I would like to address several aspects of the Draft Environmental Impact Statement (DEIS) for the Millenium Bulk Terminal Coal Export Facility Proposal that relate to public health. Overall, the DEIS lacks detail and overall substance in regards to the human health impacts of the proposed terminal. A comprehensive Health Impact Statement should be performed in order to give proper consideration to human health in this process

The air quality impact summary in 5.7.5 of the DEIS states "Overall the impacts of PM10 and PM2.5 emissions from proposed-action related rail transport of coal would not be significant because emissions would be below applicable federal standards." This is a misleading statement. While it is true that PM10 and PM2.5 emissions would fall below federal standards, that does not mean that there would be no negative health impacts. In fact, according to the World Health Organization (WHO) "Small particulate pollution have health impacts even at very low concentrations – indeed no threshold has been identified below which no damage to health is observed." [1]

The human health impacts of particulate matter include cancer, cardiovascular, cerebrovascular and respiratory disease. These health consequences accumulate with increasing exposure. There is a close quantitative correlation between exposure and negative health impacts (morbidity and mortality). Comparing the guidelines used in the DEIS (which are from the U.S. National Ambient Air Quality Standards and Washington State Air Quality standards – from here on out I will simply refer to the DEIS reference standards as NAAQS) against the WHO guidelines we find that the WHO guidelines are lower and more restrictive -- in some cases (particularly PM10) they are considerably lower. The following table shows the comparison WHO guidelines with NAAQS:

WHO Particulate Matter Exposure Guideline values [2]

(NAAQS/Washington State Standards show in parentheses for comparison)

$PM_{2.5}$

Annual mean - 10 μg/m³ -- (NAAQS 12 μg/m³)

24-hour mean - 25 μg/m³ -- (NAAQS 35 μg/m³)

PM_{10}

Annual mean - 20 μg/m³ (Not included in the DEIS)

24-hour mean - 50 μg/m³ -- (NAAQS 150 μg/m³)

Below are examples of expected emissions from project operations with comparison to WHO Air Quality Guidelines:

Table 5.6-6. Maximum Modeled Concentrations from the Operation of the Coal Export Terminal shows total predicted concentrations of PM10 (24 hour average) of 80mcg/m3. This exceeds the WHO guideline of 50mcg/m3.

Table 5.6-7. Project Area Concentration from Operations (All Sources) shows total predicted concentrations of PM2.5 (24 hour average) of 29.8mcg/m3. While under the NAAQS 35mcg/m3 threshold it is over the WHO standard of 25mcg/m3.

Total predicted concentrations of PM10 (24-hour average) would be 108mcg/m3, which is over twice the WHO threshold of 50mcg/m3.

Table 5.7-6. Estimated Maximum PM10 and PM2.5 Concentrations—BNSF Main Line, Cowlitz County shows the total concentration of PM10 at 50ft and 100ft to be 58mcg/m3 and 51mcg/m3 respectively, both of which exceed the WHO guideline of 50mcg/m3. 24-hour average of PM2.5 at 50 feet is 25.5mcg/m3 which is above the WHO guideline of 25mcg/m3, while at 100feet is 24.8, just below the WHO standard.

Table 5.7-9. Estimated Maximum PM10 and PM2.5 Concentrations 100 Feet From Rail Line— BNSF Main Line, Washington State (Outside Cowlitz County) shows the total concentration of PM2.5 (annual average) to be 9.8mcg/m3 which is just under the WHO guideline of 10mcg/m3.
The 24-hour average of PM2.5 is 27mcg/m3 which exceeds the WHO guideline of 25mcg/m3.
The PM10 (24-hour average) is 125mcg/m3 which is two and a half times the WHO guideline of 50mcg/m3.

Of particular interest in Table 5.7-9 is that baseline PM10(24 hour average) is 101mcg/m3 which is already twice the level established by the WHO. Especially in light of data summarized in the WHO Air Quality Guidelines "reducing *annual* average particulate matter (PM_{10}) concentrations from levels of 70 μg/m^3, common in many developing cities, to the WHO guideline level of 20 μg/m^3, could reduce air pollution-related deaths by around 15%. However, even in the European Union, where PM concentrations in many cities do comply with Guideline levels, it is estimated that average life expectancy is 8.6 months lower than it would otherwise be, due to PM exposures from human sources."[3,4,5,6] (Note that the above numbers refer to *annual* PM10 concentrations which were not measured/modeled/included in this DEIS).

Rather than the reassuring conclusions of the DEIS, a more fitting conclusion would be: Particulate matter and coal dust emissions from the Millenium Bulk Terminal Project are expected to fall under NAAQS and Washington State Standards, however they will have negative health impacts. This study identified places in Washington State, especially near the railroad tracks, where current air quality is already unacceptably poor, exceeding WHO guidelines by two times in at least one case. Improvements in ambient air quality in these places can be expected to have considerable positive health impacts, while the affect of this project would be, in all instances, increases of particulate matter which has negative health impacts even at very low doses.

Another area warranting comment is the way in which the Jaffe study [7] was interpreted in this document. Using direct air quality monitoring and video surveillance this study found that coal trains emitted 2 times the PM2.5 than freight trains. The most interesting finding from the study was the existence of "super-dusters," which are defined as coal trains which were observed to have a large, visible plume of coal dust coming off of them and correspondingly high PM2.5 emissions. This accounted for the huge range of PM2.5 measurements from coal trains (the average peak delta PM 2.5 was 21mcg/m3 while the highest was 232mcg/m3– which is 10 times greater than the mean). Figure 4 in the study [7]shows the relationship between PM2.5 enhancement and effective wind speed over the top of the train cars. We can see that all the superduster events happened with over the top wind speeds greater than 80km/hr and that among the 4 superdusters higher PM2.5 enhancements were seen with higher speeds. An incomplete understanding of this superduster phenomenon(and grounds for further study) is demonstrated in data which show that there were many trains with effective wind speeds higher than 80km/hr and only 4 ended up being superdusters. Additionally at least 4 trains had higher effective winds speeds than the fastest (and dustiest) superduster, yet they had PM2.5 enhancements that were very close to the mean. Perhaps the most important conclusion to take from this study is that a minority of trains have massively greater coal dust emissions and the reasons certain trains performed so poorly in terms of coal dust emissions has not been definitively studied and addressed.

Which brings up the issue of air quality assessments based on modeling with insufficient actual monitoring. In section 5.6.4.2 the following statement appears:
"The only available local (Cowlitz county near project site) air pollutant monitoring is for PM2.5, at a station approximately 1.5 miles east of the project area. The monitoring data show that PM2.5 levels are well within the PM2.5 air quality standards. **Although no other monitoring data are available**, concentrations of other criteria air pollutants in the study area also are expected to be well within air quality standards."
The city of Portland and Oregon Department of Environmental Quality recently discovered the risk of underestimating air pollution when modeling of air quality is based on a small number of actual monitoring stations. A study by the US Forest service used moss bio-indicators as a novel air quality monitoring strategy finding very high levels of cadmium (49 times higher than Oregon air quality standards) next to several stained glass manufacturers[8]. These very high toxic emissions were not predicted based on prior, inadequate air quality monitoring. The data from only a few stations was available and assumptions in modeling led to significant errors. The assumption that "concentration of other criteria air pollutants in the study area also are expected to be well within air quality standards" does not rise to the level of rigor demanded in instances of protecting public health.

My reading of the conclusion of this DEIS in regards to human health is that there are not significant public health risk to cause concern from this project. In sharp contrast, reading this DEIS with a public health lens raises significant concerns not only about the proposed project, but also about existing conditions. Rather than support moving forward with the MBT project the data in this study should spark an effort to reduce and eventually eliminate any coal traffic as well as address reducing toxic emissions from all diesel locomotives and vehicles.

Patrick O'Herron, MD, FACS
Board President, Oregon Physicians for Social Responsibility
6356 N Wilbur Ave.
Portland, OR 97217
oherronp@gmail.com
503 367 5859

References:

1. WHO Fact sheet N°313 - Ambient (outdoor) Air Quality and Health including links and references to: WHO Air Quality Guidelines, Air Pollution and Cancer IARC's 2013 Assessment, Review of Evidence on the Health Aspects of Air Pollution (REVIHAAP) - http://www.who.int/mediacentre/factsheets/fs313/en/
2. WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide Global update 2005 - http://apps.who.int/iris/bitstream/10665/69477/1/WHO_SDE_PHE_OEH_06.02_eng.pdf
3. Pope CA et al. (1995). Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults. American Journal of Respiratory and Critical Care Medicine, 151:669– 674.
4. Pope CA et al. (2002). Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution. Journal of the American Medical Association, 287:1132– 1141.
5. Cohen A et al. (2004). Mortality impacts of urban air pollution. In: Ezzati M et al., eds. Comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors. Geneva, World Health Organization:1353–1434
6. Dockery DW et al. (1993). An association between air pollution and mortality in six U.S. cities. New England Journal of Medicine, 329:1753–1759.
7. Jaffe, et al (2015) *Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State, USA*, Atmospheric Pollution Research
8. Donovan, Geoffrey H, et al. 2016. Using an epiphytic moss to identify previously unknown sources of atmospheric cadmium pollution. Science of The Total Environment. 559: 84-93