

2011 Puget Sound Emissions Inventory Update

Task A: Summary of 2005 PSEI Methodology & 2011 Recommendations

INTRODUCTION

Task A of the 2011 Puget Sound Emission Inventory Update is to summarize the 2005 PSEI methodology in bullet list form and provide recommendations for the 2011 PSEI. The document will detail the pros and cons of making the recommended changes, how the changes will affect the emission results compared to using the 2005 EI method, how it will affect our ability to compare this inventory to others, and how not making the change would affect future inventories.

GEOGRAPHICAL EXTENT

2005 PSEI Summary: The 2005 PSEI covered activities within the U.S. portions of the Puget Sound/Georgia Basin Airshed. For ocean-going vessels and harbor craft, the data was collected for the greater Puget Sound area and associated waterways, and the Strait of Juan de Fuca out to the JA buoy. For CHE and fleet vehicles, the geographical scope is the ports and associated terminals. Emissions from rail locomotives were estimated to the edge of the study area. Emissions from heavy-duty trucks were estimated to the first drop or the edge of the study area in the case of cargo outbound from a port.

Starcrest 2011 PSEI Recommendation: Use the same geographical extent as the 2005 PSEI.

OCEAN-GOING VESSELS (OGV)

2005 PSEI Summary: MarEx of Puget Sound data was used for activity and was the primary basis for hotelling time, arrival and departure travel directions by route, number of ship calls for each port and the vessel routes. Lloyd's data was used to match MarEx vessels to ship type, main engine rating, vessel speed, and other parameters needed to estimate OGV emissions. Vessel Boarding Program (VBP) data was used to gain firsthand information on ship's activities and characteristics, specifically for auxiliary engine and boiler load data by mode which is not provided by Lloyd's. Emissions were estimated using equipment data, activity data, and emission factors.

Discussion Included:

- No major changes to the methods in 2005 have been made.
- A limited VBP will be completed as part of the 2011 update. The focus will be to send data collected in 2005 to the vessel operators for review and update. Starcrest will incorporate VBP data collected from Southern California ports since the 2005 report to augment the 2011 VBP data (which included Puget Sound, Houston, New York, and Southern California data). A very limited and targeted VBP will be conducted upon review of the compiled VBP data.
- Starcrest is starting the Port of Los Angeles (POLA) and Port of Long Beach (POLB) Tanker Improvement Study in conjunction with the Western States Petroleum Association (WSPA) and other bulk liquid carries. This study is to validate current bulk liquid OGV modal modeling and emissions quantifications. Starcrest will present the findings to the Project Funding Committee (PFC) and solicit incorporation into the 2011 update.
- Starcrest will review 2011 activity data to see if new routes need to be added. New terminals, such as the cruise ship terminal, will be updated in the routing files.
- Starcrest recommends estimating OGV boiler emissions based on main engine loads (e.g., boiler emissions estimated at main engine loads less than 20%), based on information collected during the POLA/POLB VBP.

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- Starcrest will provide Ron Stuart with the rules used in 2005 for OGV's crossing the U.S./Canadian border. Rules on which ships will be include or excluded that cross the border.
- Starcrest informed the PFC that the low-load emission factor correction method used in the 2005 inventory is being reviewed by POLA/POLB/California Air Resources Board (CARB)/Starcrest to determine if it significantly over-estimates main engine low load emissions. Starcrest will brief the PFC up the conclusion of that review and make a recommendation at that time whether a change is in order.
- Frank Holmes of WSPA has agreed to provide tanker information for tankers that call Puget Sound.
- Starcrest informed the PFC that slide valves are being reviewed by POLA/POLB and that incorporation of any emissions benefits are held until the results of that review are completed.
- Starcrest informed the PFC that it is currently working on incorporating Automated Identification System (AIS) data in the Port Authority of New York & New Jersey's (PANYNJ) Low Sulfur Fuel Switch Program. AIS data can be requested from the United States Coast Guard (USCG). The labor and costs associated with converting the 2011 PSEI to AIS is unknown at this time and the change might not fit within the current budget. The benefits of using AIS would be a potentially significant reduced cost to update the OGV emissions for any year and the OGV inventory could be updated more frequently than once a year. The disadvantage of moving to AIS is there would be no "apples-to-apples" comparison with the 2005 PSEI. Starcrest will brief the PFC on the AIS option when it completes its development with PANYNJ.

Starcrest 2011 PSEI Recommendations:

- Use the same overall methodology as the 2005 PSEI.
- Update auxiliary and boiler load defaults using entire Starcrest VBP data set.
- Conduct a limited and targeted VBP program focused on updating 2005 data.
- Incorporate the POLA/POLB Tanker Improvement Study findings.
- Incorporate main engine/boiler load cutoffs similar to POLA/POLB.
- Wait to incorporate the main engine low load adjustment method until POLA/POLB/CARB/Starcrest review is complete.
- Wait to incorporate emission reductions from slide valves until POLA/POLB review is complete.

Option for Future PFC Determination:

- AIS data used instead of MarEx data. A drawback to using AIS data is that it could not be directly compared to the 2005 PSEI and it may cost more than the original scope and the current budget may not support the change. The advantage would be a potentially significant reduction in the cost of future OGV updates and a potential increase in inventory frequency.

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HARBOR CRAFT (HC)

2005 PSEI Summary: Vessel types included assist tugs, commercial fishing, excursion, ferry, government, harbor tug, ocean tug and workboat. In addition, recreational vessels and tank barge diesel generators were included. The data collection effort for HC in 2005 was a significant effort. Emissions were calculated using engine type/year, size, hours of operation and appropriate emission factors.

Discussion Included:

- Emission factors will be reviewed to ensure the latest EPA engine emission standards are used, especially for Tier 2 engines
- Should recreational vessels be included in 2011 PSEI? They were included in the 2005 PSEI for the sake of completeness, but including them required extensive data collection and use of assumptions and general defaults. One option is to leave recreational vessel emissions the same as in the 2005 EI since it would be hard to determine activity and characteristic changes in 2011. Another option is to survey the marinas again to see if there are substantial changes, such as in slip vacancies, and then ratio the 2005 activity based on the differences. One final option is to not include recreational vessels in the 2011 PSEI report and future updates. Whichever path is taken, an explanation on uncertainty for this category will be included in the report. A HC Workgroup will be formed to discuss this topic.

Starcrest 2011 PSEI Recommendations:

- Use the same methodology as the 2005 PSEI.
- Update emission factors as needed.
- Update recreational vessels using the agreed upon method determined by the HC Workgroup.

CARGO HANDLING EQUIPMENT (CHE)

2005 PSEI Summary: Equipment and activity data was collected from the terminals. The EPA NONROAD (version 2005) model was used to develop emission factors for the CHE inventoried. Emissions were estimated using equipment data, activity data, and emissions factors.

Discussion Included:

- Starcrest requested Ron Stuart to ask the Washington Department of Ecology (WDOE) which version of the NONROAD model they would prefer to be used for the 2011 PSEI update.
- POLA/POLB/Starcrest conducted a study of yard tractors that analyzed load factor data collected from 85 yard tractors that operated at the San Pedro Bay ports. The cumulative data suggest an average load factor of 37-39% is appropriate for the fleet (as compared to the 65% estimate used by CARB). The 39% load factor for yard tractors was approved by CARB and has been used in the POLA and POLB Emission Inventories since the 2006 calendar year EI report.
- Likewise, POLA/POLB/Starcrest conducted a similar study of rubber-tired gantry cranes (RTGs). The cumulative data suggested an average load factor between 15% and 20% is appropriate for the fleet (as compared to the 43% estimate used by CARB). The 20% load factor for RTG cranes was approved by CARB and has been used in the POLA and POLB Emission Inventories since the 2008 calendar year EI report.

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Starcrest 2011 PSEI Recommendations:

- Use the same methodology as the 2005 PSEI.
- Use the WDOE requested version of the NONROAD model to determine emissions factors.
- Recommend using the latest load factors for yard tractors and RTG cranes instead of the default included in the NONROAD model (study reports have been provided to Ron Stuart).

RAIL LOCOMOTIVES (RL)

2005 PSEI Summary: On-terminal and off-terminal port related rail equipment and activity data was collected from the Class 1 railroads (BNSF and UP), rail traffic between Seattle and Tacoma from the Ports, and switching data from Tacoma Rail. Emission factors from the EPA 1997 locomotive rulemaking support documentation were used. Emissions were estimated using equipment data, activity data, and emissions factors.

Discussion included:

- A rail Locomotive Workgroup will be established including port, Class 1 railroads, and switching companies. BNSF wants to be active and provide the data in a timely manner.
- Emissions from the cargo handling equipment and heavy duty vehicles associated with the off-port rail yards will be included in the appropriate source categories instead of the rail locomotive report section for the 2011 PSEI.

2011 PSEI Recommendations:

- Use the same methodology as the 2005 PSEI.
- Use the latest EPA emission factors based on 2009 EPA guidance document regarding fleet average emission rates based on locomotive type and fleet mix.

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HEAVY-DUTY VEHICLES (HDV)

2005 PSEI Summary: Vehicle age distribution was provided by WDOE based on the 2006 State Implementation Plan modeling. Activity data was developed by Port of Seattle's Planning Department. On-terminal HDV call data, speed data, and time on terminal was collected from the terminals directly. Off-terminal data was provided by PSRC, Puget Sound Clean Air Agency, Port of Seattle (significant data from Container Terminal Access Study; Strategic Freight Transportation Analysis), Port of Tacoma, WDOE, and Washington State Department of Transportation. EPA MOBILE6 model was used to develop emissions factors. On-terminal HDV emissions were estimated by Starcrest and off-terminal HDV emissions were estimated by PSRC. Emissions were estimated using equipment data, activity data, and emissions factors.

Discussion included:

- EPA has a new model for estimating on-road emissions called MOVES. There are pros and cons to switching to MOVES - the need for consistency with the previous inventory versus being consistent with the regional on-road inventory.
- Washington Department of Ecology may be able to provide a summary of the differences between MOVES and MOBILE6 that could be used in the 2011 PSEI report.
- The Ports of Tacoma and Seattle may have transportation planners help supplement data, they will check for resources internally.

2011 PSEI Recommendations:

- Use the same methodology as the 2005 PSEI.
- Use the model/version recommended by PSRC/WDOE for development of emissions factors.

ON-TERMINAL LIGHT-DUTY VEHICLES (LDV)

2005 PSEI Summary: Vehicle and activity data was collected from the terminals. The EPA MOBILE6.1/6.2 model was used to develop emission factors for the LDV inventoried. Emissions were calculated using equipment data, activity data, and emissions factors.

Discussion included:

- Similar to the HDV discussion, the model/version requested by the PSRC and WDOE for the development of on-road emission factors will be used.

2011 PSEI Recommendations:

- Use the same methodology as the 2005 PSEI.
- Use the model/version recommended by PSRC/WDOE for development of emissions factors.