

Draft Railyard Health Risk Assessments Release for BNSF Railyards San Bernardino, Barstow, and San Diego

In the 2005 Statewide Railroad Agreement (Agreement), the Air Resources Board (ARB), Union Pacific Railroad (UP), and BNSF Railway (BNSF) committed to prepare health risk assessments (HRAs) for 16 designated railyards to quantify pollution risk levels near railyards, identify specific emission sources, and design measures to reduce health risks. In support of the Agreement, staff is now releasing three additional BNSF railyard HRAs. These HRAs are for the San Bernardino, Barstow, and San Diego railyards.

The release of these three HRAs follows the release of 14 other HRAs. In November 2007, ARB staff completed HRAs on five BNSF and four UP designated railyards, and one additional non-designated BNSF railyard (BNSF Sheila). In February 2008, ARB staff released HRAs and a corresponding fact sheet for the following three UP railyards: ICTF/Dolores, Colton, and the City of Industry. A fourth UP HRA, for the Oakland Railyard, was released in March 2008 along with the West Oakland HRA study. Information on all of the railyard HRAs can be found at: <http://www.arb.ca.gov/railyard/hra/hra.htm>.

Under the Agreement, UP and BNSF are responsible for providing information on the sources operating within the railyards. This includes both the emission inventory and air dispersion modeling data. The ARB then uses these data, in conjunction with other sources of information, to characterize the distributions of emissions within the railyards and significant sources of emissions nearby the railyard. Using this information, ARB staff estimates air pollution exposure and develops the HRAs.

In May 2008, public meetings will be held to present the results of the latest three draft BNSF HRAs, discuss the contents and current railyard pollution reduction efforts, as well as answer questions. Information of these public meetings can be found at: <http://www.arb.ca.gov/railyard/community/community.htm>. A second series of public meetings will be held in June 2008 to allow additional opportunities for the community to comment and suggest possible mitigation efforts.

Health Risks from Exposure to Toxic Air Pollutants

Many chemical substances have been designated as toxic air contaminants (TACs) and some are found in California air at levels of concern, mostly due to their potential to increase the risk of cancer. In 1998, ARB identified particulate matter from diesel exhaust (diesel PM) as a TAC.

The potential cancer risk from diesel PM estimated from the HRA is expressed as the number of potential cancer cases that could be developed per million people. For example, if the cancer risks were estimated to be 100 chances per million, the probability of an individual developing cancer would not be expected to exceed 100 chances in a million. If a population (e.g., one million people) was exposed to the same potential cancer risk (e.g., 100 chances per million), then statistics would predict that no more than 100 of those million people exposed would be likely to develop cancer from a lifetime of exposure (i.e., 70 years) due to diesel PM emissions

from a facility. Health risks are more likely to overestimate risks for the average individual¹, which leads to risk reduction efforts that are health protective for the more highly exposed individuals.

In regards to the BNSF San Bernardino railyard, ARB staff estimates that the excess cancer risk from TACs in the South Coast Air Basin was about 1,000 per million in the year 2000². Statewide, diesel PM accounts for about 70% of the estimated potential ambient air toxic cancer risks. A recently released draft study³ reported that diesel PM emissions have decreased, but are still the major contributor to air toxics in the South Coast Air Basin, accounting for over 80% of the total risk from air toxics in the region. The higher percentage contribution, over the previously reported 70%, reflects the fact that there has been a proportionally greater reduction in other air toxics.

Emissions from goods movement activities (ships, trucks, locomotives, and cargo handling equipment) are a significant source of diesel PM in California. Some residential areas are in close proximity to ports, railyards, and freeways where many diesel-fueled sources operate. In these areas, increase in cancer risk is often significant and can, in a few cases, equal or exceed the regional background levels. However, the concentration of diesel PM in the air declines rapidly with distance from any one source and the impact of even a large facility is much smaller for those living a mile or more from the source area.

Results from the BNSF Railyard Health Risk Assessments

The draft HRAs estimate population exposure impacts from railyard diesel PM emissions (i.e., on-site emissions), and other sources (i.e., off-site emissions), such as truck traffic, within a one-mile zone around each railyard. Figure 1 presents the estimated cancer risk at locations nearest to the railyard (due to on-site emissions) and at locations within one mile of the railyard (due to off-site emissions) for each of the three railyards. The BNSF Barstow and San Diego railyards have significantly less exposure impact than the four Commerce railyards mainly due to the air dispersion conditions (e.g., wind speeds and wind directions) and a lower population within their vicinity. The BNSF San Diego railyard has the lowest facility-wide emitted diesel PM emissions among the railyards studied under the Agreement. The BNSF San Bernardino railyard has a higher population exposure, about 3,800 local residents at an estimated average cancer risk of 980 chances per million, compared to other railyards studied. This is mainly attributed to the spatially concentrated diesel PM emission sources and a dense residential population nearby.

The first ten railyard HRAs showed that the diesel PM emissions from several railyards result in significantly higher pollution risks in nearby communities. The largest impacts were from the four railyards in the city of Commerce. Diesel PM emissions from the four Commerce railyards combined were about 40 tons per year in 2005, much less than the emissions at the basin's ports⁴, and only about 0.5% of the regional diesel PM emissions. However, the Commerce railyards' emissions are concentrated and occur next to populated areas, resulting in an

¹ For example, exposure estimates are based on a lifetime (70-year) exposure to current levels and on breathing rates that represent active individuals.

² The California Almanac of Emissions and Air Quality, 2006 Edition.

³ Multiple Air Toxics Exposure Study in the South Coast Air Basin, SCAQMD, 2008.

⁴ For comparison, the major source of diesel PM emissions in the South Coast Air Basin is the Port of Los Angeles/Port of Long Beach which combined are about 1,760 tons per year, or about 23% of the South Coast Air Basin diesel PM emissions. Emissions from all sources in the South Coast Air Basin were about 7,800 tons in the year 2005.

estimated 70% increase (over regional levels) in exposure to TACs for about 5,000 local residents⁵.

The emissions inventories for BNSF San Bernardino, Barstow, and San Diego, the recently released four UP draft HRAs, along with UP Roseville (released in 2004), and the first ten railyard HRAs are presented in Table 1.

Actions to Reduce Diesel PM Emissions In and Around Railyards

The ARB recognizes that diesel PM levels, both regionally and near ports, freeways and railyards, are far too high. In 2000, ARB adopted a Statewide Diesel Risk Reduction Plan. Recognizing the problems posed by the rapid growth in freight movement, the Board adopted a Goods Movement Emission Reduction Plan in 2006. To date, the Board has adopted 18 measures to reduce diesel PM emissions in and around railyards, and has another 9 in various stages of development.

ARB's efforts to comprehensively reduce locomotive and railyard emissions include voluntary agreements, state and federal regulations, and incentive mitigation programs, including early replacement of California's line haul and yard locomotive fleets (see Fact Sheet *Strategies to Reduce Locomotive and Associated Railyard Emissions*, <http://www.arb.ca.gov/railyard/hra/hra.htm>).

Locomotives represent about two-thirds (65%) on average of the diesel PM emissions at the designated railyards. Large classification railyards like UP Roseville and Colton and BNSF Barstow generate their entire diesel PM emissions from locomotives, with line haul and yard switcher locomotives split evenly in their contributions. Large intermodal railyards like BNSF Hobart and UP ICTF/Dolores have about a 1/3 split between locomotive, cargo handling equipment, and heavy-duty diesel truck diesel PM emissions.

ARB staff estimates that the following fully implemented measures have provided up to 30% reduction in railyard diesel PM emissions between 2005 and 2007:

- 2005 Statewide Railroad Agreement (up to 20%)
- ARB diesel fuel regulation for intrastate locomotives (up to 14%)
- Replacement of switcher locomotives (up to 90%)

An additional 30% reduction is expected to be generated by measures implemented between 2008 and 2010:

- Locomotive NOx Fleet Average Agreement in South Coast (up to 50%)
- ARB Cargo Handling Equipment Regulation (up to 40%)
- Port and Intermodal Railyard Regulation (up to 90%)
- Transport Refrigeration Unit Airborne Toxic Control Measure (up to 65%)

⁵ Air pollution cancer risks are a small fraction of the overall cancer risk. For example, the estimated 1,000 cancer risk per million people exposed over a 70 year lifetime of exposure (based on Los Angeles area air quality in the year 2000) represents a one tenth of one percent (0.1%) cancer risk increase. An individual lifetime risk of having cancer is about 25%. Thus, even where localized diesel PM emissions significantly increase cancer risk from pollution, the change does not produce a large increase in an individual's overall chance of cancer.

These measures and others will be implemented or initiated prior to 2015. The goal with these measures is to reduce locomotive and railyard related diesel PM emissions by up to 85% between 2015 and 2020.

Table 1 Comparison of Diesel PM Emissions from Eighteen Railyards (tons per year)

Railyard	Locomotive	Cargo Handling Equipment	On-Road Trucks	Others (Off-road, TRUs, Stationary, etc.)	Total [§]
South Coast Air Quality Management District					
BNSF Hobart	5.9	4.2	10.1	3.7	23.9
UP ICTF/Dolores	9.8	4.4	7.5	2.0	23.7
BNSF San Bernardino	10.6	3.7	4.4	3.4	22.0
UP Colton	16.3	N/A	0.2	0.05	16.5
UP Commerce	4.9	4.8	2.0	0.4	12.1
UP City of Industry	5.9	2.8	2.0	0.3	10.9
UP LATC	3.2	2.7	1.0	0.5	7.3
UP Mira Loma	4.4	N/A	0.2	0.2	4.9
BNSF Commerce Eastern	0.6	0.4	1.1	1.0	3.1
BNSF Sheila	2.2	N/A	N/A	0.4	2.7
BNSF Watson	1.9	N/A	< 0.01	0.04	1.9
Bay Area Air Quality Management District					
UP Oakland	3.9	2.0	1.9	3.4	11.2
BNSF Richmond	3.3	0.3	0.5	0.6	4.7
San Joaquin Valley Unified Air Pollution Control District					
UP Stockton	6.5	N/A	0.2	0.2	6.9
BNSF Stockton	3.6	N/A	N/A	0.02	3.6
San Diego Air Pollution Control District					
BNSF San Diego	1.6	N/A	0.007	0.04	1.7
Mojave Desert Air Quality Management District					
BNSF Barstow	27.1	0.03	0.04	0.75	27.9
Placer County Air District/Sac Metro AQMD					
UP Roseville*	25.1*	N/A	N/A	N/A	25.1
STATEWIDE RAILYARD TOTAL	136.8	25.33	31.15	17.0	210.1
STATEWIDE RAILYARD PERCENT	65%	12%	15%	8%	100%

* The UP Roseville Health Risk Assessment (ARB, 2004) was based on 1999-2000 emission estimate, only locomotive diesel PM emissions were reported in that study. The actual emissions were estimated at a range of 22.1 to 25.1 tons per year.

§ Numbers may not add precisely due to rounding.

Figure 1 Locations Nearest to Railyard (due to On-Site Diesel Sources) and within One Mile from Railyard (due to Off-Site Diesel Sources)

