REVIEW OF BAE SYSTEMS SHIP REPAIR
AB2588 HEALTH RISK ASSESSMENT (HRA)

February 12, 2019

Emissions Inventory Facility ID: 478

Toxics Emissions Inventory Year: 2013

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A Health Risk Assessment (HRA) was performed for BAE Systems Ship Repair, Foot of Sampson Street, San Diego, CA 92113 by Scientific Resources Associated (SRA) and submitted to the District for review on December 30, 2016 (Submittal HRA).

Subsequently, an updated Submittal HRA dated January 16, 2018, was evaluated using Perkins Elementary School (2010-2012) AERMET Version 16216 u* (Ustar) adjusted meteorology data for low wind speed stable conditions. The results and conclusions of the District's review of this most recent Revised Submittal HRA are presented below.

Summary of Risk Assessment Results:

Cancer Point of Maximum Impact (PMI)	84.1 in one million
Cancer Maximum Exposed Individual Resident (MEIR)	11.8 in one million
Cancer Maximum Exposed Individual Worker (MEIW)	6.51 in one million
Maximum School Risk (Perkins Elementary)	2.6 in one million
Chronic Noncancer Health Hazard Index (PMI)	0.19
Chronic Noncancer Health Hazard Index (MEIR)	0.02
8-Hour Noncancer Health Hazard Index (MEIW)	0.07
Acute Noncancer Health Hazard Index (PMI)	0.76
Acute Noncancer Health Hazard Index (MEIW)	0.76
Sub-Chronic Lead Exposure Risk	< 0.12 ug/m^3

The High Exposure Scenario approval level is 0.12 ug/m^3 in the Air Resources Board (ARB) Risk Management Guidelines for Lead, 2001.

Population Excess Cancer Burden	0.10

Summary of Health Impacts by Pollutant:

Cancer risk at the MEIR is primarily due to hexavalent chromium (67.3%), diesel particulate matter (28.9%), ethyl benzene (2.0%), and nickel (1.2%), and arsenic (0.6%). Inhalation is 93% of the risk.

The Chronic Health Hazard Index (HHI) at the MEIR is due to manganese (81.4%), arsenic (18.2%), and xylene (0.3%).

The 8-Hour HHI at the MEIW is primarily due to manganese (99%).

The Acute HHI to the immune system at the PMI is due to nickel (100%).

The Submittal HRA concludes that cancer risk at residential receptors approximately 450 meters northeast of the facility exceed the public notification level of 10 in a million specified in District Rule 1210. The District concurs with this conclusion.

Air Dispersion Modeling:

AERMOD (Version 16216r) and AERMET (Version 16216) preprocessed 2010-2012 Ustar adjusted surface and profile meteorological data for Perkins Elementary and urban dispersion coefficients were modelled.

Since fugitive sources contribute to the majority of risk, SRA determined that the volume source release parameters presented below should conservatively and adequately represent the fugitive emission sources. Volume sources are modelled as adjacent 25 meter x 25 meter cubes to not overstate the size and fugitive dispersion impacts in the model.

Volume Source Emissions Group	Source Group	Initial Horizontal Dimension (m)	Initial Vertical Dimension (m)
Pier 1	V1A-V1H V12A-V12H	25 / 4.3 = 5.81	10 / 2.15 = 4.65
Pier 3	V3A-V3G V4A-V4G	5.81	4.65
Floating Dry Dock	V2A-V2N	5.81	4.65

Emission Rates:

Annual emissions were scaled based on the daily activity of BAE operations presented below.

First Shift (7 am to 3 pm), 65% of activity, HROFDY scaling factor 1.80.
Second Shift (3 pm to 11 pm), 30% of activity, HROFDY scaling factor 1.05.
Third Shift (11 pm to 7 am), 5% of activity, HROFDY scaling factor 0.15.

The worst-case acute scenarios for the maximum one hour emissions of welding, blasting, and hull painting were determined to calculate the acute hazard index. The acute risk is mainly due to the Floating Dry Dock and Pier 1volume source emission groups.

The default (simple) HARP acute analysis was used which utilizes the highest one-hour ground level concentrations from each source at each receptor regardless of which hour the modelled concentrations occurred. For the refined acute analysis, the acute health hazard index is calculated from the maximum hourly concentrations for each source at the hour they occurred. This method is referenced in OEHHA Guidance Manual, Section 4.12.6, Modeling One-Hour Concentrations using Simple and Refined Acute Calculations, July 2015.

Refer to the BAE's Submittal HRA (December 30, 2016), Table 2-3 (a-c) for the emission allocations by source used in the risk assessment.

Cancer Risk Calculations:

Residential cancer risks were calculated using the ARB Risk Management Policy (RMP) daily breathing rates (DBR) for inhalation-based residential cancer risk. For the 30-year exposure duration, use the 95th percentile DBR for age groups less than 2 years old (3rd trimester through age 2) and the 80th DBR for age groups greater than 2 years old. Reference the ARB/CAPCOA Risk Management Guidance Document, July 2015.

The cancer risk and chronic HHI calculations included the minimum oral exposure pathways (dermal contact, soil ingestion, and mother's milk for cancer residential exposure) referencing the OEHHA Guidance Manual, Criteria for Exposure Pathway Evaluation, Section 5.2, February 2015.

In accordance with the OEHHA Guidance Manual, Estimation of Concentrations in Air, Soil, and Water, Section 5.3, the OEHHA default deposition rate of 0.05 meters per second for uncontrolled particulate matter was used for the noninhalation exposure pathways.

Since there is no school within the one in one million residential cancer risk isopleth, the 3rd trimester to age 16 frequency of time at home (FAH) was applied.

District Conclusions:

The District concurs with the air dispersion modeling procedures, including source release parameters, and risk assessment results of the most recent revised Submittal HRA.

Residential Cancer Risk Contours (in one million)