

# South Portland Clean Air Advisory Committee

## Final Report

February 2021

## Table of Contents

<b><i>Introduction and Overview</i></b> .....	<b>3</b>
<b><i>CAAC Process and Focus</i></b> .....	<b>4</b>
<b><i>Recommendations</i></b> .....	<b>5</b>
Steps to improve air quality monitoring.....	5
Steps to improve air quality and reduce potential risks to human health .....	7
Next Steps .....	10
<b><i>CAAC Members and Support</i></b> .....	<b>11</b>
CAAC members .....	11
Support .....	11

## Introduction and Overview

The South Portland Clean Air Advisory Committee (CAAC) is pleased to offer to the City Council this final report of its work. The CAAC took seriously its mandate “to present the South Portland City Council with timely yet comprehensive recommendations on improving air quality throughout South Portland,” meeting 27 times over the course of 13 months to review information, hear from experts, consider recommendations and develop comments. This final report is the result of this year-long effort, which benefitted from the complementary backgrounds and expertise of the committee’s five members and the assistance of a professional facilitator, the City Manager and the City’s outside attorney.

The report describes the CAAC’s process, offers recommendations and makes suggestions about next steps.

In this report, the CAAC recommends steps to improve monitoring in the City’s most potentially affected neighborhoods as well as steps to improve regulation and reduce emissions, including working with the Maine Department of Environmental Protection (Maine DEP), state legislators, the Maine Center for Disease Control and Prevention (Maine CDC) and the U.S. Environmental Protection Agency to:

- Achieve better air quality data in neighborhoods most impacted by emitters:
  - Relocate existing Maine DEP fixed monitoring stations as soon as possible into communities closest to petroleum storage tank farms and near major truck routes.
  - Implement additional monitoring for harmful pollutants along the tank farm fencelines
  - Monitor particulate matter from truck traffic and/or rail locomotives
  - Conduct human exposure modeling to predict risk.
- Prepare now for future actions to capture tank farm emissions, such as requirements to capture emissions on all tanks.
- Update rules and legislation to enhance Maine DEP’s regulatory oversight, including imposing Best Available Control Technology (BACT) requirements for all emissions units.
- Encourage approaches to regulating the tank farms that focus on human health effects from cumulative exposure from multiple facilities.
- Measure actual emissions from all tanks and conduct audits of estimated emissions
- Establish a committee that can help the City implement the actions in this report and respond to related events.

The CAAC is grateful for the opportunity to present these ideas, as well as the helpful input from technical experts, regulators, members of the public and other people who have shared viewpoints and information with the Committee during its meetings.

## CAAC Process and Focus

In establishing the CAAC, the City Council cited a history of events that prompted its decision. The City mentioned, in particular, its Draft Ordinance Committee, which had recommended the City “work with local, state and federal agencies to establish an effective ambient air quality monitoring program to ensure that point source and fugitive emissions from crude oil storage terminals have no undue adverse impact on public health.”

The City also highlighted the U.S. EPA complaint against terminal operator Global Partners LLC and the subsequent consent decree between the U.S. EPA and the company, as well as the “renewed interest amongst elected officials and members of the public in air quality monitoring” that resulted from the EPA action. The public concerns around the impact of the tank farms on air quality were the primary context for the CAAC’s creation.

The Committee began its work by confirming its mandate, creating a workplan and agreeing on its own process for deliberating and making decisions. The Committee then identified the most significant potential sources of air pollution in the City using data from the National Air Emissions Inventory, which showed two major permitted emitters: the tank farms and the semiconductor plants<sup>1</sup>.

The CAAC also analyzed the data around Hazardous Air Pollutants (HAPs) in South Portland. HAPs are the fraction of Volatile Organic Compounds (VOCs) that are harmful to human health. An analysis of the National Emission Inventory data from 2014 presented to the CAAC demonstrated that bulk petroleum storage was the source of just 1% of HAPs in Cumberland County, yet likely 47% of HAPs in South Portland. Manufacturing and industrial emissions probably accounted for another 23% of HAPs in the city and transportation accounted for 17%<sup>2</sup>.

This analysis helped the CAAC confirm its focus on the tank farms and semi-conductor industries, as well as identify concerns around emissions from truck and rail traffic. The CAAC also had questions about the potential emissions from ship traffic.

The semi-conductor companies answered written questions from the CAAC that addressed the Committee’s concerns. Written responses about the volume of truck traffic at the Hannaford Depot assisted the CAAC’s analysis. The CAAC did not receive a response regarding emissions from rail locomotives, though heard concerns from some residents. The CAAC did not

---

<sup>1</sup> Data presented to the CAAC showed that the tank farms are collectively permitted to emit up to 594 tons per year of volatile organic compounds (VOCs) and the semiconductor plants up to 77 tons of VOCs per year.

<sup>2</sup> The analysis can be found in this document prepared by Tom Mikulka and David Falatko:

<https://www.dropbox.com/s/8hou0uhayw9oe17/7.%20HAP%20sources%20in%20Cumberland%20County%20and%20Sopo.pdf?dl=0>

ultimately explore its questions around emissions from ships in the harbor, though believes these emissions are worthy of future study.

Several events over the past year led to the CAAC to prepare written guidance to the City Council about tank farm regulatory issues, including written comments on:

- Global’s permit revision by Maine DEP
  - Initial comments in June 2020
  - Additional comments on the draft license in October 2020
- Sprague’s Consent Decree with the U.S. EPA (July 2020)
- Global’s supplemental odor control system (October 2020)
- Changes to the locations of Maine DEP’s monitoring locations (January 2021)
- Maine DEP’s report: “Measurement and Control of Emissions from Aboveground Petroleum Storage Tanks” (January 2021)

These comments reflect common themes that are included in this report’s conclusions, such as the importance of: using actual, measured emissions to regulate the facilities, rather than estimated emissions; focusing more intentionally on potential human health impacts when regulating; and considering the cumulative air quality impacts of the multiple storage facilities.

## Recommendations

The CAAC offers the following recommendations to the City Council regarding strategies to address the likely sources of air pollution in the city and to monitor air quality.

### Steps to improve air quality monitoring

Despite more than a year of concerted efforts to monitor air quality in South Portland, the City still lacks data about the human health impacts in the most likely affected neighborhoods. The CAAC recommends several steps to fill this data gap.

#### ***Move Maine DEP’s fixed stations***

In its January 2021 comments to the City Council, the CAAC recommended that the City work with Maine DEP to move as soon as possible the existing fixed monitoring stations to locations closer to the likely sources of emissions in the city. In those comments, the CAAC emphasized:

- The sooner Maine DEP can move the stations the better, so that data can be collected and acted on as quickly as possible.
- Regarding criteria for siting, the CAAC believes that:
  - Permanent stations should be located in or near neighborhoods that are at the greatest risk of being exposed to the greatest volumes of emissions.

- The Human Exposure Modeling (HEM-3) study conducted by David Falatko and the SmellMyCity app both provide guidance for priority neighborhoods to place the permanent sites<sup>3</sup>.
- In addition to the neighborhoods abutting the tank farms, prioritize a site most impacted by truck traffic to and from the Hannaford Depot.
- The CAAC emphasizes the critical importance of collecting meteorological data alongside the air quality sampling.
- In consultation with City Manager Scott Morelli and based on initial feedback from the Council, the CAAC recommends the following locations, though recognizes the final locations may vary depending on an analysis of the suitability of each site:
  - Monitor 1 – Bug Light Park. Remains in place.
  - Monitor 2 – Assessor’s Building. Moves 0.8 mi to 49 Chapel St.
  - Monitor 3 – High School. Moves 0.6 mi to 38 Reynolds St.
  - Monitor 4 – School Administration. Moves 0.6 mi to 97 Skillings St.
  - Monitor 5 – Redbank Community Center. Moves 1.6 mi to 7 Jackson St.
  - Monitor 6 – Mechanic St. Pump Station. Remains in place.

***Additional fenceline monitoring***

In addition to the fixed Maine DEP monitoring locations, the CAAC encourages the City to reach out proactively to U.S. EPA, Maine CDC and Maine DEP about options for conducting supplementary fenceline monitoring, using low-cost methodologies such as the EPA Method 325<sup>4</sup>. The City and citizen groups could jointly fundraise to conduct this work, under the supervision of U.S. EPA and/or Maine DEP/CDC. In addition, the City should continue to press the Maine DEP to use its existing mobile monitoring unit.

***Monitor particulate matter from diesel engines***

The CAAC recommends implementing a low-cost study of particulate matter pollution from diesel engines<sup>5</sup>, focusing on truck routes to/from the Hannaford depot and to/from the tank farms, as well as Rigby Yards and areas of idling railroad locomotives. The CAAC recommends noting the presence of ships in the harbor when doing this monitoring.

---

<sup>3</sup> This analysis can be found here: <https://www.dropbox.com/s/oxb7bcw2u4qwtwdw/54.%20Falatko%20-%20SoPo%20HEM-3%20summary%2010-25-2020.pdf?dl=0>

<sup>4</sup> <https://www.epa.gov/emc/method-325a-volatile-organic-compounds-fugitive-and-area-sources-sampler-deployment-and-voc>. In addition, the CAAC reviewed these 3 studies: 1. Thoma, E.D. et. al., South Philadelphia Passive Sampler and Sensor Study Interim Report, Paper # 2015-A-34-AWMA, 2015. 2. Eben D. Thoma , Michael C. Miller , Kuenja C. Chung , Nicholas L. Parsons & Brenda C. Shine (2011) Facility Fence-Line Monitoring Using Passive Samplers, Journal of the Air & Waste Management Association, 61:8, 834-842, DOI: 10.3155/1047-3289.61.8.834 3. Passive Benzene Sampling in a Community Monitoring Study, Erica Shipley -Research Scientist, New York State Department of Environmental Conservation, Division of Air Resources -Bureau of Air Quality Surveillance. EPA National Air Monitoring Conference Portland, Oregon August 15, 2018

<sup>5</sup> One such methodology reviewed by the CAAC is called PurpleAir.

### ***Conduct human exposure modeling***

In addition to the monitoring of actual emissions, models such as the U.S. EPA's Human Exposure Model (HEM-3) are tools for estimating the potential human health impacts from an individual facility and from cumulative impacts. The CAAC urges the City to contact the U.S. EPA to validate and improve the HEM-3 analysis already initiated by citizens and include Maine CDC and Maine DEP in those conversations. The combination of modeling and actual data will give the most robust understanding of actual human health risks in South Portland neighborhoods.

### Steps to improve air quality and reduce potential risks to human health

The most recent report by the Maine CDC about air quality monitoring in South Portland and Portland contains data from November 2019 through October 2020. In analyzing this data, the Maine CDC calculated time-weighted cumulative averages from all the months of monitoring and compared those averages to Maine's Ambient Air Guidelines<sup>6</sup>.

Two Volatile Organic Compounds (VOCs) exceeded their respective Ambient Air Guidelines: acrolein, which was similar to the background level in all stations across Maine, and naphthalene, which was 1.1 to 2.7 times higher than the guideline in the South Portland stations.<sup>7</sup> Two sites on Portland's waterfront showed even higher concentrations. The CAAC also noted that the data from the Bug Light station showed periodic spikes in benzene levels, though the cumulative average did not go above the Ambient Air Guidelines.

The data alone do not provide sufficient clarity about the source of the emissions, given the locations of the sampling sites and the lack of meteorological readings. As mentioned above, it also does not give a clear understanding of the health consequences for residents in the neighborhoods abutting the tank farms.

To address those gaps, the CAAC also reviewed data from a citizen monitoring study conducted by one of its members, independently of Maine DEP and Maine CDC. That study was based on EPA's 325 passive sampling methodology conducted over 28 days and found elevated levels of benzene in one location near the tank farms.

This data, together with the cumulative permitted amount of emissions from the tank farms, the proximity of homes to the farms, the data of odor complaints from neighborhoods close to the tanks, and the results of a citizen-led analysis of human health exposure using EPA's HEM-3

---

<sup>6</sup> The guidelines are derived using the U.S. EPA Regional Screening Level calculator to be protective of human population (including sensitive subpopulation) exposures over a lifetime.

<sup>7</sup> The Maine CDC writes: "The naphthalene [Ambient Air Guideline] is set to be protective of an increased risk of cancer and is set at a lifetime incremental cancer risk of one-in-one hundred thousand assuming exposure for 24-hours per day, 7- days per week, for 70 years." More information is in the report here: [https://www.dropbox.com/preview/David%20Plumb/0.%20CURRENT%20PROJECTS/City%20of%20South%20Portland\\_Jan2020/CAAC%20files/2.%20CAAC%20member%20inputs/60.%20South%20Portland%20-%20Portland%2024%20Hour%20VOC%20Air%20Monitoring%20Summary%20Report%20Dec%20Update12.22.20.pdf?role=work](https://www.dropbox.com/preview/David%20Plumb/0.%20CURRENT%20PROJECTS/City%20of%20South%20Portland_Jan2020/CAAC%20files/2.%20CAAC%20member%20inputs/60.%20South%20Portland%20-%20Portland%2024%20Hour%20VOC%20Air%20Monitoring%20Summary%20Report%20Dec%20Update12.22.20.pdf?role=work)

model, compelled the CAAC to recommend actions to address tank farm emissions. In particular, the CAAC recommends:

- **Prepare now for future actions to capture tank farm emissions:** The evidence presented to the CAAC suggests that emissions from the tank farms may be increasing the risks to human health in abutting neighborhoods. New data from those neighborhoods, collected with the methods described in the section above, will help to validate or refute this hypothesis. In the meantime, the City should work proactively to prepare for options to reduce emissions from tank farms. Should the data indicate dangerous levels of pollutants in abutting neighborhoods, the CAAC believes that an appropriate response would be to require vapor capture units or similar technology on all active tanks in the city.
  - Global and Sprague will be installing voluntary control systems on their heated tanks. While those systems are intended to control odors, they will also reduce VOCs.
  - Maine DEP, in its January 2021 report about tank farm regulations, signaled it may require control systems on all heated tanks in the future, depending on an analysis of how well the odor control systems at Global and Sprague also remove VOCs. The CAAC recommends the City work with Maine DEP to ensure these systems are required for all heated tanks.
  - Maine DEP has not called for control systems on gasoline and other non-heated tanks. The City should proactively explore the technological options for requiring vapor capture systems on non-heated tanks, as well as their estimated costs. Options could range from carbon-bed systems to systems that fully capture all vapors.
  - If and when the City decides the data from neighborhoods proximal to the tank farms warrant regulatory action to capture vapors on all tanks, the CAAC urges the City to exhaust all efforts with Maine DEP and the state legislature before contemplating the costly and challenging step of City-level regulations on the facilities.
- **Encourage cumulative regulatory approaches that focus on human health effects:** The City should work with the state legislature and Maine DEP to direct Maine DEP to increasingly use a regulatory approach that centers around the human health effects from the cumulative exposure to emissions from these facilities.
  - The facilities have a combined impact on the city and should be regulated as such
  - Placing human health impacts at the center of regulation could mean, among other things, taking into account the proximity of homes when issuing permits as well as setting emissions limits that restrict the potential for additional cancers to 1 in 100,000 people.
- **Work with Maine DEP and Maine state representatives to request rulemaking or proposed legislation, respectively and as necessary, to:**

- Adopt regulations that would impose the stricter Best Available Control Technology (BACT) requirements for *all* emissions units on an ongoing basis upon each license renewal, and not just for new, reconstructed, or modified facilities.<sup>8</sup>
  - Adopt regulations that would impose the stricter requirements in the review of Best Practical Treatment at an existing source, such as by shortening the 15-year time period for deemed BPT compliance as currently exists.<sup>9</sup>
  - Provide Maine DEP with express authority to regulate odors due to their significant effect on air quality and quality of life, (e.g. the Rhode Island Department of Environmental Management has the authority to regulate objectionable odors);
  - Determine and provide DEP with adequate funding and resources to electronically publish all emissions test result data in “real time”; and,
  - Require the tracking of any product blended with asphalt, fuel oil or distillate fuel by any facility, and related record keeping.
- **Measure actual emissions:** The CAAC is encouraged by the Maine DEP’s new requirements for Global’s heated tanks to use actual, measured emissions to determine compliance rather than calculated emissions. Maine DEP has signaled it will use this approach for all heated tanks going forward, when such data exist. However, for non-heated tanks Maine DEP continues to support calculated emissions using the AP-42 methodology.
    - Given past doubts about the assumptions and variables that go into calculating emissions using AP-42, the CAAC recommends the City advocate for rules that require measurement of actual emissions on all tanks. The CAAC reviewed analysis that showed AP-42 methodology underestimates emissions when used on heated tanks because of incorrect assumptions on vapor pressure and other variables<sup>10</sup>. For non-heated tanks, AP-42 also contains a variety of assumptions that can alter the outcome. The CAAC reviewed an EPA study<sup>11</sup> that cited an analysis that compared actual emissions from a gasoline tank to estimated

---

<sup>8</sup> 06-096 CMR Ch. 115(4)(A)(4)(d). <https://www.maine.gov/sos/cec/rules/06/096/096c115.doc> Currently the lower Best Practical Treatment (BPT) standard applies for existing facilities, and in the case of residual fuel and asphalt it requires inspection of tanks, checking for leaks, and keeping records of throughput.

<sup>9</sup> 06-096 CMR Ch. 115(3)(D)(2). “BPT. Emissions from existing sources undergoing renewal of a minor source license shall be deemed to be receiving best practical treatment if those emissions are being controlled by pollution control apparatus that has been approved by the Department and which was installed less than 15 years prior to the date of license application approval, or an acceptable best practical treatment analysis shows that those emissions are being controlled in a manner consistent with emission controls commonly used in sources of similar age and design in similar industries.”

<sup>10</sup> This EPA Enforcement Alert describes these concerns with AP-42 and mentions South Portland specifically: <https://www.epa.gov/sites/production/files/2021-01/documents/ap42-enforcementalert.pdf>

<sup>11</sup> Emission Factor Documentation for AP-42 Section 7.1, Organic Liquid Storage Tanks, Final Report, For U. S. Environmental Protection Agency Office of Air Quality Planning and Standards Emission Factor and Inventory Group. 2006. Also: Field Testing Program to Determine Hydrocarbon Emissions from Floating Roof Tanks, Final Report, Volumes I and II, Radian Corporation, May 1979.

emissions using AP-42, finding the actual emissions to be much higher. While AP-42 has been updated since that analysis, the CAAC has not seen convincing analysis from Maine DEP that AP-42 is a reliable method for estimating actual emissions.

- If Maine DEP is unable or unwilling to measure actual emissions on all tanks, the CAAC recommends that Maine DEP run the AP-42 calculations themselves, in addition to having the companies calculate them. The CAAC sees value in this type of “audit” of the calculations, given concerns around how calculations have been made in the past. The CAAC suggests that the Maine DEP provide the results of both estimates - the Maine DEP’s calculations and those of the company - to the public.
  - The CAAC also emphasizes the importance of measuring emissions during peak times, such as when tanks are being filled or during tank cleaning.
- **Reduce transportation emissions by adopting recommendations of the Maine Climate Council and the One Climate Future plan.**
    - The One Climate Future plan for South Portland and Portland<sup>12</sup>, along with the Maine Climate Council’s Climate Action Plan<sup>13</sup>, contain strategies that will lead to lower emission from vehicles in the city. The CAAC recommends embracing these strategies.
    - The Maine Climate Action Plan also proposes strategies to strengthen public-health monitoring, education, and prevention.

The CAAC recognizes that South Portland today has few if any models in other cities to show how many of these recommendations have been implemented elsewhere. The request for emissions control technology and measurement of actual emissions on non-heated tanks would put South Portland at the forefront of communities trying to minimize risks to residents from these types of facilities. The number of facilities in South Portland, their proximity to residential neighborhoods and the potential risks to public health prompts the CAAC to call for these measures.

## Next Steps

The CAAC has heard calls from members of public to extend its work beyond its mandated time.

The CAAC sees value in a formally organized committee going forward to assist the City in implementing the steps in this report and to react to related events that may arise. This committee would meet less frequently than the current CAAC.

---

<sup>12</sup> <https://www.oneclimatefuture.org>

<sup>13</sup> <https://climatecouncil.maine.gov/>

The City Council may choose to adapt the mandate of the current CAAC to serve this role or convene an entirely new group.

In addition, the CAAC recommends that the City Manager be authorized to consult with and engage with a variety of experts, residents and/or paid consultants when technical issues arise that are outside of the expertise of City staff.

## CAAC Members and Support

### CAAC members

Anthony Moffa  
Brienne Hicknell  
Josh Cutler  
Rebecca Boulos  
Tom Mikulka

### Support

David Plumb, Consensus Building Institute (facilitator)  
Scott Morelli, South Portland City Manager  
Adrian Kendall, Special Legal Counsel