Emissions from Bulk Petroleum Storage Facilities

February 10, 2021

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Bureau of Air Quality

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)

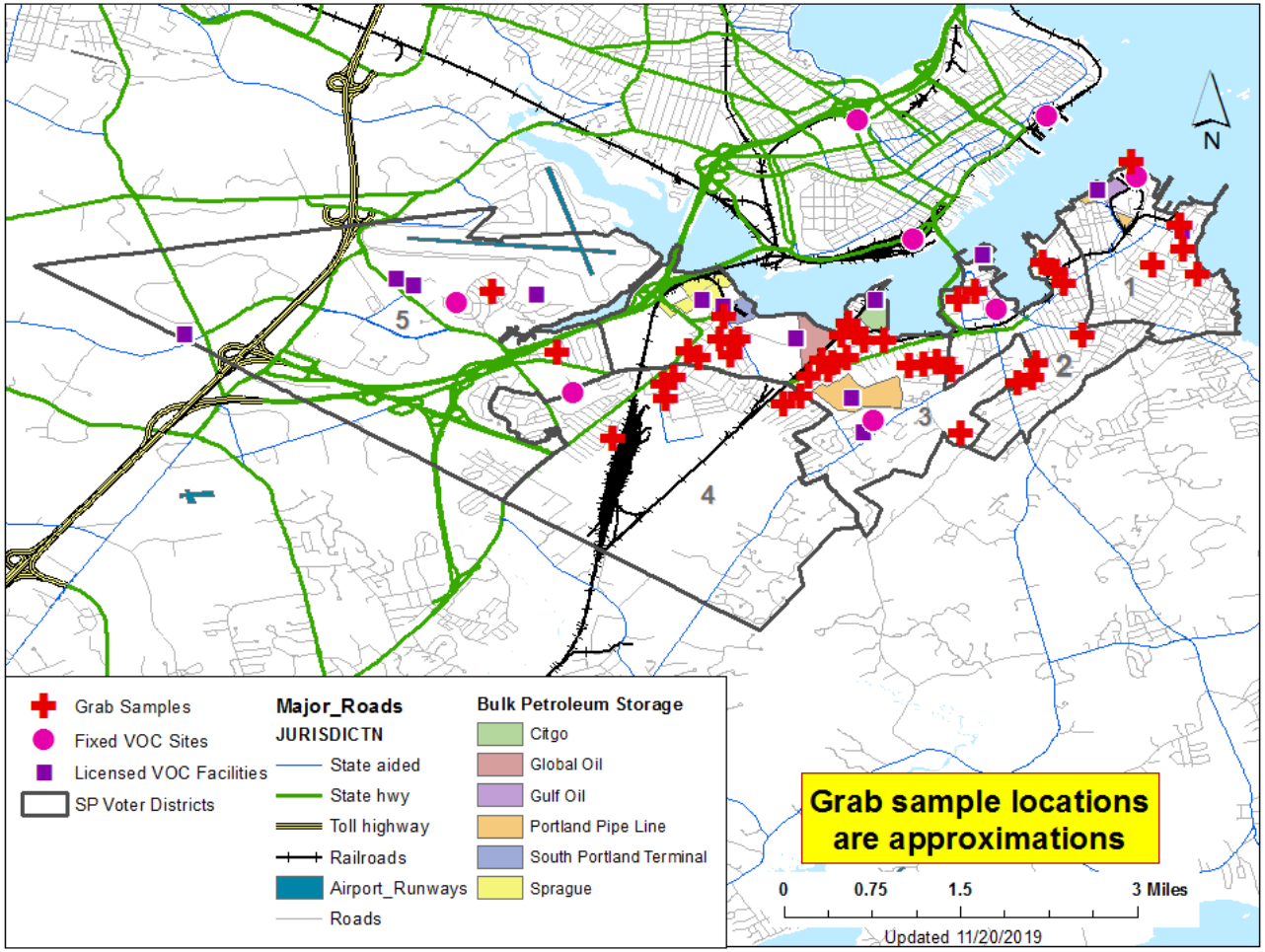
Phase 1: Grab Sampling - Completed

- 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

Purposes of Grab Sampling Effort

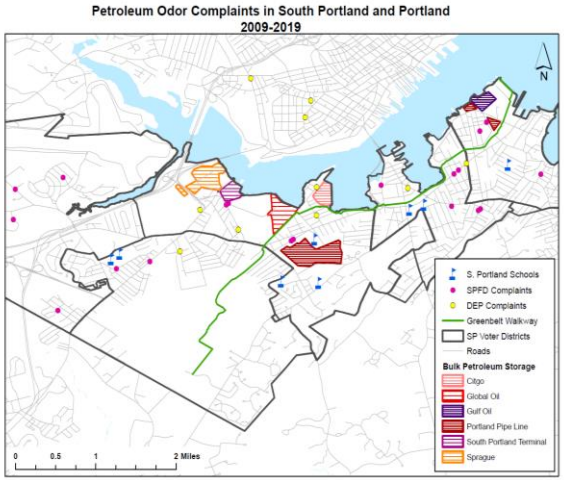
- Opportunity for citizens to become involved
- A means of correlating odor incidents as observed by the public with VOC data
- Can help to inform the adequacy of the initial 24-hour site locations and potential “hot spots”
- Grab sample data is not appropriate to use for any comparison to longer term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

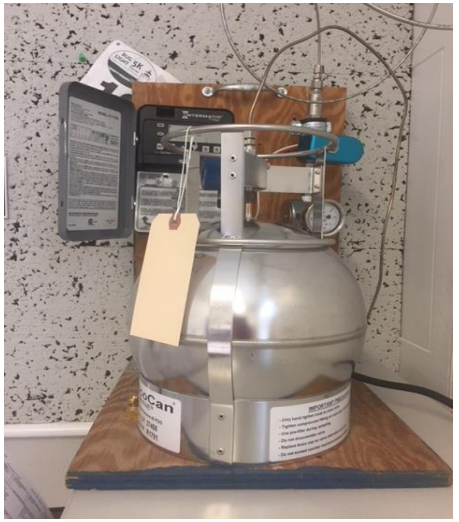
Map of All Grab Sampling Locations



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 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

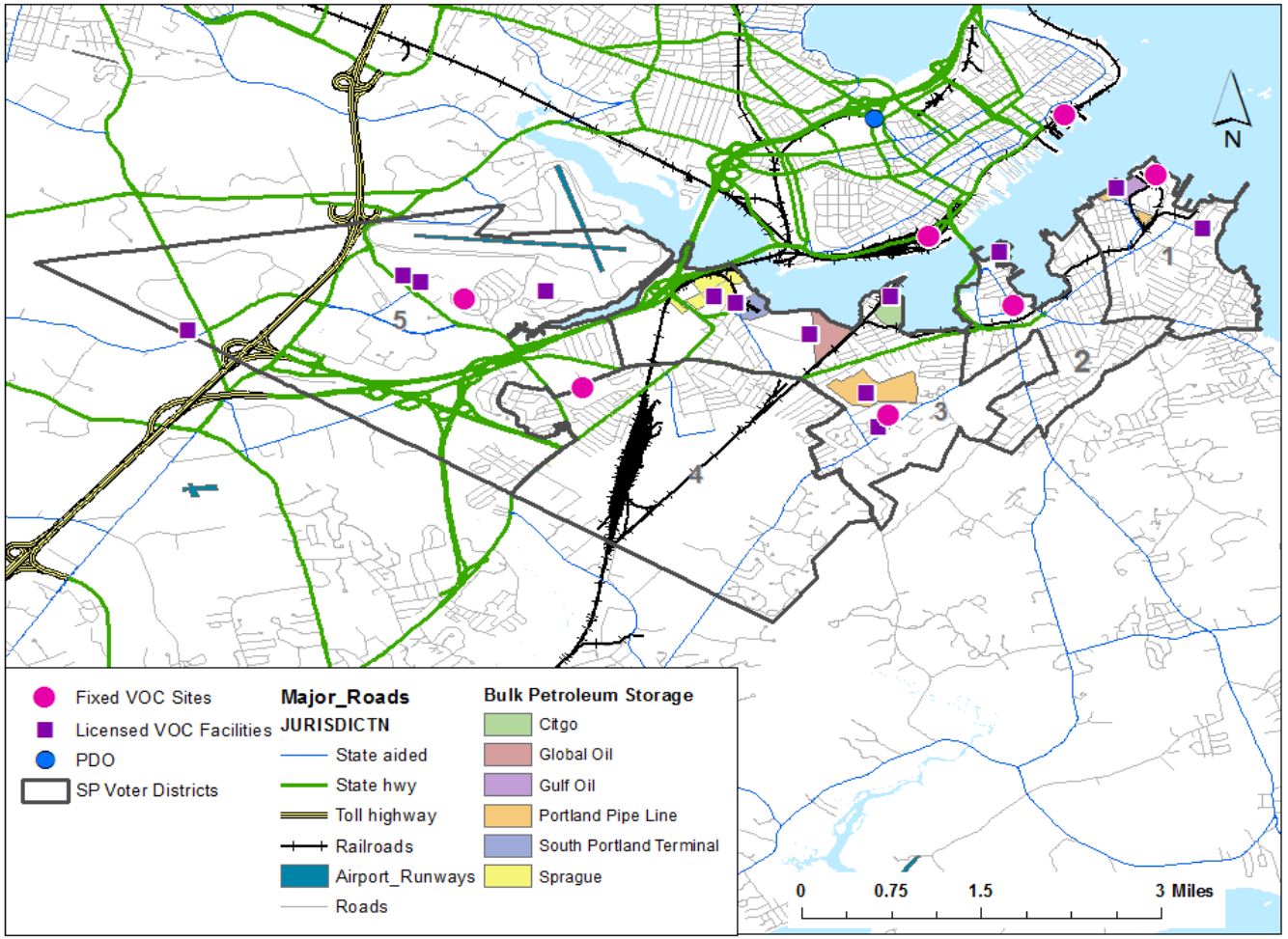




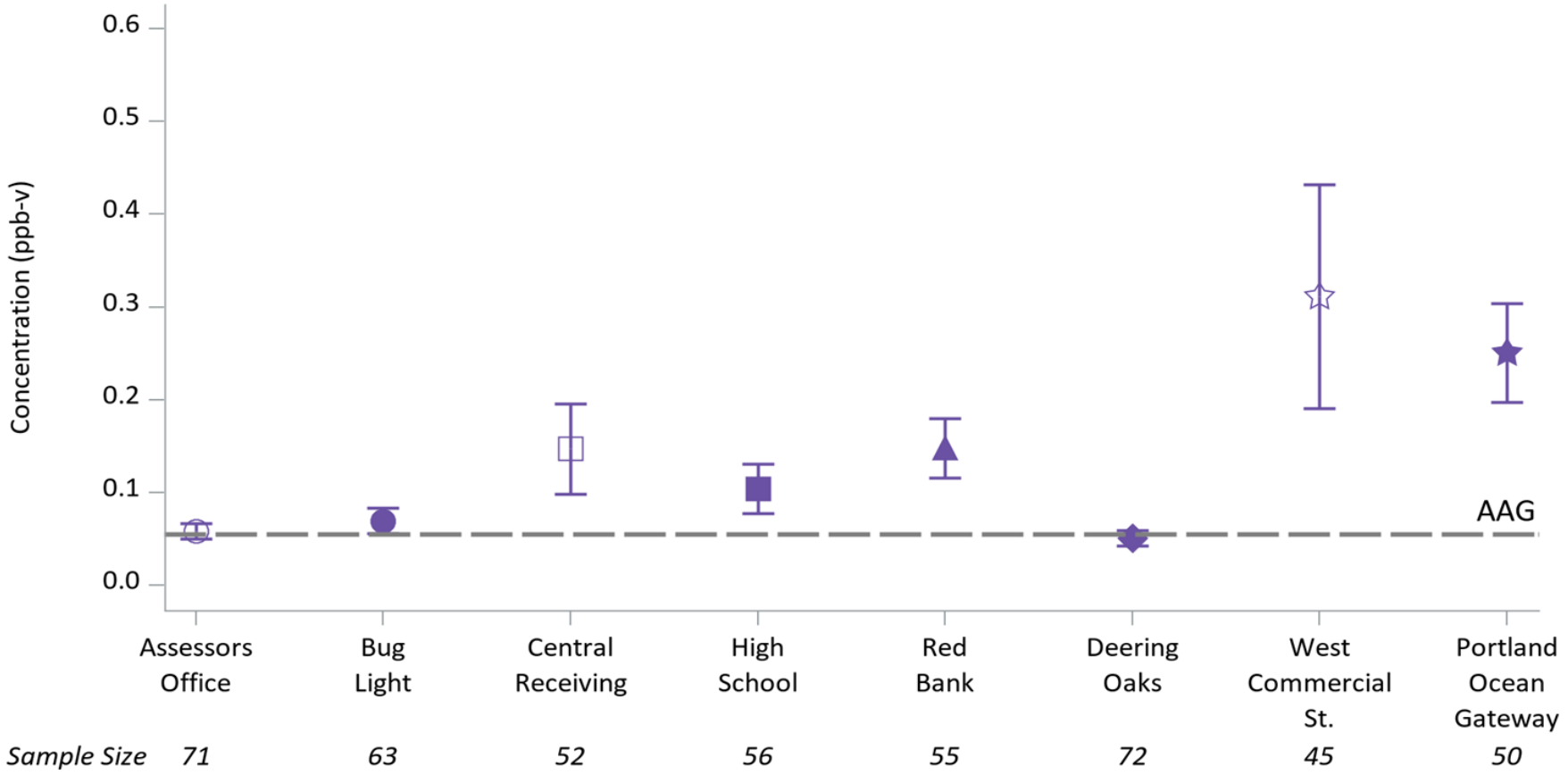
Phase 3: Portable Sampling Platform (PSP), Meteorology & PAH Monitoring - Underway

- 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

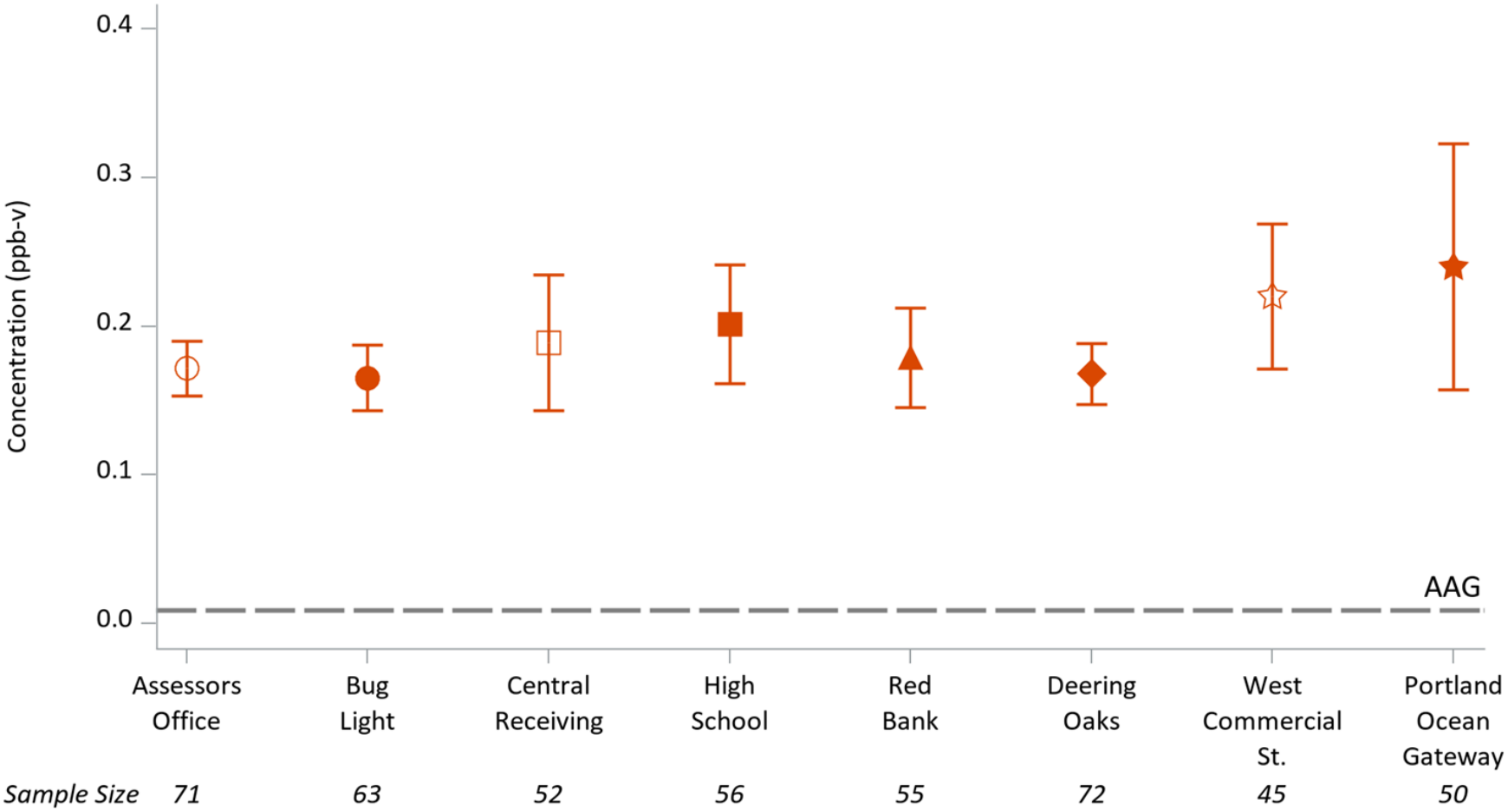


Naphthalene Monitoring Results
Cumulative Ave. & AAG



	Assessors Office	Bug Light	Central Receiving	High School	Red Bank	Deering Oaks	West Commercial St.	Portland Ocean Gateway
Sample Size	*71*	*63*	*52*	*56*	*55*	*72*	*45*	*50*

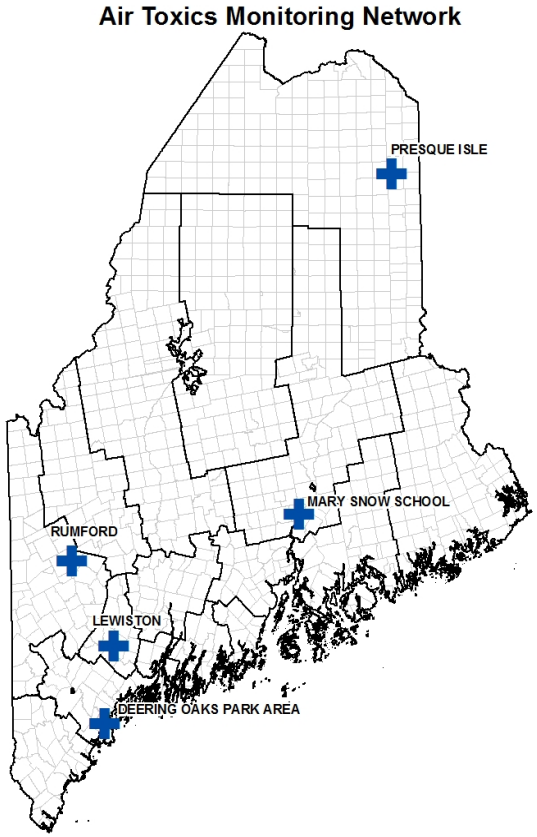
Acrolein Monitoring Results
Cumulative Average & AAG



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

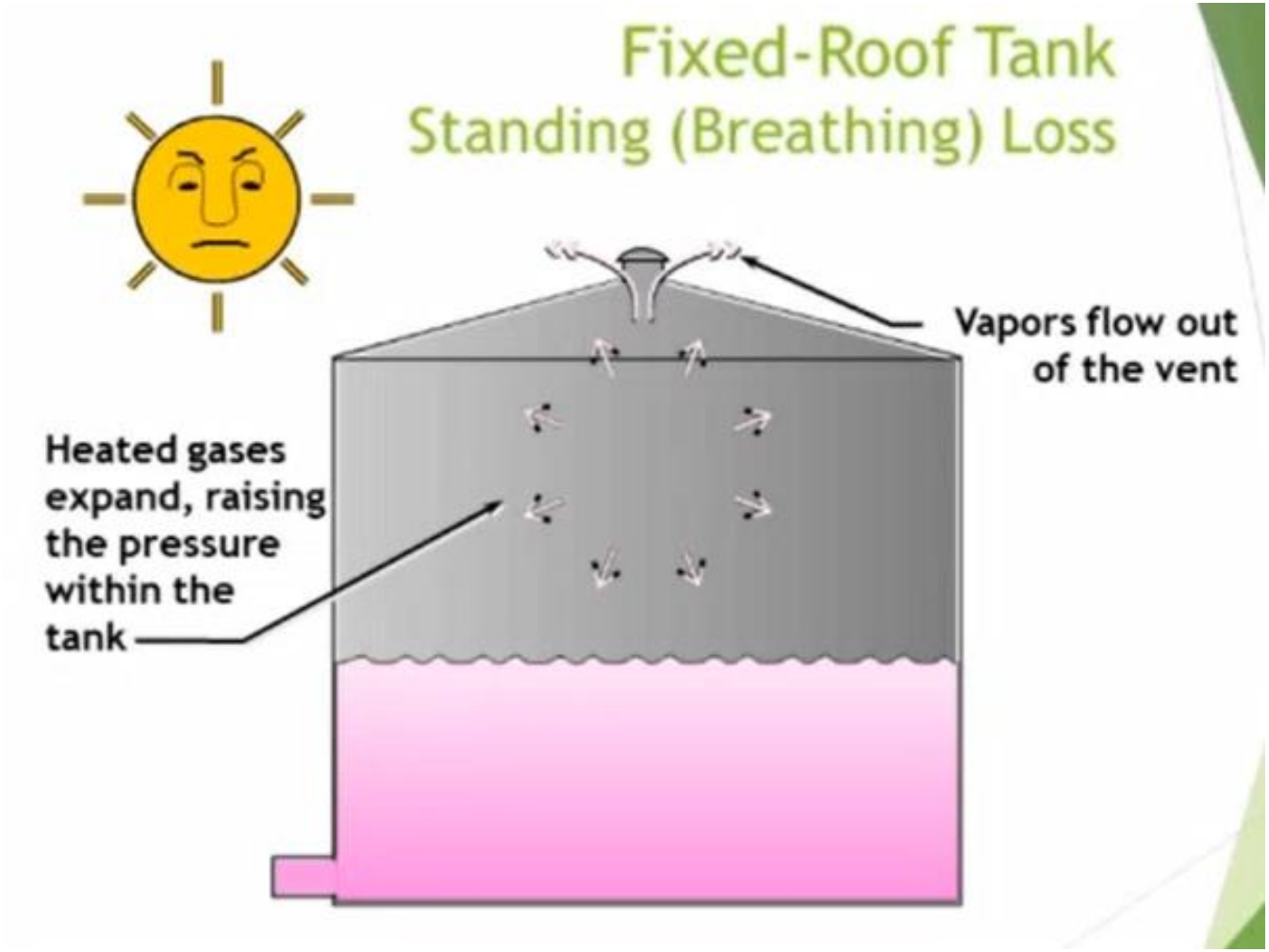
L.D. 1915 directed DEP to study-

- 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

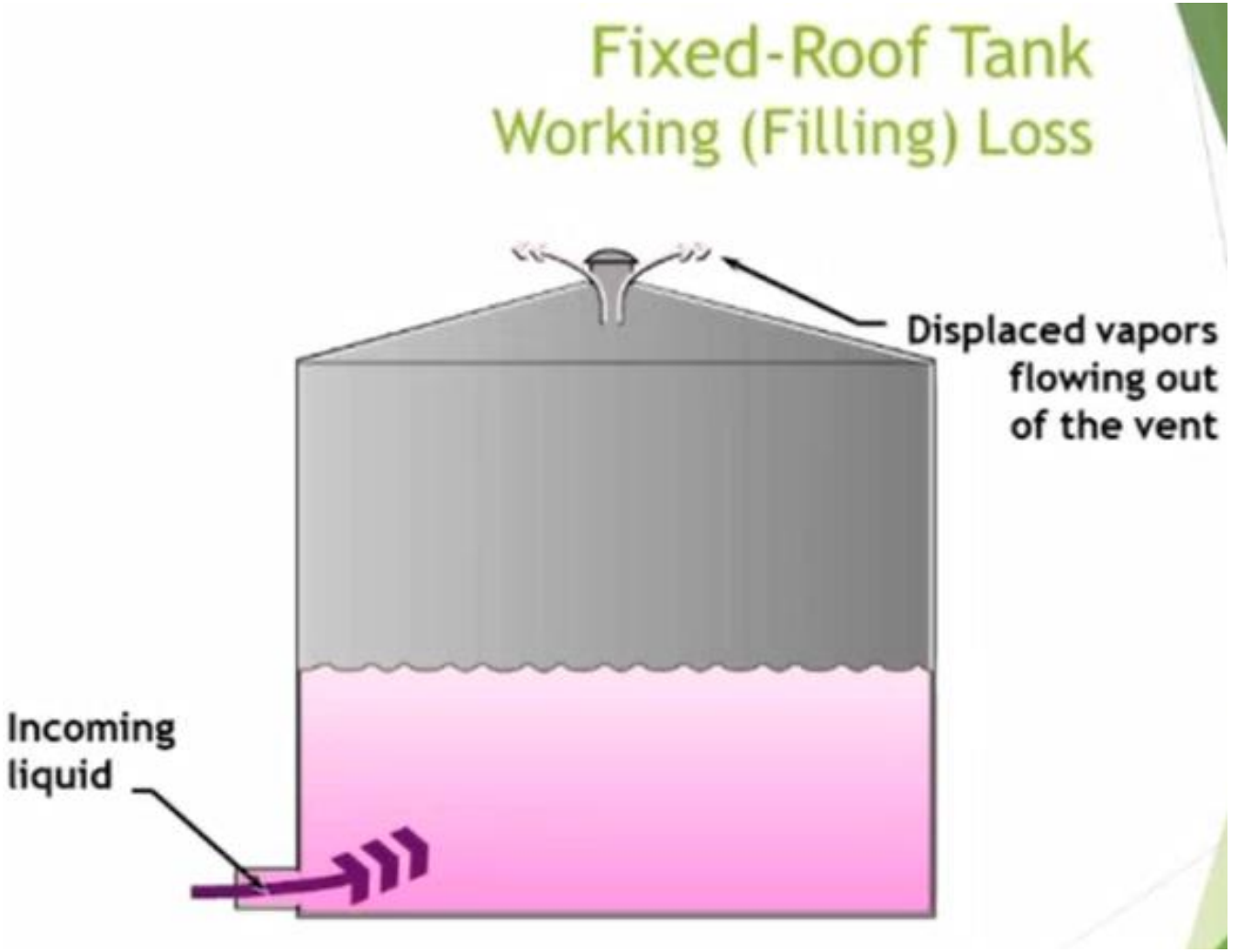
Resources

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

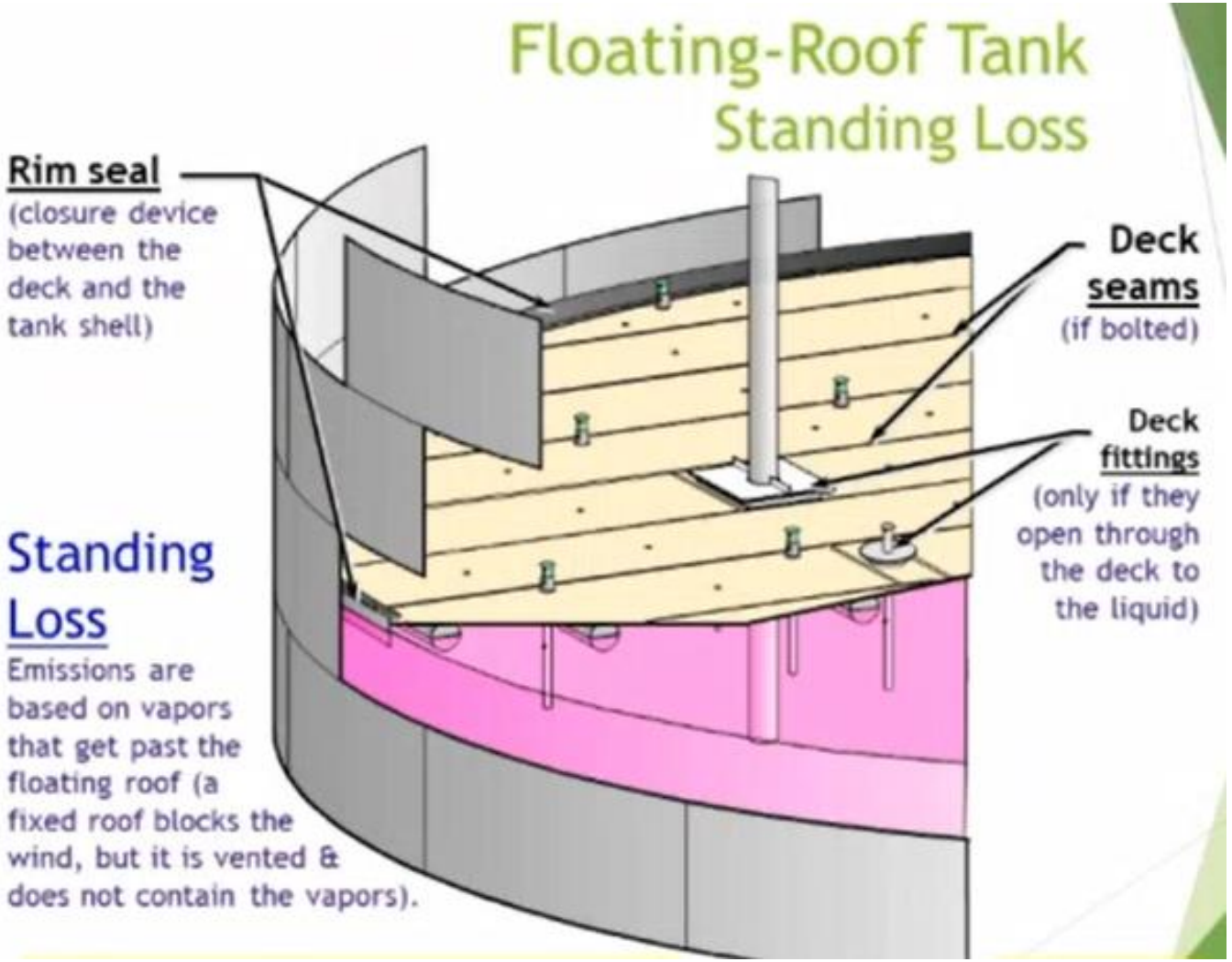
Equipment


Fixed-Roof Tank
Standing (Breathing) Loss
Vapors flow out of the vent
Heated gases expand, raising the pressure within the tank

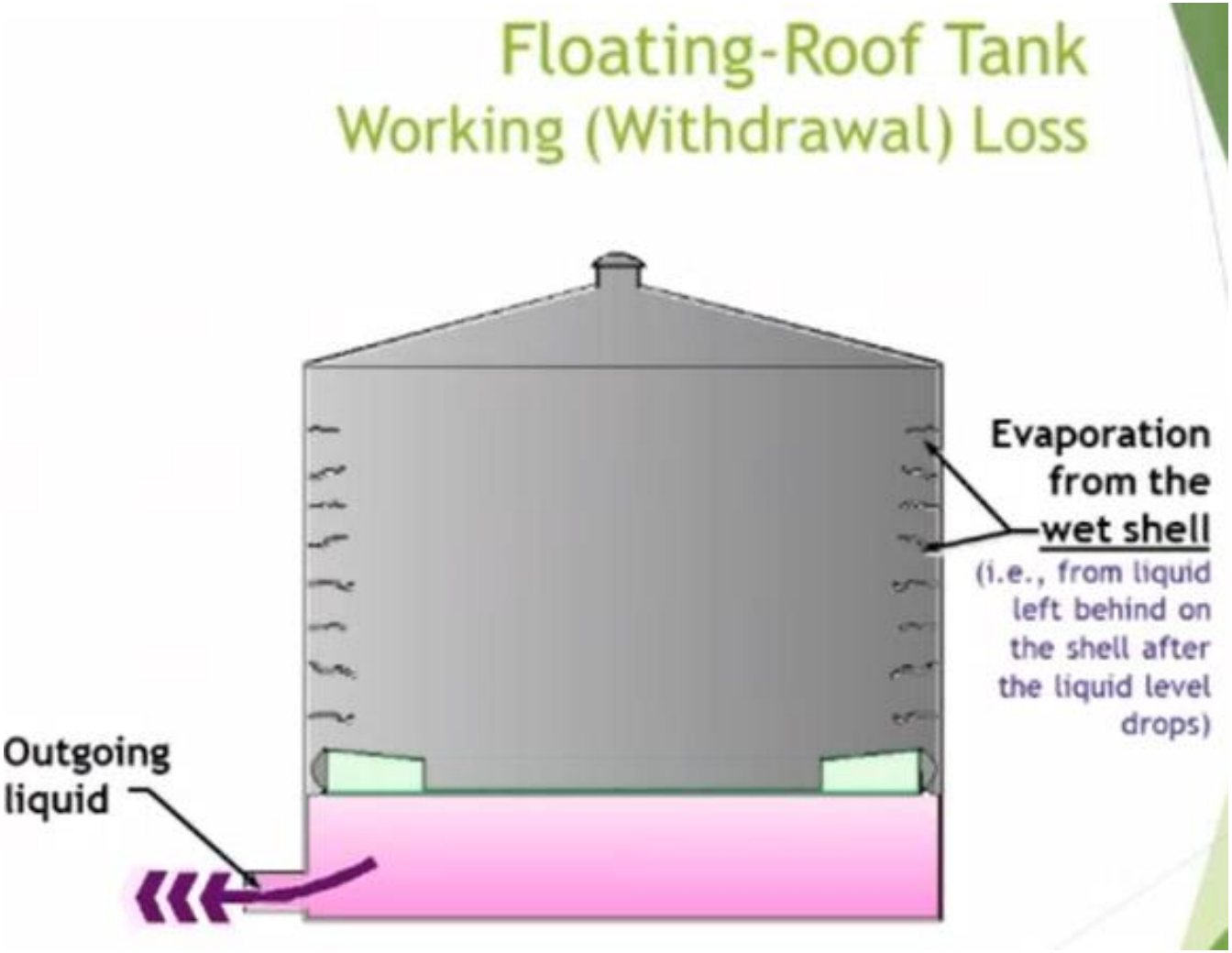
Equipment


Fixed-Roof Tank
Working (Filling) Loss
Displaced vapors flowing out of the vent
Incoming liquid

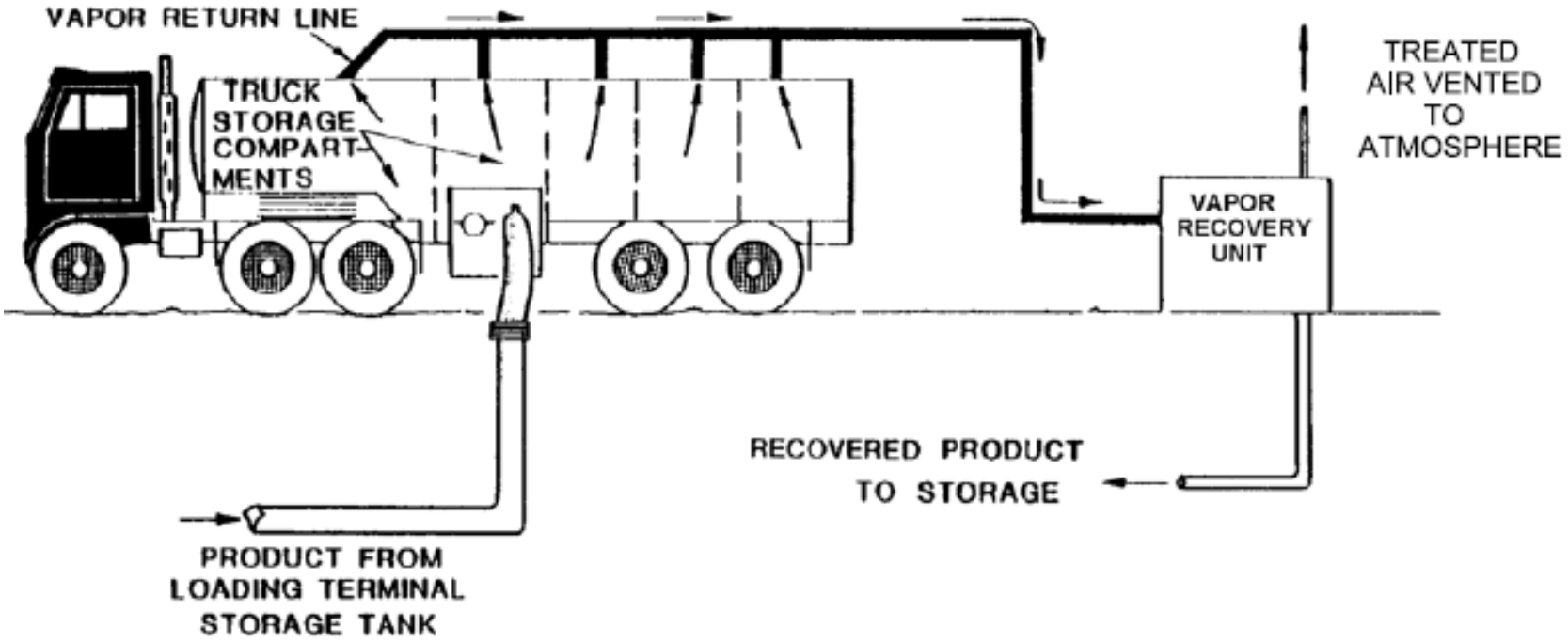
Equipment


Floating-Roof Tank
Standing Loss
Rim seal
(closure device between the deck and the tank shell)
Deck seams
(if bolted)
Deck fittings
(only if they open through the deck to the liquid)
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).

Equipment


Floating-Roof Tank
Working (Withdrawal) Loss
Evaporation from the wet shell
(i.e., from liquid left behind on the shell after the liquid level drops)
Outgoing liquid

Equipment


VAPOR RETURN LINE
TRUCK STORAGE COMPART-MENTS
TREATED AIR VENTED TO ATMOSPHERE
VAPOR RECOVERY UNIT
RECOVERED PRODUCT TO STORAGE
PRODUCT FROM LOADING TERMINAL STORAGE TANK

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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