ENVIRON

Date: September 2, 2009

MEMORANDUM

To: Mark Stehly

From: Rob Scofield and Linda Hall

Subject: **Draft Environmental Assessment for the BNSF Intermodal Facility Proposed by BNSF Railway Company near Gardner, in Johnson County, Kansas**

This memorandum addresses two broad issues either raised in or implicit to the comments on the **Draft Environmental Assessment for the BNSF Intermodal Facility Proposed by BNSF Railway Company near Gardner, in Johnson County, Kansas** (EA) submitted by Andrea Hricko (University of Southern California) and by the Natural Resources Defense Council (NRDC) specifically:

1. The reasons that health risks calculated for railyards in California are not directly applicable to the Gardner, Kansas facility; and
2. The reasons USEPA cited for their conclusion that the approach adopted by California for quantifying cancer risk is not valid.

In the following discussion, we address each of these issues in turn.

1. **The reasons that health risks calculated for railyards in California are not directly applicable to the Gardner, Kansas facility;**

   Expanding on the comments by Harold Holmes of California's Air Resources Board (CARB) (Kansas City Star, 2007) on this topic, we note that the physical features of any air emission source have an important influence on the estimated air concentrations and health risks. In particular, the proximity of houses to specific rail yard operations will have substantial influence on the risks estimated for the Maximally Exposed Individual (MEI); and when discussing estimated risks for rail yards the estimated risk at the MEI is the value most commonly cited. Estimated risks are also dependent on specific assumptions for emissions, dispersion, exposure and toxicity of chemicals. For any particular evaluation, the selection of these assumptions is guided by local regulatory authorities. California has specific assumptions that must be used for emission factors, dispersion modeling, exposure frequency, and toxicity of chemicals (e.g. diesel exhaust). Some of the assumptions required for use in California differ substantially from the USEPA guidelines used for the Gardner evaluation. Accordingly, estimated health risks for identical facilities in California and Kansas would be quite different because of the distinct set of guidelines used in each analysis. Simple ratios between the number of lifts and estimated health risks, such as are discussed in comments on the EA, are not valid.

   Among the more important specific factors rendering invalid the use of ratios between measures of throughput (e.g., numbers of lifts) and estimated health risks are the fact

that each railyard is distinct with respect to the local meteorological conditions, the type of equipment used, the activity patterns of the equipment, and the location and number of people who work or live in the vicinity or each yard Additionally, California calculates cancer risk from DPM based on an approach that has been rejected by the USEPA. These differences are discussed below.

Meteorology. The local meteorologic conditions in the vicinity of a railyard, such as predominant wind speed and direction, temperature, barometric pressure, and cloud cover (as well as the variability in each of these factors), are key determinants of any potential health effects associated with the yard. These factors are important in that the local meteorology governs the direction that emissions might be carried and the extent of their dispersal. Because of the significance of these parameters to health effects estimation, the USEPA has strict meteorologic data requirements for modeling emissions. These requirements are for one-year or five years of representative data on each of the aforementioned parameters, depending on whether the data were obtained on-site or off-site, respectively (USEPA, 2005). Meteorological data cannot be extrapolated between railyards (or between any other facility) unless they are in direct proximity to each other. Consequently, it is clear that extrapolation of such data between California and Kansas - states with dramatically different climate and meteorological regimens - is not supported (USEPA, 2004a,b; 2005). The statement that,"[s]ince the wind at the Gardner IMF proposed location apparently blows toward the town of Gardner, including toward a subdivision and two schools within a mile of the proposed IMF, there is every reason to believe that there will be elevated cancer risks as a result of the Gardner IMG (sic)", has no technical merit, cannot be substantiated, and is contradicted by the emission estimation, dispersion modeling, and health evaluation that was completed and included in the EA.

Equipment Usage and Activity. Commensurate with their individual design and geographic location, each BNSF railyard is used to conduct either different activities or a different combination of activities, and each uses a unique mix of equipment as a consequence. These differences have a substantial impact on the emissions from a railyard, making direct comparisons between yards invalid. For example, compared to BNSF's San Bernardino facility, the Argentine intermodal facility has approximately one-third fewer lifts, and compared with BNSF's Hobart yard about 70% fewer lifts. The Argentine intermodal facility has less classification and train building activity compared to other intermodal facilities, so the switching engines have fewer hours of activity relative to the number of lifts. Additionally, the majority of the arriving and departing trains at the Argentine facility are of the "setout" type, which only stop to cut off rail cars before moving on. This reduces the line-haul locomotive activity, especially idling, compared to San Bernardino or Hobart. Also, there are very few refrigerated containers with auxiliary diesel engines operating at Argentine. Lastly, while Argentine activity levels have been used to project future lift levels at the proposed new intermodal facility, the new facility will have several design features that will minimize emissions compared to even Argentine. These include electric overhead cranes, automated gate technology for truck arrivals and departures, and long tracks to accommodate whole trains, thus minimizing switch locomotive usage.

Impacted Communities. Any calculated impacts from a railyard are also a function of the proximity and number of individuals in the vicinity – factors that are unique to each railyard, and which preclude direct comparisons of health effects between yards. For example, Harold Holmes of the CARB has noted (Kansas City Star, 2007) that the CARB estimated relatively high cancer risks from the BNSF San Bernardino yard

because individuals lived in the immediate vicinity of concentrated emissions. However, higher emissions at the BNSF Barstow yard did not have comparable risks because emissions were dispersed prior to reaching the local community.

Furthermore, many of the health studies cited by Ms. Hricko and the NRDC as evidence of railyard-related health impacts are studies of populations exposed to multiple sources of industrial and transportation-related emissions (e.g., freeways) and photochemical smog in southern California, and the implication that the health effects observed in these studies can be attributed to emissions from one or more intermodal railyards in southern California is misleading. To further imply that such health effects could be expected from a single intermodal railyard in Kansas, or anywhere else, is even more misleading.

To address the noncancer health effects of diesel exhaust, the USEPA has developed a Reference Concentration. As shown in the EA, the exposure to diesel exhaust from the Gardner facility would be less than the USEPA exposure limit designed to prevent noncancer health effects (i.e. the Reference Concentration).

Calculation of Cancer Risks. For reasons explained in more detail below, the approach required in California for estimating cancer risks from diesel emissions was explicitly rejected by the USEPA as a valid way to evaluate cancer risks from diesel emissions. Because California's approach to estimating cancer risk is not accepted outside of California, any comparison of cancer risks from California rail yards to the Gardner facility is not applicable.

2. The reasons USEPA cited for their conclusion that the approach adopted by California for quantifying cancer risk is not valid.

Diesel exhaust is a complex mixture of hydrocarbons, particulates, gases, water, and other compounds (the precise composition of the mixture depends on many factors, including the fuel source, engine type, engine age, and operating condition). For both the USEPA and California, the general approach to estimating cancer risk from exposure to mixtures - such as combustion exhaust - is to select a subset of so-called indicator chemicals (e.g., the principal components of the exhaust), multiply the estimated concentration of each by a chemical-specific cancer slope factor (CSF), and then add the risks estimated for each indicator chemical. That is, the sum of the health risks from each individual chemical is used as an estimate of the risk posed by the mixture as a whole. Under current USEPA risk assessment practice this approach is used, for example, when estimating health risks from combustion of fuels such as gasoline, fuel oil, wood, natural gas, etc. While California also generally relies on this indicator chemical approach for quantifying cancer risks from mixtures, they have developed an alternative approach for quantifying cancer risks from diesel exhaust. In contrast to the approach used for other mixtures, California developed a CSF to represent the carcinogenicity of the entire mixture of chemicals in diesel exhaust, using diesel particulate matter (DPM) as a surrogate for that mixture (Office of Environmental Health Hazard Assessment [OEHHA], 1998). Both California and the USEPA have adopted a concentration limit of 5 ug/m^3 for diesel exhaust particulate matter (DPM) as a way to evaluate the noncarcinogenic health effects of diesel exhaust.

California's CSF was developed from epidemiology studies on rail road workers in which quantitative correlations were drawn between exposure to diesel exhaust and the incidence of lung cancer. Whether these epidemiology studies are adequate to support development of a CSF for diesel exhaust, using DPM as a surrogate, is the central issue

in the different approaches used to quantify diesel exhaust-attributable risk by California and the USEPA.

One of the studies central to California's analysis was that of Garshick et al. (1988). The Garshick et al. (1988) study represents a retrospective analysis of 55,407 white male railroad workers from across the U.S. The lung tumor incidence for these railroad workers was reported in Garshick *et al.* (1987, 1988) and the estimated exposures were reported in Woskie *et al.* (1988a,b).

The USEPA (2002) identified a number of limitations in the Garshick et al. (1988) data, including:

- inadequate information on exposure to diesel exhaust (i.e., assigning who was exposed and who was not exposed),
- lack of knowledge of when workers first began working with diesel equipment, and
- lack of information on smoking and other lifestyle correlates of lung cancer risk.

Of particular concern to the USEPA, to Dr. K. Crump (1991, 1999, 2001) and to the members of an expert panel[1] was the fact that lung cancer risks among the exposed workers decreased with increasing length of exposure – the opposite biological effect from what is expected for a carcinogen. Additionally, one of the categories of workers potentially exposed to high levels of DPM (shop workers), had no elevated cancer risk. Because of these findings, the USEPA has not adopted a CSF (or unit risk factor) for diesel exhaust emissions, stating that, "the available data are too uncertain at this time" (USEPA 2002).

We note that Garshick subsequently published the results of a longer follow-up study of the same workers and found the same trend (Garshick et al., 2004) - suggesting that the original observation of a negative correlation between exposure and lung cancer risk was not an artifact attributable to a truncated follow-up period. Despite the passage of seven years since the original analysis, the USEPA has not revised its position on the adequacy of available data on DPM, has not developed a CSF (USEPA, 2009), and has not adopted California's CSF for DPM.

While the USEPA approach to estimating health risks for mixtures is as discussed above, the USEPA and several states have elected to address the carcinogenicity of diesel exhaust by promoting emission reducing technologies without quantifying cancer risks.

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[1] The Diesel Epidemiology Expert Panel was formed by the Health Effects Institute (HEI), a not-for-profit research organization jointly funded by the USEPA and the automobile and trucking industries.

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