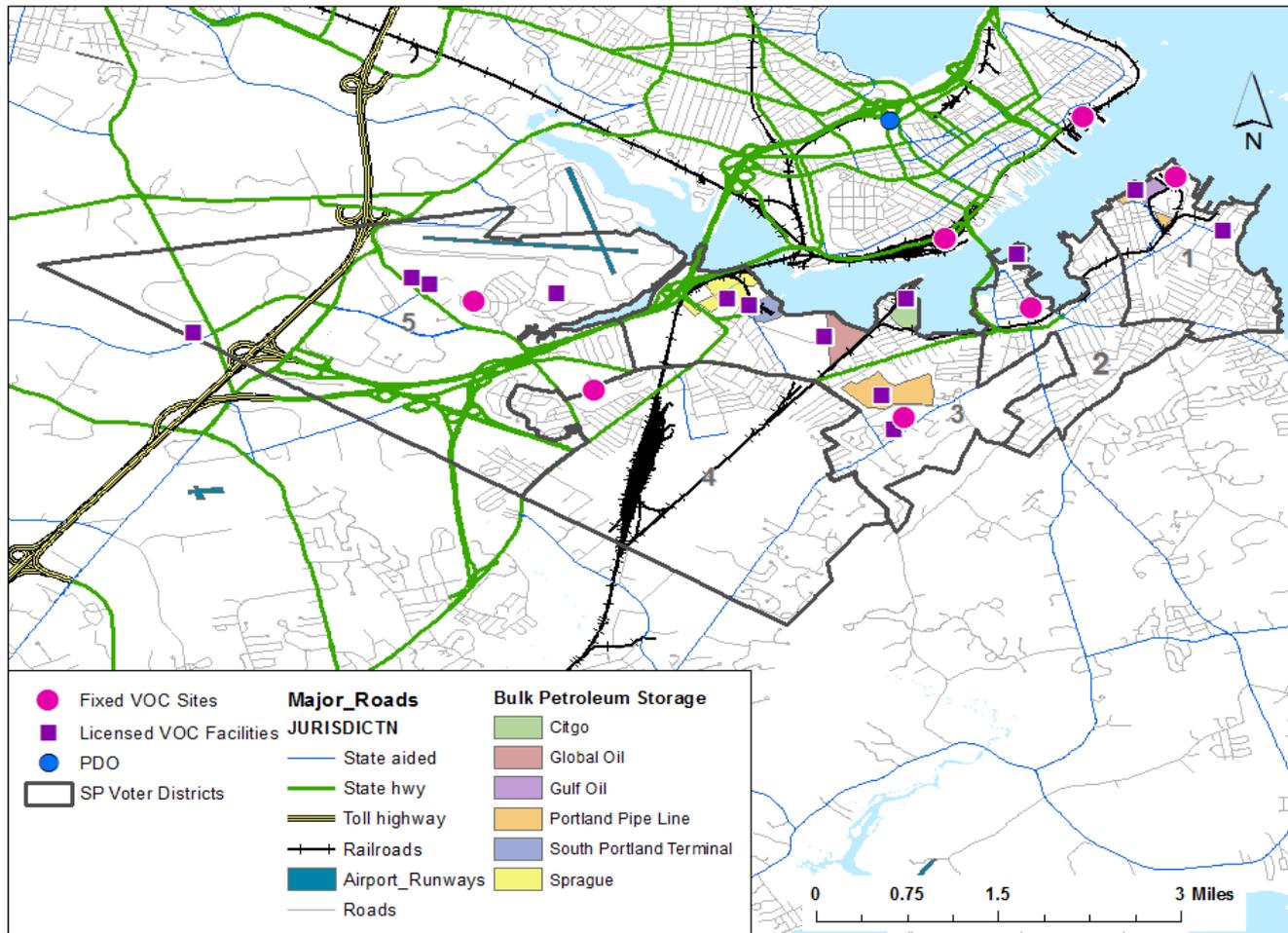


Phase 3: Portable Sampling Platform (PSP), Meteorology & PAH Monitoring - Underway

- PSP has been deployed at 4 residential locations to date
- Enough volunteers to host the PSP to take us through October 2021
- PSP typically collects samples on the same days as the other sites (SIP calendar schedule)
- Meteorological sensors units now operational at 4 fixed 24-hour sites
- 2 PAH samplers to be deployed at existing sites; PSP has one now

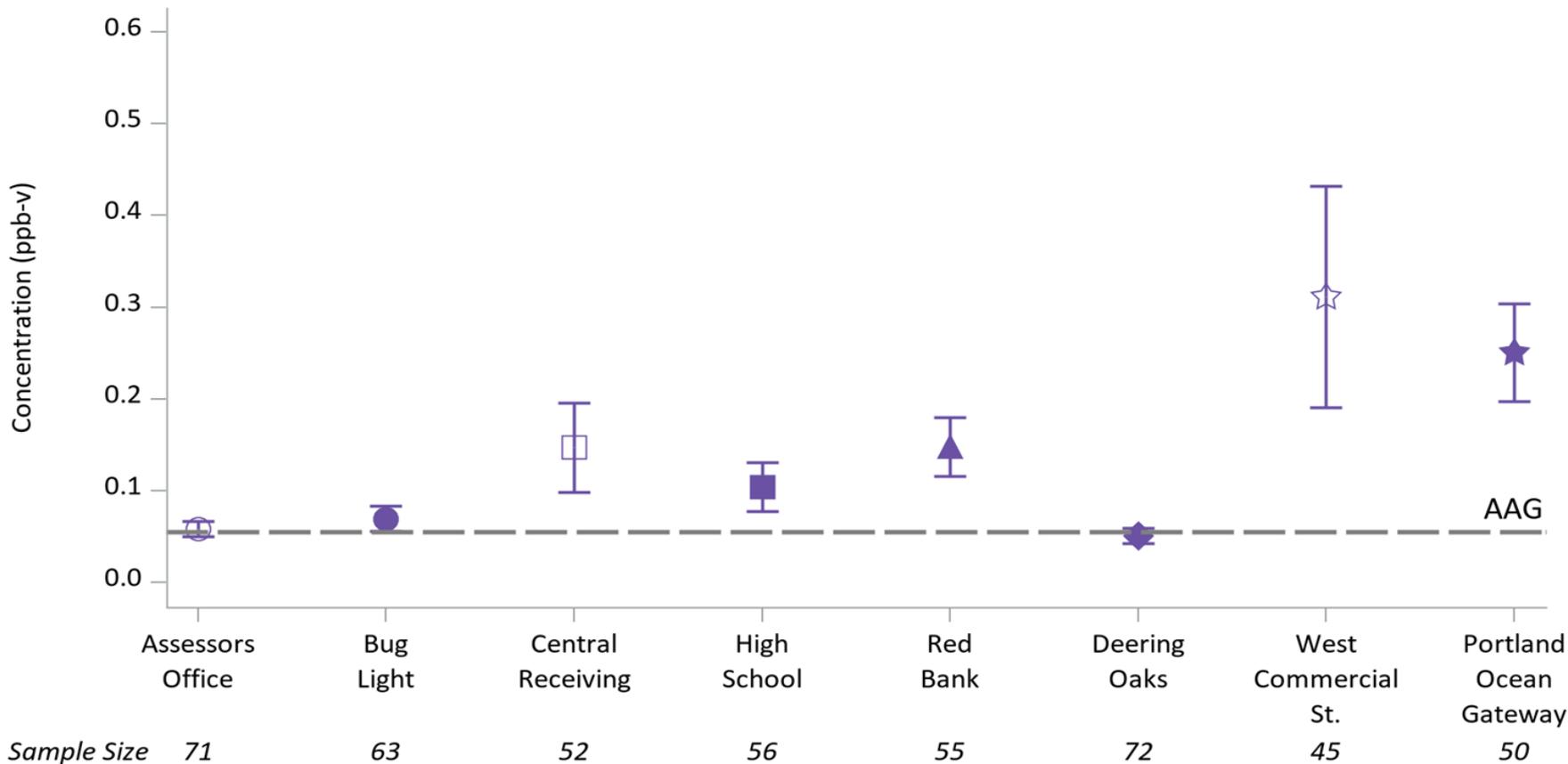


Map of 24-hour Sampling Site Locations



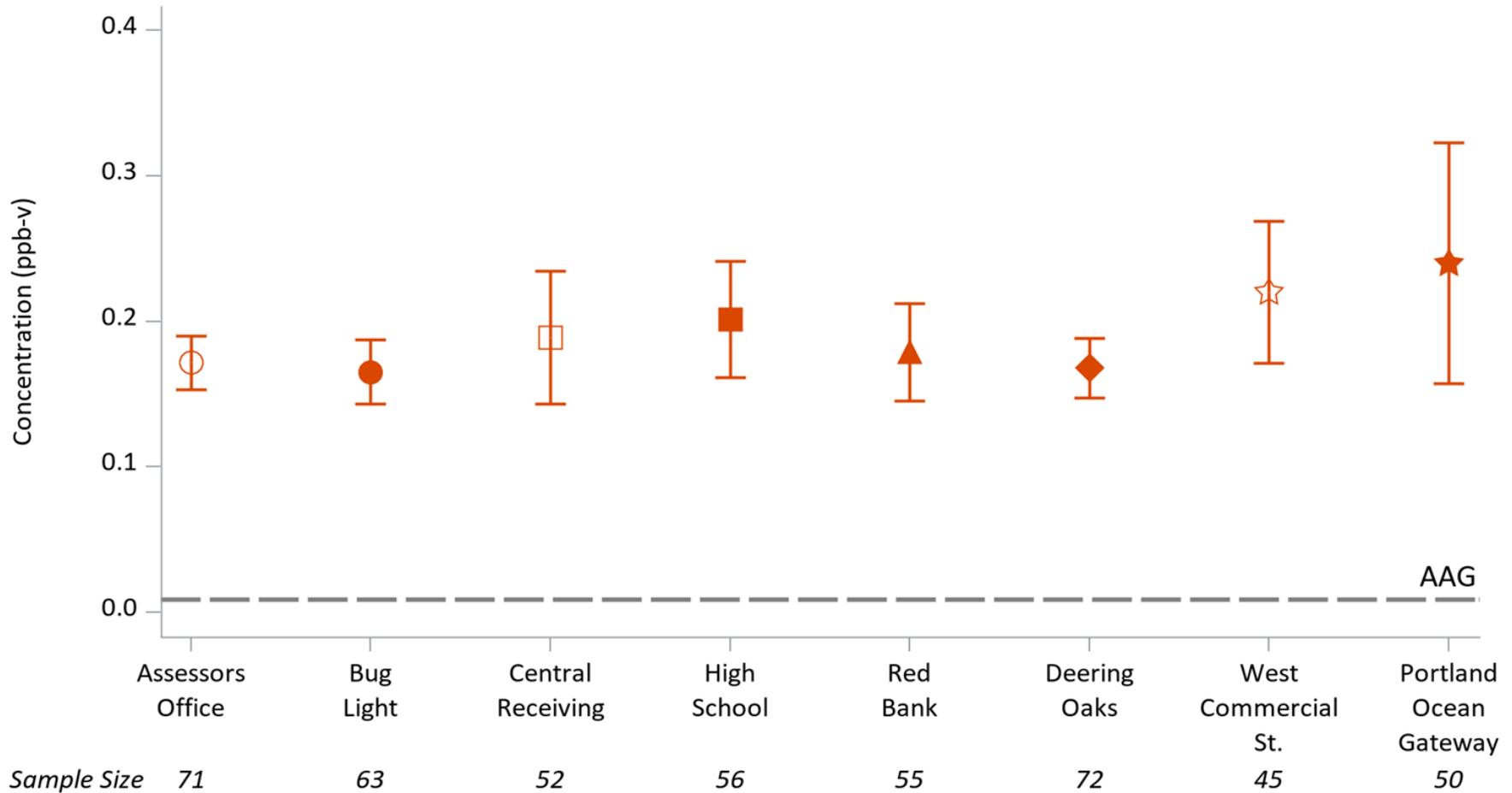
Naphthalene Monitoring Results

Cumulative Ave. & AAG



Acrolein Monitoring Results

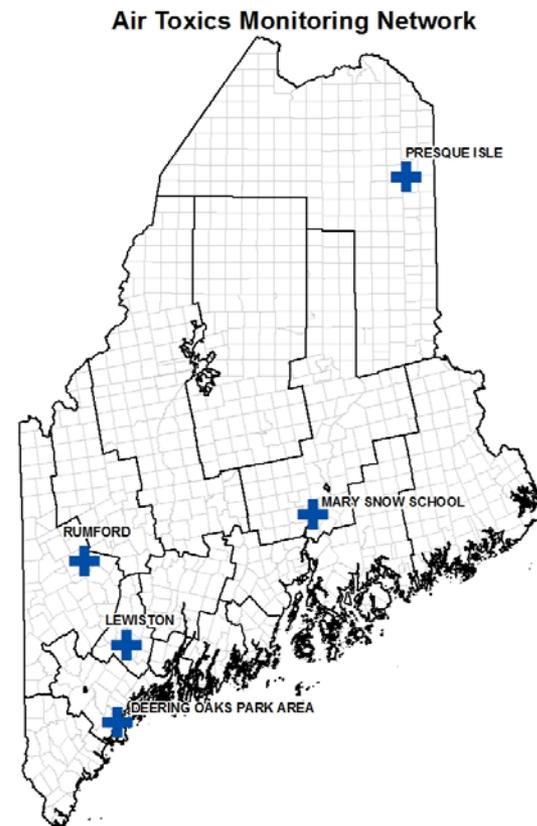
Cumulative Average & AAG



Quantifying the Effort to Date

(as of December 31, 2020)

- The 7 new VOC air monitoring sites in South Portland/Portland exceed the number of other VOC sites (5) operating across the State
- 9 canister sampling systems = ~\$20,000
 - Includes “portable” and backup/spare systems
- 48 canisters = ~\$31,200
- 9 meteorological sensors units = ~\$18,000
- Analytical costs = ~\$344,864
- Total to date: ~\$414,064
- Stakeholders contributions: \$30,00
- In-kind staff time to plan and implement project – priceless!



Maine's Air Licensing Program

Regulatory Basis

- Federal Authority
 - Clean Air Act (1970)
 - Amendments of 1977
 - Amendments of 1990
- State Authority
 - Chapter 115, *Major and Minor Source Air Emission License Regulations*
 - Chapter 140, *Part 70 Air Emission License Regulations*



Maine's Air Licensing Program

Air Emission Licenses: Types and Triggers

- **Major Sources**

- License to Construct

- New Source Review (NSR) Licenses for changes to the facility

- License to Operate

- Part 70 License / Title V License to operate existing equipment

- **Minor Sources**

- One Licensing Program



Maine's Air Licensing Program

Control Requirements

- New Source Review
 - Lowest Achievable Emission Rate (LAER)
 - Best Available Control Technology (BACT)
- Other federal and state requirements
 - New Source Performance Standards (NSPS)
 - National Emission Standards for Hazardous Air Pollutants (NESHAPS)
 - Reasonably Available Control Technology (RACT)
 - Best Available Retrofit Technology (BART)
 - Clean Air Act Section 129/111d controls
 - Best Practical Treatment (BPT)
 - Category specific requirements in statute and rule



Maine's Air Licensing Program

Public Participation, Major Sources

| | NSR Licenses | | | | Part 70 Licenses | | | |
|-------------------------------------|--------------|------------|------------|------------|------------------|-------------|------------|--------------|
| | New | Major Mod. | Minor Mod. | Minor Rev. | Initial, Renewal | Admin. Rev. | Minor Mod. | Signif. Mod. |
| Public Notice of Intent to File | ✓ | ✓ | ✓ | | ✓ | | | |
| Public Notice of Draft Availability | ✓ | ✓ | | | ✓ | | | ✓ |

✓ = required per 06-096 C.M.R. ch. 115, 140, and 100



Maine's Air Licensing Program

Public Participation, Minor Sources

| | New, Renewal | Major Modification | Minor Modification | Minor Revision |
|-------------------------------------|-----------------|-----------------------|-----------------------|-------------------|
| Public Notice of Intent to File | ✓ | ✓ | ✓ | |
| Public Notice of Draft Availability | | ✓ | | |

✓ = required per 06-096 C.M.R. ch. 115 and 100



Emissions from Bulk Petroleum Storage Facilities

L.D. 1915 directed DEP to study-

- Methods to measure and estimate air emissions from aboveground petroleum storage tanks;
- Methods to control air emissions from oil terminals;
- Methods to control odors from oil terminals;
- Programs for assisting municipalities in air monitoring

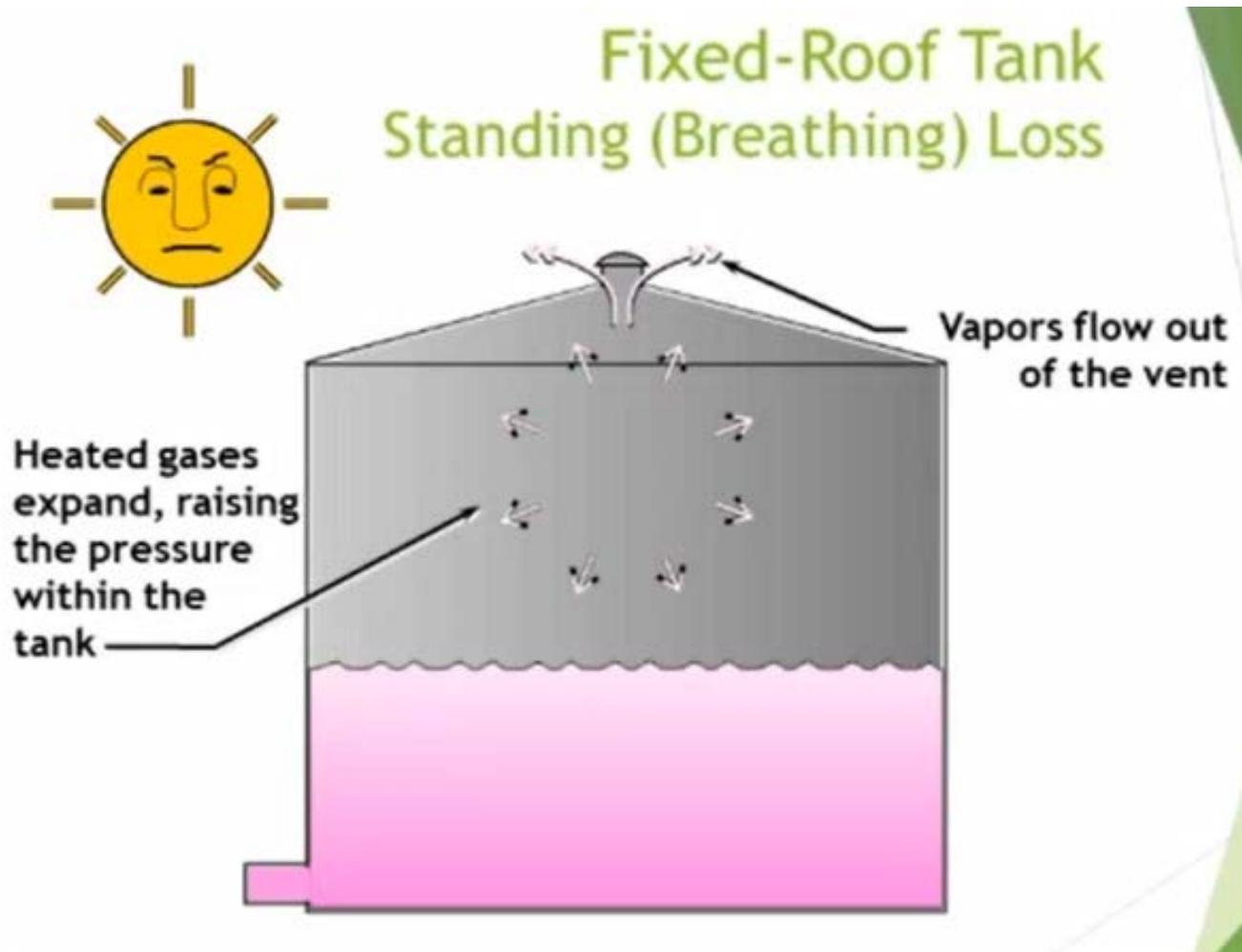


Resources

- Other States
- RACT/BACT/LAER Clearinghouse
- CA South Coast AQMD Database
- TX BACT Control Guidelines
- AP-42
- State & Federal Regulations

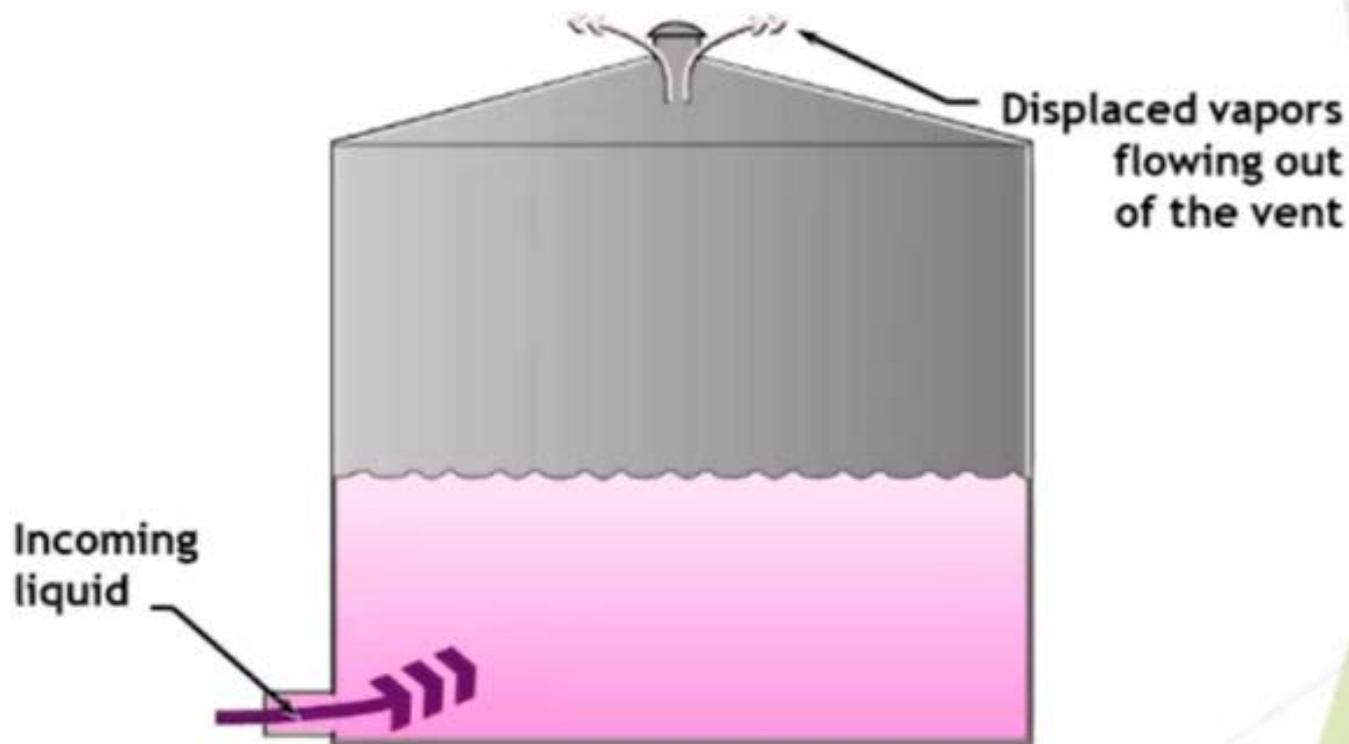


Equipment



Equipment

Fixed-Roof Tank Working (Filling) Loss



Equipment

Floating-Roof Tank Standing Loss

Rim seal

(closure device between the deck and the tank shell)

Standing Loss

Emissions are based on vapors that get past the floating roof (a fixed roof blocks the wind, but it is vented & does not contain the vapors).

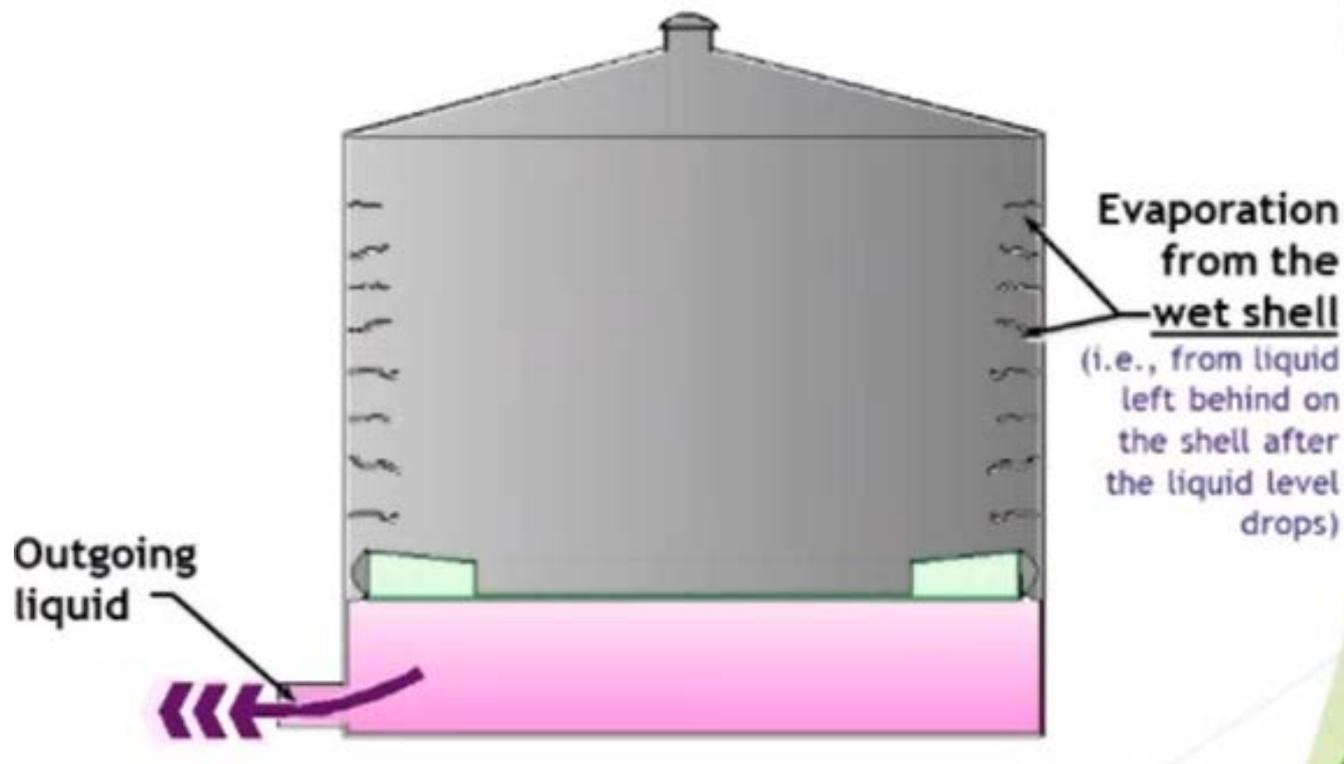
Deck seams
(if bolted)

Deck fittings
(only if they open through the deck to the liquid)

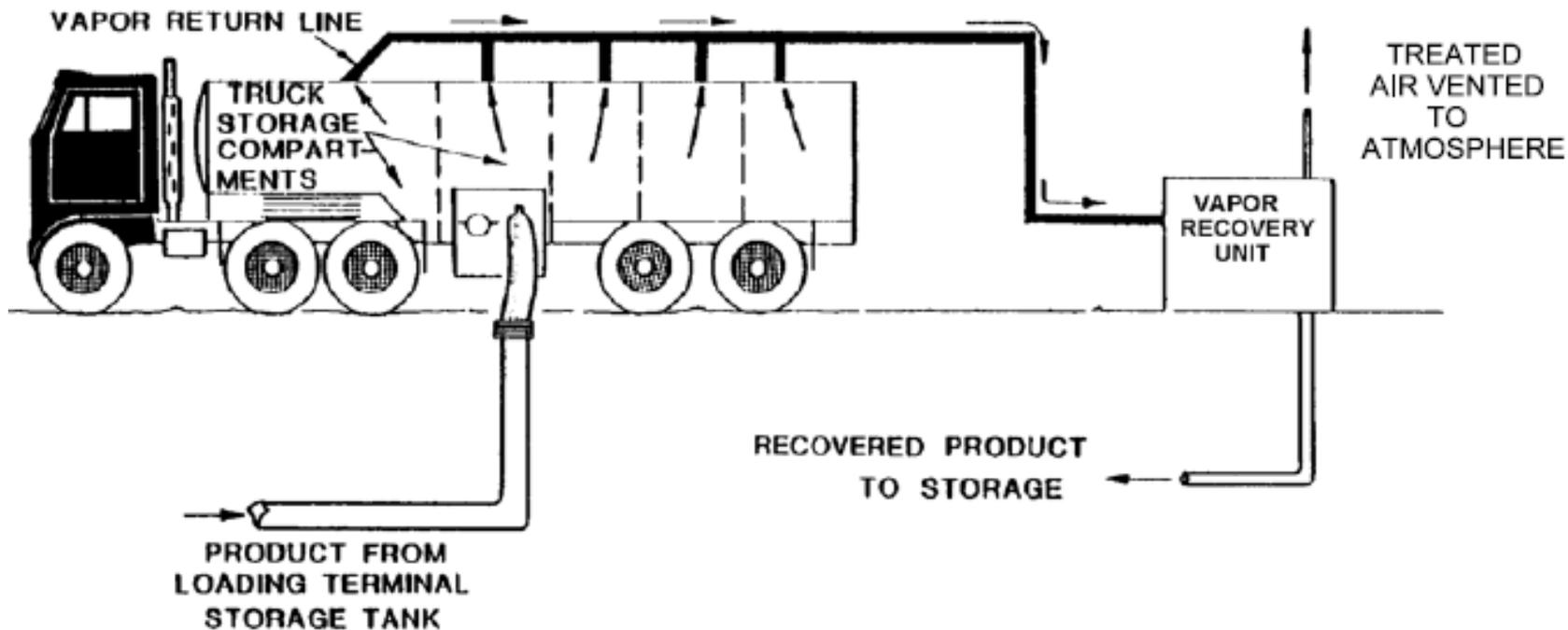


Equipment

Floating-Roof Tank Working (Withdrawal) Loss



Equipment



How Does Maine Compare?

- Methods to measure and estimate air emissions from aboveground petroleum storage tanks
- Methods to control air emissions from oil terminals
- Methods to control odors from oil terminals



Department Initiatives

Controlling Air Emissions:

- Require floating roofs of new distillate tanks greater than 40,000 gallons
- Prohibit switch-loading
- Require heated tanks be insulated
- Recordkeeping of cutter stock
- Evaluate mist eliminators and carbon beds for heated tanks



Department Initiatives

Controlling Odor:

- Evaluate mist eliminators and carbon beds for heated tanks



Department Initiatives

Determining Emissions:

- Gasoline/Distillate Storage – AP-42
- Heated Tanks – Site-specific testing & AP-42
- Product Loading – Site-specific testing & AP-42
- Purchase of commercial software
- Support for EPA Test Method



Department Initiatives

Emissions Monitoring:

- Continuing current monitoring study
- FLIR technology



Site-Specific Testing



Next Steps

- Propose revisions to Department's Chapter 111 Petroleum Liquid Storage Vapor Control rule to require monthly leak detection and repair using FLIR camera.
- Propose revisions to Department's Chapter 112 Bulk Terminal Petroleum Liquid Transfer Requirements rule to prohibit switch loading
- Evaluate effectiveness of mist eliminators and carbon adsorption odor control equipment in reducing VOC emissions. If technology is proven effective, require as Best Practical Treatment to control VOC emissions from heated petroleum storage tanks.
- Continue monitoring local air quality in South Portland and Portland to assess impact of odor controls on ambient air quality
- Investigate elevated levels of acrolein and naphthalene at other sites in Maine, including Presque Isle
- Implement other terminal initiatives through the air licensing process





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