

Date:	15 August 2022
To:	Nick Horres and Allison Weller, Air Quality Specialist AB2588 Hot Spots Program and Health Risk Assessments San Diego Air Pollution Control District
From:	Lydia Pellecer and Heather Hodlin, BAE Systems San Diego Ship Repair
Subject:	Revised BAE Systems San Diego Ship Repair Risk Reduction Plan based on the 2017 Health Risk Assessment

1.0 INTRODUCTION

BAE Systems San Diego Ship Repair (BAE Systems SDSR) received a letter from the San Diego Air Pollution Control District (SDAPCD or District) on November 16, 2021, indicating that the District-approved Health Risk Assessment (HRA) for the 2017 emissions inventory showed that both the Maximum Residential Acute Non-Cancer Health Hazard Index and Maximum Worker Acute Health Hazard Index exceeded the public notification and risk reduction levels specified in District Rule 1210, sections (d)(1) and (e)(1), respectively. The results were based on a revised HRA performed by the SDAPCD and approved on November 16, 2021. Previously, BAE Systems SDSR had submitted an HRA on June 12, 2019, and a revised HRA on May 20, 2021, based on the 2017 emissions inventory. On December 9 and December 17, 2021, BAE Systems SDSR provided a refined acute analysis to the District. These submittals resulted in Amended District Modified HRA, dated December 23, 2021, which superseded the results approved on November 16, 2021. Based on the Amended District Modified HRA, the Worker Cancer Risk and the Worker Acute Health Hazard Index exceeded the public notification levels specified in District Rule 1210, but only the Maximum Worker Acute Health Hazard Index exceeded the risk reduction level for emission inventories prior to 2018. BAE Systems SDSR has fulfilled the public notification requirements. The Risk Reduction Plan (RRP) was submitted to the District on May 12, 2022. SDAPCD provided comments on June 14, 2022. This document presents the revised Risk Reduction Plan (RRP) for the acute noncancer health risk due on August 15, 2022.

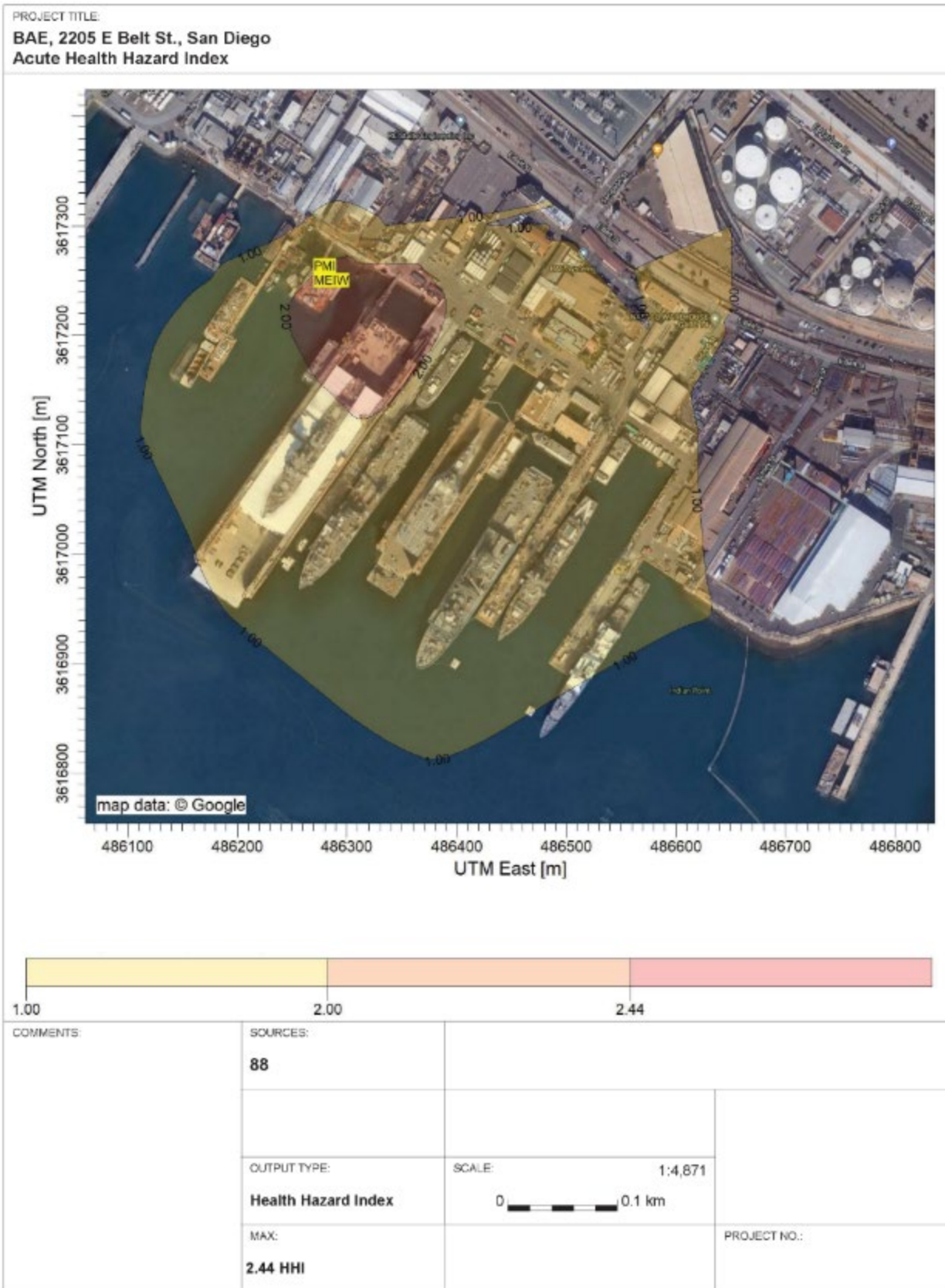
2.0 ESTIMATED NONCANCER ACUTE RISK

Rule 1210 requires that a stationary source submit a risk reduction audit and plan if their most recent approved public health risk assessment indicates potential public health risks equal to or greater than one or more of the following significant risk mitigation levels:

- Maximum incremental cancer risks equal to or greater than 100 in one million for emissions inventory years prior to 2018, or
- Cancer burden equal to or greater than 1.0, or
- Total acute noncancer health hazard index equal to or greater than 1.0, or
- Total chronic noncancer health hazard index equal to or greater than 1.0.

The 2017 Amended District Modified HRA, dated December 23, 2021, identified acute noncancer health hazard index (HHI) of 2.44, impacting R.E. Staite Engineering Inc. (RE Staite), NASSCO, and Chevron. As shown in Figure 1, the location of the RE Staite maximum receptor point is near their pier. The NASSCO receptor point is within the property fence line in the southwest corner of the facility. The isopleth slightly extends into the Chevron facility.

Figure 1. Acute Hazard Index



3.0 RISK REDUCTION PLAN ELEMENTS

The following sections present the required elements of the RRP, as prescribed in the SDAPCD Rule 1210. Responses are provided in blue font.

Rule 1210 (e)(2) states: “The risk reduction audit and plan shall comply with the requirements of Subsection (e)(2). Such risk reductions shall be accomplished within five years of the date the plan is approved by the Air Pollution Control Officer, unless an extension has been granted pursuant to Subsections (e)(4) or (e)(5).”

- i. The name and location of the stationary source.

BAE Systems San Diego Ship Repair, 2205 E Belt Street, San Diego, CA 92113

- ii. A facility risk characterization which includes an updated emissions inventory report and health risk assessment, if the risk due to total facility emissions has increased to above or decreased to below the levels indicated in the previously approved health risk assessment.

The focus of this RRP is on the welding that occurred onboard ships during the maximum day of June 13, 2017, identified in the refined acute analysis. During the preparation of this RRP, three corrections to the acute analysis were identified that directly impact the modeling and results. The first item was the location of volume sources identified for the Pride of California (POCA) dry dock, those on Pier 1 South where the USS Zumwalt was located, Pride of San Diego (POSD) dry dock, and Pier 3 North where the USS Decatur was located. Figures 2 and 3 highlight the volume source locations in reference to the actual location of ships and dry docks, based on Google Earth imagery from August 2017 and December 2017. Figures 4 and 5 represent the revised volume source locations which align accurately with the actual ships and dry docks' locations.

The second incorrect item identified in the 2017 HRA was the use of a meteorological station height (MSL) of the Perkins Elementary School (PES) station of 3 meters in AERMOD. The correct value for PES is 8 meters. This was confirmed with Mr. Bill Reeves of the SDAPCD.

The third item was the recent clarification on historical records for 0.045” diameter 309 and 316 welding spools, which were previously reported to weigh 15 pounds. The actual weight of these spools is 11 pounds. The usage amounts were divided by two (2) days and then by four (4) hours to estimate an hourly usage of 1.875 pounds per hour. Using the corrected weight, the hourly usage rate decreased to 1.375 pounds per hour. Attachment 1 includes a copy of the certificate of analysis for the 0.045” diameter 309 and 316 spools used by BAE Systems SDSR.

The three identified corrections were made to the refined acute analysis and AERMOD was rerun for nickel to identify the maximum hourly concentration. The revised values were added to the benzene values identified in the approved refined acute analysis. The revised evaluation resulted in a revised HQ for nickel and benzene at the point of maximum impact and MEIW of approximately 1.05.

Figure 2. 2017 HRA Modeled Volume Source Locations with August 2017 Imagery



Figure 3. 2017 HRA Modeled Volume Source Locations with December 2017 Imagery



Figure 4. Revised 2017 HRA Modeled Volume Source Locations with August 2017 Imagery

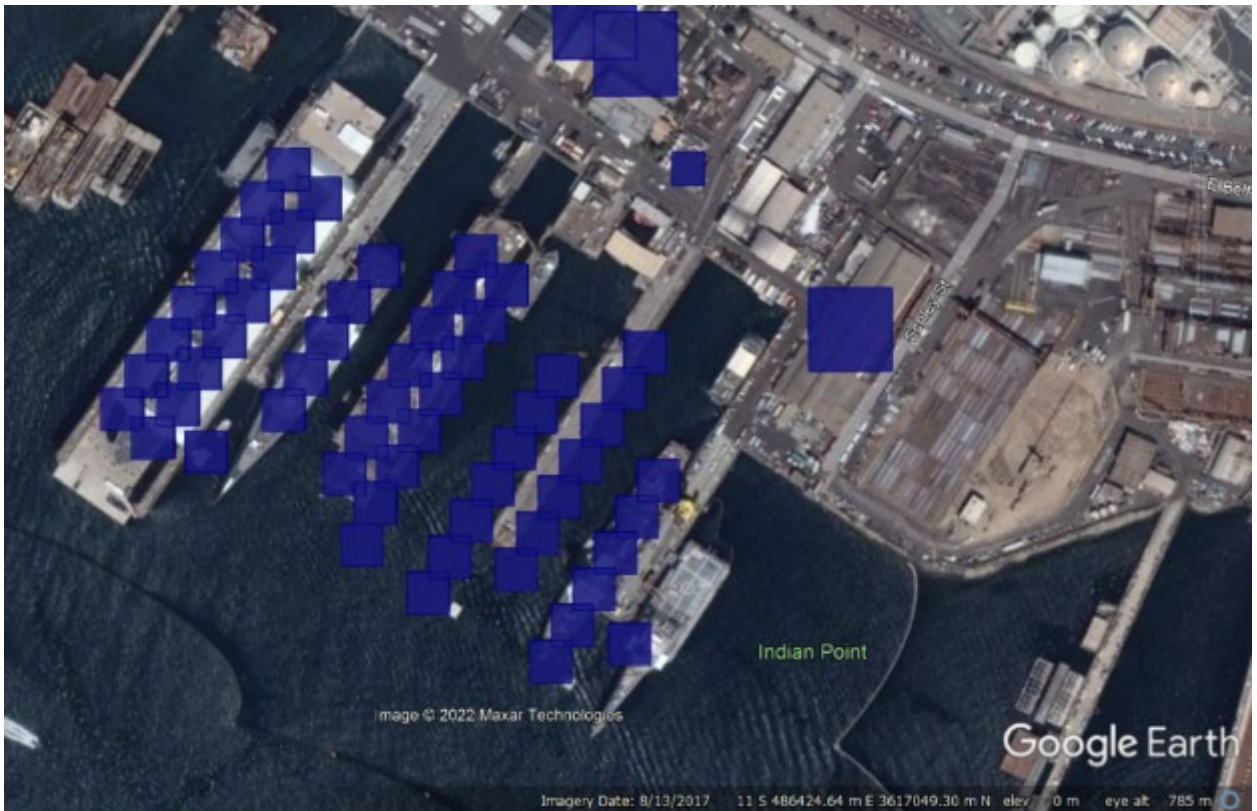
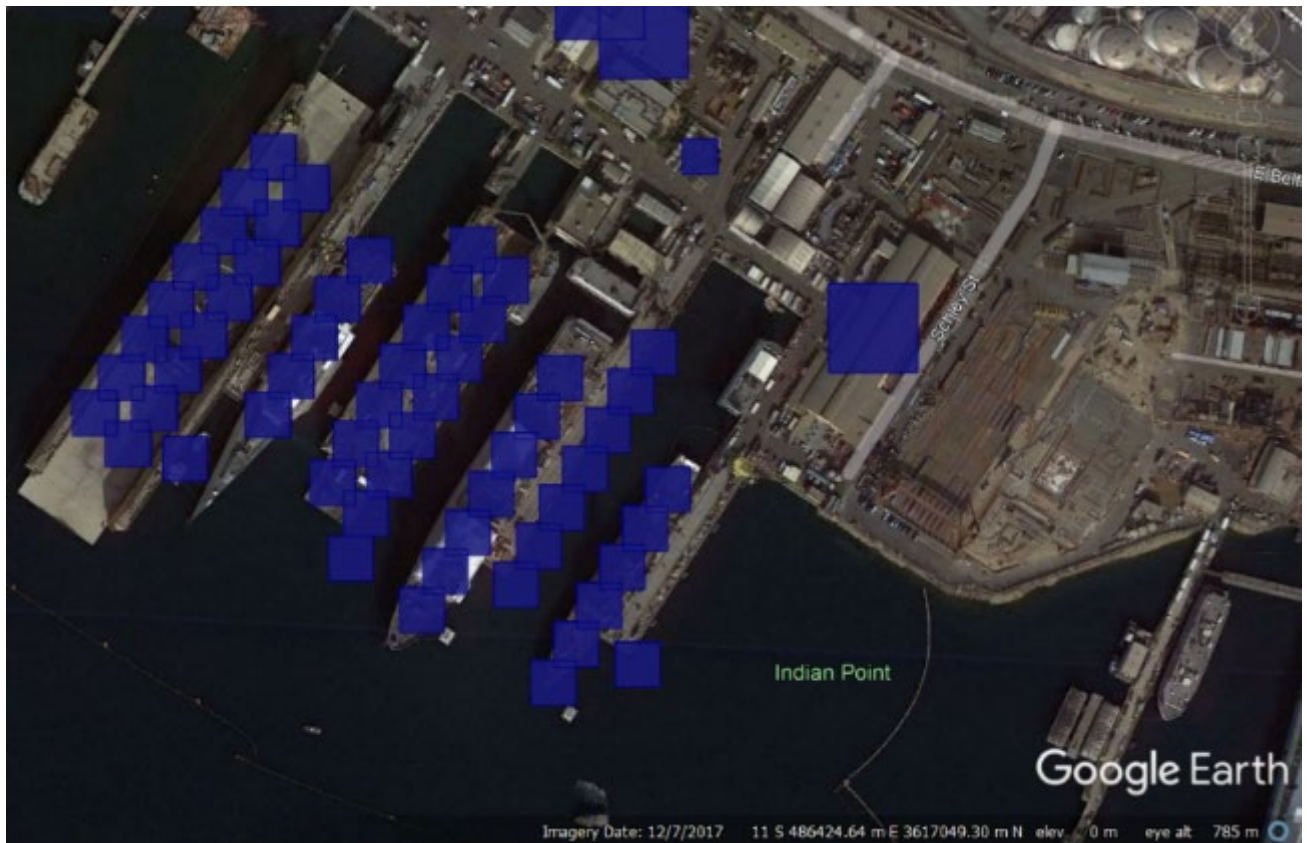


Figure 5. Revised 2017 HRA Modeled Volume Source Locations with December 2017 Imagery



- iii. The identification of all the emission unit(s) for which the owner or operator proposes to reduce toxic air contaminant emissions and the identification of the airborne toxic risk reduction measures proposed for implementation to reduce such emissions, and the anticipated emission and health risk reductions.

One of the highest concentrations of nickel emissions is from pipe repair welding using RN series and 300 series welding rod/wire in ships. To reduce pipe welding repair, BAE Systems SDSR has instituted a Mechanical Attached Fitting (MAF) process for pipe connections. MAF fittings are designed to mechanically connect pipes to avoid welding and all associated hot work permit processes. Limitations do exist based on pipe sizes and pressure requirements, but Navy Standard Items currently allow for this technology to be used on multiple systems on Navy Ships. Efforts are currently underway to obtain certification for broad use throughout other ship systems. The BAE pipe shop has conducted training and certification for over 50 of BAE pipe-fitters and invested in the required installation tools for each ship in the yard. Currently, 14% less 309 series and 85% less RN67 welding is occurring on ships due to the use of MAF. This [LOKRING® video](#) demonstrates the use of the MAF process. Additional information on the MAF process can be provided upon request. Figure 6 shows an example of an MAF process. Figures 7 and 8 show tools used in the MAF process.

Figure 6. Example of MAF



Figure 7 Lokring Tool with Fitting



Figure 8 Lokring driver device



BAE Systems SDSR is in the process of implementing a daily check out and turn in process for welding spools, and specifically 300 series stainless steel and EN (i.e., RN) spools with high nickel content. Historical records were based on a single check out of a welding spool, with no ability to track the number of days or hours over which the welding wire was used. Hourly usage tracking is not feasible; however, by gathering daily usage of these two categories of welding wire, BAE Systems SDSR will provide a more accurate account of daily usage and therefore hourly estimates.

- iv. A schedule for implementing the proposed airborne toxic risk reduction measures within five years. The schedule shall include specific increments of progress towards implementing the airborne toxic risk reduction measures.

BAE Systems SDSR had already reduced the amount of 309 and RN67 series welding rod/wire that is used on ships with the introduction of MAF. As additional certifications are obtained, BAE anticipates further use of the MAF process to reduce need for hot work permits and reduce safety concerns by eliminating the amount of welding occurring on ships.

- v. A demonstration, including supporting documentation such as emission calculations, that the proposed airborne toxic risk reduction measures will reduce or eliminate toxic air contaminant emissions from the stationary source. The demonstration shall be made through analogy with the approved health risk assessment for the stationary source or by submission of a revised forecast risk assessment. The demonstration also shall include any foreseeable new or increased emissions of toxic air contaminants from the stationary source and the estimated health risks resulting from such new or increased emissions during the period approved for implementation of the risk reduction audit and plan.

Ship pipe repair welding while ships are dry docked on the POCA was the primary source driver of the nickel emissions near the RE Staite Engineering Inc. piers, which drove the point of maximum impact (PMI). In the 2017 HRA, nickel emissions from welding were primarily from RN67 TIG, 309 GMAW, and 316 GMAW. The emissions totaled 3.46E-03 pounds per hour. Based on the 309 and 316 corrected spool weights the estimated hourly usage was reduced to 2.99E-03 pounds per hour. The operations in 2017 were evaluated based on the amount welding on of pipe connections that could now be completed using the MAF process, resulting in the 309 series rod emissions being further reduced by 29 percent, and the RN67 rod emissions being further reduced by 85 percent. This reduced the POCA hourly emissions to 1.76E-03 pounds per hour.

Similar adjustments were made to the 309 and 316 spools used on the USS Decatur (Pier 3). The 2017 HRA emissions were 1.30E-02 pounds per hour. The spool revisions reduced the emission to 1.05E-02 pounds per hour. A MAF reduction of 29% was applied to the 309 operations at Pier 3, further reducing the hourly emissions to 9.14E-03 pounds per hour.

A MAF reduction of 29 percent was also applied to the 309 usages on the USS Zumwalt (Pier 1). This reduced the hourly emission from 1.81E-03 to 1.34E-03 pounds per hour.

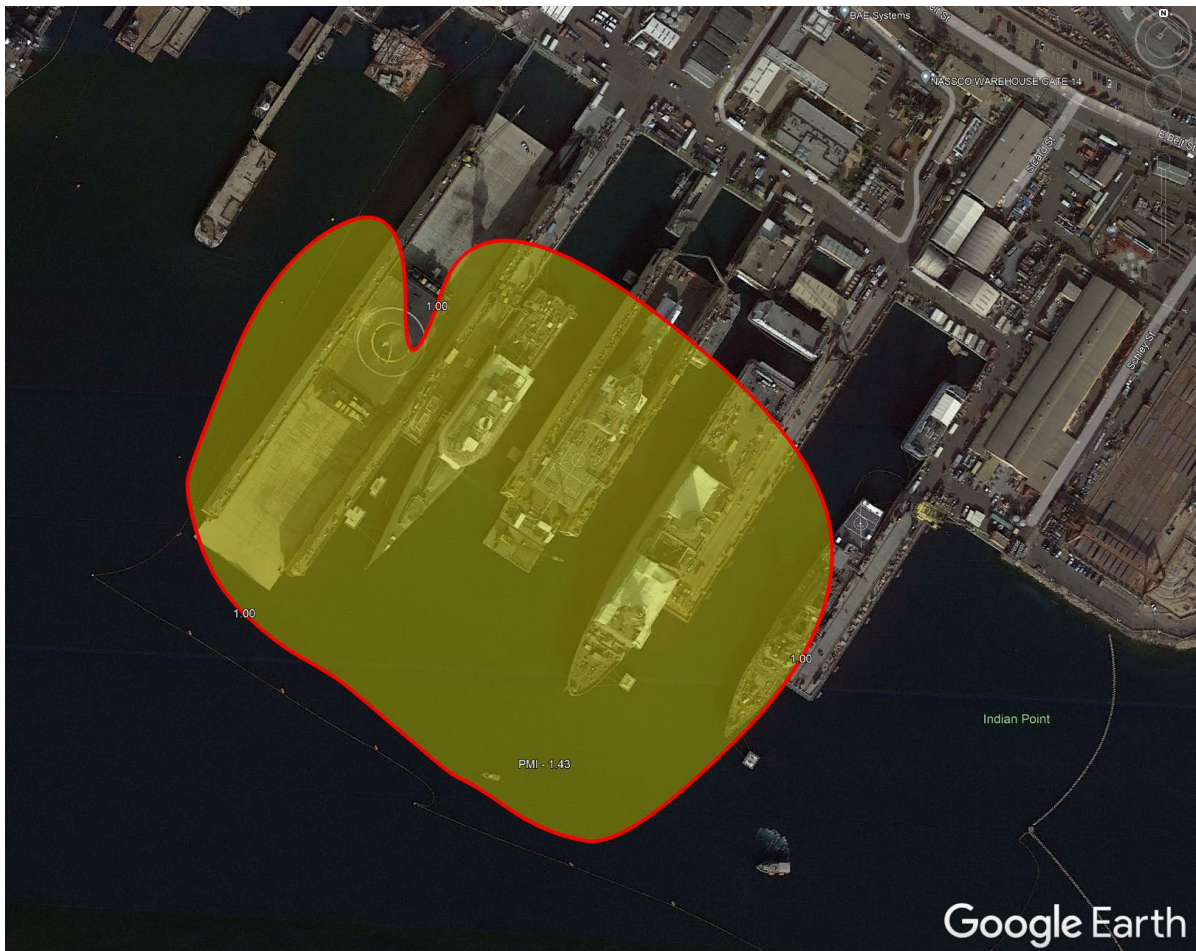
The adjusted emissions, along with the relocated volume sources, and using the correct setting for the PES height were updated in AERMOD and rerun. The results were added to the original benzene hazard quotients (HQ) as a conservative comparison. Since nickel was well over 90% of the contribution, the focus was on reductions to welding. The revised PMI shifted to the waters off Pier 3, which correlates to the higher nickel emissions from work on the USS Decatur in 2017. The maximum noncancer acute HQ for nickel and benzene near the piers at RE Staite Engineering Inc. are now at 0.90. The noncancer acute isopleth of 1.0 no longer impacts General Dynamics NASSCO, Chevron, or RE Staite Engineering Inc.

Figures 9 and 10 show the updated contour of a noncancer acute HQ of 1.0, laid out over the two available 2017 images. The revised emissions and modeling files are provided electronically.

Figure 9. Revised 2017 Refined Nickel Noncancer Acute HI with August 2017 Imagery



Figure 10. Revised 2017 Refined Nickel Noncancer Acute HI with December 2017 Imagery



- vi. A schedule for providing progress reports on reductions in emissions of toxic air contaminants and estimated health risks achieved under the implemented plan. Progress reports shall include a technology review, as applicable, that provides an update on new emissions reducing technologies, and shall be provided not less frequently than within 12 months from when the plan is approved, and annually thereafter, and may be incorporated into emission inventory report updates required pursuant to Section 44344 of the California Health and Safety Code.

The MAF process has become more prevalent in 2022 at BAE, and its usage will continue to grow. The reductions in 309 and RN67 welding on ships are being reflected in today's hourly nickel emissions and BAE is expected to continue to reflect these reductions in future air emission inventories.

Attachment 1. 0.045" 309 and 316 Certificate of Analysis