GENERAL DYNAMICS NASSCO
REVISED
2025 RISK REDUCTION AUDIT AND PLAN
BASED ON 2021 EMISSIONS INVENTORY
HEALTH RISK ASSESSMENT

August 15, 2025

Submitted by:

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ACRONYMS AND ABBREVIATIONS

BMP	best management practice
DPF	diesel particulate filter
DPM	diesel particulate matter
EPA	U. S. Environmental Protection Agency
HEPA	high efficiency particulate air
HHI	health hazard index
HRA	health risk assessment
MEIR	maximum exposed individual resident
MEIW	maximum exposed individual worker
MIL-SPEC	Military Specification
NASSCO	National Steel and Shipbuilding Company
OEHHA	Office of Environmental Health Hazard Assessment
RRAP	risk reduction audit and plan
RTO	regenerative thermal oxidizer
SCR	selective catalytic reduction
SDAPCD	San Diego Air Pollution Control District
SOC	stage of construction
TAC	toxic air contaminant
VOC	volatile organic compound

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1 INTRODUCTION

On October 23, 2023, General Dynamics National Steel and Shipbuilding Company (NASSCO) submitted a health risk assessment (HRA) to the San Diego Air Pollution Control District (SDAPCD or the District) to assess potential health risks due to emissions from operations at the NASSCO facility located at 2798 E. Harbor Drive, along the San Diego Bay in San Diego, California. The HRA was based on NASSCO's 2021 approved emissions inventory. The HRA was prepared following the guidelines of California's Office of Environmental Health Hazard Assessment's (OEHHA) Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments published in February of 2015, and the SDAPCD Supplemental Guidelines for Submission of Air Toxics "Hot Spots" Program Health Risk Assessments (HRAs) published in July 2022. The HRA was based on the April 2022 Hotspots Analysis and Reporting Program Risk Assessment Standalone Tool Version 22118 and the Lindbergh Field (San Diego International Airport) meteorological data that were processed and provided by the District.

The District and OEHHA provided comments on the HRA on April 11, 2024. In response to the comments, NASSCO submitted a revised HRA to the District on June 6, 2024, and another revision on August 16, 2024.The second revised HRA, approved on September 27, 2024, shows that the potential residential cancer risk, worker chronic risk, residential acute risk, and worker acute risk exceed the public notification and risk reduction levels specified in District Rule 1210, sections (d)(1) and (e)(1), respectively. Public Notifications were mailed out in December 2024, and a public meeting was held on January 21, 2025. The Risk Reduction Audit and Plan (RRAP) was due to the District by March 26, 2025. The RRAP was submitted to the District on March 26, 2025. The District provided NASSCO an incompleteness letter dated April 24, 2025, including a resubmission date of June 24, 2025. NASSCO submitted a revised RRAP on June 20, 2025. Subsequently, the District provided additional comments and questions that are addressed in this document.

This RRAP includes the following elements as required by Rule 1210. Sections 2 through 6 present NASSCO's proposed risk reduction audit and plan to address each element.

- Facility name and location, *Rule 1210(e)(2)(i)*: NASSCO, 2798 E. Harbor Drive, San Diego, California 92113
- Facility risk characterization based on the 2021 HRA, *Rule 1210(e)(2)(ii):* See Section 2.

- Proposed risk reduction measures, including the schedule to implement measures and the anticipated reductions to emissions and risk resulting from the measures*, Rule 1210(e)(2)(iii-v):* See Section 4.

- Updated emission inventory and health risk assessment based on reduction measures that have occurred since 2021 and as proposed in this plan, *Rule 1210(e)(2)(ii):* See Section 5.

- Schedule for providing progress reports*, Rule 1210(e)(2)(vi):* See 7.

Additional plans and considerations to meet Rule 1210 Significant Risk Thresholds are described in Section 6.

2 RISK CHARACTERIZATION

This section discusses the risk characterization from the 2021 HRA, specifically those estimated risks that were above the public notification and risk reduction thresholds. While the shipbuilding and ship repair industries are cyclical in nature, the calculated emissions and associated health risks from Calendar Year 2021 are representative of NASSCO's normal operations. Relative to previous and subsequent years, there was no material variation in operations during 2021.

2.1 ESTIMATED CANCER RISK

NASSCO's estimated potential cancer risk for calendar year 2021 exceeded the risk reduction threshold of 10 in one million for residential exposure. The potential cancer risk at the maximum exposed individual resident (MEIR) was estimated to be 28.4. The number of residences estimated to be exposed to a level between 10 and 28.4 in one million is 217 households. The orange line in Figure 2-1 is the contour line representing an estimated cancer risk of 10 in one million. Residences and businesses outside of the line have a less than 10 in one million estimated cancer risk from NASSCO's emissions.

Figure 2-1. Estimated Cancer Isopleth of 10 in One Million

(ref: Figure 3-1. AB 2588 Air Toxics "Hot Spots" Health Risk Assessment Volume 1, 16 August 2024)

The primary chemical driving the estimated cancer risk is hexavalent chromium, which contributed 41.6%, followed by nickel at 19.0%. A breakdown of the overall chemical contribution to estimated cancer risk, based on the MEIR, is shown in Figure 2-2. The primary source driving the estimated risk of cancer is welding at 60.5%, followed by paint and solvent usage at 19.9%. A breakdown of the sources contributing to the estimated cancer risk, based on the MEIR, is shown in Figure 2-3.

Figure 2-2. Estimated Cancer, MEIR, 30-year, Chemical Contribution

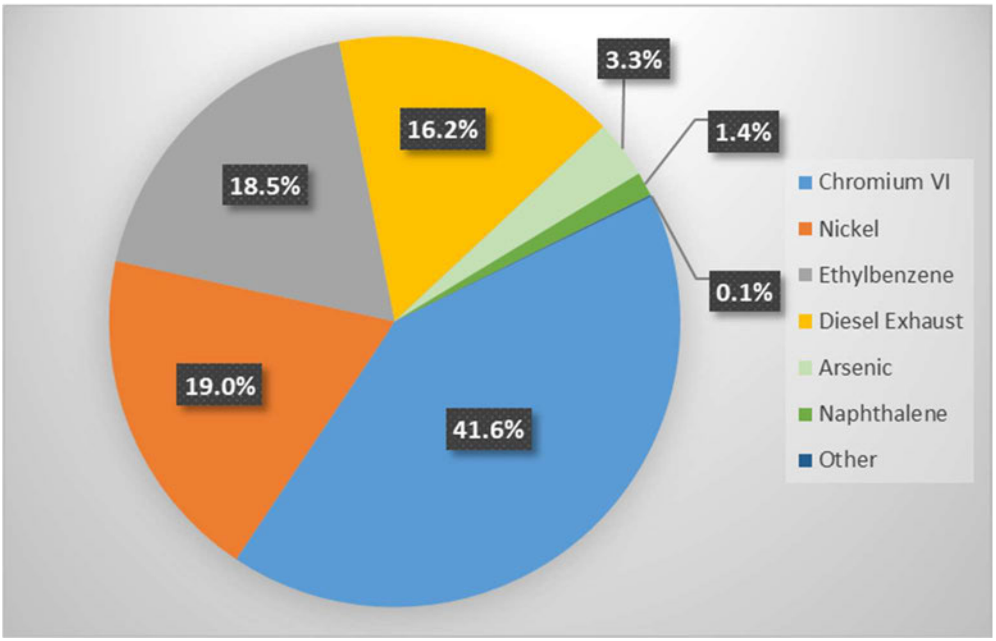
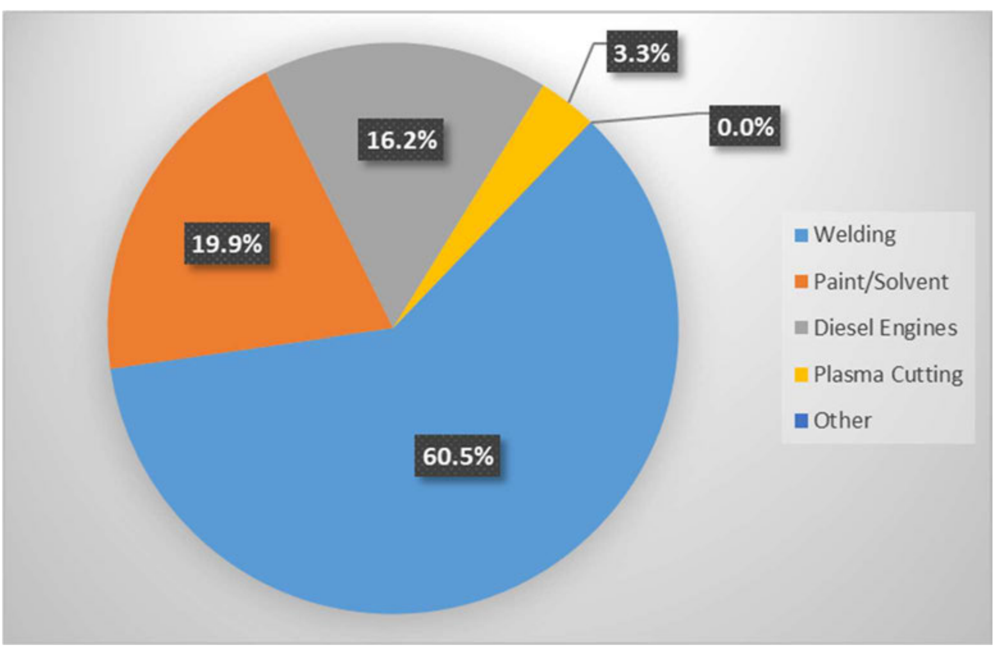


Figure 2-3. Estimated Cancer, MEIR, 30-year, Source Contribution



2.2 ESTIMATED NONCANCER CHRONIC RISK

NASSCO's noncancer chronic health hazard index (HHI), the metric used to estimate potential noncancer risk, exceeded the risk reduction threshold of 1.0 for off-site worker exposure in calendar year 2021. The chronic HHI at the maximum exposed individual worker (MEIW) was estimated to be 1.07. Four businesses are estimated to have been exposed in 2021 to a level between 1 and 1.07. The orange line in Figure 2-4 is the contour line representing an estimated chronic risk of 1.0. Residences and businesses outside of the line have a less than 1.0 estimated chronic risk from NASSCO's emissions.

Figure 2-4. Estimated Noncancer Chronic HHI Isopleth of 1.0

(ref: Figure 3-2. AB 2588 Air Toxics "Hot Spots" Health Risk Assessment Volume 1, 16 August 2024)

The primary chemical driving the estimated noncancer chronic risk is nickel, which contributed 90.4%, followed by arsenic at 8.1%. A breakdown of the overall chemical contribution to estimated noncancer chronic risk, based on the MEIW, is shown in Figure 2-5. The primary source driving the estimated noncancer chronic risk is welding at 89.7%, followed by metal cutting at 8.7%. A breakdown of the sources contributing to the estimated noncancer risk, based on the MEIW, is shown in Figure 2-6.

Figure 2-5. Estimated Noncancer Chronic, MEIW, Chemical Contribution

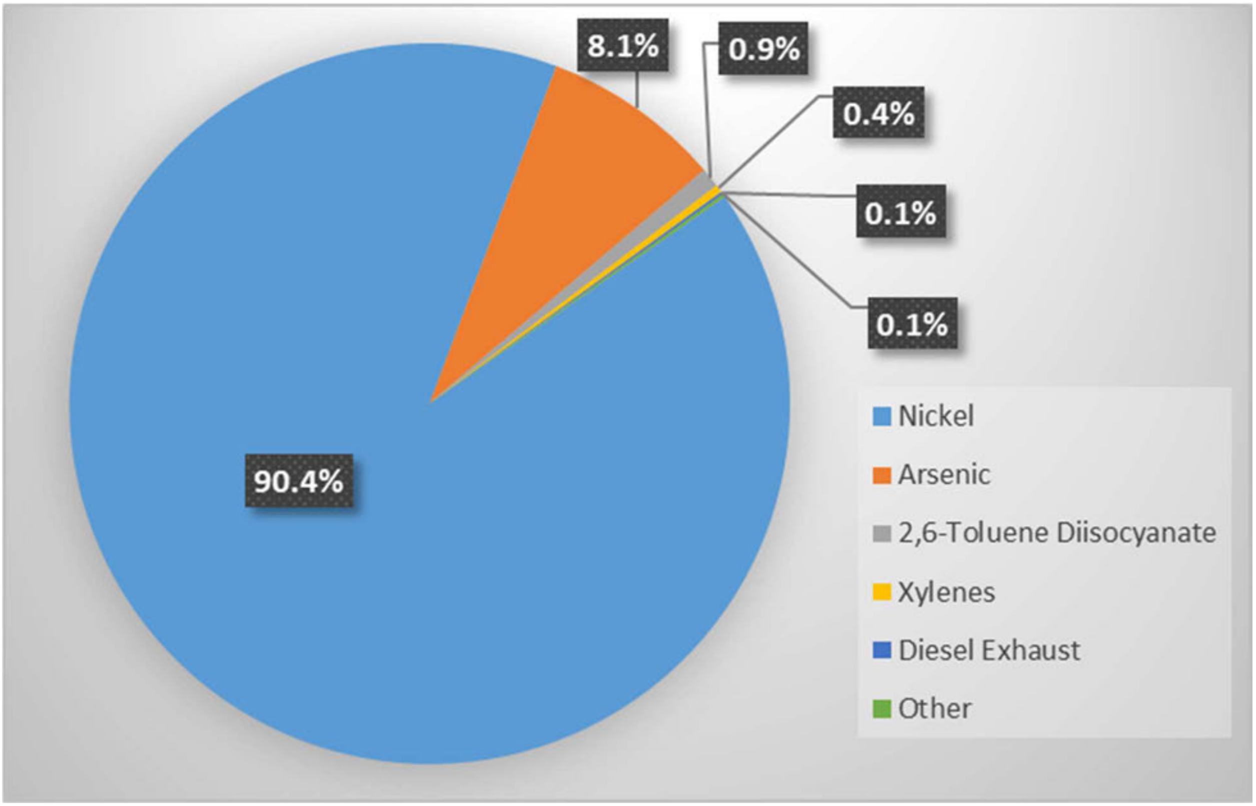
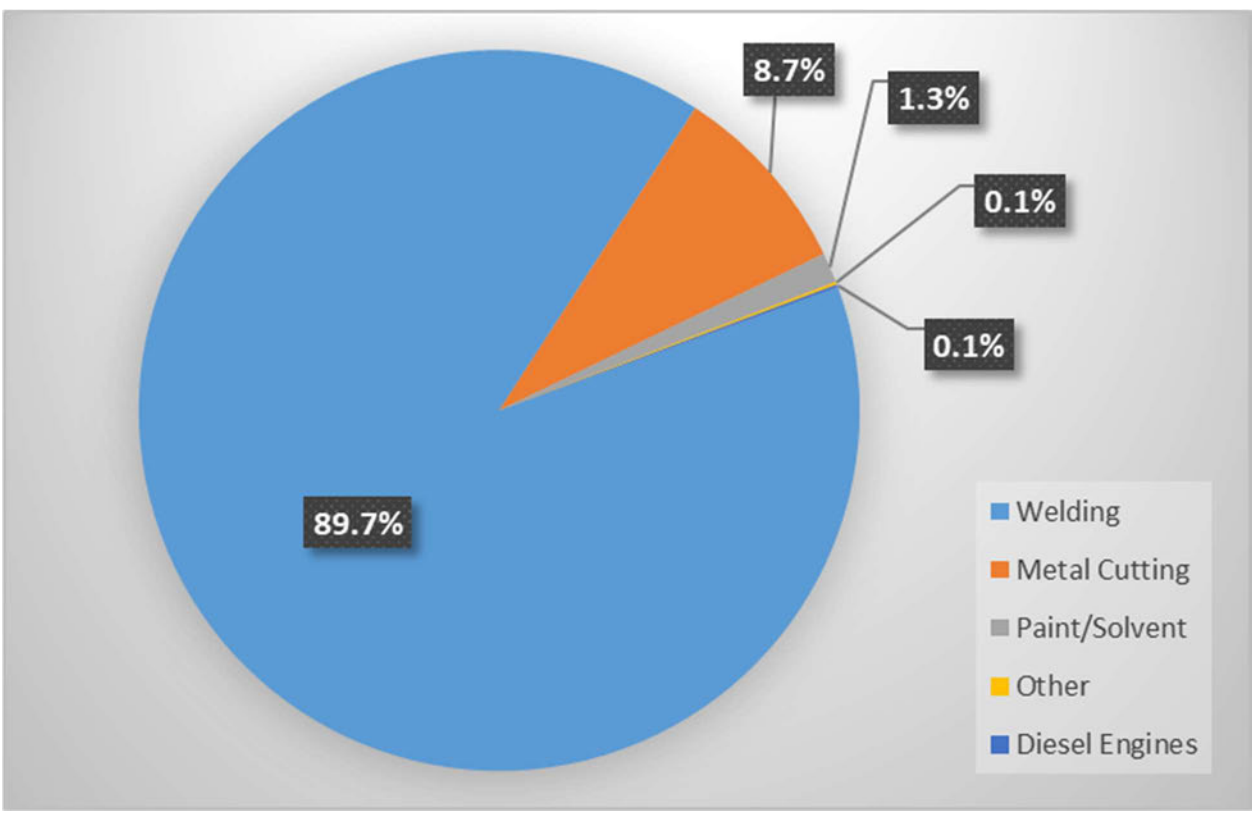


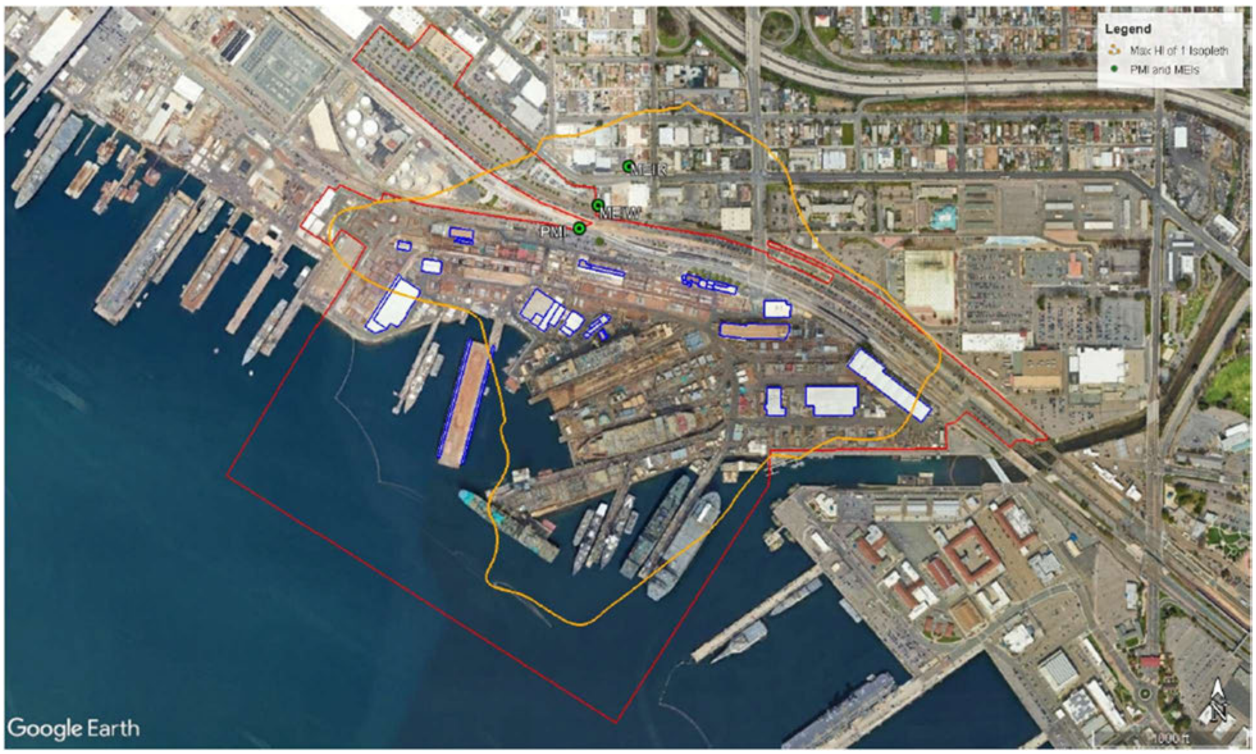
Figure 2-6. Estimated Noncancer Chronic, MEIW, Source Contribution



2.3 ESTIMATED NONCANCER ACUTE RISK

NASSCO's potential noncancer acute HHI exceeded the risk reduction threshold of 1.0 for both resident and off-site worker exposure in 2021. The acute HHI at the MEIR was estimated to be 1.19, and at the MEIW was estimated to be 1.41. Thirteen residences are estimated to have been exposed to a level between 1 and 1.19 in 2021; thirty-one businesses with workers are estimated to have been exposed to a level between 1 and 1.41. The orange line in Figure 2-7 is the contour line representing an estimated acute risk of 1.0. Residences and businesses outside of the line have a less than 1.0 estimated acute risk from NASSCO's emissions.

Figure 2-7. Estimated Noncancer Acute HHI Isopleth of 1.0



(ref: Figure 3-3. AB 2588 Air Toxics "Hot Spots" Health Risk Assessment Volume 1, 16 August 2024)

The primary chemical driving the estimated noncancer acute risk in 2021 was nickel at 99.3%, while benzene contributed to 0.6% of the risk.

The primary sources contributing to nickel emissions from NASSCO operations are welding (94.4%), abrasive blasting and metal cutting (3.1%), and diesel engines (i.e., compressors and cranes) (2.5%). Figures 2-8 and 2-9 present the chemical and source contributions to the acute HHI at the MEIR, respectively.

Figure 2-8. Estimated Noncancer Acute, MEIR, Chemical Contribution

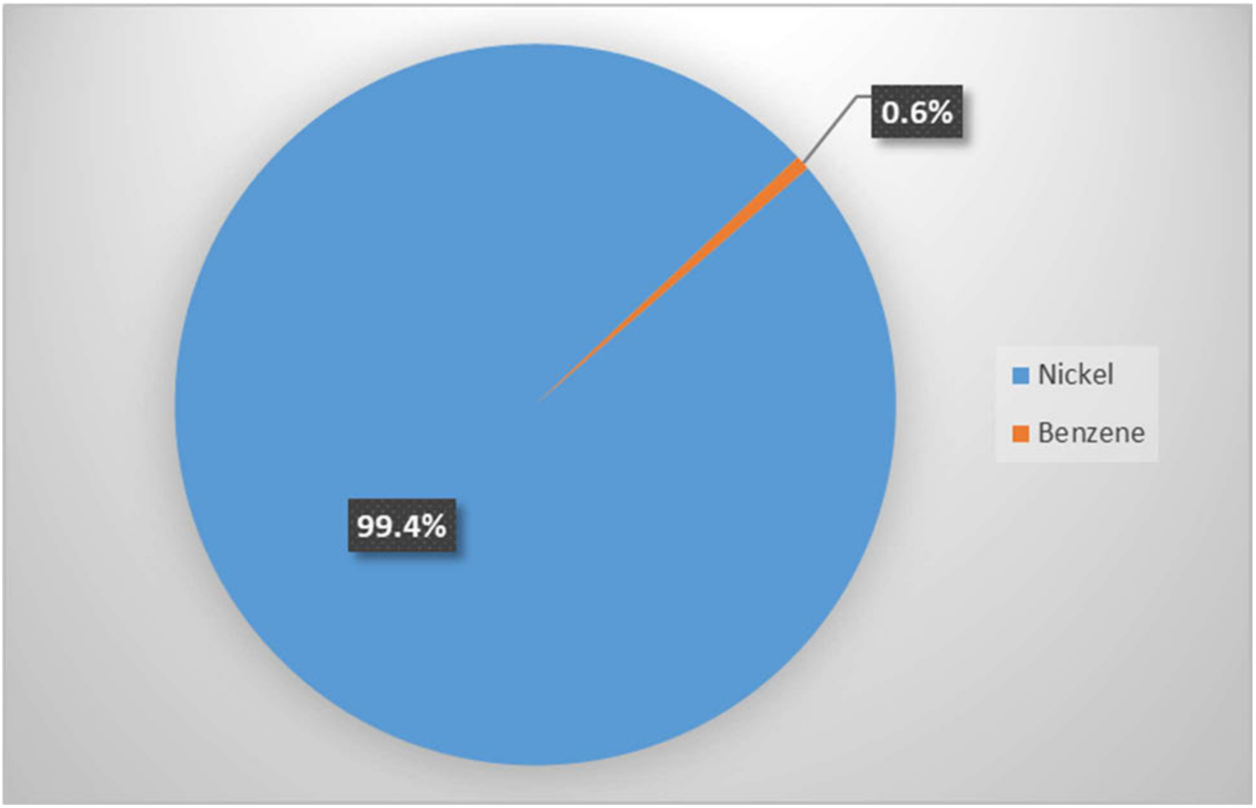
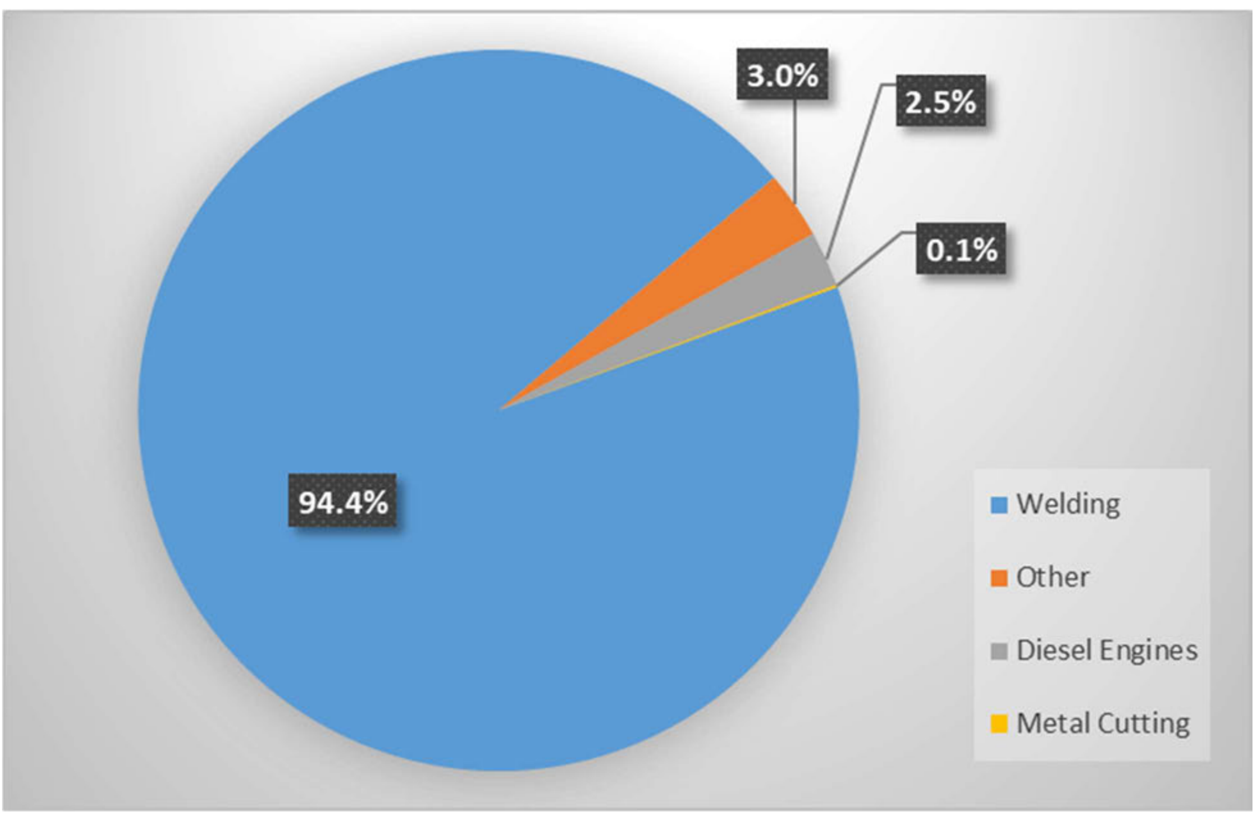


Figure 2-9. Estimated Noncancer Acute, MEIR, Source Contribution



3 HISTORICAL EMISSION REDUCTIONS

NASSCO, the only full-service shipyard on the West Coast of the United States, understands the importance of being a good steward of the environment and responsible citizen in the communities in which it operates. NASSCO operates a robust sustainability program encompassing air, water, energy, recycling, and pollution prevention. NASSCO has voluntarily implemented initiatives to reduce environmental impacts from its activities, including those focused on reducing emissions of toxic air contaminants (TAC), which are emitted from welding, abrasive blasting, burning of diesel fuel in cranes and other equipment, and use of paints, solvents, and adhesives.

In addition to initiatives that reduce emissions from NASSCO's stationary source activities, NASSCO features an award-winning alternate commuting program with carpool, vanpool, and trolley ridership programs that help to reduce indirect emissions resulting from workers commuting to and from the shipyard. Over time, NASSCO's single occupancy vehicle rate has declined steadily. Independent employee surveys conducted by SANDAG in 2022 and 2024 determined NASSCO's single occupancy vehicle rate to be 69% and 64%, respectively, resulting in less road congestion and fewer emissions in the local community.

NASSCO has also been proactive in electrifying its on-road vehicle fleet, having acquired three electric buses, one electric semi-truck, and an electric work truck to further reduce mobile source emissions.

3.1 PRE-2021 EMISSION REDUCTIONS

NASSCO has implemented voluntary initiatives to reduce TAC emissions and risk to nearby communities and NASSCO's employees. These measures have reduced the estimated cancer risk from NASSCO's 2013 operations from 53 in one million (0.0053%) to 28 in one million (0.0028%) in 2021, even as additional compounds have been newly added to District rules and health factors have grown more stringent. Some of NASSCO's initiatives that have had significant impacts are described below.

3.1.1 Blasting and Painting Facilities

Blasting and painting operations prepare and protect the steel used in ship construction from corrosion and rust over time. Recognizing the impacts these operations have on local air quality, NASSCO voluntarily commissioned several emissions control systems, to capture particulate matter and volatile organic compounds (VOCs). These systems at the time of their installation were not required by any local, state, or federal regulation and are examples of the Best Available Retrofit Control Technology for Toxics (T-BARCT), as defined in SDAPCD Rule 1210, in operation across NASSCO's facility.

Since 2009, these systems have helped to reduce NASSCO's overall yard-wide emissions of VOCs by approximately 60%.

3.1.1.1 Primer Lines

In the early ship construction phases, steel plates are blasted clean of rust and coated with preconstruction primer at two primer line facilities. Each primer line features dust collection and regenerative thermal oxidizer (RTO) systems to capture and control particulate and VOCs before they exhaust to the atmosphere.

3.1.1.2 Blast and Paint Cells

In 2009, NASSCO commissioned a 66,000-square foot blast and painting facility, consisting of two blasting cells and five paint cells that fully enclose and control their operations (Figure 3-1). The blast cells fully capture dust generated during the blasting process and process emissions are controlled by powerful dust collector systems. Each paint cell captures and routes VOCs to an RTO that destroys VOCs such as ethylbenzene and xylene.

Figure 3-1. NASSCO Blast and Paint Facility

3.1.2 Welding Emission Reductions

Welding is a primary structural process at NASSCO and is integral to building ships. Modern shipbuilding is an “assembly line” process in which steel plates travel through various stages of construction (SOCs) and are welded into progressively larger, modular structures known as blocks. These blocks are the foundation of the modular design and construction of vessels at NASSCO. Welding takes place in different forms and locations throughout NASSCO, ranging from fixed, enclosed welding workstations to open, everchanging laydown areas, as well as inside ships under construction.

For the fixed, enclosed welding workstations within the facility, such as the Thin Panel Plate Line (Figure 3-2), Block Assembly Line, and Repair Shop, NASSCO installed fume capture and control systems with high-efficiency particulate air (HEPA) filters. As a result, NASSCO reduced welding emissions in these locations by at least 90%. These systems meet T-BARCT for Thin Panel Plate Line, Block Assembly Line, and Repair Shop operations.

Figure 3-2. NASSCO Thin Panel Plate Line Operation

In addition, NASSCO follows U. S. Environmental Protection Agency (EPA)-recognized best management practices (BMPs) related to welding and reducing fumes, such as using gas-shielded welding methods and submerged arc welding whenever feasible and eliminating high fume-generating methods for stainless steel welding.

3.1.3 Diesel Emission Reductions

Over the past 20 years, NASSCO has undertaken several additional actions to reduce emissions from portable diesel equipment including upgrades to electrical infrastructure to reduce reliance on diesel equipment and retirement of older (and higher emitting) diesel engines.

While most of the cranes used in the shipyard are electrically powered, there are nine diesel whirly portal cranes that operate on a system of rails to erect ship blocks and move components within the shipyard. These nine cranes utilize non-road diesel engines for both propulsion and operational power needs but are regulated as part of the stationary source. NASSCO previously retrofitted all nine cranes to meet T-BARCT with EPA certified diesel engines equipped with diesel particulate filters (DPF), capable of greater than 85% reduction of diesel particulate matter (DPM). Additionally, six of the largest cranes were retrofitted with state-of-the-art selective catalytic reduction (SCR) aftertreatment systems, used primarily to reduce oxides of nitrogen, a precursor to ground-level ozone and a key component of smog.

Furthermore, in 2019, NASSCO implemented a policy requiring subcontractors to use solely electric or EPA Tier 4 Final-engine portable equipment such as compressors and emergency generators (Figure 3-3), meeting T-BARCT for these units.

The voluntary measures described above reduced overall DPM emissions between 2005 and 2021 by an estimated 90%.

Figure 3-3. Electric Compressors at NASSCO

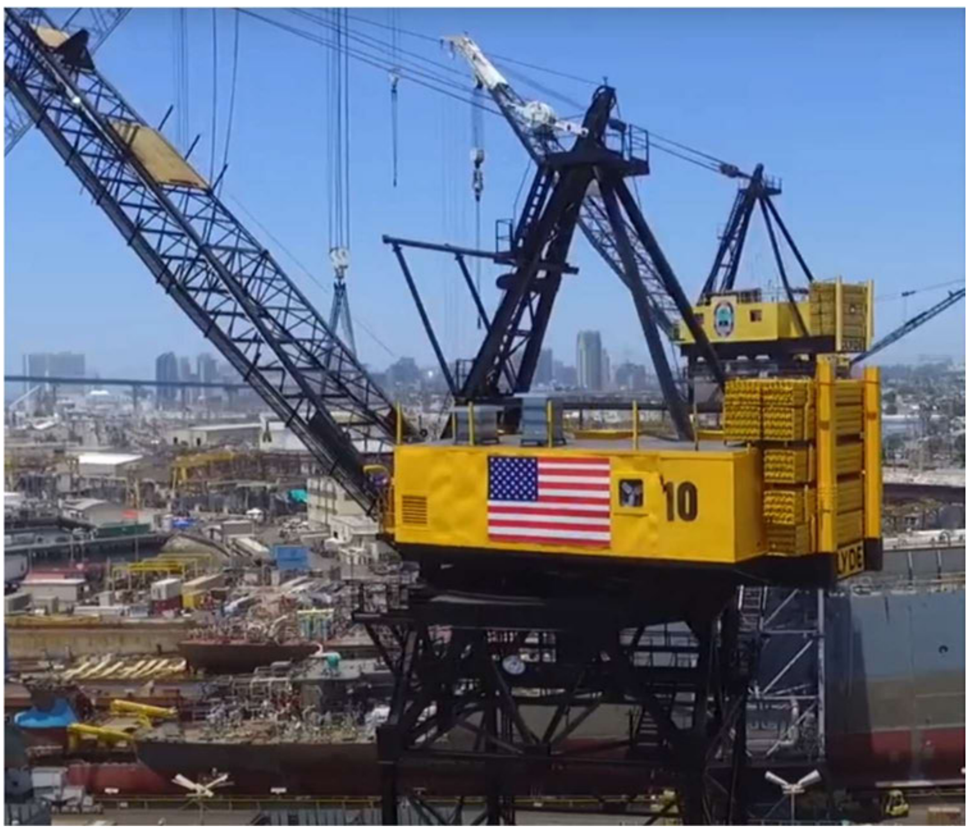
3.2 POST-2021 EMISSION REDUCTIONS

The following measures have been implemented since 2021 and were not reflected in the 2021 approved emissions inventory used in the HRA.

3.2.1 Further Diesel Emission Reductions

NASSSCO retrofitted two of its diesel whirley portal cranes, Cranes 10 and 11, with EPA certified Tier 4F engines, the cleanest engines available, in 2023. The repowering provided an additional 75% reduction in DPM emissions from these sources and met T-BARCT for these units.

Figure 3-4. Crane 10, Repowered with a Tier 4F Engine



3.2.2 Renewable Diesel

In mid-2022, NASSCO transitioned to renewable diesel for use in stationary, portable, and mobile equipment operated within NASSCO. Renewable diesel is shown to reduce DPM emissions by approximately 30% when used in engines that are not equipped with DPFs. NASSCO has committed to source only renewable diesel when the product is available.

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4 PROPOSED RISK REDUCTION AUDIT AND PLAN MEASURES

This section describes three additional risk reduction measures NASSCO proposes to implement soon to reduce estimated non-cancer and cancer risks levels associated with welding and diesel-powered equipment at the shipyard. The individual and cumulative emissions reductions and their corresponding risk values are presented in Section 5, Table 5-1 and 5-2, respectively. The outcomes of these emissions and risk reduction measures are intended to be enforced through permit conditions.

The estimated timelines for the measures presented herein may be delayed by any unavailability of materials and equipment, manufacturer delays, permitting delays, or other unanticipated interruptions or circumstances. NASSCO intends to make every reasonable effort to implement measures in a reasonable time frame and expedite those steps under NASSCO's direct control.

4.1 NONCANCER RISK REDUCTIONS

As noted in Section 2, nickel emissions from welding account for almost all estimated noncancer acute and chronic health risks for residents and workers within NASSCO's 2021 HRA isopleth.

Although welding occurs across all SOCs of NASSCO's shipyard, a significant portion takes place during its two earliest stages of construction along the fence-line and within the site's welding school. In its assessment of opportunities to reduce risk, NASSCO identified the actions described in the following sections within these areas to be feasible and effective.

4.1.1 Welding Material Selection

One recognized engineering control measure for welding fume toxicity is to evaluate and select filler materials that contain lower amounts of an alloy's elemental composition and still meet the properties needed from the steel. As an alloy, various grades of steel differ in the amounts of each element present, such as manganese, chromium, and nickel, that lend specific properties like tensile strength, heat/corrosion resistance, etc. As such, the filler material for a specific type of steel and the steel itself tend to have similar chemical makeups.

Most fumes from welding processes originate from the filler material as electric current arcs through the material to contact the welding surface. The materials used in ship construction, as well as the welding methods, must meet specific chemical composition, quality, and performance standards as established by organizations such as the American

Welding Society, International Maritime Organization, the United States Navy, and others. Therefore, NASSCO utilizes a variety of certified filler materials and welding methods for each type of steel used in ship construction. NASSCO typically performs more than 99% of its welding operations on mild and high-strength steels and must meet their respective welding standards for chemical composition, quality, and performance.

In the case of these steel types, NASSCO utilizes several high-volume filler materials containing nickel in concentrations between 0.4% and 1.7%. NASSCO's welders use these high-volume materials interchangeably in the preliminary block construction areas known as SOCs 1 through 4. From its risk reduction assessment, NASSCO determined that most of the block welding standards at this point in the construction process allow for filler materials with a nickel content on the lower range (0.4%) to be used rather than the higher range (1.7%). However, higher-nickel material is needed to meet the weld standards of the steel joining blocks and ship hulls in the final stages of construction (SOCs 5 and 6).

NASSCO proposes to increase selection of lower-nickel welding filler material where feasible in SOCs 1 through 4, targeting use of at least 50% in these SOCs, to significantly reduce nickel emissions from welding.

4.1.1.1 Welding Workstation Configurations

Most of NASSCO's welding occurs in dynamic, open-plan laydown areas to support different block geometries and to allow cranes to move the blocks throughout the shipyard and on-board the vessel under construction. Therefore, the configuration of the welders' work areas will differ on a near-constant basis according to the needs of the block's shape and working conditions on-board. For this type of work area, it is exceedingly difficult to identify risk reduction measures that are feasible and safe across NASSCO's varying production scenarios.

That said, while most of the welding workstations are necessarily open and modular, there are several fixed welding stations throughout the shipyard where welding operations are more predictable. NASSCO identified one such area in SOC 2, known as the Plate Shop, which consists of multiple fixed welding workstations (located in an open welding space) with arm-mounted welding machines that assist welders in joining smaller steel plates into the assemblies that form a block.

These workstations, known as space arms, are configured to accommodate up to two welding machines fed by either a drum (typically weighing up to 500 pounds) or individual spool (weighing 15 pounds) of weld filler material. When configured for spool-fed welding machines, the filler material's identifying information is obscured to an observer and the spool can be inadvertently changed to another type without notice. In contrast, the filler materials for drum-fed machines are larger, readily identifiable from a distance, and take more effort to replace.

NASSCO reviewed its expansive list of approved mild steel welding filler material and determined that the lower-nickel varieties proposed in Section 4.1.1 are available for purchase in drums, whereas the higher-nickel types used by NASSCO are not. This presents NASSCO with an opportunity to enforce the utilization of low-nickel welding filler material in the Plate Shop, the production area closest to the fence line, by configuring the space arms to accommodate only drum-fed (and not spool-fed) welding machines and furnishing only drums of low-nickel welding material.

4.2 CANCER RISK REDUCTIONS

As described in Section 2 of this plan, hexavalent chromium and DPM emissions are the primary drivers of the estimated cancer risk from NASSCO's operations. Over the years, NASSCO has implemented EPA-recognized BMPs to reduce welding emissions and made significant facility improvements to electrify many of its processes that previously used combustion-based technologies. NASSCO proposes the following additional measures to further reduce hexavalent chromium and DPM emissions as much as feasible.

4.2.1 Fume Capture and Filtration at Weld School

NASSCO has an on-site weld school where employees are certified to perform specific welding operations. The weld school is comprised of a series of 3-sided booths where students learn and demonstrate all welding techniques used in the shipyard. Currently, each booth is equipped with exhaust ventilation hoses ducted to a manifold that uses portable blowers to exhaust the welding fumes away from the worker. Currently, the exhaust system at the weld school does not have a filtration system to reduce emissions. Therefore, NASSCO proposes to acquire and install an exhaust system equipped with HEPA filtration (like the system already in use at the Repair Shop) for the stainless steel and mild-steel welding operations, the risk-driving emissions at this location. The proposed capture and control system will meet T-BARCT for this operation.

NASSCO has begun evaluating the engineering requirements for a new system to optimize the size, location, number of filters, and ventilation flow characteristics for fume capture and control while satisfying ventilation requirements for protecting worker safety.

4.2.2 Crane Engine Replacements

NASSCO will repower Cranes 15 and 16, two of the largest cranes at the shipyard and the biggest emitters of diesel particulate relative to the remaining crane engines such as Cranes 12 and 14. Although the current whirley crane engines for Cranes 15 and 16 are equipped with DPF and SCR aftertreatment devices to reduce emissions, NASSCO determined that the newest available EPA certified Tier 4F engines for this horsepower rating will result in significantly lower DPM emissions than the existing configuration and are therefore prioritized accordingly in this plan.

NASSCO expects to purchase the first engine in 2026. Accounting for lead times for manufacturing, permitting, materials, and installation, NASSCO projects a tentative completion date between October 2027 and June 2028. NASSCO expects to purchase the second engine in 2027 and follow a similar timeline, with a tentative completion date in late 2028 to mid-2029.

5 UPDATED HEALTH RISK ASSESSMENT

Table 5-1 presents a summary of NASSCO's facility-wide emissions for key risk drivers identified in the 2021 HRA. Table 5-1 also presents individual and cumulative emission reductions associated with risk reduction measures described in Section 4.0 (i.e., welding in SOCs 1-4, a proposed exhaust and HEPA filtration system in the weld school, and whirley crane engine replacements). The impact to facility-wide emissions associated with this plan is summarized in the last row of this table.

Table 5-1. Summary of Emissions from 2021 HRA and Proposed Risk Reduction Measures

Scenario	DPM (lb/yr)	Nickel (lb/yr)	CrVI (lb/yr)	Arsenic (lb/yr)	Ethylbenzene (lb/yr)	Benzene (lb/hr)	Nickel (lb/hr)
2021 HRA	**378.99**	**113.34**	**0.47**	**0.07**	**24,637**	**0.103**	**0.027**
Welding (SOCs 1-4)	0	61.14	0.14	0	0	0	0.011
Weld School (uncontrolled)	0	6.68	0.03	0	0	0	0.002
Other Welding	0	44.93	0.30	0	0	0	0.010
Cranes 10 & 11	93.73	0	0	0	0	0.007	0.0001
Cranes 15 & 16	162.89	0	0	0	0	0.013	0.0003
Cranes Non-T4 Ren. Diesel	80.54	0	0	0	0	0.014	0.0003
Other Diesel Engines	41.83	0	0	0	0	0.069	0.0015
Paint/Solvent Operations	0	0.0001	0	0	24,637	0	0.000001
Metal Cutting	0	0.34	0	0.07	0	0	0.0003
Remaining Sources	0	0.25	0.00004	0.0035	0	0	0.0019
Welding (SOCs 1-4)	0	(28.60)	(0.02)	0	0	0	(0.004)
Weld School (controlled)	0	(6.68)	(0.03)	0	0	0	(0.002)
Cranes 10 & 11 T4 Retrofit*	(76.79)	0	0	0	0	0	(0.0001)
Cranes 15 & 16 T4 Replac.	(115.79)	0	0	0	0	0	(0.0002)
Cranes Non-T4 Ren. Diesel*	(24.13)	0	0	0	0	0	(0.0001)
Reductions (subtotal)	**(216.72)**	**(35.29)**	**(0.05)**	**0**	**0**	**0**	**(0.006)**
Proposed	**162.27**	**78.05**	**0.41**	**0.07**	**24,637**	**0.103**	**0.021**

Numbers may not add up exactly due to rounding.
CrVI – hexavalent chromium
* Reductions that have already occurred since the calendar year 2021.

Table 5-2 summarizes estimated MEIR and MEIW risks associated with emissions in Table 5-1. The modeling data are provided to the SDAPCD for their review and concurrence.

Table 5-2. Summary of Estimated Risks from 2021 HRA and Proposed Risk Reduction Measures

Scenario	MEIR Cancer	MEIW Cancer	MEIR Chronic HHI	MEIW Chronic HHI	MEIR Acute HHI	MEIW Acute HHI
2021 HRA	**28.44**	**4.96**	**0.70**	**1.07**[a]	**1.19**	**1.41**
Welding (SOCs 1-4)	9.56	0.60	0.44	0.72	0.52	0.77
Weld School (uncontrolled)	1.50	0.14	0.04	0.05	0.25	0.35
Other Welding	6.15	1.63	0.14	0.19	0.35	0.26
Cranes 10 & 11	2.01	0.50	0.0005	0.0006	0.0035	0.0026
Cranes 15 & 16	0.85	0.19	0.0002	0.0002	0.0009	0.0005
Cranes Non-T4 Ren. Diesel	0.98	0.25	0.0003	0.0003	0.0043	0.0030
Other Diesel Engines	0.75	0.10	0.0002	0.0003	0.0207	0.0028
Paint/Solvent Operations	5.67	1.51	0.01	0.01	< 0.0001	< 0.0001
Metal Cutting	0.95	0.03	0.06	0.09	0.001	0.002
Remaining Sources	0.01	0.002	0.001	0.001	0.04	0.02
Welding (SOCs 1-4)	(2.59)	(0.18)	(0.23)	(0.16)	(0.215)	(0.266)
Weld School (controlled)	(1.50)	(0.14)	(0.04)	(0.05)	(0.126)	(0.151)
Cranes 10 & 11 T4 Retrofit*	(1.65)	(0.41)	(0.0004)	(0.0013)	(0.002)	(0.002)
Cranes 15 & 16 T4 Replac.	(0.60)	(0.14)	(0.0002)	(0.0004)	(0.001)	(0.0003)
Cranes Non-T4 Ren. Diesel*	(0.28)	(0.07)	(0.0001)	(0.0002)	(0.001)	(0.001)
Reductions (subtotal)	**(6.62)**	**(0.94)**	**(0.28)**	**(0.22)**[b]	**(0.34)**	**(0.42)**
Proposed	**21.82**	**4.02**	**0.42**	**0.73**	**0.85**	**0.99**

Numbers may not add up exactly due to rounding.
* Reductions that have already occurred since the calendar year 2021.
[a] The 2021 HRA MEIW Chronic HHI location = Loyal Towing
[b] Increments of risk reduction for the MEIW Chronic HHI are relative to risks for ESG3 in the 2021 HRA as the MEIW receptor location changed when reductions were applied.

Attachment B includes a summary of emission reductions by device for this plan relative to the approved 2021 emissions inventory. Attachment C includes a list of HRA modeling files for this plan.

6 MEETING RULE 1210 SIGNIFICANT RISK THRESHOLDS

As described in Sections 4 and 5, the proposed risk reduction measures, once implemented, will reduce the MEIW noncancer chronic HHI and MEIR/MEIW noncancer acute HHI risks to below the applicable Rule 1210 significant risk thresholds. The MEIR cancer risk, however, remains above the 10 in one million significant risk threshold.

6.1 FORESEEABLE NEW OR INCREASED EMISSIONS

NASSCO will evaluate foreseeable new or increased emission sources that could impact the estimated cancer and noncancer chronic or acute health risks. At this time, NASSCO does not anticipate any major changes to its operations that would significantly increase its existing emissions or introduce new chemicals that affect the currently estimated cancer or noncancer chronic or acute risks.

NASSCO is closely monitoring the emissions of the chemicals for which OEHHA has published health values since the 2021 HRA was requested, including but not limited to: parachlorobenzotrifluoride (PCBTF), cobalt octoate (CAS:136-52-7), HDI polymers, and trimethylbenzenes. These compounds and any others with new health values will be included in subsequent HRAs prepared for NASSCO's emissions.

Many of the foreseeable new OEHHA chemical risks are associated with health risk values being published for chemicals already present in routine marine coating operations. For instance, PCBTF, commercially known as Oxsol 100, has been used in Military Specification (MIL-SPEC) coatings for the freeboard and superstructure of Navy surface ships because it is currently the only EPA VOC-exempt solvent available from coating manufacturers with a flash point >100 degrees F.

The Navy and coating manufacturers are aware of emerging chemical risk values. Once a coating is identified as having constituents that potentially contribute to health risk, they typically research reformulations to develop material substitutions that lower or eliminate the health risk. As such, alternatives to the above chemical compounds are currently in development. Several coating manufacturers have already reformulated their polysiloxane topside coatings to be Oxsol-free while retaining a flash point >100 degrees F and a VOC content of ≤250 g/l. However, these reformulated coatings are not yet readily available and have not been tested to MIL-PRF-24635 requirements; thus, these coatings are not yet approved for use by the Naval Sea Systems Command (NAVSEA). Similarly, a recent presentation from NCP Coatings in September 2023 spoke to the goal of eliminating isocyanates and Oxsol 100 from a variety of MIL-SPEC coatings.[1]

Furthermore, the Navy Environmental Sustainability Development to Integration (NESDI) program has a project in place to evaluate reformulations on Navy ships under Project ID: 609.[2] The first phase of the project will identify one or more formulations, then move to application on Navy ships, with inspections to evaluate efficacy. Afterwards, the products would continue the path to review and approval through NAVSEA.

NASSCO is closely monitoring the Navy's evaluation of the PCBTF (Oxsol 100) issue and will continue to monitor the efforts by the Naval research center to test and approve reformulated coatings and evaluate feasibility/suitability as they become available and approved by the Navy for use. In addition, NASSCO will maintain regular outreach with paint manufacturers regarding additional reformulations to reduce or eliminate other chemicals such as cobalt octoate, HDI polymers, and trimethylbenzenes. NASSCO will report progress on these items as part of the annual reports described in Section 7.

6.2 FUTURE CONSIDERATIONS

During the execution of this plan, NASSCO will continue to evaluate technology advancements and opportunities to reduce emissions and/or risks from its operations and conduct annual public notifications and meetings as required by SDAPCD Rule 1210. As the proposed risk reduction measures are implement, NASSCO will also present updated estimated risks during the annual public meetings. Some of the potential technologies and approaches are described below.

6.2.1 Coating and Solvent Operations

As shown in Table 5-2, approximately one quarter of the remaining MEIR cancer risk in the 2021 HRA is from uncontrolled coating and solvent operations across the facility with about 93% of the risk driven by ethyl benzene and 7% of the risk from naphthalene. These compounds, among others such as trimethylbenzenes, are commonly found in marine coatings and solvents for their specific chemical and physical properties. NASSCO controls as much of its coating operations as feasible with the VOC control units at the Primelines and Paint Cells, which meet T-BARCT. However, the nature of shipbuilding

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[1] https://www.nsrp.org/wp-content/uploads/2023/09/NCP-Oxsol-Free-Update.pdf

[2] https://exwc.navfac.navy.mil/Portals/88/Documents/EXWC/Environmental_Security/NESDI/NESDIFactSheet-609.pdf

and repair requires outdoor applications of paints and solvents where additional VOC controls are not feasible. As described in Section 6.1, NASSCO must apply the coatings and solvents specified by its customers (e.g. NAVSEA) and cannot readily apply substitute materials that have not been certified to military and/or maritime specifications. At this time, there are no viable alternative marine coatings/solvents or additional control technologies that would reduce excess cancer risk from these operations. However, the Navy and marine coating manufacturers are aware of the emerging public health risks from these chemicals and are researching new formulations to either reduce or eliminate toxic ingredients and identify alternatives. NASSCO will continue to closely monitor developments in reformulations of these paints and will use any opportunity to reinforce the need for lower-risk formulations to the manufacturers and customers.

6.2.2 Welding Operations

The "other welding" category from the 2021 HRA, as presented in Tables 5-1 and 5-2, comprises approximately one quarter of the MEIR cancer risk from NASSCO operations, driven primarily by hexavalent chromium (~80%) and nickel (~20%). This includes structural mild steel and stainless steel welding in SOCs 5 and 6, the stages of construction where ship blocks are assembled into "grand blocks" and then erected by cranes onto the vessels in their build positions, respectively. The work in these areas is dynamic, requiring significant work outdoors, onboard the vessels, and often in confined spaces and on elevated work platforms where opportunities for controls are very limited.

In shipbuilding, worker safety and weld quality are paramount to NASSCO's mission and any risk reduction technologies/practices proposed for implementation must be broadly applicable without compromising safety or quality. Further risk reduction controls for welding are currently infeasible due to constantly changing work conditions and welding configurations, practical limitations with commercially-available control technologies, Occupational Safety and Health Association (OSHA) requirements, and Customer specifications.

In developing this plan, NASSCO evaluated several potential emissions reduction technologies for welding but determined them to be infeasible at this time. One technology evaluated was the use of welding guns equipped with fume extraction tips to pull fumes into a portable filtration system as a welder operates. While promising, these units are designed for use in a shop environment rather than heavy industry. The filtration units are cumbersome, weighing up to 80 pounds and not conducive for welding in confined spaces within a ship or work at heights that cannot safely accommodate additional equipment (Figure 6-1). The fume extraction tips for the welding guns are significantly wider than conventional tips and limit the welder's view of the weld. Fume extraction tips also limit access to weld tees and corners and the effectiveness of shielding gas used to protect the weld and reduce emissions. All of these challenges would result in unacceptable weld quality.

Regarding worker safety, OSHA ventilation requirements for confined spaces prevent the use of fume capture and filtration devices that exhaust treated air into the same space as the worker. OSHA fire safety requirements require unobstructed ingress and egress points in workspaces, which cannot be consistently met when having to duct multiple welding sources to an off-vessel dust collector. Furthermore, Customer specifications such as those listed in NAVSEA Standard items prevent the use of fume capture and filtration or dust collection technologies on-board a vessel.

Throughout the execution of this RRAP, NASSCO will continue assessing the state of technological improvements to welding gun fume extraction tips and portable filtration devices for feasible use in areas of the shipyard.

Figure 6-1. Welding on Vessel Hull from Mobile Elevated Work Platforms

6.2.3 Cranes

Currently, installing the cleanest diesel technology available is the most feasible risk reduction option. The electric cranes at NASSCO have a cabled power connection and move in a limited, predictable range of movement. The diesel whirley cranes run on tracks that cross each other and change direction to support the movement of ship blocks between laydown areas and the ship's build position. They cannot be physically connected to the power grid due to their movement patterns throughout the shipyard and no battery technology currently exists that can support their duty cycle. NASSCO will monitor the state of battery technology development and any other feasible options for converting additional cranes to electric throughout the yard.

6.2.4 Reducing Risk by Adjusting Source Parameters

NASSCO will continue to evaluate other source parameters to identify if any mechanical or operational modifications are feasible that can reduce health impacts. Any parameter change will be evaluated for safety, technical feasibility, overall operational efficiency, impact to risk and cost to implement.

6.3 EXTENSION REQUEST

If NASSCO's ongoing evaluation of emission and risk reduction measures and future considerations do not sufficiently reduce the MEIR cancer risk during the implementation of this plan, NASSCO will request an extension, pursuant to Rule 1210 (e)(4), with the goal to reduce the MEIR cancer risk to below the significant risk threshold. As part of any extension request, NASSCO will demonstrate that the facility has installed or implemented T-BARCT on all emission units contributing to the exceedance of the significant risk threshold. As per Rule 1210 (e)(6) (ii) and (iii), NASSCO will quantify risk reductions that have been achieved by the implementation of T-BARCT, as applicable, and provide an implementation schedule to show dates for installation and/or implementation of all technically feasible control measures, as applicable.

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7 OVERALL SCHEDULE AND PROGRESS REPORTS

This RRAP reflects previously implemented voluntary emission/risk reduction measures, new proposed risk reduction measures, material substitutions, and best management practices that proactively meet T-BARCT for our current operations. NASSCO will continue implementing welding substitution and operational changes (Section 4.1) to reduce risk upon approval of this plan. The other two proposed measures described in Section 4.2 will require additional time due to cost, engineering, and lead time. Table 7-1 outlines the overall schedule of the proposed plan. Progress reports are included in the schedule, assuming a plan approval sometime this year.

Table 7-1. NASSCO 2025 RRAP Overall Schedule

Measure/Action	Status	Completion Date
RRAP Due Date	Submitted	3/26/2025
SDAPCD Comments to RRAP	Received	4/24/2025
Revised RRAP Submittal Date	Submitted	6/20/2025 and 8/15/2025
RRAP Approval Date	Pending	To be determined
Welding Substitution at SOCs 1 through 4	Completed	6/30/2025
Plate Shop Weld Spool Configuration*	Execution in progress	9/30/2025
Technology Feasibility Evaluation	Ongoing	Ongoing
Initial Progress Report	Proposed	One year after RRAP approval
Weld School Fume Hoods and Control*	Initial Evaluations	3/31/2027
2nd Annual Progress Report	Proposed	Two years after RRAP approval
First Tier 4F Repower of Crane (15 or 16) Engine*	Initial Planning	10/30/2027
3rd Annual Progress Report	Proposed	Three years after RRAP approval
Second Tier 4F Repower of Crane (15 or 16) Engine*	Initial Planning	12/31/2028
4th Annual Progress Report	Proposed	Four years after RRAP approval
Three-year Extension Request as per Rule 1210 (e)(4) and (e)(6) - Demonstration of T-BARCT installed on all emission units within NASSCO contributing to the exceedance of the significant risk threshold(s) - Quantification of the associated risk reduction - Implementation schedule	Anticipated	During Year 5 after RRAP approval

* Actions have potential for delays based on any equipment and material availability, permitting, manufacturer, or other unforeseen circumstances.

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ATTACHMENTS

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Attachment A
General Application Form for RRAP

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Internal Use Only	
APP ID: APCD20	-APP-
SITE ID: APCD20	-SITE-

GENERAL PERMIT OR REGISTRATION APPLICATION FORM

APCD AIR POLLUTION CONTROL DISTRICT COUNTY OF SAN DIEGO

Submittal of this application does not grant permission to construct or to operate equipment except as specified in Rule 24(c) or (d)

REASON FOR SUBMITTAL OF APPLICATION:

- ☐ New Installation
- ☐ Existing Unpermitted Equipment or Rule 11 Change
- ☐ Modification of Existing Permitted Equipment
- ☐ Amendment to Existing Authority to Construct or Application
- ☐ Change of Equipment Location
- ☐ Change of Equipment Ownership *(please provide proof of ownership)*
- ☐ Change of Permit Conditions
- ☐ Change Permit to Operate Status to Inactive
- ☐ Banking Emissions
- ☐ Registration of Portable Equipment
- ☑ Other (Specify) Rule 1210 Risk Reduction Audit Plan

List affected APP/PTO Record ID(s): Not applicable

APPLICANT INFORMATION

Name of Business (DBA): General Dynamics NASSCO

Does this organization own or operate any other APCD permitted equipment at this or any other adjacent locations? ☑Yes ☐No

If yes, list assigned Site Record IDs listed on your Permits: APCD1976-SITE-00145

Name of Legal Owner (if different from DBA): N/A

Equipment Owner		Authority to Construct Mailing Address	
Name: General Dynamics NASSCO		Name: General Dynamics NASSCO	
Mailing Address: 2798 E. Harbor Drive		Mailing Address: P.O. BOX 85278, MS 22 A	
City: San Diego	State: CA	City: San Diego	State: CA
Zip: 92113	Phone: (619) 544-7780	Zip: 92186-5278	Phone: (619) 544-7780
E-Mail Address: andrew.aguilar@nassco.com		E-Mail Address: andrew.aguilar@nassco.com	

Permit To Operate Mailing Address		Invoice Mailing Address	
Name: General Dynamics NASSCO		Name: General Dynamics NASSCO	
Mailing Address: P.O. BOX 85278, MS 22 A		Mailing Address: P.O. BOX 85278, MS 22 A	
City: San Diego	State: CA	City: San Diego	State: CA
Zip: 92186-5278	Phone: (619) 544-7780	Zip: 92186-5278	Phone: (619) 544-7780
E-Mail Address: andrew.aguilar@nassco.com		E-Mail Address: andrew.aguilar@nassco.com	

EQUIPMENT/PROCESS INFORMATION: Type of Equipment: ☑ **Stationary** ☐ **Portable** ***If portable, please enter below the equipment storage address.*** **If portable, will operation exceed 12 consecutive months at the same location** ☐ **Yes** ☐ **No**

Equipment Location Address: NASSCO at 2798 E. Harbor Drive City: San Diego State: CA

Parcel No.: 7600240601 Zip: 92113 Phone: (619) 544-7780 E-mail: andrew.aguilar@nassco.com

Site Contact: Andrew Anguilar, PE, Manager, Environmental Engineering Phone: (619) 544-7780

General Description of Equipment/Process: Rule 1210 Risk Reduction Audit and Plan Addendum associated with the 2021 HRA

Application Submitted by: ☑ Owner ☐ Operator ☐ Contractor ☐ Consultant Affiliation

EXPEDITED APPLICATION PROCESSING: ☐ **I hereby request Expedited Application Processing and understand that:**

a) Expedited processing will incur additional fees and permits will not be issued until the additional fees are paid in full (see Rule 40(d)(8)(iv) for details) b) Expedited processing is contingent on the availability of qualified staff c) Once engineering review has begun this request cannot be cancelled d) Expedited processing does not guarantee action by any specific date nor does it guarantee permit approval.

I hereby certify that all information provided on this application is true and correct.

SIGNATURE: [redacted] Date: 3/25/25

Print Name: Andrew Aguilar, PE, Manager, Environmental Engineering Phone: (619) 544-7780

Company: General Dynamics NASSCO E-mail Address: andrew.agular@nassco.com

Internal Use Only

Date: ______ Staff Initials: ______ Amt Rec'd: $ ______ Fee Schedule: ______

RNP: ______ EMF: ______ NBF: ______ TA: ______ *GEN_APP_Form_Rev Date: Feb. 2015*

Attachment B
Emission Reductions for RRAP

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Attachment B
Emission Reductions for RRAP

50% Substitution of High for Low-Nickel Weld Filler Material in SOCs 1-4				Approved 2021 Emissions Inventory				2025 Risk Reduction Audit and Plan			
+ Weld School Filtration				Annual	Annual	Max Hrly	Max Hrly	Annual	Annual	Max Hrly	Max Hrly
Device	Description	Material	Chemical	Usage (lb)	Emis (lb/yr)	Usage (lb)	Emis (lb/hr)	Usage (lb)	Emis (lb/yr)	Usage (lb)	Emis (lb/hr)
1000	Welding (NASSCO)	101TC GMAW	Chromium, Hexavalent	30722	0.0025	10.97	0.000001	7596	0.00	2.71	0.000000
1000	Welding (NASSCO)	101TC GMAW	Chromium, Total	30722	0.0504	10.97	0.000018	7596	0.01	2.71	0.000004
1000	Welding (NASSCO)	101TC GMAW	Copper	30722	0.0336	10.97	0.000012	7596	0.01	2.71	0.000003
1000	Welding (NASSCO)	101TC GMAW	Manganese	30722	2.0983	10.97	0.000749	7596	0.52	2.71	0.000185
1000	Welding (NASSCO)	101TC GMAW	Nickel (except nickel oxide)	30722	3.0551	10.97	0.001091	7596	0.76	2.71	0.000270
1000	Welding (NASSCO)	101TC GMAW	Particulate Matter (PM10)	30722	307.2200	10.97	0.109700	7596	75.96	2.71	0.027123
1000	Welding (NASSCO)	101TC GMAW	Total Particulates (TSP)	30722	307.2200	10.97	0.109700	7596	75.96	2.71	0.027123
1000	Welding (NASSCO)	11018 SMAW	Chromium, Hexavalent	120	0.0009	0.04	0.000000	0	0	0	0
1000	Welding (NASSCO)	11018 SMAW	Chromium, Total	120	0.0016	0.04	0.000001	0	0	0	0
1000	Welding (NASSCO)	11018 SMAW	Copper	120	0.0007	0.04	0.000000	0	0	0	0
1000	Welding (NASSCO)	11018 SMAW	Manganese	120	0.0091	0.04	0.000003	0	0	0	0
1000	Welding (NASSCO)	11018 SMAW	Nickel (except nickel oxide)	120	0.0105	0.04	0.000003	0	0	0	0
1000	Welding (NASSCO)	11018 SMAW	Particulate Matter (PM10)	120	1.9680	0.04	0.000656	0	0	0	0
1000	Welding (NASSCO)	11018 SMAW	Total Particulates (TSP)	120	1.9680	0.04	0.000656	0	0	0	0
1000	Welding (NASSCO)	11018 SMAW	Vanadium (fume or dust)	120	0.0001	0.04	0.000000	0	0	0	0
1000	Welding (NASSCO)	309 GMAW	Chromium, Hexavalent	2398	0.1526	0.85	0.000054	2020	0.13	0.72	0.000046
1000	Welding (NASSCO)	309 GMAW	Chromium, Total	2398	3.0529	0.85	0.001082	2020	2.57	0.72	0.000912
1000	Welding (NASSCO)	309 GMAW	Copper	2398	0.0066	0.85	0.000002	2020	0.01	0.72	0.000002
1000	Welding (NASSCO)	309 GMAW	Manganese	2398	0.2070	0.85	0.000073	2020	0.17	0.72	0.000062
1000	Welding (NASSCO)	309 GMAW	Nickel (except nickel oxide)	2398	1.7112	0.85	0.000607	2020	1.44	0.72	0.000511
1000	Welding (NASSCO)	309 GMAW	Particulate Matter (PM10)	2398	23.9800	0.85	0.008500	2020	20.20	0.72	0.007160
1000	Welding (NASSCO)	309 GMAW	Phosphorous	2398	0.0016	0.85	0.000001	2020	0.00	0.72	0.000000
1000	Welding (NASSCO)	309 GMAW	Total Particulates (TSP)	2398	23.9800	0.85	0.008500	2020	20.20	0.72	0.007160
1000	Welding (NASSCO)	71T GMAW	Chromium, Hexavalent	11295	0.0012	4.03	0.000000	411264	0.02	146.74	0.000008
1000	Welding (NASSCO)	71T GMAW	Chromium, Total	11295	0.0247	4.03	0.000009	411264	0.45	146.74	0.000160
1000	Welding (NASSCO)	71T GMAW	Copper	11295	0.0185	4.03	0.000007	411264	0.45	146.74	0.000160
1000	Welding (NASSCO)	71T GMAW	Manganese	11295	0.8332	4.03	0.000297	411264	25.84	146.74	0.009220
1000	Welding (NASSCO)	71T GMAW	Nickel (except nickel oxide)	11295	0.2160	4.03	0.000077	411264	8.76	146.74	0.003127
1000	Welding (NASSCO)	71T GMAW	Particulate Matter (PM10)	11295	112.9500	4.03	0.040300	411264	4112.64	146.74	1.467370
1000	Welding (NASSCO)	71T GMAW	Total Particulates (TSP)	11295	112.9500	4.03	0.040300	411264	4112.64	146.74	1.467370
1000	Welding (NASSCO)	81K GMAW	Aluminum	1069443	0.4090	191	0.000073	626274	0.24	111.85	0.000043
1000	Welding (NASSCO)	81K GMAW	Chromium, Hexavalent	1069443	0.1169	191	0.000021	626274	0.07	111.85	0.000012
1000	Welding (NASSCO)	81K GMAW	Chromium, Total	1069443	2.3374	191	0.000417	626274	1.37	111.85	0.000244
1000	Welding (NASSCO)	81K GMAW	Manganese	1069443	66.6152	191	0.011897	626274	39.01	111.85	0.006967
1000	Welding (NASSCO)	81K GMAW	Nickel (except nickel oxide)	1069443	99.3384	191	0.017742	626274	58.17	111.85	0.010390
1000	Welding (NASSCO)	81K GMAW	Particulate Matter (PM10)	1069443	10694.4300	191	1.910000	626274	6262.74	111.85	1.118511
1000	Welding (NASSCO)	81K GMAW	Phosphorous	1069443	0.4236	191	0.000076	626274	0.25	111.85	0.000044
1000	Welding (NASSCO)	81K GMAW	Total Particulates (TSP)	1069443	10694.4300	191	1.910000	626274	6262.74	111.85	1.118511
1000	Welding (NASSCO)	81K GMAW	Vanadium (fume or dust)	1069443	0.9875	191	0.000176	626274	0.58	111.85	0.000103
1000	Welding (NASSCO)	CU AG BRAZING	Copper	773	31.1133	0.28	0.011270	633	25.48	0.23	0.009229
1000	Welding (NASSCO)	CU AG BRAZING	Particulate Matter (PM10)	773	38.6500	0.28	0.014000	633	31.65	0.23	0.011464
1000	Welding (NASSCO)	CU AG BRAZING	Silver	773	5.6429	0.28	0.002044	633	4.62	0.23	0.001674
1000	Welding (NASSCO)	CU AG BRAZING	Total Particulates (TSP)	773	38.6500	0.28	0.014000	633	31.65	0.23	0.011464
1000	Welding (NASSCO)	RN 67 GTAW	Copper	3564	13.2012	1.27	0.004704	3510	13.00	1.25	0.004633
1000	Welding (NASSCO)	RN 67 GTAW	Lead (inorganic)	3564	0.0006	1.27	0.000000	3510	0.00	1.25	0.000000
1000	Welding (NASSCO)	RN 67 GTAW	Manganese	3564	0.1441	1.27	0.000051	3510	0.14	1.25	0.000051
1000	Welding (NASSCO)	RN 67 GTAW	Nickel (except nickel oxide)	3564	5.9336	1.27	0.002114	3510	5.84	1.25	0.002082
1000	Welding (NASSCO)	RN 67 GTAW	Particulate Matter (PM10)	3564	35.6400	1.27	0.012700	3510	35.10	1.25	0.012508
1000	Welding (NASSCO)	RN 67 GTAW	Phosphorous	3564	0.0006	1.27	0.000000	3510	0.00	1.25	0.000000
1000	Welding (NASSCO)	RN 67 GTAW	Total Particulates (TSP)	3564	35.6400	1.27	0.012700	3510	35.10	1.25	0.012508

Attachment B
Emission Reductions for RRAP

Proposed Weld School Exhaust and HEPA Filtration System				Approved 2021 Emissions Inventory				2025 Risk Reduction Audit and Plan			
				Annual	Annual	Max Hrly	Max Hrly	Annual	Annual	Max Hrly	Max Hrly
Device	Description	Material	Chemical	Usage (lb)	Emis (lb/yr)	Usage (lb)	Emis (lb/hr)	Usage (lb)	Emis (lb/yr)	Usage (lb)	Emis (lb/hr)
TBD	Weld School Filter	101TC GMAW	Chromium, Hexavalent	0	0	0	0	23126	3.79E-09	8.26	1.35E-12
TBD	Weld School Filter	101TC GMAW	Chromium, Total	0	0	0	0	23126	7.58E-08	8.26	2.71E-11
TBD	Weld School Filter	101TC GMAW	Copper	0	0	0	0	23126	5.05E-08	8.26	1.80E-11
TBD	Weld School Filter	101TC GMAW	Manganese	0	0	0	0	23126	3.16E-06	8.26	1.13E-09
TBD	Weld School Filter	101TC GMAW	Nickel (except nickel oxide)	0	0	0	0	23126	4.60E-06	8.26	1.64E-09
TBD	Weld School Filter	101TC GMAW	Particulate Matter (PM10)	0	0	0	0	23126	4.63E-04	8.26	1.65E-07
TBD	Weld School Filter	101TC GMAW	Total Particulates (TSP)	0	0	0	0	23126	4.63E-04	8.26	1.65E-07
TBD	Weld School Filter	11018 SMAW	Chromium, Hexavalent	0	0	0	0	120	1.74E-09	0.04	5.79E-13
TBD	Weld School Filter	11018 SMAW	Chromium, Total	0	0	0	0	120	3.16E-09	0.04	1.05E-12
TBD	Weld School Filter	11018 SMAW	Copper	0	0	0	0	120	1.35E-09	0.04	4.51E-13
TBD	Weld School Filter	11018 SMAW	Manganese	0	0	0	0	120	1.82E-08	0.04	6.05E-12
TBD	Weld School Filter	11018 SMAW	Nickel (except nickel oxide)	0	0	0	0	120	2.10E-08	0.04	6.99E-12
TBD	Weld School Filter	11018 SMAW	Particulate Matter (PM10)	0	0	0	0	120	3.94E-06	0.04	1.31E-09
TBD	Weld School Filter	11018 SMAW	Total Particulates (TSP)	0	0	0	0	120	3.94E-06	0.04	1.31E-09
TBD	Weld School Filter	11018 SMAW	Vanadium (fume or dust)	0	0	0	0	120	1.13E-10	0.04	3.76E-14
TBD	Weld School Filter	309 GMAW	Chromium, Hexavalent	0	0	0	0	378	4.81E-08	0.13	1.71E-11
TBD	Weld School Filter	309 GMAW	Chromium, Total	0	0	0	0	378	9.62E-07	0.13	3.41E-10
TBD	Weld School Filter	309 GMAW	Copper	0	0	0	0	378	2.07E-09	0.13	7.32E-13
TBD	Weld School Filter	309 GMAW	Manganese	0	0	0	0	378	6.53E-08	0.13	2.31E-11
TBD	Weld School Filter	309 GMAW	Nickel (except nickel oxide)	0	0	0	0	378	5.39E-07	0.13	1.91E-10
TBD	Weld School Filter	309 GMAW	Particulate Matter (PM10)	0	0	0	0	378	7.56E-06	0.13	2.68E-09
TBD	Weld School Filter	309 GMAW	Phosphorous	0	0	0	0	378	4.96E-10	0.13	1.76E-13
TBD	Weld School Filter	309 GMAW	Total Particulates (TSP)	0	0	0	0	378	7.56E-06	0.13	2.68E-09
TBD	Weld School Filter	CU AG BRAZING	Copper	0	0	0	0	140	1.13E-05	0.05	4.08E-09
TBD	Weld School Filter	CU AG BRAZING	Particulate Matter (PM10)	0	0	0	0	140	1.40E-05	0.05	5.07E-09
TBD	Weld School Filter	CU AG BRAZING	Silver	0	0	0	0	140	2.04E-06	0.05	7.40E-10
TBD	Weld School Filter	CU AG BRAZING	Total Particulates (TSP)	0	0	0	0	140	1.40E-05	0.05	5.07E-09
TBD	Weld School Filter	RN 67 GTAW	Copper	0	0	0	0	54	4.00E-07	0.02	1.43E-10
TBD	Weld School Filter	RN 67 GTAW	Lead (inorganic)	0	0	0	0	54	1.77E-11	0.02	6.31E-15
TBD	Weld School Filter	RN 67 GTAW	Manganese	0	0	0	0	54	4.37E-09	0.02	1.56E-12
TBD	Weld School Filter	RN 67 GTAW	Nickel (except nickel oxide)	0	0	0	0	54	1.80E-07	0.02	6.41E-11
TBD	Weld School Filter	RN 67 GTAW	Particulate Matter (PM10)	0	0	0	0	54	1.08E-06	0.02	3.85E-10
TBD	Weld School Filter	RN 67 GTAW	Phosphorous	0	0	0	0	54	1.77E-11	0.02	6.31E-15
TBD	Weld School Filter	RN 67 GTAW	Total Particulates (TSP)	0	0	0	0	54	1.08E-06	0.02	3.85E-10
TBD	Weld School Filter	81K GMAW	Aluminum	0	0	0	0	43200	3.30E-08	7.72	5.90E-12
TBD	Weld School Filter	81K GMAW	Chromium, Hexavalent	0	0	0	0	43200	9.44E-09	7.72	1.69E-12
TBD	Weld School Filter	81K GMAW	Chromium, Total	0	0	0	0	43200	1.89E-07	7.72	3.37E-11
TBD	Weld School Filter	81K GMAW	Manganese	0	0	0	0	43200	5.38E-06	7.72	9.61E-10
TBD	Weld School Filter	81K GMAW	Nickel (except nickel oxide)	0	0	0	0	43200	8.07E-06	7.72	1.44E-09
TBD	Weld School Filter	81K GMAW	Particulate Matter (PM10)	0	0	0	0	43200	8.64E-04	7.72	1.54E-07
TBD	Weld School Filter	81K GMAW	Phosphorous	0	0	0	0	43200	3.42E-08	7.72	6.11E-12
TBD	Weld School Filter	81K GMAW	Total Particulates (TSP)	0	0	0	0	43200	8.64E-04	7.72	1.54E-07
TBD	Weld School Filter	81K GMAW	Vanadium (fume or dust)	0	0	0	0	43200	7.98E-08	7.72	1.42E-11

Attachment B
Emission Reductions for RRAP

Repower Cranes 15 and 16 with Tier 4F Engines				Approved 2021 Emissions Inventory				2025 Risk Reduction Audit and Plan			
+ Use of Renewable Diesel (benefit to non-Tier T4 Engines)				Annual	Annual	Max Hrly	Max Hrly	Annual	Annual	Max Hrly	Max Hrly
Device	Description	Material	Chemical	Usage (gal)	Emis (lb/yr)	Usage (gal)	Emis (lb/hr)	Usage (gal)	Emis (lb/yr)	Usage (gal)	Emis (lb/hr)
921303	Crane #14	DIESEL	Diesel Particulate	64677	26.5176	23.6	0.0097	64677	18.7331	23.6	0.0068
921303	Crane #14	DIESEL	Arsenic (inorganic)	64677	0	23.6	0.0000	64677	0	23.6	0.0000
921303	Crane #14	DIESEL	Cadmium	64677	0	23.6	0.0000	64677	0	23.6	0.0000
921303	Crane #14	DIESEL	Chromium, Hexavalent	64677	0	23.6	0.0000	64677	0	23.6	0.0000
921303	Crane #14	DIESEL	Chromium, Non-Hexavalent	64677	0	23.6	0.0000	64677	0	23.6	0.0000
921303	Crane #14	DIESEL	Copper	64677	0	23.6	0.0001	64677	0	23.6	0.0001
921303	Crane #14	DIESEL	Lead (inorganic)	64677	0	23.6	0.0002	64677	0	23.6	0.0001
921303	Crane #14	DIESEL	Manganese	64677	0	23.6	0.0001	64677	0	23.6	0.0001
921303	Crane #14	DIESEL	Mercury (inorganic)	64677	0	23.6	0.0000	64677	0	23.6	0.0000
921303	Crane #14	DIESEL	Nickel (except nickel oxide)	64677	0	23.6	0.0001	64677	0	23.6	0.0001
921303	Crane #14	DIESEL	Selenium	64677	0	23.6	0.0001	64677	0	23.6	0.0000
921303	Crane #14	DIESEL	Zinc	64677	0	23.6	0.0005	64677	0	23.6	0.0004
950704	Crane #11	DIESEL	Diesel Particulate	27177	28.2641	17.5	0.0182	27177	8.6586	17.5	0.0056
950704	Crane #11	DIESEL	Arsenic (inorganic)	27177	0	17.5	0.0000	27177	0	17.5	0.0000
950704	Crane #11	DIESEL	Cadmium	27177	0	17.5	0.0000	27177	0	17.5	0.0000
950704	Crane #11	DIESEL	Chromium, Hexavalent	27177	0	17.5	0.0000	27177	0	17.5	0.0000
950704	Crane #11	DIESEL	Chromium, Non-Hexavalent	27177	0	17.5	0.0000	27177	0	17.5	0.0000
950704	Crane #11	DIESEL	Copper	27177	0	17.5	0.0001	27177	0	17.5	0.0000
950704	Crane #11	DIESEL	Lead (inorganic)	27177	0	17.5	0.0001	27177	0	17.5	0.0000
950704	Crane #11	DIESEL	Manganese	27177	0	17.5	0.0001	27177	0	17.5	0.0000
950704	Crane #11	DIESEL	Mercury (inorganic)	27177	0	17.5	0.0000	27177	0	17.5	0.0000
950704	Crane #11	DIESEL	Nickel (except nickel oxide)	27177	0	17.5	0.0001	27177	0	17.5	0.0000
950704	Crane #11	DIESEL	Selenium	27177	0	17.5	0.0000	27177	0	17.5	0.0000
950704	Crane #11	DIESEL	Zinc	27177	0	17.5	0.0004	27177	0	17.5	0.0001
950705	Crane #10	DIESEL	Diesel Particulate	25978	65.4646	17.5	0.0441	25978	8.2766	17.5	0.0056
950705	Crane #10	DIESEL	Arsenic (inorganic)	25978	0	17.5	0.0000	25978	0	17.5	0.0000
950705	Crane #10	DIESEL	Cadmium	25978	0	17.5	0.0000	25978	0	17.5	0.0000
950705	Crane #10	DIESEL	Chromium, Hexavalent	25978	0	17.5	0.0000	25978	0	17.5	0.0000
950705	Crane #10	DIESEL	Chromium, Non-Hexavalent	25978	0	17.5	0.0000	25978	0	17.5	0.0000
950705	Crane #10	DIESEL	Copper	25978	0	17.5	0.0001	25978	0	17.5	0.0000
950705	Crane #10	DIESEL	Lead (inorganic)	25978	0	17.5	0.0001	25978	0	17.5	0.0000
950705	Crane #10	DIESEL	Manganese	25978	0	17.5	0.0001	25978	0	17.5	0.0000
950705	Crane #10	DIESEL	Mercury (inorganic)	25978	0	17.5	0.0000	25978	0	17.5	0.0000
950705	Crane #10	DIESEL	Nickel (except nickel oxide)	25978	0	17.5	0.0001	25978	0	17.5	0.0000
950705	Crane #10	DIESEL	Selenium	25978	0	17.5	0.0000	25978	0	17.5	0.0000
950705	Crane #10	DIESEL	Zinc	25978	0	17.5	0.0004	25978	0	17.5	0.0000
950706	Crane #12	DIESEL	Diesel Particulate	64715	17.4731	23.6	0.0064	64715	12.2244	23.6	0.0045
950706	Crane #12	DIESEL	Arsenic (inorganic)	64715	0	23.6	0.0000	64715	0	23.6	0.0000
950706	Crane #12	DIESEL	Cadmium	64715	0	23.6	0.0000	64715	0	23.6	0.0000
950706	Crane #12	DIESEL	Chromium, Hexavalent	64715	0	23.6	0.0000	64715	0	23.6	0.0000
950706	Crane #12	DIESEL	Chromium, Non-Hexavalent	64715	0	23.6	0.0000	64715	0	23.6	0.0000
950706	Crane #12	DIESEL	Copper	64715	0	23.6	0.0001	64715	0	23.6	0.0001
950706	Crane #12	DIESEL	Lead (inorganic)	64715	0	23.6	0.0002	64715	0	23.6	0.0001
950706	Crane #12	DIESEL	Manganese	64715	0	23.6	0.0001	64715	0	23.6	0.0001
950706	Crane #12	DIESEL	Mercury (inorganic)	64715	0	23.6	0.0000	64715	0	23.6	0.0000
950706	Crane #12	DIESEL	Nickel (except nickel oxide)	64715	0	23.6	0.0001	64715	0	23.6	0.0001
950706	Crane #12	DIESEL	Selenium	64715	0	23.6	0.0001	64715	0	23.6	0.0000
950706	Crane #12	DIESEL	Zinc	64715	0	23.6	0.0005	64715	0	23.6	0.0004

Attachment B
Emission Reductions for RRAP

Repower Cranes 15 and 16 with Tier 4F Engines				**Approved 2021 Emissions Inventory**				**2025 Risk Reduction Audit and Plan**			
+ Use of Renewable Diesel (benefit to non-Tier T4 Engines)				**Annual**	**Annual**	**Max Hrly**	**Max Hrly**	**Annual**	**Annual**	**Max Hrly**	**Max Hrly**
Device	Description	Material	Chemical	Usage (gal)	Emis (lb/yr)	Usage (gal)	Emis (lb/hr)	Usage (gal)	Emis (lb/yr)	Usage (gal)	Emis (lb/hr)
961422	Crane #8	DIESEL	Diesel Particulate	20646	17.9620	10	0.0087	20646	12.5720	10	0.0061
961422	Crane #8	DIESEL	Arsenic (inorganic)	20646	0	10	0.0000	20646	0	10	0.0000
961422	Crane #8	DIESEL	Cadmium	20646	0	10	0.0000	20646	0	10	0.0000
961422	Crane #8	DIESEL	Chromium, Hexavalent	20646	0	10	0.0000	20646	0	10	0.0000
961422	Crane #8	DIESEL	Chromium, Non-Hexavalent	20646	0	10	0.0000	20646	0	10	0.0000
961422	Crane #8	DIESEL	Copper	20646	0	10	0.0000	20646	0	10	0.0000
961422	Crane #8	DIESEL	Lead (inorganic)	20646	0	10	0.0001	20646	0	10	0.0001
961422	Crane #8	DIESEL	Manganese	20646	0	10	0.0000	20646	0	10	0.0000
961422	Crane #8	DIESEL	Mercury (inorganic)	20646	0	10	0.0000	20646	0	10	0.0000
961422	Crane #8	DIESEL	Nickel (except nickel oxide)	20646	0	10	0.0000	20646	0	10	0.0000
961422	Crane #8	DIESEL	Selenium	20646	0	10	0.0000	20646	0	10	0.0000
961422	Crane #8	DIESEL	Zinc	20646	0	10	0.0002	20646	0	10	0.0002
961424	Crane #9	DIESEL	Diesel Particulate	21896	10.5101	10	0.0048	21896	7.2830	10	0.0033
961424	Crane #9	DIESEL	Arsenic (inorganic)	21896	0	10	0.0000	21896	0	10	0.0000
961424	Crane #9	DIESEL	Cadmium	21896	0	10	0.0000	21896	0	10	0.0000
961424	Crane #9	DIESEL	Chromium, Hexavalent	21896	0	10	0.0000	21896	0	10	0.0000
961424	Crane #9	DIESEL	Chromium, Non-Hexavalent	21896	0	10	0.0000	21896	0	10	0.0000
961424	Crane #9	DIESEL	Copper	21896	0	10	0.0000	21896	0	10	0.0000
961424	Crane #9	DIESEL	Lead (inorganic)	21896	0	10	0.0001	21896	0	10	0.0001
961424	Crane #9	DIESEL	Manganese	21896	0	10	0.0000	21896	0	10	0.0000
961424	Crane #9	DIESEL	Mercury (inorganic)	21896	0	10	0.0000	21896	0	10	0.0000
961424	Crane #9	DIESEL	Nickel (except nickel oxide)	21896	0	10	0.0000	21896	0	10	0.0000
961424	Crane #9	DIESEL	Selenium	21896	0	10	0.0000	21896	0	10	0.0000
961424	Crane #9	DIESEL	Zinc	21896	0	10	0.0002	21896	0	10	0.0002
961425	Crane #7	DIESEL	Diesel Particulate	16830	8.0784	10.2	0.0049	16830	5.5980	10.2	0.0034
961425	Crane #7	DIESEL	Arsenic (inorganic)	16830	0	10.2	0.0000	16830	0	10.2	0.0000
961425	Crane #7	DIESEL	Cadmium	16830	0	10.2	0.0000	16830	0	10.2	0.0000
961425	Crane #7	DIESEL	Chromium, Hexavalent	16830	0	10.2	0.0000	16830	0	10.2	0.0000
961425	Crane #7	DIESEL	Chromium, Non-Hexavalent	16830	0	10.2	0.0000	16830	0	10.2	0.0000
961425	Crane #7	DIESEL	Copper	16830	0	10.2	0.0000	16830	0	10.2	0.0000
961425	Crane #7	DIESEL	Lead (inorganic)	16830	0	10.2	0.0001	16830	0	10.2	0.0001
961425	Crane #7	DIESEL	Manganese	16830	0	10.2	0.0000	16830	0	10.2	0.0000
961425	Crane #7	DIESEL	Mercury (inorganic)	16830	0	10.2	0.0000	16830	0	10.2	0.0000
961425	Crane #7	DIESEL	Nickel (except nickel oxide)	16830	0	10.2	0.0000	16830	0	10.2	0.0000
961425	Crane #7	DIESEL	Selenium	16830	0	10.2	0.0000	16830	0	10.2	0.0000
961425	Crane #7	DIESEL	Zinc	16830	0	10.2	0.0002	16830	0	10.2	0.0002
975360	Crane #15	DIESEL	Diesel Particulate	75701	85.5421	34.3	0.0388	75701	23.9801	34.3	0.0109
975360	Crane #15	DIESEL	Arsenic (inorganic)	75701	0	34.3	0.0001	75701	0	34.3	0.0000
975360	Crane #15	DIESEL	Cadmium	75701	0	34.3	0.0001	75701	0	34.3	0.0000
975360	Crane #15	DIESEL	Chromium, Hexavalent	75701	0	34.3	0.0000	75701	0	34.3	0.0000
975360	Crane #15	DIESEL	Chromium, Non-Hexavalent	75701	0	34.3	0.0000	75701	0	34.3	0.0000
975360	Crane #15	DIESEL	Copper	75701	0	34.3	0.0001	75701	0	34.3	0.0000
975360	Crane #15	DIESEL	Lead (inorganic)	75701	0	34.3	0.0003	75701	0	34.3	0.0001
975360	Crane #15	DIESEL	Manganese	75701	0	34.3	0.0001	75701	0	34.3	0.0000
975360	Crane #15	DIESEL	Mercury (inorganic)	75701	0	34.3	0.0001	75701	0	34.3	0.0000
975360	Crane #15	DIESEL	Nickel (except nickel oxide)	75701	0	34.3	0.0001	75701	0	34.3	0.0000
975360	Crane #15	DIESEL	Selenium	75701	0	34.3	0.0001	75701	0	34.3	0.0000
975360	Crane #15	DIESEL	Zinc	75701	0	34.3	0.0008	75701	0	34.3	0.0002

Attachment B
Emission Reductions for RRAP

Repower Cranes 15 and 16 with Tier 4F Engines				Approved 2021 Emissions Inventory				2025 Risk Reduction Audit and Plan			
+ Use of Renewable Diesel (benefit to non-Tier T4 Engines)				Annual	Annual	Max Hrly	Max Hrly	Annual	Annual	Max Hrly	Max Hrly
Device	Description	Material	Chemical	Usage (gal)	Emis (lb/yr)	Usage (gal)	Emis (lb/hr)	Usage (gal)	Emis (lb/yr)	Usage (gal)	Emis (lb/hr)
975361	Crane #16	DIESEL	Diesel Particulate	72965	77.3429	34.3	0.0364	72965	23.1134	34.3	0.0109
975361	Crane #16	DIESEL	Arsenic (inorganic)	72965	0	34.3	0.0001	72965	0	34.3	0.0000
975361	Crane #16	DIESEL	Cadmium	72965	0	34.3	0.0001	72965	0	34.3	0.0000
975361	Crane #16	DIESEL	Chromium, Hexavalent	72965	0	34.3	0.0000	72965	0	34.3	0.0000
975361	Crane #16	DIESEL	Chromium, Non-Hexavalent	72965	0	34.3	0.0000	72965	0	34.3	0.0000
975361	Crane #16	DIESEL	Copper	72965	0	34.3	0.0001	72965	0	34.3	0.0000
975361	Crane #16	DIESEL	Lead (inorganic)	72965	0	34.3	0.0003	72965	0	34.3	0.0001
975361	Crane #16	DIESEL	Manganese	72965	0	34.3	0.0001	72965	0	34.3	0.0000
975361	Crane #16	DIESEL	Mercury (inorganic)	72965	0	34.3	0.0001	72965	0	34.3	0.0000
975361	Crane #16	DIESEL	Nickel (except nickel oxide)	72965	0	34.3	0.0001	72965	0	34.3	0.0000
975361	Crane #16	DIESEL	Selenium	72965	0	34.3	0.0001	72965	0	34.3	0.0000
975361	Crane #16	DIESEL	Zinc	72965	0	34.3	0.0008	72965	0	34.3	0.0002

Chemicals Contributing to Risk Reductions, Subtotals

	Approved 2021 Emissions Inventory		2025 Risk Reduction Audit and Plan	
	Annual	Max Hrly	Annual	Max Hrly
Chemical	Emis (lb/yr)	Emis (lb/hr)	Emis (lb/yr)	Emis (lb/hr)
Diesel Particulate	337.15	0.1719	120.44	0.0570
Nickel (except nickel oxide)	110.26	0.0223	74.98	0.0167
Chromium, Hexavalent	0.27	0.0001	0.22	0.0001
Arsenic (inorganic)	0	0.0003	0	0.0001
Ethyl Benzene	0	0.0020	0	0.0020
Benzene	0	0.0337	0	0.0337

Chemicals Contributing to Risk Reductions, Net Changes

	2025 RRAP Total Reductions	
	Annual	Max Hrly
Chemical	Emis (lb/yr)	Emis (lb/hr)
Diesel Particulate	(216.72)	(0.1149)
Nickel (except nickel oxide)	(35.29)	(0.0056)
Chromium, Hexavalent	(0.05)	(0.00002)
Arsenic (inorganic)	0	(0.0002)
Ethyl Benzene	0	0
Benzene	0	0

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Attachment C
HRA Modeling Files for RRAP

(Provided to the District in Electronic Format)

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