



Brief: Port of Seattle Under-Reported Heavy Duty Truck Diesel Emissions for Five Years

Puget Sound Sage
December 7, 2012

Summary

Consultants for the Port of Seattle recently revised earlier estimates of diesel pollution emitted from heavy duty trucks at the region's ports. The new emissions modeling reveals that previous estimates greatly under-reported the scale of air-borne toxics produced by port trucks and their associated risks for communities located near ports in 2005. This earlier under-reporting was the basis for several diesel reduction policies subsequently adopted by the Port. This suggests that hazardous air pollution affecting the nearest port communities may be inadequately addressed by recent Port programs, particularly those aimed at reducing diesel emissions from heavy duty trucks.

Background

In 2007, the Port of Seattle, along with other agencies concerned with maritime-related air pollution, released its first inventory of air pollutants.¹ The inventory assessed the total air pollution footprint for maritime activity around the Puget Sound airshed, including ports.²

¹ The inventory was conducted for the Puget Sound Maritime Air Forum, which consists of several Washington ports, clean air agencies, maritime and shipping trade associations and state transportation agencies. The inventory was conducted by the Starcrest Consulting Group. The Port of Seattle contributed the largest amount of funding for the inventory as well as provided overall project management. For a full list of participants and their roles, the 2005 and 2011 inventory reports can be found here: <http://www.pugetsoundmaritimeairforum.org>.

² Maritime air emissions inventories produce estimations for the quantity of pollution generated by maritime activity including; ocean going vessels, commercial and recreation harbor vessels, sea-port dock equipment, heavy duty trucks moving shipping containers, and trains hauling cargo. Once each component is assessed, they are aggregated a sum total of emissions for a defined region airshed. Emissions inventories focus on pollutants identified by the EPA that can be hazardous to human health.

The inventory included estimates of emissions profiles for each of six active seaports. One purpose was to create an accurate, definitive benchmark to measure progress towards clean air goals.

The initial inventory estimated emissions for 2005. This year, the involved agencies, including the Port of Seattle, released an updated inventory. That inventory models emissions for 2011 and includes a comparison with the results for 2005.

While air emission inventories are critical in understanding overall environmental impacts of maritime operations, such as seaports, they are inadequate to understanding the public health harm caused by those emissions. In particular, the greatest harms caused by air pollution (primarily diesel emissions) are experienced by communities closest to the sources. For example, the air emissions from thousands of diesel truck trips in and out of the Port of Seattle primarily affect residents of the Duwamish Valley.

These communities have the most at stake from the total quantity of diesel emissions from created by port trucks. The Duwamish Valley and the Tacoma Tidelands have had some of the highest levels of particulate matter in the region.³ Additionally, the Puget Sound Clean Air Agency has stated that people living near ports and roadways have higher exposures to air toxics and health risks.⁴ For example, communities living near the Port of Seattle have the highest asthma hospitalization for children under 18 in the entire county.⁵ When Puget Sound Sage conducted a community health survey in 2009, 60% of residents of port-adjacent neighborhoods believed port trucking negatively affected their health.⁶

These significant local impacts and related community concerns have been documented through investigative journalism from KCTS and Investigate West in a project called *Breathing Uneasy: The air pollution crisis in South Seattle*⁷ and in media sources as diverse as Seattle Weekly, Crosscut.com, KOMO 4 and the Seattle Times.⁸

³ Current Central Puget Sound Region Designated Maintenance and Nonattainment Areas. Puget Sound Regional Council – January 2011. psrc.org/assets/5243/ConformMap_110104.pdf.

⁴ Puget Sound Clean Air Agency, *Air Toxics Fact Sheet, 2011*: www.pscleanair.org/airq/basics/Air%20Toxics%20Fact%20Sheet%201-31-11.pdf.

⁵ Investigate West: *The high health costs of a Seattle's Superfund site: it can take years off your life* - www.invw.org/content/the-high-health-costs-of-a-seattles-superfund-site-it-can-take-years-off-your-life.

⁶ See Puget Sound Sage, *Community Health Impact Survey: Port of Seattle Operations Hazardous to Health in Georgetown and South Park, 2009*: <http://www.pugetsoundsage.org/downloads/Community%20Health%20Impact%20Survey%20Overview.pdf>.

⁷ First aired June 17, 2011 *Breathing Uneasy: The air pollution crisis in South Seattle* 6/17/11 – kcts9.org/kcts-9-connects/breathing-uneasy-air-pollution-crisis-south-seattle-june-17-2011.

⁸ Seattle Weekly: *What to consider while wheezing your way through Georgetown* 10/13/09 - blogs.seattleweekly.com/dailyweekly/2009/10/southland_tales_something_to_c.php. Crosscut.com: *South Seattle residents/scientists look for answers on air pollution's health threats* 6/14/11 - crosscut.com/2011/06/14/port-seattle/21014/South-Seattle-residents-scientists-look-for-answer/?page=single. KOMO 4 TV: *Port Trucks* 10/7/09 - www.komonews.com/home/video/63692647.html. Seattle Times: *Puget Sound area ranks high in cancer risk from toxic air pollution, reports say* 6/25/09 - seattletimes.com/html/health/2009381228_pollution25m0.html. Seattle PI: *New test results on dioxin source raise*

Analysis

This brief does not address the top level findings highlighted by Port of Seattle in their presentation to the Commission, namely, whether and how much air emissions were reduced between 2005 and 2011. Rather, our focus is how the Port's consultants have revised upward their original 2005 estimate of air emissions for heavy duty port trucks.⁹

The *2005 Puget Sound Maritime Air Emissions Inventory (2005 Inventory)* provides two levels of air emissions – an overall assessment for the region and specific assessments for individual ports. The *2011 Puget Sound Maritime Air Emissions Inventory (2011 Inventory)* does the same thing. All data presented below are from these two reports.

The chart below shows the total heavy duty truck emissions in the regional airshed reported in the *2005 Inventory*. It also shows revised estimates for 2005 that have been published in the *2011 Inventory*. The *2011 Inventory* explains that these revisions were based on an update to how port truck emissions are calculated. Primarily, the Port's consultants changed their computer model and several underlying assumptions, including estimates of what types of trucks were operating at the Port.¹⁰

The 2005 baseline estimates presented in the recent inventory are roughly double those reported in the earlier inventory for each type of pollutant. For example, the estimate of diesel particulate matter (DPM) rose a dramatic 165%, from 43 tons to 114 tons. The revision is striking, given that DPM represents the highest potential cancer and respiratory disease risk of all air toxics in the Puget Sound area.¹¹ Another toxic of concern is fine particulate matter (PM2.5), like soot, smoke and dust, which can easily travel deep into lungs. The 2005 estimation for PM2.5 has been adjusted upward from 43 tons to 98 tons per year, an increase of 128%.

alarm in South Park 1/21/09 - www.seattlepi.com/local/article/New-test-results-on-dioxin-source-raise-alarm-in-1298015.php.

⁹ These are primarily the semi-trucks that move international shipping containers on and off seaport docks, also known as "port trucks." The vast majority of containers move through the Ports of Seattle and Tacoma.

¹⁰ The explanation for updating the models and assumptions from the 2005 Inventory can be found on page 36 of the 2011 Inventory. An explanation for the difference between emission calculation models can be found on pages 216 and 238 of the 2011 Inventory and pages 351 and 357 of the 2005 Inventory. The biggest assumption change underlying the model was about the types of trucks utilized by the port. 2011 assumptions can be found on pages 224, 225 and 227 of the 2011 Inventory. 2005 assumptions can be found on pages 361- 367 in the 2005 Inventory.

¹¹ Puget Sound Clean Air Agency, *Air Toxics Fact Sheet, 2011*: [http://www.pscleanair.org/airq/basics/Air Toxics Fact Sheet 1-31-11.pdf](http://www.pscleanair.org/airq/basics/Air%20Toxics%20Fact%20Sheet%201-31-11.pdf).

**Emissions from Heavy Duty Vehicles (aka Port Trucks) For Regional Airshed, 2005
In Tons Per Year¹²**

<i>2005 Emissions Estimations¹³</i>								
	<i>NOx</i>	<i>VOC</i>	<i>CO</i>	<i>SO2</i>	<i>PM 10</i>	<i>PM 2.5</i>	<i>DPM</i>	<i>CO2EQ</i>
Original 2005 Emissions <i>(From 2005 Inventory)</i>	1,323	76	455	39	49	43	43	164,087
Revised 2005 Emissions <i>(From 2011 Inventory)</i>	3,010	148	896	87	114	98	114	387,846
Difference	+1,687	+72	+441	+48	+65	+55	+71	+223,759
Percent Change	+127%	+95%	+97%	+123%	+133%	+128%	+165%	+136%

While the stated purpose for revising 2005 estimates in the *2011 Inventory* is to provide an “apples-to-apples” comparison between 2005 and 2011, it must be pointed out that the new, better modeling reveals that there were 2-3 times more toxic truck emissions than initially reported. To the degree that the *2005 Inventory* was a disclosure of how much diesel pollution originates from port trucks, the public was led to believe that half as much pollution was being produced in the region for the last five years.

It should also be noted that comparisons for heavy duty trucks emissions must be made at the regional airshed level, due to missing data for port-specific activity in the original *2005 Inventory*. While the inventories provide specific detail for every source of air emissions at three ports in the study, the *2005 Inventory* failed to determine the largest component of port truck pollution at the local level – emissions after a truck leaves the docks, or “off terminal” emissions. Although the *2005 Inventory* estimated “on-terminal” port truck emissions, these represent only a minute portion of the total generated by these vehicles. For example, on-terminal truck activity produced only 3.5% of total diesel particulate matter (DPM) generated by trips to and from the Port of Seattle in 2005.¹⁴ That is to say, the *2005 Inventory* did not determine 95% of diesel emissions estimates for localized, Port of Seattle truck operations.

¹² Data from this chart can be found on page 237 of the *2011 Inventory* and page 3 of the 2005 Inventory.

¹³ Refer to addendum in this memo on pollutant descriptions and air quality standards for information about health effects and national standards for the pollutants in this chart.

¹⁴ According to the 2011 Inventory, the amount of DPM generated in 2005 by Port of Seattle’s heavy duty trucks was 53.60 tons “off-terminal” compared to 1.99 tons “on-terminal”. Accordingly the total amount of DPM generated by Port of Seattle’s trucks in 2005 was roughly 55.59 tons.

Conclusion

Given the missing off-terminal data at the port specific level in the *2005 Inventory*, residents close to the Port of Seattle could only infer the scale of emissions from the combined off-terminal and on-terminal data estimated for the total airshed. In other words, data from the total airshed was the best available to make conclusions about local health impacts. For this reason, the dramatic increase in estimated emissions in the *2011 Inventory* should be seen as an under-reporting of great concern to community residents over the last five years. Such a perspective would be well-founded – the *2011 Inventory* also reveals that roughly 50% of all port truck pollution in the airshed originates from the Port of Seattle.¹⁵

A more troubling implication is that since the *2005 Inventory* the Port of Seattle advanced an emissions reduction plan for heavy duty trucks based on the insufficient data. In light of the revised data, the Port should revisit the aggressiveness and timetable of its current plans to reduce toxic air pollutants from the thousands of port truck trips through nearby communities every day.

Addendum: Pollutant Descriptions and Air Quality Standards¹⁶

NO_x – Nitrogen Dioxide (NO₂) is one form of NO_x that contributes to respiratory diseases like asthma. NO_x – Oxides of Nitrogen can combine with other pollutants to either form fine particulate matter (PM_{2.5}) or can react to Volatile Organic Compounds to create smog (ozone). For many of the low-income people and people of color living along highways and truck routes, the high presence NO_x is a known contributor to poor health.

VOC – Volatile Organic Compounds combine with NO_x on particularly warm days to form ozone.

CO – Carbon Monoxide can affect brain and lung function. People with heart disease and pregnant women are especially at risk.

¹⁵ This 50% figure was calculated by comparing 2005 airshed emissions for the Port of Seattle with the airshed emissions for all Ports as reported on page 55 of the 2011 Inventory.

¹⁶ The primary sources for this section are the *2011 Puget Sound Maritime Air Emissions Inventory* and the Environmental Protection Agency's National Ambient Air Quality Standards (NAAQS) home page. More information about the pollutants in this section can be found on pages 5-8 of the *2011 Inventory* and NAAQS here: <http://www.epa.gov/air/criteria.html>.

SO₂ – SO₂ is associated with a variety of respiratory diseases. In 2010, the EPA mandated a shift for all diesel fuel produced and sold to be minimum of 80% ultra low sulfur diesel (ULSD), which is now widely available nationwide and much of the truck fleet has shifted to this fuel source.

PM₁₀ and PM_{2.5} – Particulate matter (PM) refers to tiny, discrete solid or aerosol particles in the air like dust, dirt, soot and smoke. Fine particles (PM_{2.5}) are a concern to human health because their very tiny size allows them to travel more deeply into lungs. PM lingers in the communities where it is emitted, causing increased health effects for people living along truck routes and near ports.

DPM – Diesel particulate matter is a significant component of PM. Diesel exhaust also includes more than 40 substances that are listed as hazardous pollutants. The Puget Sound Clean Air Agency has indicated that DPM has the greatest risk to increased rates of cancer for all air toxics in our region. Like PM, DPM lingers in communities where it is emitted, like the port adjacent communities in the Duwamish Valley.