



Questions & Answers
Spokane Regional Clean Air Agency's Study of
Diesel particle emissions and potential health concerns
regarding Burlington Northern-Santa Fe Rail Yard
in Spokane, Washington

Q: *What was the purpose of the study?*

A: After hearing a presentation by the California Air Resources Board on the health impacts of rail yards in California, the Director of Spokane Regional Clean Air Agency (Spokane Clean Air) requested staff to conduct a comparative study of the Burlington Northern – Santa Fe (BNSF) Spokane rail yard with studies done in California. The risk assessment study done at the Union Pacific rail yard in Stockton, California, was selected because of its similarities to Spokane's BNSF rail yard. There were some assumptions made to address the differences between the two locations; and these assumptions mean that an exact risk to populations can't be assigned.

Q. *Is this a Health Risk Assessment?*

A: No. It is important to point out that the study is not an actual Health Risk Assessment (HRA). The comparative study was based on data projections from the state's emissions inventory and not on actual data collected. A HRA is a process of identifying and documenting actual and perceived risks to human health or the environment, to allow further evaluation and appropriate responses.

Q: *The rail yard has been there for years. Why is Spokane Clean Air now concerned about the emissions and their potential health effects?*

A: Spokane Clean Air was unaware of the extent of this problem until the California Air Resources Board presented its studies on 17 rail yards in that state. In addition, there is a growing body of scientific studies regarding health effects of diesel particulate matter (DPM). The Washington State Department of Ecology recently ranked diesel exhaust as the air toxic pollutant that has the greatest potential to cause health problems in people in Washington state.

Q: *What are the main sources of DPM in the Spokane-area?*

A: According to Ecology's 2005 Emissions Inventory for Spokane Co., the breakdown is:

- 45% - Non-road mobile sources (construction, agricultural equipment)
- 35% - On-road mobile sources (truck, cars)
- 18% - Railroad
- 2% - Residential

Q: *When did the study begin?*

A: Our review began in November 2008. Projects of this nature are not normal duties of Spokane Clean Air's engineering staff. The review involved a "learning curve", a considerable amount of research, and coordination with other agencies.

The Washington State Department of Health, the Spokane Regional Health District, California Air Resources Board, and other local agencies either provided data and/or reviewed and commented on the draft review. In addition because of limited staff resources, priorities dictated that engineering staff work on normal essential duties and work on this study as staff time allowed.

As we have learned more about the effects of diesel emissions, we believe that it is important to identify large sources of diesel emissions and work to reduce the air quality impacts. Constant long-term exposure to DPM which may cause cancer, is the issue that we are trying to address. This review is just the first step in the process.

Q: *What are the health concerns from breathing Diesel Particulate Matter (DPM) ?*

A: Numerous studies have been published about DPM and its health effects on the exposed public. Diesel exhaust has been strongly linked to many major chronic and/or terminal ailments. These include cancer, emphysema, auto-immune disorders, asthma, stroke, heart and lung conditions of all types, and the underdevelopment of children's lungs. Fine particles in diesel exhaust penetrate our lungs and remain there indefinitely to create and/or worsen both lung and heart conditions. Studies show an association between exposure to diesel exhaust and lung cancer, as well as cancers of the bladder and soft tissues (Guo et al., 2004). The immune suppressing effects of diesel exhaust can also increase the susceptibility to cancer among those exposed. Several extensive and detailed reviews have been conducted on the body of literature relating long-term exposure to diesel exhaust particles and lung cancer (California EPA, 1998; U.S. EPA, 2002; Cohen and Nikula, 1999). In addition, over 40 studies conducted among those populations exposed to diesel exhaust have found increased rates of lung cancer associated with diesel exhaust particles exposure (Cohen and Nikula, 1999)

Q: *The Washington State Department of Health reviewed Spokane Clean Air's draft review, what did they conclude?*

A: In January 2010, the Washington State Department of Health performed a (1997-2007) lung cancer cluster investigation for the area. They used a ratio of the observed number of cases of lung cancer over the expected number of cases (O/E). The number of expected people with lung cancer is the number that would have occurred if the people residing near the rail yard had the same lung cancer rate as the reference population, considering people's age and gender. In this investigation, two separate reference populations were used: Washington state and the City of Spokane minus the rail yard. If an O/E is greater than 1, then that indicates that there are more cancer incidences than would be expected.

The lung cancer cluster investigation looked at 15 years of data from the state's cancer registry and estimated that within the 2-mile radius around the rail yard there was a statistically significant O/E of 1.4 for lung cancer.

A total of 97 cases of lung cancer in the vicinity of the rail yard were reported to the Washington State Cancer Registry. Using the state as a reference population and its rate of lung cancer, a total of 72 people would have been expected to develop lung cancer, yielding the 1.4 O/E. While the O/E = 1.4 estimate is considered statistically significant, the state health department doesn't carry an investigation further unless the O/E is at least 2.0 where there are 50 or more people with the same type of cancer. The O/E ratio is therefore below the level needed to continue the investigation as outlined in the state's cancer cluster guidelines.

Washington State Department of Health also commented that there are a number of exposures, in addition to diesel exhaust, that are associated with lung cancer, such as smoking. In addition, the rail yard is located near a number of other potential sources of toxic air pollutants that could contribute to health impacts. The Washington State Department of Health pointed out that cancer is a very common and complex disease that is influenced by many factors such as genetic patterns, lifestyle choices, and environmental exposures. Most cancers have a long latency period so that exposures that occurred years or decades in the past may be linked to the cancer of interest. Quantifying the risk of any cancer causing chemical (carcinogen) can be difficult for a number of reasons.

People move from place to place, and exposures change depending on where they live. People can also be exposed to carcinogens at work, and people may be exposure to a number of different carcinogens that may all be linked to increasing risk of developing a certain type of cancer.

Q: *Did the Washington State Department of Health provide other technical assistance?*

A: Yes. In addition to providing the cancer cluster assessment in January 2010, the Washington State Department of Health reviewed and commented on Spokane Clean Air's study document in August 2010. After reviewing the Spokane study, including the comparison between the Stockton, California rail yards and the BNSF Spokane rail yard, the department of health concluded that it is unknown whether risk estimates are similar for the Stockton rail yard and the Spokane rail yard. And, although there are many similarities between the two sites, there is a lack of data (i.e. air emissions inventory and air dispersion modeling) and site specific information for the BNSF Spokane rail yard. According to the department of health, this lack of information makes it difficult to conclude that potential health risk estimates are similar.

Washington State Department of Health commented that in order to conclude that air quality impacts and potential health risks from BNSF Spokane rail yard are similar to those found in the Stockton, California, rail yard study, three additional phases must be conducted at the BNSF Spokane rail yard:

1. **Data collection and pollutant identification (emissions inventory):** Gather all of the emissions data (on-site/off-site sources) and source characteristics for the study area.
2. **Air dispersion modeling:** Conduct a dispersion modeling analysis for the study area using a computer program (e.g. Hotspots Analysis and Reporting Program – HARP) to determine ground-level concentrations on a grid encompassing the area.
3. **Health risk assessment:** Perform a health risk analysis for the study area using the estimated ground-level concentrations to compute and determine cancer and chronic non-cancer health effects.

Q: *Is Spokane Clean Air planning to conduct these three additional phases?*

A: No, due to funding constraints. It is estimated that pursuing these three phases would cost between \$300,000 and \$500,000. Spokane Clean Air believes that there is enough anecdotal and comparative evidence that diesel emissions from the rail yard impact public health. The agency's director wrote a letter to the Chairman of Berkshire Hathaway which owns BNSF, and has exchanged correspondence with BNSF environmental personnel, but no commitments to reduce emissions beyond the normal retirement of equipment were offered.

Q: *Should people living within a few miles of the switch yard be concerned about the quality of air they are breathing?*

A: All residents should be concerned and aware about the quality of air they breathe, at home and at work. The closer you live or work to an air pollution source, the greater the likelihood of an impact on your health. Rail yards are just one of many air pollution sources that can impact a person's ability to breathe clean air each day.

According to the Washington State Department of Health, *“there are positive correlations between air pollution and disease. A great deal of research shows a connection between respiratory chronic disease in people and their proximity to living near or downwind from a source of toxic emissions. In general, there are risks around rail yards and point sources of pollution. People that live in close proximity (within 300-500 meters) of high-traffic areas have the potential to develop higher cancer and non-cancer health risks. Non-cancer related illness includes asthma, cardiovascular morbidity, and mortality. Studies increasingly link land use and air pollution exposures. Recent studies show people living near ports and roadways have higher exposures and health risks.”*

Q: *Are idling locomotive engines the main source of the DPM at BNSF rail yard?*

A: Yes. The idling of switch yard and line haul locomotives at the BNSF rail yard is the main source of DPM with emissions from switch yard engines being much higher than line haul locomotives.

Q: *Do we know how many engines are idling and for how long at the rail yard? If not, how did we arrive at the emissions estimates for BNSF?*

A: We do not presently know how many engines are idling and for how long at the rail yard; however, in order to obtain the estimated emissions from the rail yard, the amount of diesel fuel used annually can be used to give a reasonable estimate of emissions emanating from the rail yard. Emission estimates were developed using emission factors provided by BNSF and fuel usage numbers provided by the WA State Dept. of Ecology in their 2005 emissions inventory.

Q: *What can BNSF do to reduce DPM at the Spokane rail yard?*

A: There are numerous operating practices and technologies available to reduce unnecessary idling, emissions and fuel costs. Spokane Clean Air is interested in partnering with BNSF to pursue federal and state grant funding to assist in efforts to reduce diesel emissions.

Q: *What is BNSF doing in other areas of the country to reduce DPM emissions?*

A: BNSF is implementing many operating practices, equipment replacements, and technologies in major cities throughout the U.S. and especially at its larger rail yards within California.

Q: *What about the other railroad companies – is Spokane Clean Air requesting that they do something too?*

A: There are several railroad companies that pass through Spokane; however, only two of the railroad companies have rail yards in Spokane: BNSF and Union Pacific (UP). The two rail yards are very different in their main function and the amount of DPM emissions released to the air. The UP rail yard is a minimal activity rail yard and is used primarily for storage of railcars with no switching or other equipment within it and has minor DPM emissions compared to those at BNSF’s rail yard.

However, the BNSF rail yard employs many different operations at its rail yard, including haul line, switching operation, repairs, and other activities resulting in significantly more DPM emissions being generated at BNSF’s rail yard than at UP’s. Therefore, Spokane Clean Air believes concentrating efforts on controlling DPM emissions from the Spokane BNSF rail yard will have a more profound effect on reducing DPM emission impacts in the Spokane area.

Q: *What regulatory authority does Spokane Clean Air have over rail yards?*

A: The State of Washington's Clean Air Act provides broad authority to Spokane Clean Air to control pollution. To date, no regulations exist in Washington to require BNSF or any other railroad company to control emissions from mobile sources unless they establish stationary air pollution sources at their site and then only over those stationary sources. At its board's direction, Spokane Clean Air has investigated an indirect source regulation to require an emission reduction plan from the BNSF, similar to the plans in place in California. Spokane Clean Air has also approached BNSF about a voluntary emission reduction program and has offered to partner with them to obtain funding for emission reductions.

Q: *Isn't the U.S. EPA addressing diesel emissions from rail yards? If so, why is Spokane Clean Air getting involved?*

A: EPA's role in addressing this issue is on a national scale and tends to relate to issues and equipment that could affect emissions nationally. It has issued numerous federal regulations related to locomotives, such as ensuring that locomotives use ultra low sulfur content diesel fuel (designated for implementation in 2012), and that engines manufactured for use in locomotives and other vehicles meet strict requirements concerning emissions of air pollutants. Such engines are designated as Tier I, II, III, and IV. Each of these engines has progressively more stringent emission requirements which are being implemented during specified years defined in the applicable regulations. However, the life of a typical diesel train engine is 50-100 years--therefore, new Tier engines may not be in use until 40 to 50 years from now. The effect of regulating the combustion of lower sulfur content diesel fuel will result in a dramatic lowering of sulfate emissions into the ambient air, which are precursors to fine particulate being formed.

Spokane Clean Air's mandate is to maintain clean air locally in Spokane County. The agency takes this seriously and believes that all possible means should be taken to meet its mandate.

Q: *What will Spokane Clean Air do next if BNSF chooses to do nothing in Spokane?*

A: The agency is proposing a regulation to require the owners/operators of "indirect sources" such as rail yards and large truck fleets, to develop emission reduction plans to protect public health. In August 2011, the Spokane Clean Air Board of Directors delayed pursuing a proposed rule for six months, and encouraged staff to pursue voluntary partnerships.