Lincoln40 Project

Health Risk Assessment

Prepared For

Davis
California

April 2017

Prepared by

RANEY
PLANNING & MANAGEMENT, INC.
1501 Sports Drive, Suite A, Sacramento, CA 95834

TABLE OF CONTENTS

FIGURES

TABLES

ATTACHMENTS

REFERENCES

1. Alameda County Superior Court. *California Building Industry Association v. Bay Area Air Quality Management District. A135335 and A136212*. Filed August 12, 2016.
2. Allison, Jim, Manager of Planning, Capitol Corridor Joint Powers Authority. Personal Communication [email] with Nick Pappani, Vice President of Raney Planning & Management, Inc. September 01, 2016.
3. Bomar, Clem A., Rail Transportation Manager II, Division of Rail and Mass Transportation. Personal Communication [email] with Nick Pappani, Vice President of Raney Planning & Management, Inc. September 06, 2016.
4. Brennan, Jim, President, j.c. brennan & associates, Inc. Personal Communication [phone] with Nick Pappani, Vice President of Raney Planning & Management, Inc. December 20, 2016.
5. California Air Resources Board. *Air Quality and Land Use Handbook: A Community Health Perspective*. April 2005.
6. California Air Resources Board. *User Manual for the Hotspots Analysis and Reporting Program Health Risk Assessment Standalone Tool, Version 2*. March 17, 2015.
7. City and County of San Francisco Superior Court. *Mission Bay Alliance et al. v. Office of Community Investment and Infrastructure et al., GSW Arena LLC et al*. Filed November 29, 2016.
8. County of Yolo. *2030 Countywide General Plan: Health and Safety Element*. Adopted November 10, 2009.
9. Health Effects Institute. *Understanding the Health Effects of Ambient Ultrafine Particles*. Accessible at https://www.healtheffects.org/system/files/Perspectives3-ExecutiveSummary.pdf. Accessed February 2017.
10. Office of Environmental Health Hazard Assessment. *Air Toxics Hot Spots Program Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments*. February 2015.
11. South Coast Air Quality Management District. *Final 2012 Air Quality Management Plan*. December 2012.
12. Southern California Particle Center and Supersite. *Studies of Emission Sources and Related Adverse Health Effects: Particulate Matter*. Available at https://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.files/fileID/7692. Published on August 31, 2006.
13. U.S. Environmental Protection Agency Office of Transportation and Air Quality. *Emission Factors for Locomotives*. April 2009.
14. U.S. Environmental Protection Agency. *User's Guide for the AMS/EPA Regulatory Model – AERMOD*. September 2004.
15. County of Yolo. *2030 Countywide General Plan: Health and Safety Element*. Adopted November 10, 2009.
16. Yolo-Solano Air Quality Management District. *Handbook for Assessing and Mitigating Air Quality Impacts*. July 11, 2007. Available at: http://www.ysaqmd.org/documents/CEQAHandbook2007.pdf. Accessed September 2016.

INTRODUCTION

This Health Risk Assessment (HRA) has been prepared for the City of Davis to address the potential health risks to future residents of the Lincoln40 Project (proposed project) related to diesel-fueled locomotive activity along the existing railroad tracks north of the site and vehicle traffic along Interstate 80 (I-80) approximately 600 feet south of the project site.

PROJECT DESCRIPTION

The proposed project site is located along Olive Drive, immediately south of the Union Pacific Railroad (UPRR) tracks and the Davis Amtrak station, in the City of Davis (see Figure 1, Project Vicinity). Regional access to the proposed project site is provided by the Olive Drive off-ramp from westbound I-80 and the I-80/Richards Boulevard interchange, located southwest of the project site. The 5.92-acre project site consists of a small field, approximately 180 trees, and 24 existing residential units. The existing residential units include 10 single-family homes and an old lodging facility that was previously converted into a 14-unit apartment complex. Portions of the project site not containing structures are mostly dominated by weedy, ruderal vegetation with the aforementioned 180 existing trees scattered throughout the site.

Immediately south of the project site, on the opposite side of Olive Drive, are the Lexington Apartments, the Arbors Apartments, and Cesar Chavez Plaza, as well as a self-storage facility. Beyond the apartment and self-storage facility, further south from the project site, is the I-80 mainline. Commercial developments as well as Slatter's Court exist to the west of the project site, while medium density residential developments and automotive uses are located to the east of the project site, south of Olive Drive. Railroad tracks owned by the UPRR and operated in part by Amtrak make up the northern border of the project site. Tracks operated by the California Northern Railroad Company (CNRC) connect to the UPRR tracks to the east and southwest of the project site. A chainlink fence, installed by the UPRR, separates the project site from the tracks. Beyond the railway is the Old East Davis community, which contains a mix of residential and commercial uses. The winds in the area are moderate in strength and vary from moist, clean breezes from the south to dry land flows from the north.[1] According to the Western Regional Climate Center, the prevailing wind direction throughout the year in the project area is from the south.[2]

The proposed project is a residential in-fill project that would include the demolition of the existing apartment complex and 10 single-family homes and the construction of a 249,788-square-foot student-oriented residential building, as well as parking areas and various amenities. The building would include three tiers, which would step up in height from Olive Drive. The first tier (closest to Olive Drive) would be three stories, the second would be four stories, and the third (closest to the UPRR tracks) would be five stories tall, with a maximum height of 60 feet. The proposed project would include a total of 130 rental units, an increase of 106 units over existing baseline conditions on the project site, and will be designed specifically as off-campus student housing. The 130 proposed rental units would include 473 bedrooms, 235 of which would be double occupancy rooms, for a total population of 708 residents.

---

1 Yolo-Solano Air Quality Management District. *Handbook for Assessing and Mitigating Air Quality Impacts*. July 11, 2007. Available at: http://www.ysaqmd.org/documents/CEQAHandbook2007.pdf. Accessed September 2016.

2 Western Regional Climate Center. *Prevailing Wind Direction*. Available at: http://www.wrcc.dri.edu/htmlfiles/westwinddir.html. Accessed September 2016.

Figure 1
Project Vicinity

PURPOSE OF THE HRA

Toxic Air Contaminants (TACs) are a category of environmental concern. Health risks from TACs are a function of both the concentration of emissions and the duration of exposure, which typically are associated with long-term exposure and the associated risk of contracting cancer. Health effects of exposure to TACs other than cancer include birth defects, neurological damage, and death. Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, State, and federal level. The identification, regulation, and monitoring of TACs is relatively new compared to that for criteria air pollutants that have established ambient air quality standards. TACs are regulated or evaluated on the basis of risk to human health rather than comparison to an ambient air quality standard or emission-based threshold.

Elderly individuals, children, individuals with already compromised immune systems, and pregnant women are the most susceptible to the adverse health effects of TAC exposure. Accordingly, land uses that are typically associated with the aforementioned susceptible groups, such as residences, schools, childcare centers, playgrounds, retirement homes, convalescent homes, hospitals, and medical clinics, are considered to be sensitive receptors. As such, residences currently on the project site and in the surrounding area would be considered sensitive receptors. Because the proposed project would result in an increase in the density of residences on the project site, operation of the proposed project would introduce new sensitive receptors to the project site.

In terms of health risks, the most volatile contaminants are diesel particulate matter (DPM), benzene, formaldehyde, 1,3-butadiene and acetaldehyde. Gasoline vapors contain several TACs, including benzene, toluene, and xylenes. Diesel engines emit a complex mixture of air pollutants, including both gaseous and solid material. The solid material in diesel exhaust is known as DPM, which is composed of carbon particles and numerous organic compounds, including over 40 known cancer-causing organic substances. Examples of such chemicals include polycyclic aromatic hydrocarbons, benzene, formaldehyde, acetaldehyde, acrolein, and 1,3-butadiene. Diesel exhaust also contains gaseous pollutants, including volatile organic compounds and NO_X. More than 90 percent of DPM is less than one micrometer in diameter, and, thus, DPM is a subset of $PM_{2.5}$. Due to the published evidence of a relationship between diesel exhaust exposure and lung cancer and other adverse health effects, the California Air Resources Board (CARB) has identified DPM from diesel-fueled engines as a TAC.

Due to the high levels of diesel activity, high volume freeways, stationary diesel engines, and facilities attracting heavy and constant diesel vehicle traffic are identified as having the highest associated health risks from DPM. Most major sources of diesel emissions, such as ships, trains, and trucks, operate in and around ports, rail yards, and heavily traveled roadways. Such areas are often located near highly populated areas. Thus, elevated DPM levels are mainly an urban problem, with large numbers of people exposed to higher DPM concentrations, resulting in greater health consequences compared to rural areas.

The UPRR tracks, located directly to the north of the project site, are currently used for both freight and passenger train operations, while the CNRC tracks are operated for freight only. Freight and passenger train operations on the UPRR and CNRC lines rely on diesel-fueled locomotives, the operation of which results in DPM emissions. The CARB evaluated sources of TACs, including

DPM, and provides recommendations for siting new sensitive land uses near existing major sources of TAC emissions in their *Air Quality and Land Use Handbook: A Community Health Perspective* (Handbook).[3] The CARB Handbook identifies rail yards as being a major source of TAC emissions due to the associated large amounts of locomotive idling, for testing and maintenance. The idling of trains allows for a greater concentration of TACs, as the trains are not moving, yet their locomotive engines continue to run. However, the CARB does not typically consider railroad tracks to represent a potentially significant source of TAC emissions, because trains on railroad tracks do not typically idle in place for long periods of time. Instead, trains on railroad tracks are more often moving through the area, which disperses the DPM emissions being emitted by the locomotive's diesel engine over the distance travelled.

Although the railroad tracks near the site are not considered a rail yard and would not typically be considered a major source of TAC emissions, operation of the passenger train service involves frequent stops at the Davis Amtrak station, located to the northwest of the project site. Amtrak passenger trains stopping at the Davis Amtrak station idle on the tracks near the project site for approximately one minute before leaving the station. Approximately 34 passenger trains and 21 freight trains travel along the UPRR tracks, and an additional two freight trains travel along the CNRC tracks through Davis per day.[4] Given the frequent passenger train idling near the project site, as well as the passenger and freight trains traveling along the tracks near the project site each day, the activities associated with the nearby tracks may result in substantial concentrations of DPM at the project site.

In addition, the project site is located approximately 600 feet north of I-80. Freeways such as I-80 are considered sources of TACs due to the frequent heavy-duty truck traffic, and heavy single-passenger vehicle traffic. In the CARB's Handbook, proximity to freeways is shown to be linked with adverse health effects including respiratory symptoms, asthma exacerbation, and decreased lung function.[5]

Vehicle-related emissions linked to health effects include DPM from heavy-duty trucks as well as ultra-fine particle (UFP) emissions. UFPs are a subset of particulate matter, and, thus, also a subset of DPM, with small diameters (on the order of 0.1 micrometers).[6] The small diameter of UFPs imparts the particulates with unique attributes such as high surface areas and the ability to penetrate deeply into lungs. Once UFPs have been inhaled and deposited in lungs, the small diameter allows the UFPs to be transferred to the bloodstream. The high surface area of the UFPs also allows for a greater adsorption of other chemicals, which are transported along with the UFPs into the bloodstream of the inhaler, where the chemicals can eventually be transported with the UFPs to

[3] California Air Resources Board. *Air Quality and Land Use Handbook: A Community Health Perspective*. April 2005.

[4] Bomar, Clem A., Rail Transportation Manager II, Division of Rail and Mass Transportation. Personal Communication [email] with Nick Pappani, Vice President of Raney Planning & Management, Inc. September 06, 2016.

[5] California Air Resources Board. *Air Quality and Land Use Handbook: A Community Health Perspective*. April 2005.

[6] South Coast Air Quality Management District. *Final 2012 Air Quality Management Plan*. December 2012.

critical organs.[7] The penetration capability of UFPs may contribute to adverse health effects related to heart, lung, and other organ health.[8] Fuel combustion in vehicles is the primary source of UFPs near roadways, but vehicle brake and tire wear can also contribute UFPs.[9]

Due to atmospheric dispersion, coagulation, condensation, and evaporation concentrations of DPM, particularly the UFP component of DPM, rapidly decrease with distance from the source. Therefore, projects or individuals located farther from a source of DPM would experience less exposure than projects or individuals located closer to a source of DPM.[10] Indeed, background pollutant concentrations are typically only affected within 1,000 feet of freeways, and health effects from such pollutant concentrations were most pronounced within the first 300 to 500 feet of the source. Considering the highly dispersive nature of DPM, the CARB recommends avoiding the placement of new sensitive receptors within 500 feet of freeways and other high traffic roadway.[11] The proposed project is approximately 100 feet outside of the CARB recommended 500-foot buffer from I-80. However, it should be noted that the actual risk of health impacts from DPM and UFPs at a given distance will vary depending on local variables such as area-specific meteorological conditions and wind directions.[12]

Although the project site is outside of the CARB's recommended setback distance from freeways, in the interest of public disclosure, the City has chosen to conduct a full HRA for aggregate emissions related to railway operations and emissions related to freeway operations.

STANDARDS OF SIGNIFICANCE

The proposed project is located within the jurisdictional boundaries of the Yolo-Solano Air Quality Management District (YSAQMD), which is the agency responsible for local air quality management in the project area. In order to help public agencies evaluate air quality impacts, the YSAQMD has developed the *Handbook for Assessing and Mitigating Air Quality Impacts*.[13] The YSAQMD's handbook includes methodology and recommended thresholds of significance, including thresholds for potential exposure of the public to TACs from new stationary sources. According to the YSAQMD, exposure of the public to TACs from new stationary sources in excess of the following thresholds would be considered a significant impact:

---

7 Health Effects Institute. *Understanding the Health Effects of Ambient Ultrafine Particles*. Accessible at https://www.healtheffects.org/system/files/Perspectives3-ExecutiveSummary.pdf. Accessed February 2017.

8 South Coast Air Quality Management District. Final 2012 Air Quality Management Plan. December 2012.

9 Health Effects Institute. *Understanding the Health Effects of Ambient Ultrafine Particles*. Accessible at https://www.healtheffects.org/system/files/Perspectives3-ExecutiveSummary.pdf. Accessed February 2017.

10 Southern California Particle Center and Supersite. *Studies of Emission Sources and Related Adverse Health Effects: Particulate Matter*. Available at https://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.files/fileID/7692. Published on August 31, 2006.

11 California Air Resources Board. *Air Quality and Land Use Handbook: A Community Health Perspective*. April 2005.

12 California Air Resources Board. *Air Quality and Land Use Handbook: A Community Health Perspective*. April 2005.

13 Yolo-Solano Air Quality Management District. *Handbook for Assessing and Mitigating Air Quality Impacts*. July 11, 2007. Available at: http://www.ysaqmd.org/documents/CEQAHandbook2007.pdf. Accessed September 2016.

- Probability of contracting cancer for the Maximally Exposed Individual (MEI) equals to 10 in one million or more; and
- Ground-level concentrations of non-carcinogenic TACs would result in a Hazard Index equal to 1 for the MEI or greater.

Although the YSAQMD has established thresholds for exposure to TACs from new stationary sources, a threshold for exposure of the public to mobile TAC emissions does not currently exist. Furthermore, while the current YSAQMD thresholds for TAC emissions apply to new stationary sources affecting existing or proposed off-site sensitive receptors, a threshold for TAC exposure from existing sources of TACs onto new sensitive land uses does not currently exist. The proposed project would not involve the siting of a new stationary source of TACs, and would instead involve the siting of new sensitive receptors in proximity to two existing mobile sources of TACs. Because future residents would be exposed to multiple existing sources of TACs, the YSAQMD's standards for new stationary sources near sensitive receptors would not be applicable to the effects of the existing mobile sources of TAC emissions on the proposed project.

Considering that the proposed project would be located in proximity to two existing mobile sources of TACs, and the YSAQMD thresholds would not be directly applicable, a threshold for analyzing a cumulative cancer risk from multiple mobile sources is needed. The nearby Bay Area Air Quality Management District (BAAQMD) established a cumulative threshold of significance of an excess cancer risk level of more than 100 persons in one million or a Hazard Index greater than 10.0.[14] In the recent court case *Mission Bay Alliance et al. v. Office of Community Investment and Infrastructure et al., GSW Arena LLC et al*, the Superior Court of the City and County of San Francisco upheld the validity of the use of the 100 in one million threshold for use in cumulative analyses of TACs.[15] Although the aforementioned court case affirmed the validity of BAAQMD's thresholds, other recent court cases have challenged BAAQMD's process of adoption for all of the District's thresholds of significance. The aforementioned challenge to BAAQMD's thresholds were not based on the validity of the thresholds, rather the challenge focused on whether the adoption of thresholds was a project under CEQA, necessitating environmental review. In response to the cases regarding the need for environmental review of the adoption of BAAQMD's thresholds, BAAQMD has withdrawn their revised quantitative thresholds for the time being. However, the BAAQMD's thresholds of significance are supported by substantial evidence, were affirmed in the court case *Mission Bay Alliance et al. v. Office of Community Investment and Infrastructure et al., GSW Arena LLC et al*, and remain the best available option for TAC analysis. Thus, considering the above, the City, as lead agency, has selected BAAQMD's cumulative cancer risk standard for use in the analysis of the effects of the existing mobile sources of TAC emissions on the project site.

[14] Bay Area Air Quality Management District. *California Environmental Quality Act: Air Quality Guidelines*. June 2010.

[15] City and County of San Francisco Superior Court. *Mission Bay Alliance et al. v. Office of Community Investment and Infrastructure et al., GSW Arena LLC et al*. Filed November 29, 2016.

METHOD OF ANALYSIS

The $PM_{2.5}$ (assumed to encompass both DPM and UFP) concentration associated with the operation of the nearby railroad tracks and I-80, at the maximally exposed sensitive receptor on the project site has been estimated using the American Meteorological Society/Environmental Protection Agency (AMS/EPA) Regulatory Model (AERMOD) dispersion model. The associated cancer risk and non-cancer hazard index were calculated using the CARB's Hotspot Analysis Reporting Program Version 2 (HARP 2) Risk Assessment Standalone Tool (RAST),[16] which calculates the cancer and non-cancer health impacts using the risk assessment guidelines of the 2015 Office of Environmental Health Hazard Assessment (OEHHA) Guidance Manual for Preparation of Health Risk Assessments.[17] The modeling was performed in accordance with the U.S. Environmental Protection Agency's (USEPA) *User's Guide for the AMS/EPA Regulatory Model – AERMOD*[18] and the 2015 OEHHA Guidance Manual.

Railroad Operations

Multiple sources of information were consulted to obtain details regarding the rail activity associated with the UPRR and CNRC lines near the site. The Department of Transportation's Division of Rail and Mass Transportation, the Capitol Corridor Joint Powers Authority, the 2013 California State Rail Plan, and the Yolo County General Plan were consulted for information regarding the number, type, and manner of locomotives traveling along the railroad tracks in the project area (e.g., number of passenger and freight trains passing the project site per day, number and type of locomotives per train, horsepower of locomotive engines, speed of trains traveling near the project site, etc.). The 2013 California State Rail Plan estimated that approximately 20 freight trains travel along the UPRR tracks per day,[19] while the Division of Rail and Mass Transportation reported that 34 passenger trains pass by the site as well.[20] An environmental noise assessment of the project area completed by j.c. brennan & associates, Inc. included 24-hour noise level measurements at the project site.[21] The noise level measurements taken at the project site were then used to validate freight trip numbers near the project site.[22] Using the noise analysis, the typical train activity near the project site was determined to include 21 freight trips along the UPRR lines. Additionally, based on information contained in the Yolo County General Plan, the CNRC

16 California Air Resources Board. *User Manual for the Hotspots Analysis and Reporting Program Health Risk Assessment Standalone Tool, Version 2*. March 17, 2015.

17 Office of Environmental Health Hazard Assessment. *Air Toxics Hot Spots Program Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments* [pg. 8-18]. February 2015.

18 U.S. Environmental Protection Agency. *User's Guide for the AMS/EPA Regulatory Model – AERMOD*. September 2004.

19 California Department of Transportation. *2013 California State Rail Plan* May 2013.

20 Bomar, Clem A., Rail Transportation Manager II, Division of Rail and Mass Transportation. Personal Communication [email] with Nick Pappani, Vice President of Raney Planning & Management, Inc. September 06, 2016.

21 j.c. brennan & associates. *Preliminary Railroad Noise Assessment: Callori Residential Subdivision*. March 15, 2017.

22 Brennan, Jim, President, j.c. brennan & associates, Inc. Personal Communication [phone] with Nick Pappani Vice President, Raney Planning & Management, Inc. December 20, 2016.

tracks were assumed to operate two trains through Davis per day.[23] Once the typical train activities occurring near the project site were determined, emissions factors obtained from the USEPA and the Capitol Corridor Joint Powers Authority were applied to determine the estimated DPM emission rate associated with each type of locomotive.[24] Total emission rates for traveling passenger and freight trains were then calculated, as well as a total emission rate for idling trains. The resultant emission rates were applied in AERMOD.

The traveling trains were modeled in AERMOD as a series of line sources located along the nearby railroad tracks. The idling trains were modeled as an area source located in front of the Davis Amtrak station.

I-80 Operations

According to Caltrans, the portion of I-80 in proximity to the project site experiences annual average daily traffic (AADT) of approximately 128,800 vehicles.[25] The CARB has developed the EMFAC emissions model for use in assessing emissions from on-road vehicles including cars, trucks, and buses in the state.[26] Vehicle emissions for Yolo County were calculated using EMFAC for the proposed project's first operational year of 2019. According to EMFAC, approximately 20 percent of vehicles traveling on I-80 would be diesel fueled, thus, constituting sources of DPM. Although the residential nature of the proposed project makes operational activities unlikely to involve the use of any substantial number of diesel-fueled vehicles, to provide a conservative analysis, 20 percent of the anticipated 353 daily trips related to operations of the proposed project were assumed to be made by diesel-fueled vehicles. The total emissions rates from existing traffic on I-80 and traffic from the proposed project were estimated using EMFAC data. The vehicle traffic on I-80 was modeled in AERMOD as a series of line sources located along I-80 from the Olive Drive westbound off-ramp to the Richards Boulevard Interchange.

On-site Receptors

A receptor grid using flagpole receptors was applied to AERMOD over the entire project site area, including parking areas, landscaped areas, and the proposed residential structure. Ground-level receptors were set to a flagpole height of 1.8 meters, representing the average height of an adult human. The proposed project would involve up to five stories nearest the railroad tracks. Accordingly, five total receptor grids were used to represent each of the five floors proposed for construction, where the flagpole height was increased by 3.6 meters per floor to represent floors two through five. The AERMOD analysis relied on data from the nearest meteorological station to the proposed project site, which is located at the Sacramento International Airport, approximately 11.80 miles northeast of the project site.

---

[23] County of Yolo. *2030 Countywide General Plan: Health and Safety Element* [pg. HS-50-HS51]. Adopted November 10, 2009.

[24] U.S. Environmental Protection Agency Office of Transportation and Air Quality. *Emission Factors for Locomotives*. April 2009.

[25] Caltrans. *2015 Traffic Volumes*. Available at: http://www.dot.ca.gov/trafficops/census/volumes2015/. Accessed February 2017.

[26] California Air Resources Board. *Mobile Source Emissions Inventory – Categories*. Available at https://www.arb.ca.gov/msei/categories.htm#emfac2014. Accessed February 2017.

Calculating Health Risk

The maximum annual average and maximum one-hour concentrations from AERMOD for emissions related to railroad operations and I-80 operations were applied to HARP 2 RAST, separately, to calculate the cancer risk and non-cancer hazard index, respectively, at the maximally exposed future resident on the project site. In accordance with the 2015 OEHHA Guidance Manual, an exposure period of 30 years for an individual resident was applied, with exposure occurring to residents of all ages, including women during the third trimester of pregnancy. The 2015 OEHHA Guidance Manual recommends that the fraction of time spent at home be used for a residential receptor based on the assumption that exposure of future residents to DPM is not occurring away from home. Therefore, the aforementioned options in HARP 2 RAST were applied in accordance with the 2015 OEHHA Guidance Manual recommendations. As a result, the maximally exposed future resident would be the most vulnerable individual resident, that was exposed to the highest possible concentration for the entire 30-year period, with the 2015 OEHHA recommended assumption that a fraction of the individual's time was spent away from the project site.

The resultant cancer and non-cancer health risks associated with DPM emissions from nearby railroad activity and I-80 operations were combined and compared to the standards of significance discussed above in order to determine the associated level of impact. The AERMOD and HARP 2 RAST modeling results for railroad activity are included as Attachment A and Attachment B, respectively, and the AERMOD and HARP 2 RAST modeling results for I-80 operations are included as Attachment C and Attachment D, respectively, to this HRA.

HRA RESULTS

According to the AERMOD results for railroad operations (see Attachment A), the maximum annual average and maximum one-hour DPM concentration at the maximally exposed future resident on the project site were estimated to be 0.01568 $\mu g/m^3$ and 0.63127 $\mu g/m^3$, respectively. Additionally, according to the AERMOD result for emissions related to operation of I-80 (See Attachment C), the maximum annual average and maximum one-hour DPM concentration at the maximally exposed future resident on the project site were estimated to be 0.00350 $\mu g/m^3$ and 0.06161 $\mu g/m^3$, respectively. As discussed previously, UFPs are a subset of total DPM emissions. After applying the DPM concentration to the HARP 2 RAST model, the corresponding increase in cancer risk and non-cancer hazard index at the maximally exposed future resident were estimated as presented in Table 1 below.

As shown in Table 1 below, DPM emissions from operations of the nearby railroad and I-80 would expose future residents to a hazard index below the threshold of significance being applied to the proposed project. Furthermore, the nearby mobile sources would not create a cumulative cancer risk in excess of 100 cases per million persons; therefore, the proposed project would not expose new sensitive receptors to an increased cancer risk in excess of the standards being applied to the proposed project.

Table 1
Maximum Cancer Risk and Non-Cancer Hazard Index Associated With Nearby Mobile Sources

	Cancer Risk (per million persons)	Non-Cancer Hazard Index
Railroad Exposure	10.69	0.003
I-80 Exposure	2.39	0.001
Total	**13.08**	**0.004**
Thresholds of Significance	*100*	*10.0*
Exceed Thresholds?	**NO**	**NO**

Sources: AERMOD and HARP 2 RAST, February 2017 (see Attachments A, B, C, and D).

It should be noted that many forms of diesel emissions control technologies and reduction strategies are currently available and will be increasingly applied to locomotives throughout the nation. The results of the HRA are based on the assumption that the locomotives would continue to operate under current conditions, without diesel exhaust emission controls or compliance with any USEPA diesel engine emission reduction standards. Accordingly, the actual DPM concentrations at the project site and associated cancer risk may be less than what has been estimated and presented in this HRA and would likely decrease over time.

Although future residents at the proposed project would not be exposed to an increased cancer risk in excess of the 100 cases per million persons threshold being applied, measures to reduce the risk to future residents are available and should be considered. Specifically, the Sacramento Metropolitan Air Quality Management District recommends that enhanced indoor air filtration be used in projects located near sources of diesel particulates. As such, the following measure is recommended to be required by the City as a condition of approval for the proposed project in order to reduce potential risks to future on-site residents:

> Prior to approval of building plans, the project applicant shall submit a ventilation plan to the City's Community Development and Sustainability Department for review and approval. The ventilation plan should include a detailed description of the heating, ventilation, and air conditioning (HVAC) system for the proposed residential structure, which should be designed sufficient to meet the USEPA's ENERGY STAR specification that the HVAC system shall include high-efficiency particulate air (HEPA) filters, with a minimum efficiency reporting value (MERV) rating of 13 or higher at 295 feet per minute according to the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standard 52.2. The ventilation plan shall include a statement, signed by the licensed design professional who prepares the plan, certifying that in his or her judgment, the proposed ventilation system will be capable of removing at least 80 percent of ambient DPM from the indoor air of the building.

Implementation of the recommended measure above would reduce exposure of the future residents to the ambient DPM concentrations related to nearby railroad and I-80 activity, further ensuring that future residents of the project site are not exposed to excess increased cancer risks from TACs.

Attachment A

Railroad Operations AERMOD Outputs

BREEZE AERMOD Model Results

Max. Annual (5 YEARS) Results of Pollutant: PM25 (ug/m**3)

Group ID	High	Avg. Conc.	UTM		Elev.	Hill Ht.	Flag Ht.	Rec. Type	Grid ID
			East (m)	North (m)	(m)	(m)	(m)		
ALL	1ST	0.01568	610091.80	4266804.10	0.00	0.00	1.80	DC	
	2ND	0.01548	610091.80	4266794.10	0.00	0.00	1.80	DC	
	3RD	0.01542	610091.80	4266814.10	0.00	0.00	1.80	DC	
	4TH	0.01492	610091.80	4266784.10	0.00	0.00	1.80	DC	
	5TH	0.01469	610091.80	4266824.10	0.00	0.00	1.80	DC	
	6TH	0.01412	610091.80	4266774.10	0.00	0.00	1.80	DC	
	7TH	0.01378	610101.80	4266794.10	0.00	0.00	1.80	DC	
	8TH	0.01373	610101.80	4266804.10	0.00	0.00	1.80	DC	
	9TH	0.01358	610091.80	4266834.10	0.00	0.00	1.80	DC	
	10TH	0.01354	610101.80	4266784.10	0.00	0.00	1.80	DC	

Highest Results of Pollutant: PM25

Avg. Per.	Grp ID	High	Type	Val	Units	Date	UTM		Elev.	Hill Ht.	Flag Ht.	Rec. Type	Grid ID
						YYMMDDHH	East (m)	North (m)	(m)	(m)	(m)		
1-HR	ALL	1ST	Avg. Conc.	0.63127	ug/m**3	14012324	610092.30	4266860.40	0.00	0.00	5.40	DC	

Summary of Total Messages

#	Message Type
0	Fatal Error Message(s)
7	Warning Message(s)
9526	Informational Message(s)
43824	Hours Were Processed
7881	Calm Hours Identified
1645	Missing Hours Identified (3.75 Percent)

Error & Warning Messages

Msg. Type	Pathway	Ref. #	Description
WARNING	CO	W276	Special proc for 1h-NO2/SO2 24hPM25 NAAQS disabled PM25 H1H
WARNING	CO	W363	Multiyr 24h/Ann PM25 processing not applicable for PM25 H1H
WARNING	SO	W390	Aspect ratio (L/W) of LINE source greater than 100 2
WARNING	SO	W390	Aspect ratio (L/W) of LINE source greater than 100 3

WARNING	SO	W390	Aspect ratio (L/W) of LINE source greater than 100 4
WARNING	SO	W390	Aspect ratio (L/W) of LINE source greater than 100 1
WARNING	SO	W390	Aspect ratio (L/W) of LINE source greater than 100 9

www.breeze-software.com

AERMOD Model Options

Model Options

Pathway	Keyword	Description	Value
CO	TITLEONE	Project title 1	Lincoln40
CO	TITLETWO	Project title 2	
CO	MODELOPT	Model options	DFAULT,CONC
CO	AVERTIME	Averaging times	1,ANNUAL
CO	URBANOPT	Urban options	
CO	POLLUTID	Pollutant ID	PM25 H1H
CO	HALFLIFE	Half life	
CO	DCAYCOEF	Decay coefficient	
CO	FLAGPOLE	Flagpole receptor heights	1.8
CO	RUNORNOT	Run or Not	RUN
CO	EVENTFIL	Event file	F
CO	SAVEFILE	Save file	F
CO	INITFILE	Initialization file	
CO	MULTYEAR	Multiple year option	N/A
CO	DEBUGOPT	Debug options	N/A
CO	ERRORFIL	Error file	F
SO	ELEVUNIT	Elevation units	METERS
SO	EMISUNIT	Emission units	N/A
RE	ELEVUNIT	Elevation units	METERS
ME	SURFFILE	Surface met file	I:\PROJECTS\ACTIVE\DAVIS\LINCOLN40 EIR\TECHNICAL REPORTS\AQ & GHG\FULL HRA\MET DATA\INT 10-14 N1MD.SFC
ME	PROFFILE	Profile met file	I:\PROJECTS\ACTIVE\DAVIS\LINCOLN40 EIR\TECHNICAL REPORTS\AQ & GHG\FULL HRA\MET DATA\INT 10-14 N1MD.PFL
ME	SURFDATA	Surf met data info.	93225 2010
ME	UAIRDATA	U-Air met data info.	23230 2010
ME	SITEDATA	On-site met data info.	
ME	PROFBASE	Elev. above MSL	0
ME	STARTEND	Start-end met dates	
ME	WDROTATE	Wind dir. rot. adjust.	
ME	WINDCATS	Wind speed cat. max.	
ME	SCIMBYHR	SCIM sample params	
EV	DAYTABLE	Print summary opt.	N/A
OU	EVENTOUT	Output info. level	N/A

OU	DAYTABLE	Print summary opt.	

Source Parameter Tables

All Sources

Source ID / Pollutant ID	Source Type	Description	UTM		Elev.	Emiss. Rate	Emiss. Units	Release Height
			East (m)	North (m)	(m)			(m)
IDL	AREA	TRN IDL	610012.2	4266846.9	0	5.55E-07	(g/s-m**2)	4.42
2	LINE	Line 2	610215.8	4266961.6	0	0.0000002459	(g/s-m**2)	4.42
3	LINE	Line 3	610009.2	4266859	0	0.0000002390	(g/s-m**2)	4.42
4	LINE	Line 4	609919.1	4266771.5	0	0.0000001890	(g/s-m**2)	4.42
5	LINE	Line 5	610215.8	4266961.3	0	0.000000055797	(g/s-m**2)	4.42
6	LINE	Line 6	610133	4266953.6	0	0.000000073868	(g/s-m**2)	4.42
7	LINE	Line 7	610051.5	4266981.8	0	0.000000078311	(g/s-m**2)	4.42
1	LINE	Line 1	610214.6	4266962.6	0	0.0000001778	(g/s-m**2)	4.42
8	LINE	Line 8	610001.7	4267029.2	0	0.000000097038	(g/s-m**2)	4.42
9	LINE	Line 9	609971.4	4267086.7	0	0.000000073868	(g/s-m**2)	4.42

Rectangular Area Sources

Source ID / Pollutant ID	Description	UTM		Elev.	Emiss. Rate	Release Height	X Length	Y Length	Angle	Init. Vert. Dim.
		East (m)	North (m)	(m)	(g/s-m**2)	(m)	(m)	(m)	(deg)	(m)
IDL	TRN IDL	610012.2	4266846.9	0	5.55E-07	4.42	29.3	7.5	-39.3	2.06

EPA Line Sources

Source ID / Pollutant ID	Description	UTM		Elev.	Emiss. Rate	Release Height	End X	End Y	Width	Init. Vert. Dim.
		East (m)	North (m)	(m)	(g/s-m**2)	(m)	(m)	(m)	(m)	(m)
2	Line 2	610215.8	4266961.6	0	0.0000002459	4.42	1	2.06	610009.2	4266859
3	Line 3	610009.2	4266859	0	0.0000002390	4.42	1	2.06	609919.3	4266772
4	Line 4	609919.1	4266771.5	0	0.0000001890	4.42	1	2.06	609824.4	4266661
5	Line 5	610215.8	4266961.3	0	0.000000055797	4.42	1	2.06	610132.5	4266953
6	Line 6	610133	4266953.6	0	0.000000073868	4.42	1	2.06	610052	4266982
7	Line 7	610051.5	4266981.8	0	0.000000078311	4.42	1	2.06	610001.9	4267029
1	Line 1	610214.6	4266962.6	0	0.0000001778	4.42	1	2.06	610706.7	4267086
8	Line 8	610001.7	4267029.2	0	0.000000097038	4.42	1	2.06	609970	4267088
9	Line 9	609971.4	4267086.7	0	0.000000073868	4.42	1	2.06	609933.2	4267299

Attachment B

Railroad Operations HARP 2 RAST Outputs

*HARP - HRACalc v16088 1/18/2017 10:38:24 AM - Cancer Risk

INDEX	GRP1	GRP2	POLID	POLABBREV	CONC
1	Diesel	PM	9901	DieselExhPM	0.01568

RISK_SUM	SCENARIO	DETAILS	INH_RISK	SOIL_RISK
1.07E-05	30YrCancerDerived	*	1.07E-05	0.00E+00

DERMAL_RISK	MMILK_RISK	WATER_RISK	FISH_RISK	CROP_RISK
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

BEEF_RISK	DAIRY_RISK	PIG_RISK	CHICKEN_RISK	EGG_RISK
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

1ST_DRIVER	2ND_DRIVER	PASTURE_CONC	FISH_CONC	WATER_CONC
INHALATION		0.00E+00	0.00E+00	0.00E+00

*HARP - HRACalc v16088 1/18/2017 10:38:24 AM - Acute Risk

INDEX	GRP1	GRP2	POLID	POLABBREV	CONC
1	Diesel	PM	9901	DieselExhPM	0.63127

SCENARIO	CV	CNS	IMMUN	KIDNEY
NonCancerAcu	0.00E+00	0.00E+00	0.00E+00	0.00E+00

GILV	REPRO/DEVEL	RESP	SKIN	EYE
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

BONE/TEETH	ENDO	BLOOD	ODOR	GENERAL
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

*HARP - HRACalc v16088 1/18/2017 10:38:24 AM - Chronic Risk

INDEX	GRP1	GRP2	POLID	POLABBREV	CONC
1	Diesel	PM	9901	DieselExhPM	0.01568

SCENARIO	CV	CNS	IMMUN	KIDNEY
NonCancerChr	0.00E+00	0.00E+00	0.00E+00	0.00E+00

GILV	REPRO/DEVEL	RESP	SKIN	EYE
0.00E+00	0.00E+00	3.14E-03	0.00E+00	0.00E+00

BONE/TEETH	ENDO	BLOOD	ODOR	GENERAL
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

DETAILS	INH_CONC	SOIL_DOSE	DERMAL_DOSE	MMILK_DOSE
*	1.57E-02	0.00E+00	0.00E+00	0.00E+00

WATER_DOSE	FISH_DOSE	CROP_DOSE	BEEF_DOSE	DAIRY_DOSE
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

PIG_DOSE	CHICKEN_DOSE	EGG_DOSE	1ST_DRIVER	2ND_DRIVER
0.00E+00	0.00E+00	0.00E+00	INHALATION	

3RD_DRIVER	PASTURE_CONC	FISH_CONC	WATER_CONC
	0.00E+00	0.00E+00	0.00E+00

	1	2	3	4	5	6
POL	POLABBREV	InhalationCancerURF	InhalationCancerSlopeFactor	OralCancerSlopeFactor	AcuteREL	
9901	DieselExhPM		0.0003	1.1		

	7	8	9	10	11	12
InhalationChronicREL	OralChronicREL	IsMultipathway	AcuteCV_	AcuteCNS_	AcuteIMMUN_	
	5	FALSE	FALSE	FALSE	FALSE	

	13	14	15	16	17	18
AcuteKIDNEY_	AcuteGILV_	AcuteREPRO_DEVEL_	AcuteRESP_	AcuteSKIN_	AcuteEYE_	
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	

	19	20	21	22	23	24
AcuteBONE_TEETH_	AcuteENDO_	AcuteBLOOD_	AcuteODOR_	AcuteGENERAL_	InhalationChronicCV_	
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	

	25	26	27	28	29	30
InhalationChronicCNS_	InhalationChronicIMMUN_	InhalationChronicKIDNEY_	InhalationChronicGILV_	InhalationChronicREPRO_DEVEL_	InhalationChronicRESP_	
FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	

	31	32	33	34	35	36
InhalationChronicSKIN_	InhalationChronicEYE_	InhalationChronicBONE_TEETH_	InhalationChronicENDO_	InhalationChronicBLOOD_	InhalationChronicODOR_	
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	

	37	38	39	40	41	42
InhalationChronicGENERAL_	OralChronicCV_	OralChronicCNS_	OralChronicIMMUN_	OralChronicKIDNEY_	OralChronicGILV_	
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	

	43	44	45	46	47	48
OralChronicREPRO_DEVEL_	OralChronicRESP_	OralChronicSKIN_	OralChronicEYE_	OralChronicBONE_TEETH_	OralChronicENDO_	
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	

	49	50	51	52	53	54
OralChronicBLOOD_	OralChronicODOR_	OralChronicGENERAL_	PathwayInhalation	PathwayDrinking	PathwayFood	
FALSE	FALSE	FALSE	TRUE	FALSE	FALSE	

	55	56	57	58	59
PathwayCrop	PathwayExposed	PathwayLeafy	PathwayProtected	PathwayRoot	
FALSE	FALSE	FALSE	FALSE	FALSE	

	60	61	62	63	64	65
PathwayDairy	PathwayMeatEggs	PathwaySoilIngestion	PathwayFish	PathwayDermal	PathwayMothersMilk	
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	

	66	67	68	69	70	71	72
SoilUptakeFactorLeafy	SoilUptakeFactorExposed	SoilUptakeFactorProtected	SoilUptakeFactorRoot	FoodTcoMilk	FoodTcoEgg	FoodTcoChicken	

	73	74	75	76	77	78	79
FoodTcoBeef	FoodTcoPig	HalfLifeInSoil	GRAF	FishBCF	MolWtCorrection	DermalAbsorptionFactor	
						1	

	80	81	82	83	84	85	86
InhalationChronicREL_8HR	InhalationChronicCV_8HR	InhalationChronicCNS_8HR	InhalationChronicIMMUN_8HR	InhalationChronicKIDNEY_8HR	InhalationChronicGILV_8HR	InhalationChronicREPRO_DEVEL_8HR	
	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	

	87	88	89	90	91	92	93
InhalationChronicRESP_8HR	InhalationChronicSKIN_8HR	InhalationChronicEYE_8HR	InhalationChronicBONE_TEETH_8HR	InhalationChronicENDO_8HR	InhalationChronicBLOOD_8HR	InhalationChronicODOR_8HR	
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	

	94	95	96	97
InhalationChronicGENERAL_8HR	Tco_InhMM	Tco_OralMM	RChem_Group_HV	
FALSE				

1	Diesel	PM	9901	DieselExhP	0.01568	0.63127	0	0	0

Attachment C

Interstate 80 AERMOD Outputs

AERMOD Model Options

Model Options

Pathway	Keyword	Description	Value
CO	TITLEONE	Project title 1	Lincoln40
CO	TITLETWO	Project title 2	
CO	MODELOPT	Model options	DFAULT,CONC
CO	AVERTIME	Averaging times	1,ANNUAL
CO	URBANOPT	Urban options	
CO	POLLUTID	Pollutant ID	PM25 H1H
CO	HALFLIFE	Half life	
CO	DCAYCOEF	Decay coefficient	
CO	FLAGPOLE	Flagpole receptor heights	1.8
CO	RUNORNOT	Run or Not	RUN
CO	EVENTFIL	Event file	F
CO	SAVEFILE	Save file	F
CO	INITFILE	Initialization file	
CO	MULTYEAR	Multiple year option	N/A
CO	DEBUGOPT	Debug options	N/A
CO	ERRORFIL	Error file	F
SO	ELEVUNIT	Elevation units	METERS
SO	EMISUNIT	Emission units	N/A
RE	ELEVUNIT	Elevation units	METERS
ME	SURFFILE	Surface met file	C:\USERS\JBYRNE\DESKTOP\INT10-~1.SFC
ME	PROFFILE	Profile met file	C:\USERS\JBYRNE\DESKTOP\INT10-~1.PFL
ME	SURFDATA	Surf met data info.	93225 2010
ME	UAIRDATA	U-Air met data info.	23230 2010
ME	SITEDATA	On-site met data info.	
ME	PROFBASE	Elev. above MSL	0
ME	STARTEND	Start-end met dates	
ME	WDROTATE	Wind dir. rot. adjust.	
ME	WINDCATS	Wind speed cat. max.	
ME	SCIMBYHR	SCIM sample params	
EV	DAYTABLE	Print summary opt.	N/A
OU	EVENTOUT	Output info. level	N/A

OU	DAYTABLE	Print summary opt.	

Source Parameter Tables

All Sources

Source ID / Pollutant ID	Source Type	Description	UTM		Elev.	Emiss. Rate	Emiss. Units	Release Height
			East (m)	North (m)	(m)			(m)
LINE1	LINE		610189.4	4266516.2	0	0.0000002404	(g/s-m**2)	2.24
LINE2	LINE		610452.4	4266791.3	0	0.0000000107	(g/s-m**2)	2.24
LINE3	LINE		610688.2	4266978.8	0	0.0000000117	(g/s-m**2)	2.24

EPA Line Sources

Source ID / Pollutant ID	Description	UTM		Elev.	Emiss. Rate	Release Height	End X	End Y	Width	Init. Vert. Dim.
		East (m)	North (m)	(m)	(g/s-m**2)	(m)	(m)	(m)	(m)	(m)
LINE1		610189.4	4266516.2	0	0.0000002404	2.24	1	1.04	610452.4	4266791
LINE2		610452.4	4266791.3	0	0.0000000107	2.24	1	1.04	610687.2	4266979
LINE3		610688.2	4266978.8	0	0.0000000117	2.24	1	1.04	610981.5	4267125

BREEZE AERMOD Model Results

Max. Annual (5 YEARS) Results of Pollutant: PM25 (ug/m**3)

Group ID	High	Avg. Conc.	UTM		Elev.	Hill Ht.	Flag Ht.	Rec. Type	Grid ID
			East (m)	North (m)	(m)	(m)	(m)		
ALL	1ST	0.00350	610271.80	4266884.10	0.00	0.00	1.80	DC	
	2ND	0.00347	610281.80	4266894.10	0.00	0.00	1.80	DC	
	3RD	0.00341	610291.80	4266904.10	0.00	0.00	1.80	DC	
	4TH	0.00339	610251.80	4266874.10	0.00	0.00	1.80	DC	
	5TH	0.00339	610241.80	4266864.10	0.00	0.00	1.80	DC	
	6TH	0.00338	610261.80	4266884.10	0.00	0.00	1.80	DC	
	7TH	0.00338	610231.80	4266854.10	0.00	0.00	1.80	DC	
	8TH	0.00335	610271.80	4266894.10	0.00	0.00	1.80	DC	
	9TH	0.00335	610221.80	4266844.10	0.00	0.00	1.80	DC	
	10TH	0.00334	610301.80	4266914.10	0.00	0.00	1.80	DC	

Highest Results of Pollutant: PM25

Avg. Per.	Grp ID	High	Type	Val	Units	Date	UTM		Elev.	Hill Ht.	Flag Ht.	Rec. Type	Grid ID
						YYMMDDHH	East (m)	North (m)	(m)	(m)	(m)		
1-HR	ALL	1ST	Avg. Conc.	0.06161	ug/m**3	12011222	610411.80	4266994.10	0.00	0.00	1.80	DC	

Summary of Total Messages

#	Message Type
0	Fatal Error Message(s)
5	Warning Message(s)
9526	Informational Message(s)
43824	Hours Were Processed
7881	Calm Hours Identified
1645	Missing Hours Identified (3.75 Percent)

Error & Warning Messages

Msg. Type	Pathway	Ref. #	Description
WARNING	CO	W276	Special proc for 1h-NO2/SO2 24hPM25 NAAQS disabled PM25 H1H
WARNING	CO	W363	Multiyr 24h/Ann PM25 processing not applicable for PM25 H1H
WARNING	SO	W390	Aspect ratio (L/W) of LINE source greater than 100 LINE1

WARNING	SO	W390	Aspect ratio (L/W) of LINE source greater than 100 LINE2
WARNING	SO	W390	Aspect ratio (L/W) of LINE source greater than 100 LINE3

www.breeze-software.com

Attachment D

Interstate 80 Operations HARP 2 RAST Outputs

*HARP - HRACalc v16088 2/15/2017 5:14:27 PM - Cancer Risk

INDEX	GRP1	GRP2	POLID	POLABBREV	CONC	RISK_SUM
1	Diesel	DPM	9901	DieselExhPM	0.0035	2.39E-06

SCENARIO	DETAILS	INH_RISK	SOIL_RISK	DERMAL_RISK	MMILK_RISK	WATER_RISK
30YrCancerDer	*	2.39E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00

FISH_RISK	CROP_RISK	BEEF_RISK	DAIRY_RISK	PIG_RISK	CHICKEN_RISK	EGG_RISK
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

1ST_DRIVER	2ND_DRIVER	PASTURE_CONC	FISH_CONC	WATER_CONC
INHALATION		0.00E+00	0.00E+00	0.00E+00

1	Diesel	DPM	9901	DieselExhP	0.0035	0.06161	0	0	0

*HARP - HRACalc v16088 2/15/2017 5:14:27 PM - Acute Risk

INDEX	GRP1	GRP2	POLID	POLABBREV	CONC	SCENARIO
1	Diesel	DPM	9901	DieselExhPM	0.06161	NonCancerAcute

CV	CNS	IMMUN	KIDNEY	GILV	REPRO/DEVEL
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

RESP	SKIN	EYE	BONE/TEETH	ENDO	BLOOD	ODOR	GENERAL
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

*HARP - HRACalc v16088 2/15/2017 5:14:27 PM - Chronic Risk

INDEX	GRP1	GRP2	POLID	POLABBREV	CONC	SCENARIO
1	Diesel	DPM	9901	DieselExhPM	0.0035	NonCancerChronicDerived

CV	CNS	IMMUN	KIDNEY	GILV	REPRO/DEVEL	RESP
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E-04

SKIN	EYE	BONE/TEETH	ENDO	BLOOD	ODOR	GENERAL
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

DETAILS	INH_CONC	SOIL_DOSE	DERMAL_DOSE	MMILK_DOSE	WATER_DOSE	FISH_DOSE
*	3.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CROP_DOSE	BEEF_DOSE	DAIRY_DOSE	PIG_DOSE	CHICKEN_DOSE	EGG_DOSE	1ST_DRIVER
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	INHALATION

2ND_DRIVER	3RD_DRIVER	PASTURE_CONC	FISH_CONC	WATER_CONC
		0.00E+00	0.00E+00	0.00E+00

1	2	3	4	5	6	7	8
POL	POLABBREV	InhalationCancerURF	InhalationCancerSlopeFactor	OralCancerSlopeFactor	AcuteREL	InhalationChronicREL	OralChronicREL
	9901 DieselExhPM		0.0003	1.1			5

9	10	11	12	13	14	15	16
IsMultipathway	AcuteCV	AcuteCNS	AcuteIMMUN	AcuteKIDNEY	AcuteGILV	AcuteREPRO_DEVEL	AcuteRESP
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE

17	18	19	20	21	22	23	24	25
AcuteSKIN_	AcuteEYE_	AcuteBONE_TEETH_	AcuteENDO_	AcuteBLOOD_	AcuteODOR_	AcuteGENERAL_	InhalationChronicCV_	InhalationChronicCNS_
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE

26	27	28	29	30	31	32	33	34
InhalationChronicIMMUN_	InhalationChronicKIDNEY_	InhalationChronicGILV_	InhalationChronicREPRO_DEVEL_	InhalationChronicRESP_	InhalationChronicSKIN_	InhalationChronicEYE_	InhalationChronicBONE_TEETH_	InhalationChronicENDO_
FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE

35	36	37	38	39	40	41	42	43
InhalationChronicBLOOD	InhalationChronicODOR	InhalationChronicGENERAL	OralChronicCV	OralChronicCNS	OralChronicIMMUN	OralChronicKIDNEY	OralChronicGILV	OralChronicREPRO_DEVEL
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE

44	45	46	47	48	49	50	51	52
OralChronicRESP_	OralChronicSKIN_	OralChronicEYE_	OralChronicBONE_TEETH_	OralChronicENDO_	OralChronicBLOOD_	OralChronicODOR_	OralChronicGENERAL_	PathwayInhalation
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE

53	54	55	56	57	58	59	60	61
PathwayDrinking	PathwayFood	PathwayCrop	PathwayExposed	PathwayLeafy	PathwayProtected	PathwayRoot	PathwayDairy	PathwayMeatEggs
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE

62	63	64	65	66	67	68	69	70
PathwaySoilIngestion	PathwayFish	PathwayDermal	PathwayMothersMilk	SoilUptakeFactorLeafy	SoilUptakeFactorExposed	SoilUptakeFactorProtected	SoilUptakeFactorRoot	FoodTcoMilk
FALSE	FALSE	FALSE	FALSE					

71	72	73	74	75	76	77	78	79
FoodTcoEgg	FoodTcoChicken	FoodTcoBeef	FoodTcoPig	HalfLifeInSoil	GRAF	FishBCF	MolWtCorrection	DermalAbsorptionFactor
								1

80	81	82	83	84	85	86	87	88
InhalationChronicREL_8HR	InhalationChronicCV_8HR	InhalationChronicCNS_8HR	InhalationChronicIMMUN_8HR	InhalationChronicKIDNEY_8HR	InhalationChronicGILV_8HR	InhalationChronicREPRO_DEVEL_8HR	InhalationChronicRESP_8HR	InhalationChronicSKIN_8HR
	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE

89	90	91	92	93	94	95	96	97
InhalationChronicEYE_8HR	InhalationChronicBONE_TEETH_8HR	InhalationChronicENDO_8HR	InhalationChronicBLOOD_8HR	InhalationChronicODOR_8HR	InhalationChronicGENERAL_8HR	Tco_InhMM	Tco_OralMM	RChem_Group_HV
FALSE	FALSE	FALSE	FALSE	FALSE	FALSE			