

## Potential Odor Impacts of Proposed Sulfur Loading

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The purpose of this memo is to discuss the potential odor related impacts of the proposed sulfur loading operations at the Port of Anacortes.

### Potential Odor Impacts

The sulfur would come to the Port in the form of prills, small spherical pellets. These prills will contain a small amount of hydrogen sulfide (H<sub>2</sub>S). During the handling and loading process, a small amount of the H<sub>2</sub>S will be released to the atmosphere. The Port was required to address these emissions in its application for approval to the Northwest Clean Air Agency (NWCAA). H<sub>2</sub>S is of particular concern because it has a very strong odor, often called a rotten egg odor, and can be detected at a low level by the average person. As part of the application and approval process, the Port was required to demonstrate that the H<sub>2</sub>S emissions would not cause or contribute to a violation of any air quality standards, would not be a threat to public health as a result of air emissions, and would not cause a nuisance as determined by NWCAA.

The H<sub>2</sub>S emissions would come from unloading of the haul trucks, transporting the sulfur prills to the ship, and off gassing while the ship's hold is being loaded. As noted in the application, the maximum H<sub>2</sub>S emissions are expected to be less than one pound per day and less than 75 pounds per year. These emission rates were determined using standard U.S. Environmental Protection Agency (USEPA) methods and an Alberta Sulfur Research Limited investigation of H<sub>2</sub>S releases from sulfur prills<sup>1</sup>.

The H<sub>2</sub>S emissions were modeled using standard USEPA mathematical air quality models to estimate potential impacts on the surrounding area. The modeling used actual meteorological data from the nearby Puget Sound Refinery. The data meets all USEPA criteria for permitting new emission sources. The air quality modeling showed a maximum predicted H<sub>2</sub>S concentration of 1.9 micrograms per cubic meter for a 24 hour average. The USEPA has no specific ambient air quality standard for H<sub>2</sub>S; however, the Washington Department of Ecology has established an Acceptable Source Impact level for H<sub>2</sub>S of 2.0 micrograms per cubic meter for a 24 hour average. Based on the air quality modeling, the proposed project will comply with the Ecology requirement. It is worth noting that the air quality objective of the BC Ministry of Environment for H<sub>2</sub>S is 3 micrograms per cubic

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<sup>1</sup> W.J. Schwalm and J.B. Hyne, "The Release of Hydrogen Sulphide from Formed Solid Elemental Sulphur"

meter. The Port will install an H<sub>2</sub>S monitor on Pier 2 as required by NWCAA to ensure compliance with air quality standards.

There are several other facilities that ship sulfur prills. The table below provides the proposed sulfur prill loading rate for the Port of Anacortes and the sulfur shipping rates for four other facilities.

Table

Location	Actual sulfur shipped last year mt/yr	Shipping capacity mt/yr
Anacortes, WA	130,000 (proposed)	300,000
Port Moody, BC	3,500,000 (average)	
North Vancouver, BC	4,100,000	5,000,000
Stockton, CA	218,000	350,000
Beaumont, TX		700,000

All of the facilities have residential or public uses within 1000 feet, about the same distance from the Port's loading operation to the adjacent neighborhood. Figures 1 through 4 at the end of this document provide aerial views of these facilities. Note that the two in B.C. are more than 10 times the size of the proposed Anacortes operations. All have requirements not to cause an odor outside the property similar to the one that NWCAA has proposed. For example, the North Vancouver permit requires no odors past the plant boundary such that the District Director determines that pollution has occurred.

Unlike the other facilities, the Port of Anacortes will not store sulfur on site. The sulfur will be unloaded from trucks at the Port and transported directly to the ships. In addition to storing sulfur prills, some of the other facilities such as the Port of Stockton and Beaumont, Texas, make sulfur prills from molten sulfur.

Metro Vancouver, the air quality agency that handles environmental compliance for the North Vancouver Sulphur Works and Pacific Coast Terminals (PCT) facilities in Port Moody, was contacted regarding the history of complaints for these two facilities. Dan Saunders of Metro Vancouver indicated that there had been less than 10 complaints regarding the two facilities in the last 6 years. All of the complaints, except one, have been about visible dust during ship loading. One odor complaint was received last year for the Pacific Coast Terminals facility in Port Moody. However, the odor complaint was suspected to be caused by the sewer system and not the facility, but the agency could not determine for sure if either one was the actual cause of the odor.

Both PCT and North Vancouver handle 16 times more material than the proposed operation at the Port of Anacortes. Information provided by PCT's website indicates that their shiploader is capable of loading 5000 metric tons of sulfur in to a ship's hold in one hour. The Port of Anacortes is proposing to load a maximum of 6000 metric tons per day at a maximum rate of 480 metric tons per hour. The lower volume of material and the slower load rate, combined with the fact that no sulfur prill material will be stored onsite, greatly reduces the chance of fugitive dust and odor compared to a facility like PCT.

The Texas Commission on Environmental Quality (TCEQ) has a website database of all recorded complaints: <http://www5.tceq.state.tx.us/oc/waci/>. A search of the database did not reveal a record of any odor or dust complaints against the Martin Midstream Neches facility in Beaumont, Texas. The Beaumont facility is significantly smaller than PCT and North Vancouver but is more than twice the size of the proposed operation at the Port of Anacortes.

## Conclusion

As part of the application and approval process, the Port demonstrated that the H<sub>2</sub>S emissions would not cause or contribute to a violation of any air quality standards, would not be a threat to public health as a result of air emissions, and would not cause a nuisance as determined by NWCAA. An investigation of other sulfur loading operations indicated that odors were not an issue and that fugitive dust was reported as an issue less than 10 times in the last six years and only at the largest two facilities. The proposed sulfur loading operation at the Port of Anacortes is smaller than the other sulfur loading operations reviewed; therefore it is not likely to produce adverse odors.

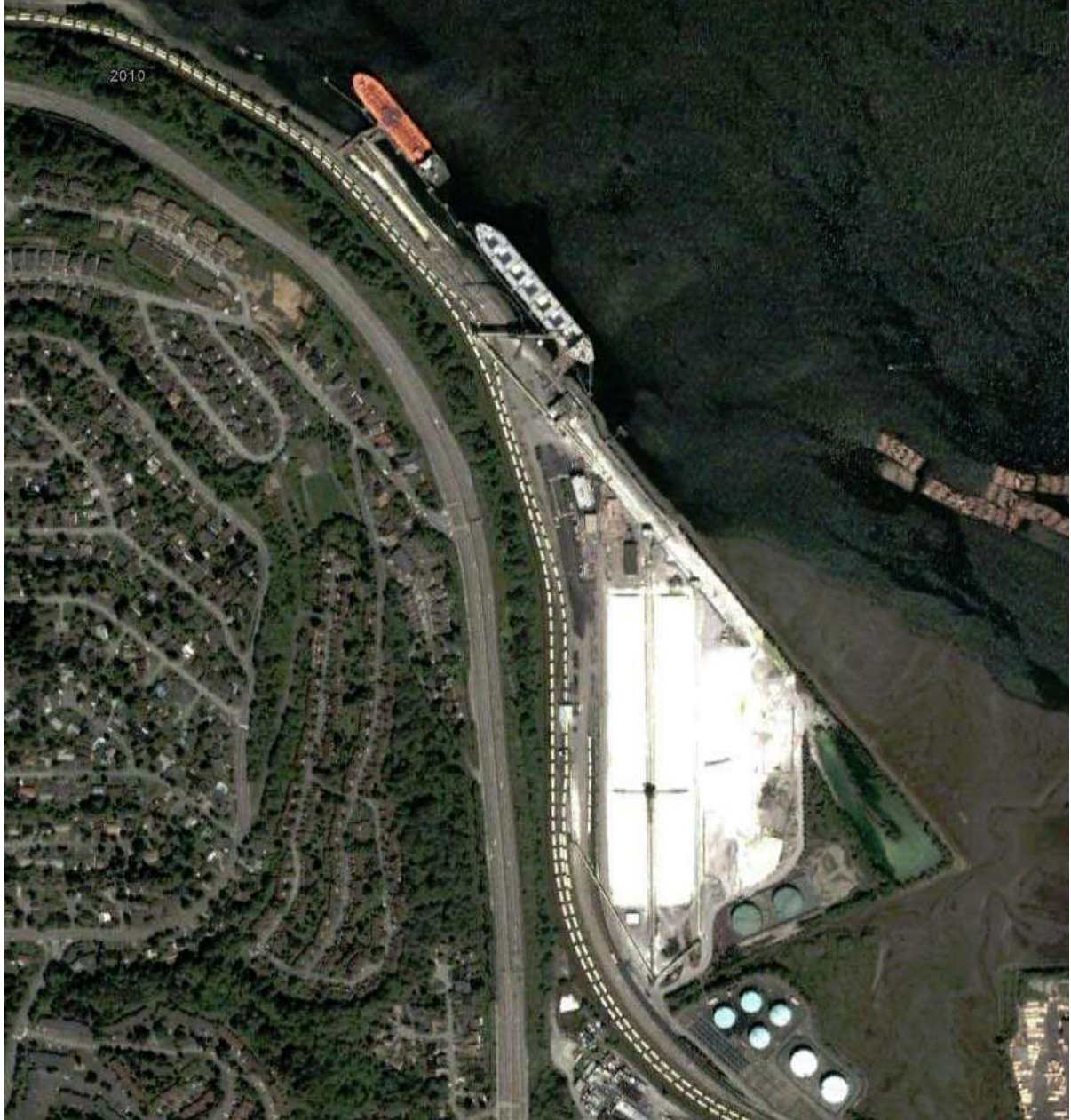


FIGURE 1. PORT MOODY

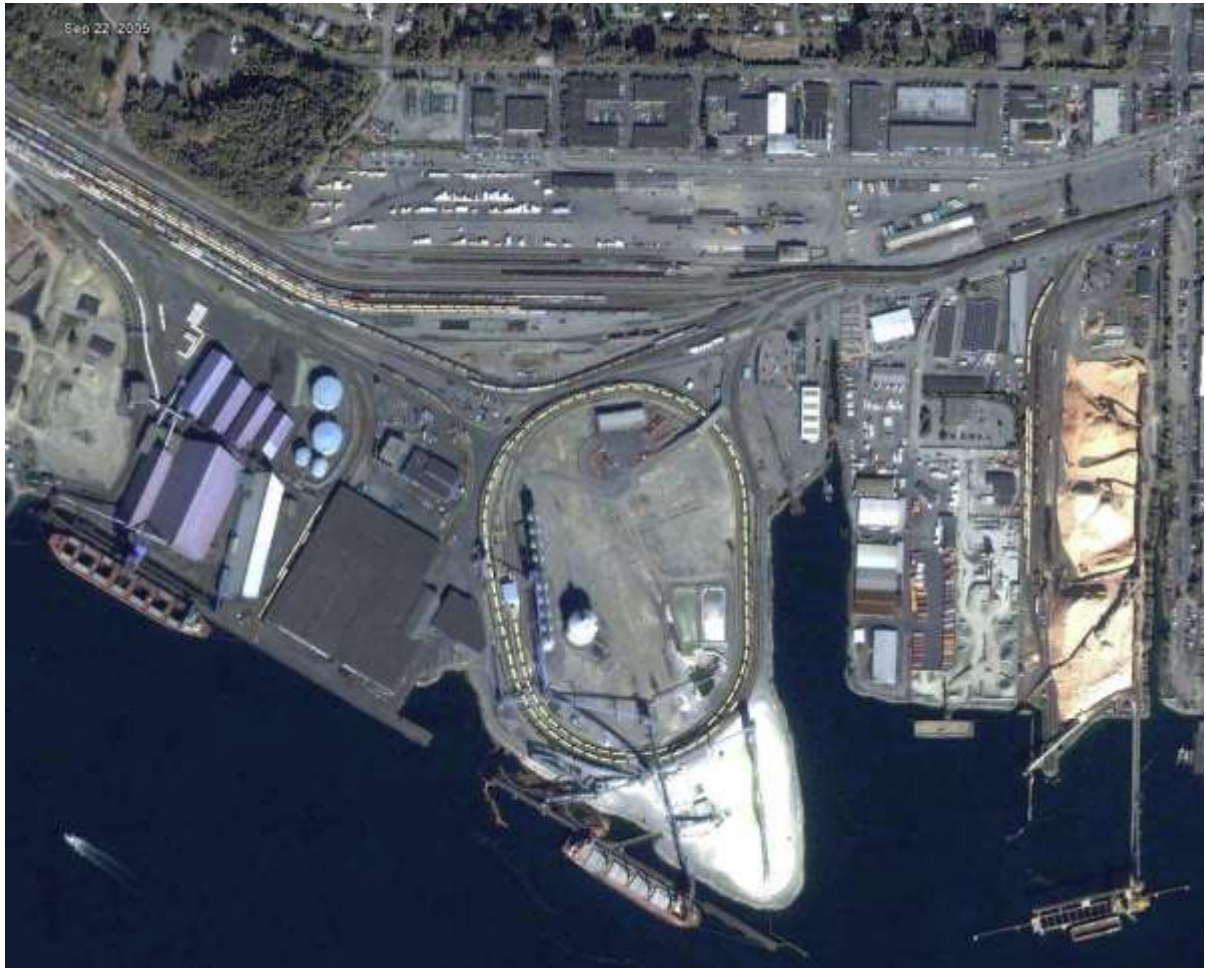


FIGURE 2. NORTH VANCOUVER

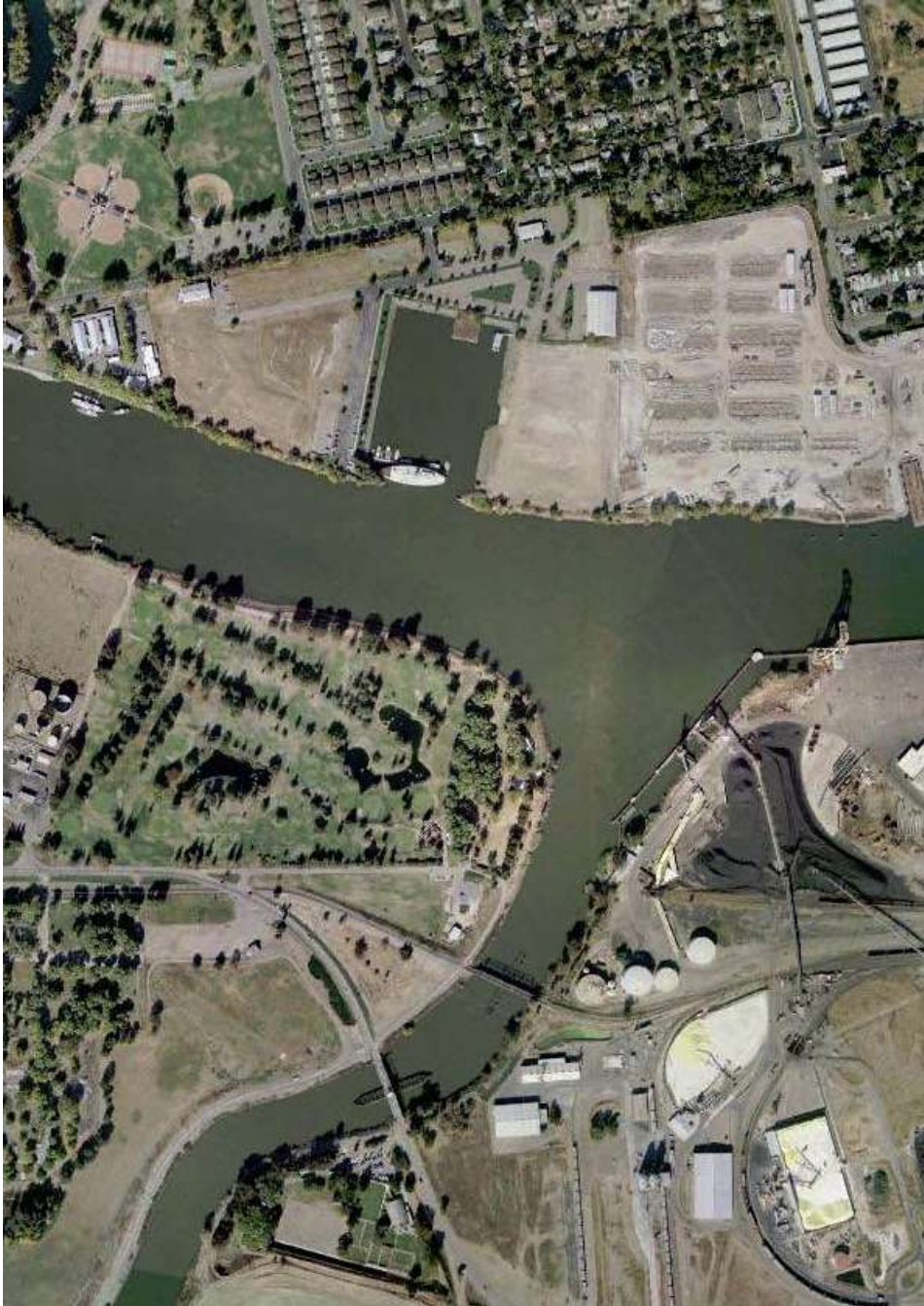


FIGURE 3. STOCKTON



FIGURE 4. BEAUMONT