PERMIT TO OPERATE ADDENDUM
TO ENGINEERING EVALUATION REPORT

RADIUS RECYCLING, INC.
(f/k/a SCHNITZER STEEL PRODUCTS COMPANY)
PLANT NUMBER 208 – APPLICATION NUMBER 30009

ADDITION OF THERMAL OXIDIZER AND SCRUBBER EQUIPMENT
TO METAL SHREDDER ENCLOSURE PROJECT

July 2025

The Bay Area Air District (Air District) has prepared this Addendum to supplement its August 2021 Engineering Evaluation Report for the installation of new air pollution control equipment by Radius Recycling, Inc. (formerly known as Schnitzer Steel Products Company).[1] The August 2021 Engineering Evaluation Report documented the basis for the issuance of an Authority to Construct to Radius Recycling for the new abatement equipment, consisting of two regenerative thermal oxidizers (RTOs) and two packed-bed acid gas scrubbers. This Addendum provides additional documentation and analysis to support the issuance of a Permit to Operate for the equipment.

I. EXECUTIVE SUMMARY

The Air District took enforcement action in 2020 to require Radius Recycling to install additional air pollution control equipment on its metal shredder at its facility in West Oakland.[2] This new abatement equipment, which Radius Recycling installed in 2022, was designed to reduce the facility's potential to emit smog-forming Precursor Organic Compounds (POC) by over 232 tons per year – from 236.7 tons per year to just 5.1 tons per year – and bring Radius Recycling's emissions into compliance with Air District regulations. The new abatement equipment has also greatly reduced health risks for those living near the facility. It has reduced cancer risk by 84%, and it has reduced exposures to non-cancer compounds with long-term (chronic) health effects by 21% and exposures to non-cancer compounds with short-term (acute) health effects by 65%.

Radius Recycling installed the new abatement equipment pursuant to an Authority to Construct issued by the Air District under Permit Application No. 30009, which authorized installation and initial operation of the equipment. The Authority to Construct and related Air District regulations required Radius Recycling to conduct startup emissions testing after installation was complete to confirm that the equipment is operating in compliance with the emission limits specified in the Air District's permit conditions and with assumptions used in the underlying emission calculations.

[1] Schnitzer Steel Products Company recently changed its name to Radius Recycling, Inc. This Addendum uses the new Radius Recycling name, although the company has not yet formally changed its name for purpose of the Air District's records. Some other Air District documents published in connection with this permitting action use the older Schnitzer Steel name. These references refer to one and the same company and one and the same facility.

[2] See Air District Notice of Violation No. A57682. In 2021, the California Attorney General, along with the Department of Toxic Substances Control and the Alameda County District Attorney, took a similar enforcement action requiring Radius Recycling to install this abatement equipment. See *People v. Schnitzer Steel Industries, Inc.* (Alameda County Superior Court Case No. RG21087468).

Radius Recycling was required to conduct this testing in order to obtain a Permit to Operate authorizing ongoing operation of the equipment.

Based on this and other recent emissions testing, it became clear that certain changes were required to the permit conditions as set forth in the Authority to Construct. The Air District issued a draft of its proposed changes to the permit conditions for public comment, along with a draft of this Addendum, in September of 2024. After having considered all the public comments received, the Air District is now finalizing its proposal and issuing a Permit to Operate for the new abatement equipment (with certain revisions to address points raised in the comments). The Permit to Operate will require the continued use of the equipment going forward and will make permanent the significant emissions reductions being achieved by the equipment.

The Permit to Operate incorporates changes to the permit conditions as initially issued in the Authority to Construct in 2021, including revisions to the emissions limits to ensure compliance with Air District regulations and other adjustments to improve monitoring, recordkeeping and compliance. All of these changes are described in detail in this Addendum to the original Engineering Evaluation Report prepared for the Authority to Construct. This Addendum also includes a discussion of civil rights and environmental justice considerations to augment the regulatory analyses included in the original Engineering Evaluation Report, as well as an analysis of California Environmental Quality Act compliance for the revised permit conditions.

Changes to Emissions Limits:

Startup emissions testing showed that the new air pollution control equipment is operating in compliance with the emissions performance standards that were contemplated when the Air District issued the Authority to Construct, with a few exceptions. Startup emissions testing revealed that the feedstock Radius Recycling processes in the metal shredder contains nitrogen compounds, which generate oxides of nitrogen (NOx) when emissions from the shredder are abated in the pollution control equipment. Under Air District regulations, Radius Recycling is required to abate these NOx emissions using a level of emissions control technology known as “Reasonably Available Control Technology,” or “RACT”. The Air District has evaluated what this level of emissions control requires for Radius Recycling’s operation, and it has determined that the equipment’s current NOx emissions comply with this RACT emissions control standard. The Air District is imposing additional NOx emission limits in the Permit to Operate to ensure that these feedstock-generated NOx emissions comply with the RACT requirement in a legally enforceable manner.

The Air District is retaining the original 50 lb/MMscf NOx emission limits for NOx generated by the new pollution control equipment itself, with which the equipment is in compliance as demonstrated by the startup emissions testing. The Air District is adding additional permit limits that will apply to the combined NOx emissions from the control equipment and NOx emissions generated from the shredder feed. These limits are specified in Condition #27348, Part 10. Emissions testing showed that the shredder and the new control equipment will comply with all

limits in Part 10. To ensure ongoing compliance, the Air District is requiring more frequent testing of NOx emissions. Condition #27348, Part 12, increases the testing frequency of NOx emissions from annual to quarterly testing. If continued compliance is demonstrated for at least three years with a sufficient margin of compliance, Radius Recycling may request that testing frequency revert to the usual annual frequency. These additional NOx limits are discussed in detail in Section III.D of this Addendum.

Testing for Toxic Air Contaminants (TACs) confirmed that the new abatement equipment is achieving significant emission reductions. However, a Health Risk Assessment indicated a cancer risk of 7.6 chances in a million, which exceeds the applicable limit of 6.0 chances in a million in Air District Regulation 2-5-302.1. The Air District is therefore adding toxicity-weighted TAC emissions limits for cancer risk and chronic non-cancer risk to ensure that the level of toxic health risk associated with the metal shredder and related sources remains within acceptable limits. The Air District is also increasing the frequency of mandatory testing to ensure that the facility is complying with these limits – from once every five years to a mandatory compliance test every two years. If any future testing were to show elevated TAC emissions rates, the facility will be required to reduce its level of operations to ensure that its annual emissions do not exceed the specified limits. These additional TAC emissions limits are in Condition #27348, Part 11, and the enhanced monitoring requirements are in Condition #27348, Part 13, and Condition #27410, Part 4. These new TAC emissions limits are discussed in detail in Section III.E. of this Addendum.

Other Permit Condition Changes:

The metal shredder is housed within an enclosure that helps prevent “fugitive” TAC emissions by capturing emissions and routing them to the abatement equipment. The shredder enclosure is designed to capture at least 95% of these TAC emissions. In Condition # 27410, Part 2, the Air District is enhancing the requirements for the enclosure by requiring that Radius Recycling follow an operating and maintenance plan for the shredder enclosure, which includes keeping openings in the enclosure closed, inspection and maintenance requirements for the enclosure and curtains, and recordkeeping for all monitoring, inspection, and repair events. The enhanced conditions also require continuous monitoring systems to measure the stack flow rate, in order to verify the shredder enclosure and blowers meet the capture efficiency requirement (expressed as derived inward face velocity) outlined in EPA Method 204, and to ensure ongoing compliance with the Air District’s inferred minimum enclosure capture efficiency of 95%.

Emissions testing demonstrated that the venturi scrubbers that are upstream of the new abatement systems can achieve compliance with particulate matter limits at a lower water flow rate. The Air District has therefore adjusted the minimum water flow rate requirement (see Condition #27410, Part 3). This change will not have an effect on emissions limits or Radius Recycling’s compliance with applicable regulatory requirements.

The Air District is also adjusting the minimum operating temperature for the thermal oxidizers and the operating temperature range for thermocouples measuring this temperature, based on recent

emission test data. This change is intended to ensure ongoing compliance with POC destruction efficiency requirements and TAC emission limits.

Finally, the Air District is adding appropriate averaging times for parametric operating limits, such as fan amperes and minimum water flow rates, and adding language to allow adjustment of parametric monitoring limits based on Air-District-approved source test results when needed to assure compliance with applicable emission limits.

All of these permit condition changes are discussed in detail in Section IV of this Addendum.

Additional Considerations:

Due to the changes in emissions limits in the Permit to Operate, the Air District has further considered the potential impacts from this project on the surrounding environment pursuant to the California Environmental Quality Act (CEQA). The Air District has concluded that this project will not have any significant adverse impacts and there is no requirement to consider alternatives or mitigation measures beyond what the Air District is imposing anyway under its own regulations. These conclusions are discussed in more detail later in Section V of this Addendum.

The Air District has also included a discussion of civil rights and environmental justice considerations in this Addendum. The Radius Recycling facility is located in West Oakland, where civil rights and environmental justice concerns are an important consideration due to the higher proportion of Black residents and higher pollution levels compared to the greater Bay Area. This permitting decision is consistent with civil rights law and environmental justice principles because, among other reasons, the abatement equipment that is the subject of the permit is benefitting the surrounding community by reducing emissions from Radius Recycling's facility. Although the installation of the abatement equipment has resulted in some incidental emission increases, any potential adverse impacts are far outweighed by the positive impacts and would be mitigated. These issues are discussed in more detail in Section VI of this Addendum.

Issuance of Permit to Operate for the New Abatement Equipment:

Under the Air District's permitting regulations, a permit applicant is required to obtain an Authority to Construct to authorize construction and initial operation of a project, and then it is required to obtain a Permit to Operate based on startup emissions testing to authorize continued operation going forward. Based on these analyses establishing that the new pollution control equipment Radius Recycling has installed is in compliance with Air District regulatory and permitting standards, the Air District is now issuing the Permit to Operate for the equipment, with additional and revised permit conditions as outlined above. This Addendum discusses the test results and the basis for the permit condition revisions in more detail. The revised permit conditions are provided in Section VII of this Addendum, showing the changes from made to the original Authority to Construct conditions in underline/~~strikeout~~ format.

The Air District is issuing the Permit to Operate after issuing a proposed permit for public review and comment, along with a draft version of this Addendum. The Air District has considered all of the public comments received, and it has prepared a written response to all of the comments, which is being published concurrently with this Addendum. The Air District thanks all the commenters for their insightful comments. These comments have improved the final Permit to Operate.

II. AUTHORITY TO CONSTRUCT FOR RADIUS RECYCLING'S NEW AIR POLLUTION CONTROL EQUIPMENT

The Air District issued an Authority to Construct to Radius Recycling on August 26, 2021, authorizing Radius Recycling to install two Regenerative Thermal Oxidizers and two Packed Bed Acid Gas Scrubbers on its metal shredder.[3] Specifically, the Authority to Construct authorized Radius Recycling to install the following pollution control equipment on the metal shredder (Source S-6):

A-15 Regenerative Thermal Oxidizer, 21 MMBTU/hr

A-16 Regenerative Thermal Oxidizer, 21 MMBTU/hr

A-17 Packed Bed Scrubber, abating A-15

A-18 Packed Bed Scrubber, abating A-16

Radius Recycling sought to install this abatement equipment to control emissions of Precursor Organic Compounds (POC) that are generated by the metal shredder. POC is a precursor pollutant that combines with oxides of nitrogen (NOx) in the atmosphere to form tropospheric ozone, the principal ingredient in regional smog. Air District regulations restrict the amount of POC that can be emitted from Radius Recycling's facility, and the Regenerative Thermal Oxidizers (RTOs) are necessary to control emissions to compliant levels. The packed bed scrubbers are necessary to remove any acid gases that may form in the RTOs. A more detailed description of the equipment is provided in Section II of the Engineering Evaluation for the project.

Under Air District regulations, an Authority to Construct allows a facility to install the equipment and operate it for a limited startup period, during which the facility is required to test the equipment to demonstrate that it has been installed in compliance with the Authority to Construct and is complying with applicable permit conditions. (*See* Air Dist. Regulations 2-1-210 & 2-1-411.) The Air District reviews the results of the startup emissions testing (among other information) to confirm compliance. Once the facility demonstrates that it has installed the equipment and is operating it in compliance with applicable permit conditions, the Air District issues a Permit to Operate to authorize continued operation going forward, with any changes to the permit conditions necessary to ensure ongoing compliance. (*See* Air Dist. Regulations 2-1-411.) The Permit to Operate is subsequently renewed annually.

[3] The Air District subsequently made some minor changes in a revised Authority to Construct issued March 2, 2022, which was the version of the Authority to Construct in effect at the time of this permit issuance.

After receiving its Authority to Construct in August of 2021,[4] Radius Recycling installed the new pollution control equipment and began operating it in April of 2022. Radius Recycling conducted startup emissions testing in 2022, as well as additional testing in February 2023 and May 2024.[5] Testing included:

- Testing of the abatement equipment's POC destruction efficiency to confirm compliance with the requirement in Condition #27348, Part 2;
- Testing of CO and NOx emissions to confirm compliance with the limits in Condition #27348, Part 10;
- Testing of PM and POC limits to confirm compliance with the limits in Condition #27410, Part 3; and,
- Testing of Toxic Air Contaminant (TAC) emissions in accordance with Condition #27348, Part 11, and related requirements.

The results of this testing are discussed below.

III. RESULTS OF STARTUP EMISSIONS TESTING

The startup emissions testing has ultimately confirmed that Radius Recycling's new air pollution control equipment is operating in compliance with applicable Air District regulatory standards. In some cases, certain adjustments were necessary to get the equipment operating properly, and in other cases (with NOx and TAC emissions) new permit limits were required to ensure that emissions remain compliant with applicable requirements. The following discussion provides a detailed overview of the emissions testing results and how emissions will comply under the revised conditions being included in the Permit to Operate.

A. POC Emissions:

Emissions testing conducted April 26-29, 2022, showed that each RTO met all applicable emission limits for organic compounds, including (i) the total carbon emission limits in Air District Regulation 8-2-301; (ii) the volatile organic compound (VOC) destruction efficiency requirement in Condition #27348, Part 2; and (iii) the POC limits in Condition #27410, Part 3. Subsequent testing in October 2022 also demonstrated compliance with all applicable organic emission limits.

[4] After initial issuance of the Authority to Construct, the Air District issued a revision on March 2, 2022, that amended certain permit conditions to clarify operating and monitoring requirements and correct errors.

[5] The emissions testing included the following tests, as documented in the cited test results and accompanying memoranda: (i) Air District Interoffice Memorandum, November 3, 2022: Outside Test CST-10028; April 26 thru 29, 2022, source test of S-6 for Schnitzer Steel (Oakland, CA), Plant #208, Application #30009; (ii) Air District Interoffice Memorandum, September 29, 2022: Outside Test CST-10032; July 14 & 15, 2022, source test of S-6 for Schnitzer Steel (Oakland, CA), Plant #208, Application #30009; (iii) Air District Interoffice Memorandum, December 7, 2022: Outside Test CST-10051; October 4 thru 5, 2022, source test of S-6 for Schnitzer Steel (Oakland, CA), Plant #208, Application #30009; (iv) Air District Interoffice Memorandum, June 6, 2023: Outside Test CST-10139; February 23-24, 2023, source test of S-6 for Schnitzer Steel (Oakland, CA), Plant #208, Application #30009; and (v) Air District Interoffice Memorandum, November 26, 2024: Outside Test CST-10466 to 10469 NST-9202 to 9205, source test of S-6 for Schnitzer Steel (Oakland, CA), Plant #208, Application #30009.

Organic emissions were less than 53% of the permit condition limits and less than 3% of the Regulation 8, Rule 2 emission limit. These test results confirm that the RTOs are working as intended to achieve very significant POC emission reductions from Radius Recycling's facility and to bring the facility into compliance with applicable Air District regulations. Results from the April and October tests are summarized in Tables 1 and 2 below, respectively.

Table 1: April 2022 Organic Compound Emissions Test Results

Requirement	Limit	Emissions	
		North Stack	South Stack
Regulation 8-2-301[(a)]	Total Carbon ≤ 300 ppmv	8.7 ppmv	6.3 ppmv
Cond. 27348, Part 2[(b)]	> 98% VOC destruction eff.	98.7%	98.9%
Cond. 27410, Part 3	POC ≤ 2.74 lbs/hour	1.21 lbs/hour	1.03 lbs/hour
Cond. 27410, Part 3	POC ≤ 2.55 tons/year	1.08 tons/year	0.92 tons/year

(a) Stack data is reported as total hydrocarbon (THC). THC may include compounds that are not considered total carbon as defined in Regulation 8-2-202. Total carbon emissions may therefore actually be less than reported here.

(b) From Part 2d, the VOC destruction efficiency requirement is a minimum of 98% by weight, if the inlet concentration is between 200 and 2000 ppmv. The inlet VOC concentration was estimated to be 450-780 ppmv; therefore, the VOC destruction efficiency limit is 98%. Alternatively, the RTOs may demonstrate compliance with Part 2a by emitting less than 20 ppmv of POC. Each RTO also met this alternative outlet concentration limit.

Table 2: October 2022 Organic Compound Emissions Test Results

Requirement	Limit	Emissions	
		North Stack	South Stack
Regulation 8-2-301[(a)]	Total Carbon ≤ 300 ppmv	< 2 ppmv	8.9 ppmv
Cond. 27348, Part 2[(b)]	POC ≤ 20 ppmv	< 2 ppmv	8.9 ppmv
Cond. 27410, Part 3	POC ≤ 2.74 lbs/hour	0.2 lbs/hour	1.45 lbs/hour
Cond. 27410, Part 3	POC ≤ 2.55 tons/year	0.25 tons/year	1.79 tons/year

(a) Stack data is reported as total hydrocarbon (THC). THC may include compounds that are not considered total carbon as defined in Regulation 8-2-202. Total carbon emissions may therefore actually be less than reported here.

(b) VOC destruction efficiency was not determined during the October 2022 test. However, the RTOs may demonstrate compliance with Part 2 by emitting less than 20 ppmv of POC.

B. Carbon Monoxide Emissions:

The April 2022 and October 2022 emissions testing also demonstrated compliance with the CO emission rate limit of 84 lbs/MM scf of fuel combusted, as set forth in Condition #27348, Part 10. In all cases, CO emissions were less than half of the permit limit. The CO test results are summarized in Table 3 below:

Table 3: April 2022 and October 2022 Carbon Monoxide Emissions Test Results

Permit Limit	April 2022		October 2022	
	North Stack	South Stack	North Stack	South Stack
84 lbs/MMscf	7 lbs/MMscf	36 lbs/MMscf	4.2 lbs/MMscf	5.5 lbs/MMscf

C. Particulate Matter Emissions:

Radius Recycling's initial testing in April and July of 2022 showed that particulate matter emissions exceeded the applicable limits set forth in Condition #27410, Part 3.[6] The April testing showed that the North Stack was emitting PM_{10}[7] at 4.87 lb/hour and 4.34 tons/year, above the permit limits of 3.11 lb/hour and 3.32 tons/year; and that it was emitting Total Suspended Particulate (TSP) at 0.0078 gr/dscf, above the permit limit of 0.0048 gr/dscf. The July testing also showed both the North Stack and South Stack exceeding these limits. For PM_{10}, the North Stack was emitting 6.08 lb/hour and 8.88 tons/year, and the South Stack was emitting 5.74 lb/hour and 8.38 tons/year, both exceeding the permits limits of 3.11 lb/hour and 3.32 tons/year. And for TSP, the North Stack was emitting 0.0143 gr/dscf and the South Stack was emitting 0.0125 gr/dscf, both exceeding the permit limit of 0.0048 gr/dscf.

After receiving these test results, Radius Recycling evaluated the two packed bed scrubbers with its equipment vendors and consultants and made repairs to both units. After the repairs were complete, Radius Recycling retested the equipment on October 4-5, 2022. This testing showed that, with the repairs, the equipment was operating in compliance with all particulate emission limits. Particulate emissions were found to be about 50% of the permit limits and about 10% of the Regulation 6, Rule 1 emissions limits. The Particulate Matter test results are summarized in Table 4 below:

Table 4: October 2022 Particulate Matter Emissions Test Results

Requirement	Limit	Emissions	
		North Stack	South Stack [(a)]
Cond. 27410, Part 3a	PM10 $\leq$ 3.11 lbs/hour	1.24 lbs/hour	1.69 lbs/hour
Cond. 27410, Part 3a	PM10 $\leq$ 3.32 tons/year	1.53 tons/year	2.06 tons/year
Cond. 27410, Part 3b	TSP $\leq$ 0.0048 gr/dscf	0.0024 gr/dscf	0.003 gr/dscf
Regulation 6-1-310.2 [(b)]	TSP $\leq$ 0.0382 gr/dscf (N&S)	0.0024 gr/dscf	0.003 gr/dscf
Regulation 6-1-311.2[(c)]	TSP $\leq$ 26.6 lbs/hour	1.24 lbs/hour	1.69 lbs/hour

(a) Although quality assurance issues for the South Stack particulate emissions were noted by the Air District's Source Test Section, the Air District recalculated emissions based on the most conservative assumptions. Testing demonstrated compliance based on the recalculated emissions.

[6] These initial tests showed emissions in compliance with the particulate matter emission limits in Air District Regulation 6, Rule 1.

[7] PM_{10} refers to fine particulate matter with a diameter of 10 micrometers (μm) or less.

(b) From Table 6-1-310.2, the TSP concentration limit varies based on the exhaust flow rate. The limit is 0.0382 gr/dscf for exhaust gas flow rate ranging from 52,972-70,629 dscfm. For the north stack, exhaust flow rates for normal operation ranged from 60,428-62,349 dscfm. For the south stack, exhaust flow rates ranged from 64,355-65,828 dscfm.
(c) From Table 6-1-311.2, the TSP emission rate limit varies based on the processing rate. For processing rates of 440,925-661,387 pounds/hour, the applicable TSP emission rate limit is 26.6 pounds/hour. The processing rate for both stacks was 292 tons/hour (584,000 pounds/hour) during this source test.

D. Nitrogen Oxide Emissions:

Radius Recycling's initial testing showed emissions of NOx well above the permit limit of 50 lb/MMscf of fuel combusted. The April testing showed NOx emissions of 425 lb/MMscf at the North Stack and 560 lb/MMscf at the South Stack, around ten times the permit limit. Radius Recycling identified several different mechanical issues that were contributing to the elevated NOx emissions, but even after these mechanical issues were corrected the NOx emissions remained about 20% higher than the permit limit.

Additional source tests and engineering analyses in July and October of 2022 indicated that the excess NOx emissions were being caused by a source of nitrogen in the feedstock being processed in the metal shredder. This feedstock-based nitrogen is most likely coming from residual ammonia or similar compounds that are used as blowing agents during the manufacture of foam used as insulation in appliances, cars or objects found in the metal scrap processed by the shredder. During shredding, the heat of the shredding process starts to break down the foam and releases the nitrogen into the shredder enclosure air, which is captured and vented through venturi scrubbers and then to the RTOs. The combustion process at the RTOs converts the feedstock-based nitrogen to NOx. Radius Recycling's testing showed that about 70% of the NOx emissions come from feedstock-based nitrogen and about 30% come from the fuel used in the RTO burners. Feedstock-based nitrogen cannot be separated from other enclosure gases and cannot feasibly be controlled. It is also not possible to remove the suspected foam from the metal scrap, much of which is received at the site in compressed blocks.

The Air District was not aware of this additional contributor of NOx emissions when it initially drafted the permit conditions for the RTOs and packed bed scrubbers. The Air District established the NOx emissions limits in the Authority to Construct based on an assumption that there would be no nitrogen compounds in the exhaust stream coming from the shredder gas, as previous emissions testing at this site had not identified any such compounds. The Air District therefore established the NOx emissions limit based solely on NOx generated as part of the combustion of natural gas fuel in the RTO burners. The NOx emissions limit in the permit is based on an emission rate of 0.05 pounds of NOx created per million BTU of fuel burned in the RTOs, which equates to the 50 pounds of NOx per million scf of natural gas burned in each RTO burner as specified in Part 10 of Condition #27348.

Radius Recycling's startup emissions testing showed that NOx emissions from the RTOs alone complied with this 50 lb/MMscf limit specified in the original permit conditions. However, total NOx exceeded that 50 lb/MMscf limit because of the additional, unanticipated feedstock-based

NOx contribution from the exhaust gas coming from the metal shredder. To address this situation, the Air District is retaining the 50 lb/MMscf limit for NOx emissions from the RTOs alone, to ensure compliance with the requirements for RTO-generated NOx as specified in the Authority to Construct. But it is adding an additional limit applicable to the combination of NOx from feedstock-based nitrogen and NOx from the RTOs directly to ensure that total NOx emissions comply with the Air District's regulatory standards. These NOx limits will apply as follows:

1. The RTOs will be subject to the 50 lbs/MMscf NOx limit per RTO during periods of operation in standby (preheat or idle) mode. Standby mode is defined as any period when the RTO burner is operational, but feed material is not entering the shredder. With no feed entering the shredder, there will be no feedstock-based nitrogen in the shredder exhaust and no additional NOx being contributed to the RTO emissions.
2. When feed is entering the shredder, the RTOs will be subject to an hourly NOx emission limit of 4.23 lbs/hour per stack, which is based on 50 lbs/MMscf of fuel combusted in the RTO plus 0.016 lbs/ton of feed to the shredder during periods of shredder operation.
3. An annual NOx emission limit of 9.03 tons/year will apply for total NOx emissions from the two stacks combined, which is about 2.8 times higher than the original limit.

Requirement to Meet "Reasonably Available Control Technology" Standard:

These NOx emissions limits reflect a level of emissions control known as "Reasonably Available Control Technology," or RACT. RACT is defined in Regulation 2-2-225 as the lowest emission limit that is technologically feasible and cost-effective. These NOx emissions must meet a RACT level of emissions control pursuant to Air District Regulations 2-2-301 and 2-2-102. Regulation 2-2-301 requires new and modified sources to implement a level of emissions control called "Best Available Control Technology" (BACT) if the source will have the potential to emit over 10 pounds per day of NOx. But Regulation 2-2-102 provides an exemption from this BACT requirement for "secondary pollutants", which include products of combustion like NOx and CO, that are the direct result of use of abatement equipment – such as the RTOs and Packed Bed Scrubbers being used here – provided the equipment uses "Reasonably Available Control Technology" (RACT) instead.

The Air District did not conduct an analysis of the RACT level of emissions control for NOx emissions from the RTOs and packed bed scrubbers in the initial Engineering Evaluation in 2021 because it was believed at the time that NOx emissions would be below the 10 lb/day threshold in Regulation 2-2-301.

However, with the new information about the additional NOx being contributed as a result of the feedstock-based nitrogen, it is now clear that NOx emissions may be as high as 42 lbs/day.[8] This level of emissions puts the RTOs and packed bed scrubbers over the 10 lb/day threshold at which BACT would be required under Regulation 2-2-301 – except that the NOx emissions here are "secondary pollutants" (i.e. products of combustion from abatement equipment), so a RACT level of control is required instead of BACT pursuant to Regulation 2-2-102. Demonstrating that total NOx emissions comply with the RACT standard of control required under Regulation 2-2-102 establishes that the emissions are exempt from the BACT requirement in Regulation 2-2-301, and thus that the equipment satisfies the emissions control requirements of Regulation 2, Rule 2.

The Air District therefore conducted an analysis to determine what the RACT level of emissions control requires for this equipment. As noted above, RACT – "Reasonably Available Control Technology" – is defined in Air District Regulation 2-2-225 as the lowest emission limit that is technologically feasible and cost-effective. To apply this standard, the Air District first evaluated whether any additional add-on control equipment would be feasible and cost-effective, but found that there were no such options that can be used here. The Air District then determined the lowest emissions level that Radius Recycling can feasibly achieve from the RTOs and Packed Bed Scrubbers without add-on control equipment. This analysis is outlined below.

Evaluation of the Potential to Use Add-On NOx Emissions Control Equipment:

There are add-on control devices such as Selective Catalytic Reduction (SCR) or Selective Non-Catalytic Reduction (SNCR) that can reduce NOx emissions. SCR reduces NOx emissions using ammonia in the presence of a catalyst. The major advantages of SCR control technology are the higher control efficiency (70% to 90%) and the lower temperatures at which the reaction can take place (400 °F to 800 °F, depending upon the catalyst selected). SCR is widely used for combustion processes where the type of fuel produces a relatively clean combustion gas. However, the temperature of the RTOs' exhaust (200 °F to 300 °F)[9] is too low for operation of SCR systems. In addition, the gases produced by the shredding operation contain compounds that could impair the function of the catalyst. Therefore, SCR is not a feasible control technology for this project.

SNCR utilizes a combustion chamber as the control device reactor, achieving NOx control efficiencies of 30% to 70%. SNCR systems rely on the reaction of ammonia and nitrogen oxide to produce molecular nitrogen and water. However, certain applications are better suited for SNCR

[8] Daily NOx emissions are calculated as follows. For burner-based NOx generated from natural gas combustion in the burners, staff assumed 10 hours/day in operation mode and 14 hours/day in standby mode, but staff included also included a 10% margin to account for potential variability in operating or fuel usage rates. Daily emissions were calculated as:

50 lbs/MMscf / 1020 MMBTU/MMscf x 12.75 MMBTU/hr x 10 hrs/day x 1.1 +

50 lbs/MMscf / 1020 MMBTU/MMscf x 4 MMBTU/hr x 14 hrs/day x 1.1 = 6.875 + 3.02 = **9.9 lbs/day** per stack

For feedstock-generated NOx, assuming 10 hours/day of shredder operation, emissions were calculated as:

0.016 lb/ton feed x 400 tons/hour x 10 hrs/day = 64 lb/day, split between 2 stacks = **32 lbs/day** per stack

Combined emissions from burner-based NOx and feedstock-generated NOx are **42 lbs/day** at each stack.

[9] www.banksengineering.com/About%20RTOs%20Banks%20Engineering%2010-8-2007.pdf.

than others due to the combustion unit design[10]. SNCRs are not suitable for sources with low NOx concentrations because they are most effective at abating waste streams with NOx concentrations between 200 ppm to 400 ppm. The exhaust stream from the RTOs contains a NOx concentration of less than 10 ppm, well below the optimal range. Additionally, the temperature of the RTOs' exhaust (200 °F to 300 °F) is below the optimal range of operation for SNCR systems downstream of the RTO system. Applications with exhaust streams between 1550 °F to 1950 °F are good candidates for SNCR technology. Therefore, SNCR is not a feasible control technology for this project.

Evaluation of the Most Stringent Achievable NOx Emissions Limit Without Add-On Controls:

With no feasible and cost-effective add-on control equipment available to abate NOx emissions, the Air District next evaluated the lowest emissions rate that Radius Recycling can achieve without add-on controls. The NOx emissions are generated both as a byproduct of the oxidation of the gases that the RTOs are abating (feedstock-based NOx emissions) and also as a byproduct of fuel combustion (burner-based NOx emissions). The Air District therefore evaluated both of these NOx sources to see how it can effectively be minimized in a feasible and cost-effective manner.

With respect to feedstock-based NOx emissions, the nitrogen generated from the feedstock processed in the metal shredder cannot be separated from the other enclosure gases and cannot feasibly be controlled with any add-on control technology as explained above. It is also not possible to remove the suspected source of feedstock–based nitrogen – foam in appliances, cars and other objects – from the scrap feedstock prior to shredding. As a result, there is no feasible means to reduce NOx generated from the metal shredder feedstock.

With respect to burner-based NOx emissions, the RTO vendor has guaranteed a NOx emission rate that will not exceed 50 pounds per million cubic feet of natural gas burned, which equates to 0.05 lb NOx/MM BTU. The Air District compared this emissions performance level to similar RTOs at other facilities. Based on an analysis of emissions testing of permitted RTOs within the Bay Area, the Air District is developing a policy to set a burner-based NOx RACT limit of 0.14 lb/MM BTU for RTOs. The 0.05 lb NOx/MM BTU rate being achieved by Radius Recycling's RTOs here is well below this proposed level. Moreover, it is not technologically feasible for Radius Recycling's RTOs to achieve a NOx emissions standard below this level without compromising TAC destruction efficiency. Lowering NOx emission rates in an RTO is achieved by reducing the operating temperature and possibly the residence time. However, these changes can reduce the efficiency of TAC destruction, which is achieved through thermal oxidation where TACs are exposed to high temperatures and oxygen to convert them to their constituent elements, such as carbon dioxide and water vapor. To ensure a high destruction efficiency of TACs emitted by the shredding process, especially for polychlorinated biphenyls (PCBs) which are difficult to destroy, the Radius Recycling RTOs were designed for high temperature operation (1600 °F to 1900 °F). Achieving a lower NOx emission rate than 0.05 lbs/MM BTU would require reducing the operating temperature to a range of 1400 °F to 1500 °F. At this lower operating temperature, the

[10] EPA Air Pollution Control Technology Fact Sheet, EPA Report EPA-452/F-03-031, available at: https://www3.epa.gov/ttncatc1/dir1/fsncr.pdf.

organic toxic compounds may not achieve the necessary destruction efficiency required to keep health risks as low as possible. Additionally, lower residence times can result in incomplete destruction of TACs because there is not enough time for the organic compounds to react with oxygen in the exhaust stream. The Air District has therefore determined that NOx emissions of 0.05 lb/MM BTU from natural gas combustion is the lowest feasible NOx emission rate for this type of application.

For these reasons, the Air District has concluded that the 0.05 lb/MM BTU NOx emissions rate being achieved by the RTOs satisfies the RACT requirement for NOx emissions under Air District regulations and 2-2-102 and 2-2-225. This 0.05 lb/MM BTU NOx limit will be prescribed in Condition #27438, Part 10 for the RTOs during standby mode operation, expressed as 50 pounds of NOx per MM scf of fuel combusted. For operation mode with shredder gas that has nitrogen-containing compounds fed into the RTOs, maximum hourly NOx emissions of 4.23 lb/hour per RTO will be prescribed in Condition #27348, Part 10, to reflect the feedstock-based NOx contribution plus the burner-based NOx during the operation mode, since it is not possible to control or eliminate the feedstock-based NOx contribution. Condition #27348, Part 10, will also incorporate an annual limit of 9.03 tons/year of NOx for both stacks combined.

Radius Recycling's startup source testing demonstrated that the equipment is meeting these NOx emissions limits, as shown in Table 5 below. The NOx emission limit during operation has been set with consideration of the potential variability in the source of nitrogen in the feedstock.

Table 5: October 2022 NOx Emissions Test Results

Requirement	NOx Emission Limit	Measured NOx Emissions	
		North Stack	South Stack
Cond. 27348, Part 10, Standby Mode [(a)]	50 lbs/MM scf of fuel (per stack)	22.4 lbs/MMscf	24.3 lbs/MMscf
Cond. 27348, Part 10, Operation Mode [(b)]	4.23 lbs/hour (per stack)	0.92 lbs/hour	0.85 lbs/hour
Cond. 27348, Part 10, Combined Mode	9.03 tons/year (both stacks combined)	2.74 ton/year [(c)]	

(a) The NOx limit for standby mode reflects only burner-based NOx emissions and is the permit limit that was initially included in the Authority to Construct.

(b) The NOx limit for operation mode reflects both burner-based and feedstock-based NOx emissions, and is an additional limit being added in the Permit to Operate.

(c) The 2.74 tons/year emissions from both stacks combined is calculated based on 0.56 tons/year from standby mode emissions and 2.18 tons/year from operation mode emissions.

Recalculation of Cumulative Increase in NOx Emissions and Required Emissions Offsets:

Finally, the additional feedstock-based NOx emissions also require a re-calculation of the facility's cumulative increase in NOx emissions and requires additional NOx offsets to be provided for the facility's un-offset cumulative increase under Air District Regulation 2-2-302. As explained in the Engineering Evaluation (see p. 8), the facility's cumulative increase in NOx emissions prior to the implementation of this project was 11.913 tons/year, all of which has previously been offset. The

Air District initially calculated a further increase of 3.267 tons/year of NOx, for which offsets – banked Emission Reduction Credits from the Air District's emissions bank – would have to be provided. Based on the new information about feedstock-generated NOx emissions, it is now clear that the further increase in NOx emissions is 9.027 tons/year of NOx, as outlined above. This means that the new cumulative increase for the facility will be 20.940 tons/year of NOx (11.913 tons/year + 9.027 tons/year), and that 9.027 tons/year of NOx offsets must be provided. The Air District is updating its record of the facility's cumulative increase to reflect the correct 20.940 tons/year cumulative increase for NOx. The Air District is also providing additional offsets from its Small Facility Banking Account in connection with the issuance of the Permit to Operate to ensure that the cumulative increase is fully offset as required by Regulation 2-1-302.1.[11]

E. Toxic Air Contaminant Emissions

As explained in the 2021 Engineering Evaluation, the Air District conducted a Health Risk Assessment (HRA) to evaluate the potential health impacts from Toxic Air Contaminants (TACs) that would be emitted from the new pollution control equipment. The HRA was based on TAC emission rates estimated from prior testing of shredder TAC emissions, thermal oxidizer destruction efficiency estimates, venturi scrubber particulate removal efficiency estimates, a 95% capture efficiency for the shredder enclosure, and calculations of toxics generated by combustion based on shredder gas compositions and emissions factors published by the US Environmental Protection Agency for toxic emissions generated by combustion of natural gas fuel. (*See* 2021 Engineering Evaluation at pp. 8-10 and Appendix A.) The HRA estimated that, after installation of these abatement systems, the residual cancer risk from the metal shredder, its abatement systems, and several sources permitted earlier under related permit applications would be 2.8 chances in a million, which was below the Regulation 2-5-302 project risk limit of 10.0 chances in a million in effect at the time. The HRA further found that for non-cancer health risk, TAC exposures at the location of the maximally exposed individual were below the levels at which no observable health impacts would be expected. Given these low levels of toxic risk, which were well within the limits set forth in Air District regulations, the Air District concluded that the TAC emissions complied with the applicable regulatory requirements for obtaining a permit.

In issuing the Authority to Construct for the project, the Air District imposed permit conditions requiring Radius Recycling to evaluate the equipment's TAC emissions after it was installed. This is important to confirm that actual TAC emissions conform to the estimates the Air District used in its analysis. The permit conditions required that, if measured TAC emissions exceeded the levels the Air District used in the initial HRA, then Radius Recycling must undergo a further HRA using actual TAC emissions levels to confirm that the project complies with applicable regulatory requirements at its actual, measured emission rates. Parts 11 and 13 of Condition #27348 in the Authority to Construct required testing after initial installation to confirm that TAC emission rates

[11] Since the facility's total potential to emit for NOx is less than 35 tons per year and the facility does not own any NOx emission reduction credits, Radius Recycling may avail itself of credits from the Small Facility Banking Account. In this case, the amount of offsets required is calculated at a 1:1 ratio as provided for in Regulation 2-2-302.1.

conform with emissions evaluated in the HRA. Emission rates for TACs that have the most influence on health risks were identified in Part 11d.

Radius Recycling conducted startup source testing in April of 2022 to assess whether TAC emissions levels were within the values specified in Part 11d. Table 6 below compares the emission rates measured during the April 2022 startup source test to the Part 11d emission rates. Arsenic, 1,3-butadiene, and PCBs exceeded the action level thresholds in Part 11d. A revised HRA was therefore required.

Table 6: Summary of TAC Action Level Thresholds and April 2022 Test Results

TAC	Action Level Threshold [(b)] (lb/hour)	Total Stacks (lb/hour)	North Stack (lb/hour)	South Stack (lb/hour)
Arsenic [(a)]	0.0000082	0.000045	0.000012	0.000033
Benzene	0.024	0.014	0.0087	0.0056
Butadiene, 1,3- [(a)]	0.00061	0.00091	0.00049	0.00042
Cadmium [(a)]	0.0005	0.000018	0.0000067	0.000012
Chromium, Hexavalent	0.000078	0.000034	0.0000063	0.000028
Ethyl Benzene	0.05	0.025	0.012	0.013
Lead	0.0032	0.00031	0.000092	0.00022
Nickel	0.0015	0.00034	0.00015	0.00019
PCBs	0.00034	0.00063	0.00021	0.00042
Toluene	0.2	0.13	0.071	0.062

(a) The average measured emission rates for the compound included at least one fraction below the detection limit for the test. The reported emission rates used one-half the detection limit to calculate the average emissions shown here.

(b) The Action Level Thresholds are the levels specified in Part 11d of the Authority to Construct, exceedances of which triggered the requirement for a subsequent HRA.

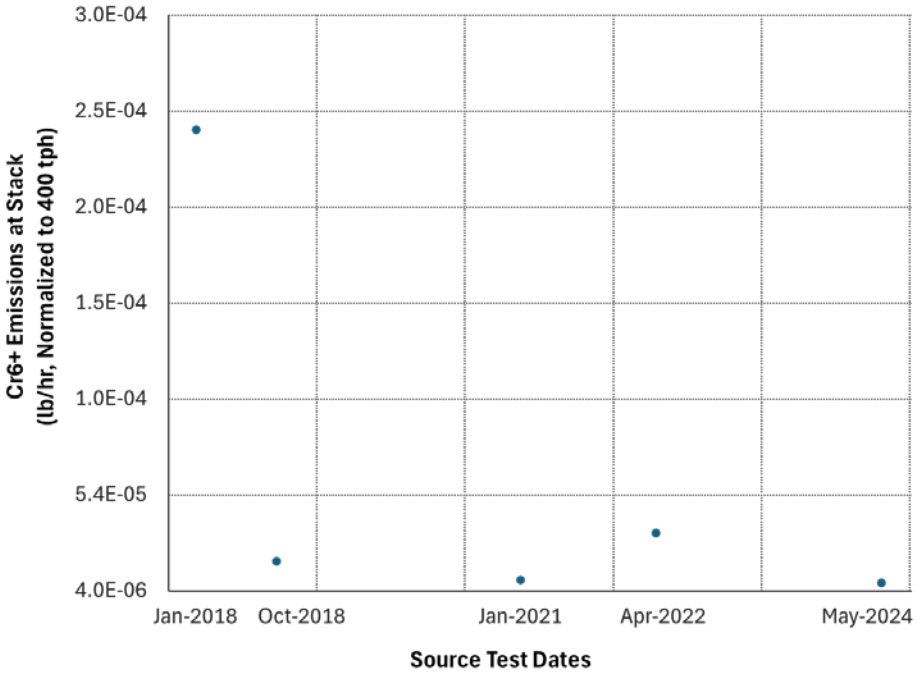
The Air District therefore conducted a revised HRA in connection with the draft Permit to Operate. The revised HRA showed a cancer risk at the Maximally Exposed Individual Resident (MEIR) receptor at 7.6 in a million – which exceeds the maximum health risk limit of 6.0 in a million for projects within an Overburdened Community specified in Air District Regulation 2-5-302.1.[12] To ensure that the metal shredder and associated equipment do not cause a cancer risk exceeding the 6.0-in-a-million limit, the Air District is revising the TAC permit conditions to limit cancer-causing TAC emissions to keep the risk below 6.0 in one million. Specifically, the Air District is

[12] When the Air District published the draft permit, it erroneously specified a maximum cancer risk of 5.6 in a million. This lower level of cancer risk was based on the risk at a location that is farther away from the facility than the maximally exposed receptor. Comments submitted on the draft permit identified this error and noted that there is a closer residential receptor location where the risk is 7.6 in a million. The Air District has taken this closer receptor location into account in its HRAs for the final Permit to Operate as described in this Addendum. The Air District thanks the commenters for bringing this oversight to its attention.

imposing a toxicity-weighted TAC emissions limit of 1,014 pounds per year, as specified in new subpart 11.b in permit condition 27348. As detailed in the May 29, 2025, revised Health Risk Assessment prepared for this permit (attached hereto as Appendix A), this toxicity-weighted TAC emissions limit will limit the cancer risk associated with the project to 5.9 in a million.

Moreover, the Air District has conducted further analysis of the source testing data for the metal shredder's TAC emissions, and based on this data it appears that actual TAC emissions have been and will continue to be within this limit. The TAC that was driving the 7.6-in-a-million risk from the previous HRA was hexavalent chromium (Cr6+). There have been five hexavalent chromium tests performed in recent years, three of which were done before the installation of the new abatement equipment (January 2018, October 2018, and January 2021) and two of which were done after the new abatement equipment began operation (April 2022 and May 2024). The results of these five hexavalent chromium emissions tests (with results normalized to the shredder's maximum hourly processing rate of 400 tons/hr) are shown in Figure 1 below:

Figure 1: Hexavalent Chromium Stack Emissions Test Results (lb/hr)



As Figure 1 shows, there is one test result, from January of 2018, that is about an order of magnitude higher than the others. The hexavalent chromium emissions rate used in the HRA for the September 2024 draft permit was based on the average of the first two data points (January 2018 and October 2018). As a result, the very high data point from January of 2018 had an outsize impact on the overall risk estimate.

Based on further analysis, however, this outlier data point appears to be anomalous and not indicative of actual hexavalent chromium emissions. The January 2018 source test was undertaken before the installation of the new abatement equipment, and it was done using an unmodified

version of California Air Resources Board (CARB) Test Method 425. The unmodified version of CARB Method 425 carries the potential for laboratory analytical instrument interference due to artifacts in the originally specified sampling reagents, or hexavalent chromium (Cr6+) contamination of the originally specified sampling reagents, which leads to false positives and the overestimation of the true hexavalent chromium levels in the reported results. As shown in Figure 1, all of the subsequent tests taken after the installation of the new abatement equipment, which were performed using the modified version of CARB Method 425, show much lower levels of emissions. These lower levels are better indicators of actual hexavalent chromium emissions from the metal shredder. At these lower levels, the metal shredder's TAC emissions should easily comply with the new toxicity-weighted emissions limits, which will ensure that the overall cancer risk does not exceed 5.9 in a million.

Furthermore, to ensure that TAC emissions and cancer risk do not exceed these limits, the Air District is imposing more frequent TAC emissions testing requirements in the Permit to Operate. Specifically, the Air District is increasing the required testing frequency from once every five years as specified in the Authority to Construct to mandatory testing within 90 days after permit issuance and then every two years thereafter. And to make the limits enforceable as a practical matter in the event a test shows elevated toxicity-weighted emissions, the Permit to Operate requires Radius Recycling to reduce its operations in the event of an elevated test result so that total annual emissions remain below the permit limit. These requirements will ensure that cancer risk stays within the limits prescribed by Air District Rule 2-5 and that public health is adequately protected.

With regard to non-cancer health risks, the Air District is taking a similar approach with chronic (long-term) non-cancer risk and is imposing a toxicity-weighted limit on annual TAC emissions. This limit is specified in new subpart 11.c in permit condition 27348, which requires toxicity-weighed emissions to remain below 29,464 pounds per year. This type of long-term health risk requires a different limit from the carcinogenic risk limit discussed above, because TACs have different toxicity factors for non-cancer health risk than they do for carcinogenic risk.

For acute (short-term) non-cancer health risks, it is not possible to utilize the same approach of specifying a toxicity-weighted emissions limit, since there is no toxicity-weighted factor for toxics with acute impacts. The Air District is therefore retaining the approach taken in the Authority to Construct, with specific hourly emissions limits for each individual TAC that has acute health effects. These pollutants are arsenic, benzene, 1,3-butadiene, mercury, nickel, toluene, and xylenes. For these pollutants, the Air District is finalizing the hourly emissions limits as proposed in the draft permit issued in September of 2024. As documented in the HRA prepared for the draft permit, the acute HI at the point of maximum impact is 0.15.[13]

[13] The point of maximum impact for acute risk is not affected by the confusion about the Maximally Exposed Individual Resident (MEIR) for cancer risk discussed above. As documented in the HRA for the draft permit, the maximally exposed acute receptor is a worker receptor closer to the facility than the MEIR for cancer risk. See www.baaqmd.gov/~/media/files/engineering/public-notices/2024/30009/fid208_nsr_30009_hra_092724-pdf.pdf?rev=9fc033503ee1489e80657a85f2559a1f&sc_lang=en.

The Air District used these enforceable emissions limits in the revised permit conditions as the basis for the emissions rates used for the revised HRA, as discussed below.

Revised Health Risk Assessment:

For the revised HRA, the Air District conducted analyses for both a pre-project scenario (before the installation of the new abatement equipment) and the current post-project scenario (with the new abatement equipment) to provide additional information for this Permit to Operate decision. These HRAs, the results, and applicable project risk requirements are summarized below and discussed in detail in the attached May 26, 2025 HRA report.[14]

The pre-project scenario includes the equipment configuration for the metal shredder operations that existed prior to this abatement project: the metal shredder surrounded by an enclosure equipped with two high-capacity blowers that each vented to a venturi scrubber and then to a single stack (P-15). Metal Shredder emissions include the fugitive emissions from the shredder enclosure and the stack emissions from P-15. TAC emissions for this pre-project scenario were determined using updated emission factor estimates for shredder fugitive emissions and pre-control stack emissions. These updated emission factors included an expanded list of potential TAC emissions that was derived from all available source test data (conducted both prior to and after the installation of the abatement equipment). Annual emissions were calculated using the 3-year average baseline throughput rate for the shredder (691,314 tons per year). This pre-project scenario also includes TAC emissions from Radius Recycling's Joint Products Plant and a backup generator (Sources S-11, S-13, and S-16) operating at their maximum permitted emission rates. These are emissions from related permit applications and were included in the initial HRA for this project.

The post-project scenario includes the installed equipment configuration: the metal shredder surrounded by an enclosure equipped with two high-capacity blowers that each vent to a venturi scrubber followed by a thermal oxidizer, packed-bed acid gas scrubber, and stack. Metal shredder emissions include the fugitive emissions from the shredder enclosure and the stack emissions from the two new stacks (P-17 and P-18). Fugitive emissions from the shredder enclosure were based on a capture efficiency of 95% (which was confirmed by a capture efficiency study as discussed below); a venturi scrubber control efficiency of 90% for particulate TACs and 0% for organic TACs; and a packed-bed scrubber destruction efficiency of 98%.[15] TAC emissions for this post-project scenario were based on the toxicity-weighted annual emissions limits discussed above for the cancer risk and chronic non-cancer risk analyses as specified in Parts 11b and 11.c of Condition

[14] See Appendix A. As noted above, the Air District used a corrected location for the Maximally Exposed Individual Resident (MEIR) receptor, after receiving public comments noting the error in the HRA published with the draft permit.

[15] Fugitive emission rates from the metal shredder enclosure cannot be measured directly and must be estimated based on emissions at the stack. Based on the effectiveness of the abatement equipment, one can back-calculate the amount of pre-abatement emissions being collected in the enclosure from the measured emissions rates at the stack after abatement. And based on the enclosure capture efficiency, one can calculate the fugitive emissions that are not captured in the enclosure based on the amount of emissions that are captured. The calculation of fugitive emissions is discussed in more detail in the attached HRA.

27348. For acute risk, TAC emissions were based on the hourly emissions limits for acute TACs as specified in Part 11a. As with the pre-project scenario, the post-project scenario also includes TAC emissions from the Joint Products Plant and backup generator (Sources S-11, S-13, and S-16) as related emissions sources to be included in the HRA.

The TAC emission rates used to evaluate the health risk associated with each scenario are identified in Appendix A to the May 26, 2025 HRA. For the toxicity-weighted TAC emissions limits for cancer and chronic non-cancer risk, the specific TAC emissions rates are one set of rates corresponding to these toxicity-weighted limits. Individual TACs could be emitted at higher or lower rates, but as long as the total toxicity-weighted emissions of all TACs combined remains the same, the level of health risk will remain the same.

Health Risk Summary:

Health risks for the pre-project and post-project scenarios are presented in Table 7 below. As shown in the table, this abatement project has resulted in reductions for each type of health risk. This abatement project has reduced cancer risk by 84%, has reduced chronic hazard index by 21%, and has reduced acute hazard index by 65%.

Although the post-project cancer risk level (5.9 in a million) is not as low as the initial cancer risk estimate (2.8 in a million), it complies with the applicable project cancer risk limit in Regulation 2-5.[16] For non-cancer risk, the chronic hazard index and acute hazard index are less than project risk limits of 1.0, which indicates that TAC exposures at the location of the maximally exposed individual are below the levels at which adverse health impacts may start to be observed.

Table 7: Summary of Health Risk Estimates for Application #30009

	Cancer Risk (in a million)	Chronic Hazard Index	Acute Hazard Index
Pre-Project Actual Emissions	37.3	0.127	0.42
Post-Project Maximum Emissions	**5.9**	**0.10**	**0.15**
Project Risk Reductions	31.4	0.027	0.29
Risk Reduction Percentage	84%	21%	65%
Project Risk Limits for Post-Project Scenario	**6.0**	**1.0**	**1.0**

Table 8 presents the maximum source risks for the post-project metal shredder and abatement systems. This metal shredder abatement project resulted in a physical change of the source and emissions of several toxic air contaminants that were not previously emitted, including the

[16] When the Authority to Construct for the new abatement equipment was issued in 2021, the applicable project cancer risk limit was 10.0 in a million pursuant to in Regulation 2-5-302.1. Effective July 1, 2022, the Air District added a more stringent cancer risk limit to Regulation 2-5-302.1 for projects located in Overburdened Communities. This project is limited to the more stringent project cancer risk limit of 6.0 in a million, because the Radius Recycling facility in West Oakland is located in an Overburdened Community as defined in Regulation 2-1-243.

following combustion product TACs: polychlorinated dibenzo-p-dioxins (dioxins), polycyclic aromatic hydrocarbons (PAHs), hydrogen chloride, and hydrogen fluoride. These TACs are generated in the RTOs by combustion of natural gas and captured gases from the shredder enclosure. Since the residual cancer risk exceeded 1.0 in a million, this project is a "modification" as defined in Regulation 2-5-214 and is subject to the toxic new source review requirements of Rule 2-5.[17] Furthermore, the project triggers Best Available Control Technology for Toxics (TBACT) for cancer risk pursuant to Regulation 2-5-301. Non-cancer impacts do not trigger TBACT, because the maximum chronic hazard index for the metal shredder and abatement systems is less than 0.20.

Table 8. Post-Project Maximum Source Risks for Shredder Operations

	Cancer Risk (in a million)	Chronic Hazard Index	Acute Hazard Index
Impacts from Shredder Enclosure: Residual Fugitive Emissions	3.1	0.088	0.12
Impacts from Stacks (P-17 & P-18): Post-Project Abated Emissions	2.6	0.011	0.022
Total Source Risks for Metal Shredder and Abatement Systems	5.7	0.099	0.15
TBACT Source Risk Thresholds (Regulation 2-5-301)	1.0	0.20	N/A

As shown in Table 8, the estimated cancer risk for the post-project metal shredder operations is 5.7 in a million. The pollutants that contribute most to this cancer risk are: polychlorinated biphenyls (PCBs) (35%), hexavalent chromium (25%), polycyclic aromatic hydrocarbons (PAHs) (10%), and benzene (4%). Hexavalent chromium, PCBs, and other metals are produced during the shredding process. PAHs and dioxins are generated during RTO combustion of natural gas and captured gas from the shredder enclosure. Benzene may be generated during the shredding process and as a product of natural gas combustion.

Compliance with Best Available Control Technology for Toxic Air Emissions:

As noted above, Radius Recycling is required to use TBACT – the Best Available Control Technology for controlling TAC emissions – to limit TAC emissions as much as possible. The Air District evaluated TBACT for Radius Recycling's metal shredding operation in the initial Engineering Evaluation in 2021 and determined that TBACT requires full enclosure of the shredding operations in a building with minimal openings and a high-capacity building ventilation system capable of capturing at least 95% of all emissions, coupled with a venturi scrubber system

[17] Regulation 2-5-214 defines a modified source of toxic air contaminants as: "An existing source that undergoes a physical change, change in the method of operation, or increase in throughput or production that results or may result in any of the following:" [214.4] "The emission of any toxic air contaminant not previously emitted in a quantity that would result in a cancer risk greater than 1 in a million (10^{-6}) or a chronic hazard index greater than 0.20."

capable of removing at least 90% of all particulate TAC emissions and a thermal oxidizer/packed bed scrubber abatement system capable of achieving destruction of at least 98% of acid gases.

Given the importance of the shredder enclosure's capture efficiency in controlling TAC emissions, limiting public health risk, and ensuring compliance with the TBACT requirement, the Air District and Radius Recycling agreed to conduct a study of the capture efficiency to assess whether enclosure is meeting the 95% capture and associated shredder emissions calculations.

Radius Recycling contracted with two source testing firms, Lagus Applied Technology, Inc. and Montrose Air Quality, to develop a capture efficiency testing plan for Radius Recycling's metal shredder enclosure. There is no promulgated reference test method specific to this application, necessitating the development of a unique testing protocol based on standard methods and engineering principles. The testing firms used ASTM E2029 "Standard Test Method for Volumetric and Mass Flow Rate Measurement in a Duct Using Tracer Gas Dilution" with testing conducted under specialized operating conditions that were necessary to avoid damage to testing equipment and to avoid loss of tracer gas through the downstream abatement equipment. The operating conditions included: fans at normal flow rates, enclosure openings in standard positions, closed ambient air dampers, shredder, conveyors, and water sprays not operating, and downstream abatement devices not operating. In addition to measuring capture efficiency using tracer gas, the testing plan also included measurement and calculation of parameters that were intended to demonstrate that the total enclosure criteria described in EPA Method 204 "Criteria for and Verification of a Permanent or Temporary Total Enclosure" are also met. In accordance with EPA Method 204, an enclosure that meets all of the Method 204 criteria and that ducts all gases from the enclosure to a control device may be assumed to have a volatile organic compound capture efficiency of 100%, and capture efficiency need not be measured. The Air District reviewed and commented on the test plan in advance of the testing. The testing firms conducted the capture efficiency testing on January 27-28, 2024. The Air District determined that testing was done by qualified personnel following reasonable QA procedures.

The Air District received initial reports for the January 2024 capture efficiency test and engineering study on March 18, 2024, and amended reports on June 7, 2024.[18] These reports identified a capture efficiency of greater than 98% for the shredder enclosure. While the Air District acknowledges the greater-than-98% capture efficiency reported, given the inherent uncertainties in conducting this unique capture efficiency test, the Air District has concluded that an inferred enclosure capture efficiency of 95% by weight is an appropriately conservative and reasonable engineering approach. The basis for this conclusion is that the EPA Method 204 total enclosure criteria were met, including:

(a) calculated ratio of natural draft openings compared to total enclosure wall area is less than 5%,

(b) demonstrated air flow into the enclosure,

(c) calculated average face velocity is greater than 200 feet per minute, and

[18] Outside Test CST-10243; January 24-28, 2024, at Facility A0208, Schnitzer Steel Products Company

(d) alternatively, average measured pressure drop is greater than 0.007 inches of water

In Condition # 27410, Part 2, the Air District is enhancing the requirements for the enclosure by requiring that Radius Recycling follow an operating and maintenance plan for the shredder enclosure, which includes keeping openings in the enclosure closed, inspection and maintenance of the enclosure and curtains, and recordkeeping for all monitoring, inspection, and repair events.

The Air District is also adding continuous monitoring systems to measure the stack flow rate, in order to verify the shredder enclosure and blowers meet the capture efficiency requirement (expressed as derived inward face velocity) outlined in EPA method 204, as well as Condition #27410, Part 2e to ensure ongoing compliance with the Air District's inferred minimum enclosure capture efficiency of 95%.

The Air District has been requiring monitoring of amperage of each enclosure fan to ensure that enclosure air flow is sufficient. When Radius Recycling installed its new air pollution control equipment, it also replaced its existing shredder enclosure fans with new fans for efficiency reasons. The new fan motors operate at a higher voltage and lower amperage than the previous fan motors. The Air District is therefore adjusting the amperage requirement for the shredder enclosure ventilation fans in Condition #27410, Part 2d. This change will not have any effect on emission limits or on Radius Recycling's compliance with applicable regulatory requirements and is discussed in more detail later in this report.

IV. PERMIT TO OPERATE ISSUANCE

As discussed in this Addendum, with the permit conditions being imposed in the Permit to Operate, Radius Recycling will operate the metal shredder and new abatement equipment in compliance with applicable emissions limits and related regulatory requirements. The Air District is therefore issuing Radius Recycling the Permit to Operate for this equipment in accordance with District Regulation 2-1-411.

In doing so, the Air District is revising several permit conditions from the conditions specified in the 2021 Authority to Construct. These revisions include the additional NOx emissions limits and revised TAC emission limits, as well as the enhanced requirements to ensure that the shredder enclosure maintains a high capture efficiency, all of which are discussed in detail in Section III above. The Air District is also making the following revisions to various requirements for equipment operating parameters and related administrative provisions, as well as additional non-substantive changes such as formatting and correcting typographical errors.

A. Minimum RTO Combustion Zone Temperature

The Air District evaluated the combustion zone temperatures of the RTOs during recent source testing and determined that the minimum temperature required by the permit conditions should be increased to ensure proper destruction efficiency of TACs. The source testing showed that the RTOs achieved the required destruction efficiency while operating at 1750 °F to 1850 °F. As a

result, the Air District is increasing the minimum combustion zone temperature requirement in Part 3 of Condition #27348 from 1600 °F to 1750 °F to ensure adequate destruction efficiency. As previously discussed, higher combustion zone temperatures lead to greater destruction efficiencies of TACs. Additionally, the Air District is adding provision to allow the Air District to adjust the operating temperature limit if source test data demonstrates compliance at a different temperature.

Due to this change in Part 3, the thermocouple operating range in Part 4 of Condition #27348 is also being revised. The thermocouple is a temperature measuring device used to continuously measure the temperature in each RTO. The upper end of the temperature range that the thermocouple must be capable of measuring is being increased from 1750 °F to 1800 °F.

B. Packed Bed Scrubber Parametric Monitoring

The Air District is adding an averaging period for scrubber parametric operating limits because momentary deviations in these parameters are not expected to impact the performance of the scrubbers, which is typically measured over at least a 1.5-hour period (three ½ hour test runs) during source testing. The exhaust gas flow rate and liquid flow rate to each Packed Bed Scrubber in Condition #27348 Part 9 will be averaged over a one-hour period. In addition, the Air District is adding provisions to allow the Air District to adjust these parametric limits if source testing demonstrates compliance with the relevant emission limits at alternate parametric limits. Furthermore, the Air District is adding a requirement for the facility to keep records of operating differential pressure for each packed bed scrubber to Condition #27348 Part 9 as an indicator of scrubber efficiency during shredding operations.

C. Monitoring and Recordkeeping Requirements

The Air District evaluated the feasibility of installing a Continuous Emissions Monitoring System (CEMS) at the RTO stacks to better understand NOx emissions from feedstock variability. The Air District evaluated several of the RTO parameters and determined that CEMS would not be feasible at this site for the following reasons:

- CEMS is ideal for steady-state continuous operation of sources like boilers or turbine generators. Radius Recycling's shredder and RTOs do not operate continuously.
- The low NOx concentration in the exhaust stream (<1 ppm) lowers the accuracy of the results.
- The high moisture concentration in the exhaust can lead to clogging of the pitot tubes used to measure flow speed.

Instead, the Air District is increasing the frequency of mandatory source testing to better characterize NOx emissions. The frequency of emissions testing is being increased from yearly to quarterly to determine compliance with the limits set forth in Condition #27348 Parts 10c and 10d. The quarterly testing will determine NOx emissions while the shredder is in operation as required by Part 12 of the permit condition. NOx testing frequency during shredder operation may be reduced to annual testing if continued compliance is demonstrated for at least three years with an adequate compliance margin.

D. Shredder Enclosure Fan Motor Amperage

The Air District is revising the provision in Condition #27410, Part 2, specifying a minimum operating current of 480 amps for the shredder enclosure fan motors during shredder operations. Radius Recycling replaced the existing shredder enclosure fans for efficiency reasons when it installed the RTOs. The new fan motors operate at a higher voltage and a lower amperage than the previous fan motors. The average amperage determined during the October 2022 emissions test report was 97 amperes and the average amperage determined during the January 2024 capture efficiency test was 91 amperes for the two fans. To provide a small compliance buffer the Air District is setting the limit at 90% of the average amperes measured during the capture efficiency test (91 amperes * 0.9 = 82 amperes) averaged over an hourly period. As a result, the permit requirement is being revised from 480 amperes to 82 amperes. This change will not affect any emission limits. In addition, language is being added to allow the Air District to adjust this operating parameter if future source testing demonstrates compliance with applicable limits at alternative minimum fan amperes.

E. Water Flow Rate to Venturi Scrubbers

Radius Recycling requested to reduce the minimum water flow rate, currently 300 gallons per minute (gpm), to each venturi scrubber to 200 gpm. The Air District is revising the water flow rate limit to 260 gpm, which is 90% of the lowest water flow rate measured during the October 2022 source test (289 gpm * 0.9 = 260 gpm). Condition #27410, Part 2 is being changed accordingly and a 1-hour averaging period will be added because momentary changes in scrubber water flow rate will not impact the average hourly particulate control rate achieved by the venturi scrubbers. In addition, language is being added to allow the Air District to adjust this operating parameter in the future if source test results demonstrate compliance with PM emission limits at alternative minimum water flow rates.

F. Venturi Scrubber Pressure Differential Operating Range

Radius Recycling requested that the effective pressure differential operating range for each venturi scrubber be modified from 15-22 inches of H_2O to 10-22 inches of H_2O. However, the April and October 2022 source test reports do not support this change. There were four runs when the venturi scrubber pressure drop decreased to below 15 inches of H_2O. For two of those runs the particulate matter readings exceeded the 0.0048 gr/dscf limit. Since compliance was not demonstrated at the lower pressure differential operating range, the Air District will not approve this change to Condition #27410, Part 2.

G. Recordkeeping Requirements

Since this facility is expected to be subject to a Title V Major Facility Review permit and/or a Synthetic Minor Operating permit, which would require recordkeeping for 5 years, the Air District is revising the recordkeeping requirement in Condition 27348, Part 15, to require maintaining records for 5 years instead of just 2 years. This is also consistent with other 5-year recordkeeping requirements in this permit, such as in Part 9 of Condition 27410.

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT CONSIDERATIONS

As explained in the 2021 Engineering Evaluation, the Air District reviewed and considered the documentation prepared by the Port of Oakland for the installation of the new air pollution control equipment pursuant to the California Environmental Quality Act (CEQA), including the Port's "Second Addendum to Schnitzer's Stormwater Improvement Project Initial Study/Negative Declaration" dated September 3, 2020 (Addendum). This CEQA analysis concluded that the installation and operation of the new air pollution control equipment would have a significant *beneficial* environmental impact and would not result in any significant adverse environmental impacts associated. (*See* Engineering Evaluation, at p. 19.)

Given the change in the Air District's understanding of the project because of the new information about shredder feedstock-based NOx emissions and evaluation of site-specific TAC emissions, the Air District has considered whether there is a need for any new CEQA environmental analysis under CEQA Section 21166 (Cal. Pub. Res. Code § 21166) and Section 15162 of the state CEQA Guidelines (14 Cal. Code Regulations § 15162). Those provisions establish that a public agency should continue to rely on the previous CEQA environmental analysis – and prohibit undertaking any new CEQA analysis – unless changes in the project and/or new information suggest that there may be new significant adverse environmental effects from the project or a substantial increase in the severity of previously identified significant effects.

The Air District has considered whether any additional CEQA environmental review would be required under these provisions. Specifically, the Air District evaluated whether there would be any new significant environmental impact as a result of the additional feedstock-based NOx emissions that were not anticipated at the time of the original CEQA environmental analysis or from residual health impacts based on increased TAC emission levels.

The Air District has developed Thresholds of Significance for use in this analysis.[19] The Air District's Threshold of Significance for NOx establishes that the impacts from NOx emissions become significant if the emissions exceed 10 tons/year. Here, NOx emissions will not exceed 9.027 tons/year from both RTOs combined, as specified in revised Part 10.d. of Condition #27348 – including both the 3.267 tons/year of thermal NOx from combustion in the RTOs anticipated in the Engineering Evaluation and the additional 5.76 tons/year of feedstock-based NOx.

The Air District's Thresholds of Significance for project level risks and hazards establishes that impacts become significant if the project cancer risk is greater than 10.0 chances in a million or if an increased non-cancer hazard index is greater than 1.0 for both chronic and acute. Overall, the installation of the RTOs and packed-bed scrubbers to control emissions from shredder operations results in a beneficial reduction in risks and hazards at this facility. Furthermore, the Air District is also comparing total post-project residual health risks from shredder operations to the risks and hazards Thresholds of Significance. As previously stated, the maximum cancer risk for this project,

[19] *See* 2022 Air District CEQA Air Quality Guidelines (April 2023), at p. 3-4 Table 3-1, available at: www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines.

after installation of the abatement equipment, is 5.9 chances in a million, and the maximum chronic hazard index and acute hazard index are 0.10 and 0.15, respectively. These residual health risks from the shredder operations are also below the Thresholds of Significance for risks and hazards.

Accordingly, there will be no new significant impacts, or any substantial increase in the severity of any previously identified significant impacts, as a result of the new information and changes associated with the feedstock-based NOx emissions and residual TAC emissions. As a result, there is no subsequent or supplemental environmental analysis required under CEQA Section 21166 and Guidelines Section 15162.

The Air District is therefore proposing to issue the Permit to Operate on the same basis it issued the Authority to Construct, as described in the Engineering Evaluation. The Air District has reviewed and considered the project's environmental impacts as discussed in the Addendum and earlier Negative Declaration analyses pursuant to CEQA Guidelines Section 15096 and has determined that there will be no significant environmental impacts. As the project will not have any significant impacts, there is no need to consider alternatives or mitigation measures (beyond what the Air District is imposing anyway under its own regulations) to avoid or minimize any such impacts. The Air District will publish a Notice of Determination in connection with the issuance of the Permit to Operate in accordance with CEQA Guidelines Section 15096(i), 14 Cal. Code Regulations § 15096(i).

VI. CIVIL RIGHTS AND ENVIRONMENTAL JUSTICE CONSIDERATIONS

The Air District's permitting decisions must comply with federal and state civil rights laws, including Title VI of the Civil Rights Act of 1964[20] and California Government Code section 11135, and regulations promulgated under those laws. The Air District also endeavors to ensure that its permitting decision-making is informed by and consistent with environmental justice principles.

The Air District has not historically provided written civil rights or environmental justice analyses in connection with the permitting process. But it has recently committed to an increased focus on civil rights and environmental justice, and community advocates have specifically requested that the Air District address these issues in its review of this permit application and of two additional pending permit applications (Application Numbers 29573 and 30009) related to the Radius Recycling Oakland facility. The Air District is therefore providing this written analysis.

Civil rights and environmental justice concerns are especially important for permits issued in West Oakland, where Radius Recycling's facility is located. It is well-documented that West Oakland residents have been, and continue to be, exposed to comparatively high cumulative levels of

[20] 42 U.S.C. § 2000d *et seq.*; *see also* 40 C.F.R. Part 7.

pollution that amplify the impact of new and ongoing pollution sources.[21] And West Oakland has a far higher proportion of Black residents than the Bay Area as a whole.

The decision to issue a Permit to Operate for the new abatement equipment complies with Title VI and Government Code section 11135 and regulations promulgated under those laws and accords with broader principles of environmental justice.

This permitting decision grants Radius Recycling a permit to operate its two RTOs and two packed bed scrubbers to abate emissions of POCs and TACs from its shredder. This abatement equipment has decreased the shredder's potential to emit POCs from approximately 236.7 tons per year to 5.1 tons per year and has substantially reduced overall health impacts for Radius Recycling's facility. As described above, however, installation of the RTOs and packed bed scrubbers does involve combustion product emissions, including NOx and CO. These combustion product emissions result from the combustion of natural gas to provide heat to the RTOs, as well as from the combustion of POCs and other pollutants in the exhaust stream from the shredder.

In a case with mixed harms and benefits, legal precedent suggests at least two factors are relevant when considering whether an agency decision gives rise to an unlawful disparate impact under Title VI regulations (and, by extension, under Government Code section 11135).[22] First, it is relevant if and the extent to which benefits to the affected group outweigh the harms to that group. Second, it is relevant if and the extent to which adverse impacts to the protected group are mitigated.[23]

Here, these two factors strongly suggest this permit decision does not have the potential to cause or contribute to an unlawful disparate impact. First, the benefits to neighboring residents and workers from the reductions in POCs and TACs and their associated health risks far outweigh the potential harm from the combustion product emissions. Although NOx emissions have been greater than first anticipated when the Authority to Construct was issued, the massive decreases in POC emissions and, to a lesser but still significant extent, TAC emissions comfortably outweigh the comparatively minor increases in combustion product emissions. On a mass basis for ozone precursors (POC and NOx), the POC emission reductions are about 25 times higher than the NOx emission increases. If project emission increases and reductions are compared to Alameda County

[21] *See, e.g.*, Lily MacIver, Univ. of Cal., Berkeley, *AB617 in West Oakland: Community-Based Air Pollution Abatement Planning* 17-22 (2019), https://www.baaqmd.gov/~/media/files/ab617-community-health/west-oakland/final_ab-617-in-west-oakland-pdf.pdf?la=en&rev=b47178d004774010a3830679f9e7f556; Darryl Fears & John Muyskens, *City Planners Targeted a Black Community for Heavy Pollution. Can the Damage Be Undone?*, Wash. Post (May 7, 2023), https://www.washingtonpost.com/climate-environment/2023/05/07/oakland-freeways-environmental-justice/.

[22] *Darensburg v. Metro. Transp. Comm'n*, 636 F.3d 511, 519 (9th Cir. 2011) ("In light of the parallel language of [Government Code section 11135 and Title VI], federal law provides important guidance in analyzing state disparate impact claims.").

[23] U.S. Dep't of Justice, Title VI Legal Manual, Section VII, *Proving Discrimination – Disparate Impact*, pp. 14-16, https://www.epa.gov/sites/default/files/2021-01/documents/titlevi_legal_manual_rev._ed_1.pdf (discussing *Nat'l Ass'n For Advancement of Colored People v. Med. Ctr., Inc.*, 657 F.2d 1322, 1340 (3d Cir. 1981) and *United States v. Bexar Cty.*, 484 F.Supp. 855, 859 (W.D. Tex. 1980)).

emissions,[24] the project increases are 0.053% of Alameda County NOx emissions and 0.0082% of Alameda County CO emissions and project emission reductions are 1.21% of Alameda County POC emissions. A comparison of these percentages demonstrates that the POC emission reductions are of much greater importance on a sub-regional scale than the incidental increases in NOx and CO emissions. In addition, as discussed above in Section V (CEQA Considerations), the proposed NOx emission rates are less than the Air District's CEQA Threshold of Significance for project NOx emissions, which indicates that these project NOx emissions are not causing any significant adverse environmental impacts. When considering health impacts, the project results in an 84% reduction in cancer risk, 21% reduction in chronic non-cancer impacts, and a 65% reduction in acute non-cancer impacts. These local health impact reductions are expected to be far greater than any potential local non-cancer impacts from incidental NOx and CO increases.

Second, the combustion products associated with the abatement equipment are necessary to achieve these benefits and are subject to mitigation. There is no alternative abatement mechanism or, as described above and in the initial Engineering Evaluation Report, add-on abatement device of which the Air District is aware that would further reduce emissions. Further, the equipment is subject to rigorous monitoring, performance requirements, and emission limits, as outlined elsewhere in this Addendum and related permitting documents.

Considerations other than these may be relevant as well, but the Air District need not determine precisely the appropriate test in this instance because the context of this project and its overwhelming benefits to the neighboring community demonstrate that the project will not give rise to an unlawful disparate impact.

EPA has also highlighted the importance of public involvement for civil rights compliance and for consistency with environmental justice principles. Here, the Air District has taken a number of steps to ensure adequate public involvement.

For one, the Air District's standard practices are more rigorous than are required by federal law. For example, the proposed permit conditions and accompanying Engineering Evaluation were circulated for public comment pursuant to Regulation 2-1-412.1, which requires a public comment period before an Authority to Construct or Permit to Operate is issued for a source located in an overburdened community that requires a Health Risk Assessment under Air District toxics regulations. Regulation 2-1-412.1 requires a public comment opportunity in a broader range of instances than is required by the federal Clean Air Act, and this particular permit application does not require a public comment period under federal law.

The Air District also took additional steps, beyond those required by its regulations, to facilitate engagement with this permit application. Among other things, the Air District developed, published, and translated into Spanish, Chinese, Tagalog, and Vietnamese an illustrated fact sheet to describe the proposed permit; conducted an in-person public workshop about the proposed permit in close proximity to Radius' facility; did on-foot outreach to unhoused populations near

[24] Bay Area Emissions Inventory – Summary Report for Criteria Air Pollutants, February 2024, Table 1, https://www.baaqmd.gov/~/media/files/planning-and-research/emission-inventory/bay-area-emissions-inventory-summary-report.pdf?rev=aab699bc827450598292f0537b2c2a7&sc_lang=en.

the facility to discuss the proposed permit; and sent mailed notices of the proposed permit issuance to businesses and residences well past the required 1,000 foot radius from the shredder.

VII. PERMIT CONDITIONS

The Regenerative Thermal Oxidizers (A-15 and A-16) and Packed Bed Scrubbers (A-17 and A-18) are currently subject to Condition # 27348 and 27410 as set forth in the Authority to Construct. The Air District is now issuing the Permit to Operate for this equipment, with changes to Condition #27348 and Condition #27410 as shown below in underline/~~strikeout~~ format.

Condition # 27348

A-11 Venturi Scrubber, A-12 Venturi Scrubber, A-15 Regenerative Thermal Oxidizer, A-16 Regenerative Thermal Oxidizer, A-17 Packed Bed Scrubber, and A-18 Packed Bed Scrubber abating S-6 Shredder and S-7 In-feed Conveyor.

1. The owner/operator shall abate emissions from A-11 and A-12 Venturi Scrubbers with A-15 and A-16 Regenerative Thermal Oxidizers during all periods of operation. Combined flow rate shall not exceed 180,000 acfm.
   (~~b~~Basis: Cumulative Increase, BACT/TBACT)

2. The owner/operator shall operate A-15 and A-16 each to meet the following VOC destruction efficiency requirements:
   a. Outlet VOC concentration of 20 ppmv or less; or
   b. All of the following standards depending on the applicable inlet VOC concentration:
      i. VOC destruction efficiency ≥ 98.5% if inlet VOC concentration > 2,000 ppmv;
      ii. VOC destruction efficiency > 98% if inlet VOC concentration > 200 to ≤~~<~~ 2,000 ppmv; and
      iii. VOC destruction efficiency > 90% if inlet VOC concentration ≤~~<~~ 200 ppmv.

   (~~b~~Basis: Cumulative Increase; BACT/TBACT)

3. The owner/operator shall operate A-15 and A-16 at a minimum combustion zone temperature of ~~1600~~ 1750 degrees F, at all times when the shredder S-6 is operating. The Air District may adjust this operating temperature limit if source test data demonstrate that alternate values are necessary for or capable of maintaining compliance with Part 2 above.
   (~~b~~Basis: Cumulative Increase; BACT/TBACT)

4. To determine compliance with the temperature requirement in these permit conditions, the owner/operator shall equip A-15 and A-16 each with a temperature measuring device capable of continuously measuring and recording the temperature in each regenerative thermal oxidizer. The owner/operator shall install, and maintain in accordance with

manufacturer's recommendations, a temperature measuring device that meets the following criteria: the minimum and maximum measurable temperatures with the device are 560 degrees F and ~~1750~~1800 degrees F, respectively, and the minimum accuracy of the device over this temperature range shall be 1.0 percent of full-scale.
(~~b~~Basis: Cumulative Increase; BACT/TBACT)

5. The owner/operator shall report any non-compliance with Part 3 of this condition to the Director of the Compliance & Enforcement Division at the time that it is discovered. The submittal shall detail the corrective action taken and shall include the data showing the exceedance as well at the time of occurrence.
(~~b~~Basis: Cumulative Increase, Regulation 2-5)

6 The temperature limit in Part 3 shall not apply during an "Allowable Temperature Excursion", provided that the temperature controller setpoint complies with the temperature limit. An Allowable Temperature Excursion is one of the following:

a. A temperature excursion not exceeding 20 degrees F; or
b. A temperature excursion for a period or periods which when combined are less than or equal to 15 minutes in any hour; or
c. A temperature excursion for a period or periods which when combined are more than 15 minutes in any hour, provided that all three of the following criteria are met.
    i. the excursion does not exceed 50 degrees F;
    ii. the duration of the excursion does not exceed 24 hours; and
    iii. the total number of such excursions does not exceed 12 per calendar year (or any consecutive 12-month period).

Two or more excursions greater than 15 minutes in duration occurring during the same 24-hour period shall be counted as one excursion toward the 12-excursion limit.
(~~b~~Basis: Regulation 2-1-403)

7. For each Allowable Temperature Excursion that exceeds 20 degrees F and 15 minutes in duration, the Permit Holder shall keep sufficient records to demonstrate that they meet the qualifying criteria described above. Records shall be retained for a minimum of five years from the date of entry and shall be made available to the District upon request. Records shall include at least the following information:

a. Temperature controller setpoint;
b. Starting date and time, and duration of each Allowable Temperature Excursion;
c. Measured temperature during each Allowable Temperature Excursion;
d. Number of Allowable Temperature Excursions per month, and total number for the current calendar year; and
e. All strip charts or other temperature records.

(~~b~~Basis: Regulation 2-1-403)

8. The owner/operator shall not use more than 1,332,980 therms combined during any consecutive twelve-month period in A-15 and A-16 regenerative thermal oxidizers. (~~b~~Basis: Cumulative Increase)

9. The owner/operator shall abate emissions from A-15 and A-16 Regenerative Thermal Oxidizers with A-17 and A-18 Packed Bed Scrubbers during all periods of operation. Exhaust gas flow rate to each Packed Bed Scrubber shall not exceed 90,000 acfm, averaged over a 1-hour period, and liquid flow rate shall be at least 720 gallons per minute, averaged over a 1-hour period. The owner/operator shall maintain daily records of the operating differential pressure across each packed bed scrubber. The Air District may adjust these limits if source test data demonstrates that alternate values are necessary for or capable of maintaining compliance with the requirements of this Condition and the particulate emission limits in Condition 27410, Part 3. The owner/operator shall maintain the records in an Air-District-approved log for at least 36 months from the date of entry. Log entries shall be retained on-site, and made immediately available to the Air District upon request.
(~~b~~Basis: Cumulative Increase, BACT/TBACT)

10. The owner/operator shall not emit more than following from A-15 and A-16 Regenerative Thermal Oxidizers at stacks P-17 and P-18:
    a. CO Limit: The owner/operator shall not emit more than 84 pounds of CO per million (MM) scf of fuel burned from either A-15 or A-16.
    b. Standby Mode NOx Limit: When there is no feed material entering the shredder (S-6), the owner/operator shall not emit more than 50 pounds of NOx per MM scf of fuel burned from either A-15 or A-16.
    c. Shredder Operation Mode NOx Limit: When there is feed material entering the shredder (S-6), the owner/operator shall not emit more than 4.23 pounds of NOx per hour from either A-15 or A-16.
    d. Annual NOx Limit: The owner/operator shall not emit more than 9.027 tons of NOx per year in total from A-15 and A-16 combined.

~~NOx CO~~
~~(lb/MMscf) (lb/MMscf)~~
~~A-15 50 84~~
~~A-16 50 84~~

(~~b~~Basis: RACT, Cumulative Increase, Source Test Method 13A and Method 6)

11. The owner/operator shall not emit more than the following toxic air contaminants from the exhaust of A-17 and A-18 Packed Bed Scrubbers, combined. ~~, unless the owner/operator complies with all of the procedures and limits in Parts 11a-d:~~
    ~~a. Within 60 days of receiving source test results demonstrating that total emissions from stack P-17 and P-18 combined exceed any one of the limits in this part, the owner/operator shall submit a permit application to the Air District to request revisions in the TAC emission limits below. The permit application shall include~~

~~all information required to conduct an updated health risk assessment for the Shredder, Thermal Oxidizers, and Acid Gas Scrubbers, including new proposed emission limits for fugitive emissions from the shredder building and for each stack for the full list of potential TACs for these devices, as identified in Part 13, that also demonstrate compliance with the source test results.~~

~~b. The health risk assessment for this project shall demonstrate that total health risks resulting from the proposed limits on shredder building fugitive emissions, P-17 emissions, and P-18 emissions do not exceed the lower of (a) a cancer risk limit of 3.0 in a million for this project or (b) the applicable project cancer risk limit identified in Regulation 2, Rule 5. The health risk values shall be evaluated at the Maximally Exposed Individual Resident (MEIR) and Maximally Exposed Individual Worker (MEIW), but not the Point of Maximum Impact (PMI). In addition, the health risk assessment for this project shall demonstrate compliance with any other applicable limits or requirements of Regulation 2, Rule 5.~~

~~c. The health risk assessment shall be conducted in accordance with the Regulation 2-5 procedures in effect at the time the HRA is conducted.~~

~~d. If the health risk assessment for the revised TAC emissions limits for the shredder and its associated abatement equipment find that health risks exceed any of the limits described in Part 11b, the owner/operator shall submit a compliance plan to reduced TAC emissions, change operational parameters, or make other improvements such that the health risk assessment meets the requirements of Part 11b. This compliance plan shall be submitted to the District within 60 days of notification by the District that such a plan is required.~~

a. Emissions of the following TACs from the exhaust of A-17 and A-18 shall not exceed the specified hourly limits:

Pollutant	Total Stack Emissions (P-17 + P-18) (lbs/hour)
Arsenic	1.1E-04 ~~8.2E-06~~
Benzene	2.8E-02 ~~2.4E-02~~
Butadiene, 1,3-	1.1E-03 ~~6.1E-04~~
~~Cadmium~~	~~5.0E-4~~
~~Chromium, Hexavalent~~	~~7.8E-5~~
~~Ethyl Benzene~~	~~5.0E-2~~
~~Lead~~	~~3.2E-3~~
Mercury	3.4E-03
Nickel	4.8E-04 ~~1.5E-03~~
~~PCBs~~	~~3.4E-4~~
Toluene	2.4E-01 ~~2.0E-01~~
Xylenes	2.4E-01

b. Carcinogenic toxicity-weighted emissions of all TACs from the exhaust of A-17 and A-18 combined shall not exceed 1,014 lbs/year.

c. Chronic non-carcinogenic toxicity-weighted emissions of all TACs from the exhaust of A-17 and A-18 combined shall not exceed 29,464 lbs/year.

If source testing shows that the toxicity-weighted TAC emissions per ton of material shredded would exceed the annual limits specified in subparts 11b and 11c at the S-6 Shredder's maximum permitted throughput of 720,000 tons per year, then the S-6 Shredder shall be limited to a lower annual throughput corresponding to the toxicity-weighted emissions limits in subparts 11b and 11c. In that event, the owner/operator shall not process more material per calendar month than the lowered annual throughput limit divided by 12. The owner/operator may increase the throughput back to its otherwise permitted levels if the owner/operator demonstrates with further Air-District-certified source test results that the toxicity-weighted emissions will comply with the limits specified in subparts 11b and 11c at the higher throughput.

(~~b~~Basis: Regulation 2-5)

12. Not later than ~~60~~90 days from ~~the startup of A-15 and/or A-16~~issuance of the Permit to Operate and annually thereafter, the owner/operator shall conduct source tests to determine ~~initial~~ compliance with the limits in ~~p~~Parts 2 and 10. In addition, after issuance of the Permit to Operate, the owner/operator shall conduct source tests for NOx on a quarterly basis to determine compliance with limits in Parts 10c and 10d. The owner/operator shall submit the source test results to the Air District ~~staff~~ no later than 60 days after the source test. After at least three years of quarterly testing demonstrating

continuous compliance with the limits in Parts 10c and 10d, the owner/operator may submit a permit application to request reduction of the testing frequency.
(~~b~~Basis: Cumulative Increase, Regulation 2-5)

13. Not later than ~~60~~90 days from ~~the startup of A-15 and/or A-16~~issuance of the Permit to Operate and every ~~five~~ two years thereafter, the owner/operator shall conduct source tests to determine compliance with the limits in ~~p~~Part 11. In addition to the compounds identified in Part 11, this source test shall include, as a minimum, the full list of potential TACs for the Shredder, Thermal Oxidizers, and Acid Gas Scrubbers identified below. The owner/operator shall submit the source test results to the Air District ~~staff~~ no later than 60 days after the source test. The owner/operator shall include a calculation of the toxicity-weighted TAC emissions per unit of material shredded, and annual toxicity-weighted TAC emissions at an annual processing rate of 720,000 tons of material processed, in order to determine compliance with the toxicity-weighted TAC emissions limits in subpart 11b and 11c. (~~b~~Basis: Cumulative Increase, Regulation 2-5)

Potential TACs	**Potential TACs**
Acetaldehyde	Perchloroethylene
Arsenic	PCBs
Benzene	Propylene
Beryllium	PAHs (as benzo(a)pyrene)
Butadiene, 1,3-	Selenium
Cadmium	Styrene
Chromium, Hexavalent	Toluene
Cobalt	Vanadium
Copper	Xylenes (mixed)
Ethyl Benzene	o-Xylene
Formaldehyde	Cumene
Hexane	Hexachloroethane (PCA)
Isopropyl Alcohol	Methyl Isobutyl Ketone (MiBK)
Lead	Trimethylpentane, 2,2,4-
Manganese	Acrylonitrile
Methanol	1,1 Dichloroethene
Methyl Chloroform	Carbon Disulfide
Methyl Ethyl Ketone	1,4-Dioxane
Methylene Chloride	1,4-Dichlorobenzene
Mercury	Hydrogen Fluoride
Naphthalene	Hydrogen Chloride
Nickel	
Polychlorinated Dibenzo-p-Dioxins (PCDDs), Polychlorinated Dibenzo Furans (PCDFs), and Dioxin-like PCBs*	

* This is a large group of compounds with different toxic equivalency factors (TEF) values as listed in Table 2-5-1.

14. The owner/operator shall comply with all applicable testing requirements as specified in Volume V of the District's Manual of Procedures. The owner/operator shall notify the District's Source Test Section, in writing, of the source test protocols and projected test dates at least 7 days prior to testing.
(~~b~~Basis: Cumulative Increase, Regulation 2-5)

15. In order to demonstrate compliance with the above parts of this permit condition, the owner/operator shall maintain the following monthly records in a District-approved log for at least ~~24 months~~five years from the date of entry. Log entries shall be retained on-site and made available to District staff upon request:

a. Monthly quantity of Natural Gas Consumed in A-15 and A-16 combined.
b. Monthly quantities shall be totaled for each consecutive twelve-month period.
c. All source test records required per Parts 12 and 13.

(~~b~~Basis: Cumulative Increase)

End Conditions

Condition # 27410

~~This permit condition became effective upon the installation and start-up of the Regenerative Thermal Oxidizers (A-15 and A-16) and the Packed Bed Scrubbers (A-17 and A-18).~~

S-6 Shredder and S-7 Infeed Conveyor; abated by A-6 Water Sprays, A-11 Venturi Scrubber, A-12 Venturi Scrubber, A-15 Regenerative Thermal Oxidizer, A-16 Regenerative Thermal Oxidizer, A-17 Packed Bed Scrubber, and A-18 Packed Bed Scrubber.
(Revision 1: A #14194, 6/16/06; Revision 2: A #16721, 4/9/09; Revision 3: A #27762, 11/10/16; Revision 4: A #27762, 11/20/2020, Revision 5: A #30009, 8/26/2021; Revision 6: A #30009, 3/2/2022, ~~12/30/2022~~ 7/17/2025)

1. The owner/operator shall not exceed the scrap-in throughput limit of 720,000 tons in any calendar year at this facility.
(Basis: Regulations 2-1-301–- baseline 2005 production level of 431,471 tons/year–- and 2-5-302 and Cumulative Increase for the incremental throughput)

2. The owner/operator shall enclose the shredder, S-6, and shall vent the captured shredder emissions to the Venturi Scrubbers, A-11 and A-12, followed by Regenerative Thermal Oxidizers, A-15 and A-16, followed by Packed Bed Scrubbers, A-17 and A-18, during all times that S-6 is operating. The owner/operator shall minimize fugitive emissions from the shredder enclosure during shredder operation by meeting the following requirements:

a. maintaining and following a operating and maintenance plan (O&M Plan) for the shredder enclosure and associated equipment and keeping records of all monitoring, inspections, maintenance, and repair events;

b. ~~(a) designing the enclosure such that the total surface area of all openings in the enclosure does not exceed 5% of the total surface area of the enclosure walls, floor, and ceiling~~ closing openings as specified in the O&M Plan prior to shredder operation;

c. ~~(b)~~ using and maintaining blast curtain walls or strip curtains on the inlet feed conveyor opening and as specified in the O&M Plan; repairing or replacing damaged curtain materials within 7 days of discovery; repairing any damages to the enclosure within 14 days of discovery; and ensuring the total incidental openings related to periodic damages to the enclosure does not exceed 5% of the total area of natural draft openings. In addition, the owner/operator shall maintain records of the total area of natural draft openings on the shredder enclosure including damage-related openings for each day that S-6 is operating.

d. ~~(c) ensuring that the ventilation fan is operating within its design range.,~~ operating the ventilation fans such that the average amperage for the two fans is at least 82 amperes, averaged over a 1-hour period, during shredder operation; and monitoring and recording fan amperes at least once per 15-minute period during shredder operation;

e. monitoring the flow rate in the exhaust stacks using continuous flow measurement devices, averaged over a consecutive 1-hour period, during all times that S-6 is operating. The owner/operator shall keep records of the flow measurement at one-minute intervals available when requested by the District representative.

f. deriving a face velocity based on the information in Parts 2c and 2e of this Condition, and ensuring the face velocity during all times of shredder operation is at least 220 feet per minute based on the calculation procedure in EPA Method 204, Section 8.3.

~~The owner/operator shall operate each Venturi Scrubber in accordance with manufacture specifications. The owner/operator shall demonstrate this by maintaining a minimum water flow rate of 300 gallons per minute (gpm) to each venturi scrubber and an effective pressure differential operating range 15-22 inches of H2O across each venturi scrubber, averaged over a 1-hour period. The District may adjust these operating parameter limits if source test data demonstrates that alternate values are necessary for or capable of maintaining compliance with the particulate emission limits in Part 3.~~

(Basis: Regulation 2, Rule 5 Project Risk Limits and TBACT)

3. Total emissions from the S-6 Auto Shredder shall not exceed any of the emission limits listed below:

a. Maximum Permitted Emission Rates:

	P-17 and P-18 Pounds/Hour Per Stack	P-17 and P-18 Tons/Year Per Stack
PM10 (total filterable + condensable)	3.11	3.32
POC (calculated as methane)	2.74	2.55

b. Total particulate emissions from stacks P-17 and P-18 shall not exceed a grain loading of 0.0048 grains/dscf in each stack as determined in accordance with Regulation 6-1-602.1.

c. The owner/operator shall demonstrate compliance with the Part 3a stack emission limits as described in Part 4.

d. The owner/operator shall operate each Venturi Scrubber in accordance with manufacturer specifications. The owner/operator shall maintain a minimum water flow rate of 260 gallons per minute (gpm), averaged over a 1-hour period, to each venturi scrubber and an effective pressure differential operating range of 15 to 22 inches of H_2O across each venturi scrubber. The Air District may adjust these operating parameter limits if source test data demonstrates that alternate values are necessary for or capable of maintaining compliance with the particulate emission limits in Part 3.

(Basis: Cumulative Increase, BACT, TBACT, and Regulations 2-5-302 and 8-2-301)

4. Source Testing Requirements for Part 3:

a. The owner/operator shall conduct quarterly monitoring for the total carbon concentration in stacks P-17 and P-18, using authorized procedures and methods, to demonstrate compliance with Part 3a and Regulation 8-2-301. This quarterly monitoring shall continue until an organic abatement system is operating and continued compliance with Regulation 8-2-301 has been demonstrated.

b. On an annual basis, unless noted otherwise, the owner/operator shall conduct a District approved source test at stacks P-17 and P-18, while the S-6 Auto Shredder is operating at or near the maximum operating rate, to demonstrate compliance with the stack emission limits in Parts 3a-b and Regulation 8-2-301. The owner/operator shall record the shredder processing rate, the water application rates for the shredder, the water flow rates and the pressure differential operating ranges at each venturi scrubber and at each packed bed scrubber, and the ventilation fan amperage during the source test. The source test shall determine the hourly emission rate and the average emission factor (pounds of pollutant per ton of material processed by the shredder) for the following compounds:

- total carbon (calculated as methane and as defined in Regulation 8-2-202) shall be determined by Air District approved methods, such as EPA Methods 25A and 18,

- total POC (calculated as methane), where total POC = total carbon (excluding methane only) – total NPOC. Total NPOC (calculated as methane) shall be determined by Air District approved methods, such as EPA Method 18 and EPA Method TO-15 or other similar GC/MS methods. Total NPOC is the sum of all NPOCs (other than methane) identified in Regulation 2-1-207, expressed as methane.
- total particulate emissions shall be determined using EPA Method 5/202. All measured total particulate emissions shall be assumed to be PM10 for comparison to the limits in Part 3a.
- Full speciation of organic TACs shall be determined by Air District approved methods, such as EPA Method TO-15 or other similar GC/MS methods.
- PCBs shall be determined by Air District approved methods, such as CARB Method 428. (This test shall be conducted ~~within 90 days of Permit to Operate issuance and~~ once every ~~four~~ two years ~~thereafter~~.)
- PAHs and naphthalene shall be determined by Air District approved methods, such as CARB Method 429. (This test shall be conducted ~~within 90 days of Permit to Operate issuance and~~ once every ~~four~~ two years ~~thereafter~~.)
- Full set of metal TACs (including arsenic (As), beryllium (Be), cadmium (Cd), chromium (Cr) which includes total chromium and hexavalent chromium (Cr VI), cobalt (Co), copper (Cu), lead (Pb), manganese (Mn), mercury (Hg), nickel (Ni), and selenium (Se)), shall be determined using Air District approved procedures for each compound, including CARB Method 425 for hexavalent chromium. (This test shall be conducted ~~within 90 days of Permit to Operate issuance and~~ once every ~~four~~ two years ~~thereafter~~.)
- Dioxin and furans shall be determined by Air District approved methods, such as EPA Method 23/23A.
- Annual emissions for each stack shall be calculated based on the most recent 12-month shredder feedstock throughput rate and the pounds/ton emission factors determined by the most recent source test for total POC and total particulate emissions. Annual stack emission rates shall be compared to the Part 3a limits.

The annual source test shall also determine the outlet grain loading and the concentration of total carbon in stacks P-17 and P-18 to demonstrate compliance with Part 3b Regulation 8-2-301 using Air District approved methods.

c. The owner/operator shall submit a source test protocol and notification of the scheduled source test date to the Air District's Source Test Section Manager and to the Permit Engineer at least 30 days prior to the scheduled test date.

d. The owner/operator shall notify the Source Test Section Manager of any changes to the scheduled test date as soon as possible.

e. The owner/operator shall submit a copy of the source test report to the Source Test Section Manager and the Permit Engineer within 60 days of the test date.
(Basis: Cumulative Increase, TBACT and Regulations 2-5-302 and 8-2-301)

5. The owner/operator shall apply water sprays (A-6) at the shredder, S-6, and infeed conveyor, S-7, at sufficient rates to ensure that non-metallic material exiting the sources is moist to the touch at all times of operation.
(Basis: Cumulative Increase, TBACT; and Regulation 2-5-302)

6. The owner/operator shall operate the Recycling Center in such a manner that particulate emissions into the atmosphere from any operation/equipment for a period or periods aggregating more than three minutes in any hour shall not cause a visible emission which is as dark or darker than No. 0.5 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree or result in fallout on adjacent property in such quantities as to cause public nuisance per District Regulation 1-301.
(Basis: Regulations 1-301 and 6-1-301)

7. The owner/operator shall use water spray to minimize fugitive dust emissions from material/scrap handling and storage to comply with Part 6. The owner/operator shall operate the facility at all times in accordance with its approved Emissions Minimization Plan (EMP).
(Basis: Regulations 1-301, 6-1-301, and 6-4-301)

8. The owner/operator shall not exceed a total of 26 ship calls and 63,875 truck calls per calendar year to haul in/out scrap/materials at the facility.
(Basis: health risk assessment for CEQA review)

9. In order to demonstrate compliance with Parts 1 and 8, the owner/operator shall keep records of monthly and yearly throughput of shredder feedstock materials, ship calls and truck calls in a District approved log. Shredder feedstock shall be totaled for each consecutive rolling 12-month period. All records shall be maintained for a period of at least 5 years from the date of data entry and shall be made available to Air District staff for inspection upon request.
(Basis: Regulations 2-1-301 and 2-5-302, Cumulative Increase, CEQA)

End Conditions

VIII. RECOMMENDATION

Based on the analysis set forth in this Addendum and the supporting documentation on which it relies, and after considering the public comments received on the draft permit, the undersigned air quality engineers recommend issuing Radius Recycling a Permit to Operate for the following abatement devices, subject to Condition # 27348 with the revisions noted above.

A-15 Regenerative Thermal Oxidizer, 21 MMBTU/hr; to abate A-11 Venturi Scrubber

A-16 Regenerative Thermal Oxidizer, 21 MMBTU/hr; to abate A-12 Venturi Scrubber

A-17 Packed Bed Scrubber; abating A-15 Regenerative Thermal Oxidizer

A-18 Packed Bed Scrubber; abating A-16 Regenerative Thermal Oxidizer

The undersigned air quality engineers further recommend issuing Radius Recycling a revised Permit to Operate for the following source (S-6 Metal Shredder), subject to Condition # 27410 with the revisions noted above.

S-6 Metal Shredder; abated by A-11 and A-12 Venturi Scrubbers, A-15 and A-16 Regenerative Thermal Oxidizers, and A-17 and A-18 Packed Bed Scrubbers.

Prepared By: Kevin Oei for Davis Zhu — 7/15/2025

Davis Zhu, Senior Air Quality Engineer — Date

Reviewed By: Kevin Oei — 7/15/2025

Kevin Oei, Supervising Air Quality Engineer — Date

Appendix A

Health Risk Assessment

For

S-6 Metal Shredder and Abatement Systems

INTEROFFICE MEMORANDUM
May 29, 2025

TO: **Kevin Oei** **Via:** **Daphne Y. Chong**

FROM: **Davis Zhu**

SUBJECT: **Results of Revised Health Risk Assessments (HRA) for Schnitzer Steel (Oakland, CA), Plant #208, Application #30009**

EXECUTIVE SUMMARY

Schnitzer Steel Products Company (Schnitzer) operates a metal shredding operation at their Oakland, CA facility. In 2020, the Air District required that Schnitzer install updated abatement systems for this metal shredding operation, because emissions from the shredder enclosure were exceeding the total carbon limits in Regulation 8-2-301. The updated abatement systems were required to include two regenerative thermal oxidizers (RTOs) that would control organic emissions from the shredder and two packed-bed acid gas scrubbers (AGSs) to control secondary toxic emissions generated by the thermal oxidation process. Schnitzer submitted Application #30009 to request permits for this additional air pollution abatement equipment on the existing metal shredder. On August 26, 2021, the Air District issued Schnitzer an Authority to Construct for these abatement equipment upgrades. Schnitzer installed the new abatement systems and began operating them on April 11, 2022. Subsequently, Schnitzer completed the required initial compliance demonstration testing for this equipment. This initial compliance demonstration triggered a requirement for a revised health risk assessment (HRA). The Air District prepared an initial revised HRA in March of 2024 to accompany a draft Permit to Operate for Application #30009, and it has now prepared this further revised HRA for the final Permit to Operate.

For the Authority to Construct analysis, the Air District prepared an HRA only for a post-project scenario, using emission estimates derived from thermal oxidizer control efficiency assumptions and literature-based emission factors. For the revised HRAs, the Air District evaluated both pre-project and post-project scenarios, using more comprehensive toxic emission inventories for both scenarios. The revised HRAs for the pre-project and post-project scenarios include emission estimates for fifty-five toxic air contaminants that were derived from site-specific source test data, including pre-project and post-project tests. In addition, for this further revised HRA report prepared for the final Permit to Operate, the Air District incorporated revised stack emission limits that are being imposed to ensure the project complies with the Air District's Regulation 2-5-302 project risk limits.

As shown in Table 1, the further revised HRAs show risk reductions for each type of health risk evaluated. The HRAs show a reduction in cancer risk of 84%, a reduction in chronic (annual) non-cancer health risk of 21%, and a reduction in acute (1-hour) non-cancer health risk of 69%.

Table 1. Comparison of Pre-Project and Post-Project Health Risks for Application #30009

	Cancer Risk (in a million)	Chronic Hazard Index	Acute Hazard Index
Pre-Project Scenario	37.3	0.127	0.42
Post-Project Scenario	5.9	0.10	0.13
Project Risk Reductions	31.4	0.027	0.29
Risk Reduction Percentage	84%	21%	69%

TOXIC NEW SOURCE REVIEW REQUIREMENTS

Regulation 2, Rule 5 contains the Air District's toxic new source review requirements for projects involving new or modified sources. A modified source is defined in Regulation 2-5-214.[1] This project to upgrade the abatement systems for the S-6 Metal Shredder involves a physical change to the source (the addition of abatement equipment) and results in emissions of new toxic air contaminants that were not previously emitted. Many of the compounds emitted by the shredder are organic compounds that contain chlorine or fluorine. Thermal oxidation of these compounds is necessary to reduce organic emissions to compliant levels and to reduce overall health risks from the shredding operation, but thermal oxidation will also result in new secondary toxic emissions, such as hydrogen chloride, hydrogen fluoride, formaldehyde, dioxins and polycyclic aromatic hydrocarbons. The packed-bed acid gas scrubbers will control most of these secondary toxic emissions. As defined in Regulation 2-5-214.4, the metal shredder may potentially be a modified source of toxic air contaminants, if the emission of new toxics results in a cancer risk greater than 1.0 in a million or a chronic hazard index greater than 0.20. A health risk assessment is necessary to determine if this project meets the Regulation 2-5-214.4 definition of a modified source.

If the metal shredder is presumed to be a modified source of toxic air contaminants, the metal shredder would be subject to the (a) Best Available Control Technology for Toxics (TBACT) Requirement of Regulation 2-5-301, if TBACT thresholds are exceeded, and (b) Project Risk Requirement of Regulation 2-5-302. For the Engineering Evaluation conducted prior to issuance of the Authority to Construct (ATC) for Application #30009, the Air District presumed that this project would constitute a modified source of toxic air contaminants. The Air District concluded that the shredder met TBACT requirements for carcinogenic health risks and established permit conditions to ensure that the abatement systems would achieve the highest achievable destruction efficiency for toxic air contaminants.

This updated estimate of post-project health risks is compared to Regulation 2, Rule 5 project risk limits in Table 2. Although this more comprehensive post-project HRA finds that health risks are higher than previously estimated for the Authority to Construct analysis, it demonstrates that post-project health risks comply with all applicable project risk limits for Application #30009. Project cancer risk is estimated to be 5.9 in a million and meets the most stringent project cancer risk limit of 6.0 in a million that applies to projects involving new or modified sources that are located in overburdened communities.[2] Cancer risk impacts are discussed in more detail later in this report. Non-cancer health impacts are not expected to occur, because the chronic hazard index and acute hazard index do not exceed 1.0.

---

[1] Regulation 2-5-214 defines a modified source of toxic air contaminants as: "An existing source that undergoes a physical change, change in the method of operation, or increase in throughput or production that results or may result in any of the following:" [214.4] "The emission of any toxic air contaminant not previously emitted in a quantity that would result in a cancer risk greater than 1.0 in a million (10^{-6}) or a chronic hazard index greater than 0.20."

[2] Regulation 2-5-302.1 identifies the project cancer risk limits for permit applications for new or modified sources. Effective July 1, 2022, the project cancer risk limit for permit applications with new or modified sources of toxic air contaminants was reduced from 10.0 in a million to 6.0 in a million, if the project is located in an overburdened community. The Schnitzer Steel facility is located within an overburdened community.

Table 2. Comparison of Post-Project Health Risks to Project Risk Limits for Application #30009

	Cancer Risk (in a million)	Chronic Hazard Index	Acute Hazard Index
Post-Project Scenario [3]	5.9	0.10	0.13
Project Risk Limits (Regulation 2-5-302)	6.0	1.0	1.0

Table 3 presents the maximum source risk for the Metal Shredder and its associated abatement systems. In accordance with Regulation 2-5-301, the Metal Shredder requires TBACT for potential cancer risk impacts because the residual source cancer risk exceeds 1.0 in a million. Most of the residual cancer risk is due to fugitive emissions, which were not directly impacted by this abatement project. However, fugitive impacts are higher than previously estimated due to improved emission factors and the inclusion of additional toxic air contaminants in this HRA. Estimated non-cancer impacts do not trigger TBACT, because the maximum chronic hazard index for the Metal Shredder and Abatement Systems is less than 0.20.

Table 3. Post-Project Maximum Source Risks for Shredder Operations

	Cancer Risk (in a million)	Chronic Hazard Index	Acute Hazard Index
Impacts from Shredder Enclosure: Residual Fugitive Emissions	3.1	0.088	0.11
Impacts from Stacks (P-17 & P-18): Post-Project Abated Emissions	2.6	0.011	0.020
Total Source Risks for Metal Shredder and Abatement Systems	5.7	0.099	0.13
TBACT Source Risk Thresholds (Regulation 2-5-301)	1.0	0.20	NA

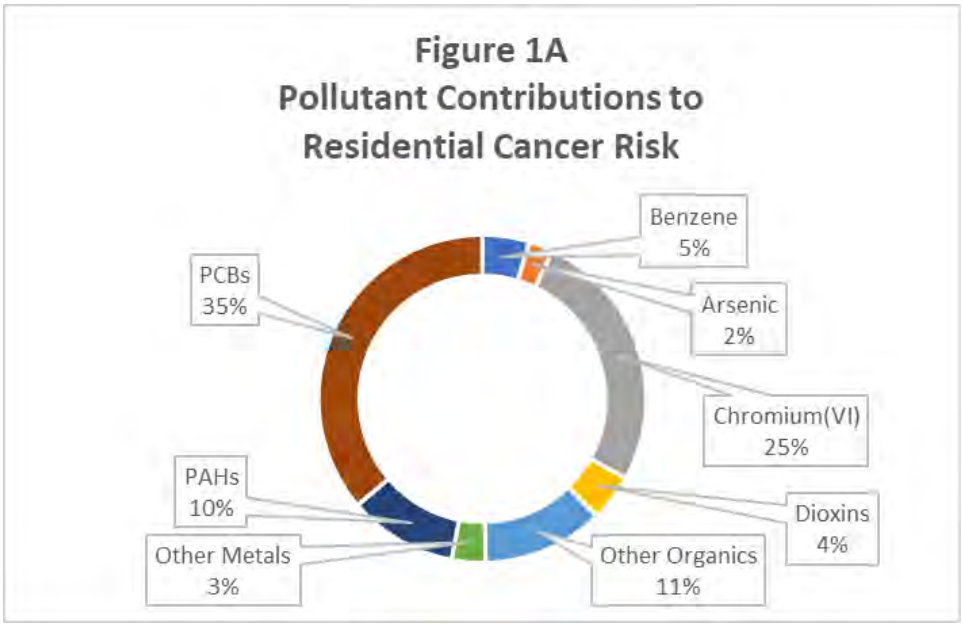
POST-PROJECT RESIDUAL HEALTH IMPACTS

For the post-project health risk scenario shown in Table 2 above, the pollutant contributions to each type of health risk (cancer risk, chronic hazard index, and acute hazard index) are presented in Figures 1A, 1B, and 1C, respectively.

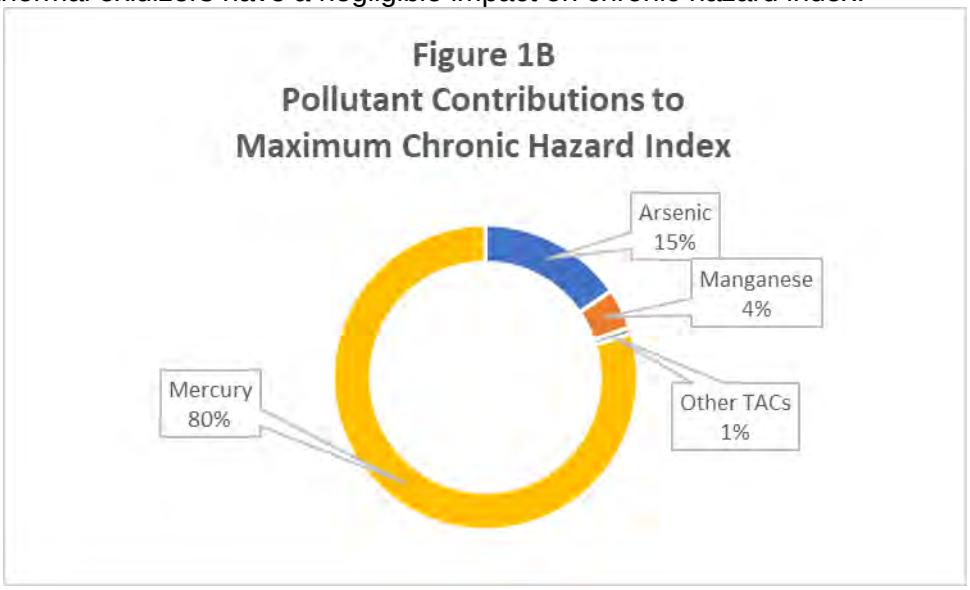
The highest project cancer risk occurs at a residential receptor. The highest pollutant contributions to cancer risk are from polychlorinated biphenyls (PCBs) and hexavalent chromium (Chromium (VI) or Cr(VI)), which collectively contribute 60% of the cancer risk. Secondary TACs, such as polycyclic aromatic hydrocarbons (PAHs) and dioxins collectively contribute 18% to cancer risk. Benzene and other organic compounds account for 15% of the cancer risk. Arsenic and the remaining metals contribute 5% to cancer risk. Emissions of PCBs, benzene, and many organic compounds are reduced by the new thermal oxidizers, while Cr(VI) and other metal emissions are not expected to be affected by

[3] As defined in Regulation 2-5-216, total project health risks include impacts from all new or modified sources in an application and any related applications. For Application #30009, the metal shredder and its proposed abatement systems, a diesel-fired emergency standby engine from Application #30401, and the Joint Products Plant from Application #29870 are included in the post-project HRA. However, only the modified source in the current application, the updated Metal Shredder and its abatement systems, are subject to a TBACT applicability determination.

the new abatement systems. PAHs and dioxins are primarily generated at the RTOs during combustion of other toxic air contaminants.

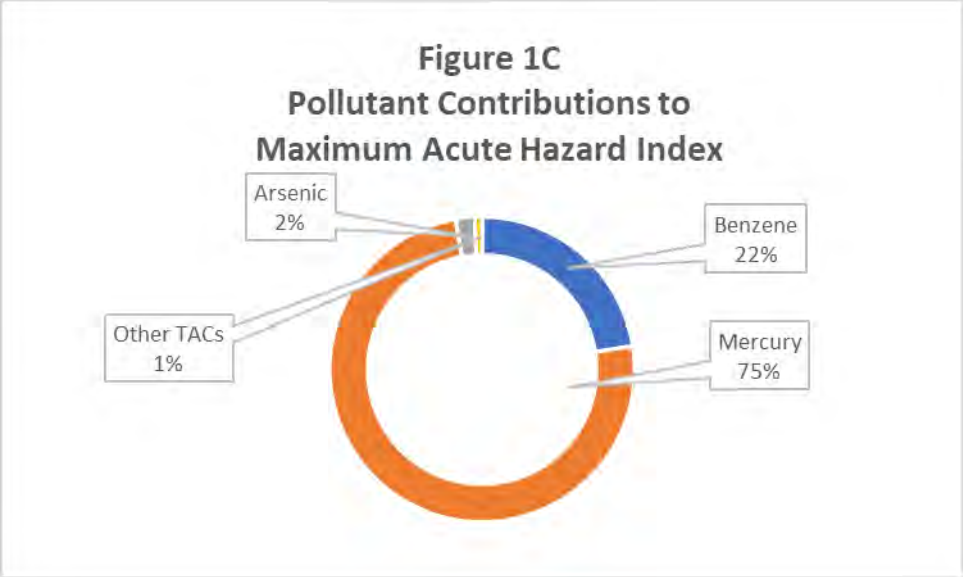


As discussed previously, non-cancer health impacts for the post-project risk scenario are not expected to occur because the hazard indices are less than 1.0. Nevertheless, the pollutant contributions to the chronic hazard index are presented in Figure 1B. The maximum chronic hazard index occurs at a worker receptor and impacts the central nervous system.[4] These impacts are mainly due to metals (mercury, arsenic and manganese) generated by the shredding process. Secondary toxic compounds generated by thermal oxidizers have a negligible impact on chronic hazard index.



[4] Non-cancer health impacts are assessed for different target organ systems, and the highest health impact for an individual organ system is reported as the maximum chronic or acute hazard index for the project. For the chronic hazard index for this project, the organ system with the highest chronic hazard index was the central nervous system. Figure 1B shows the contributions to the central nervous system impacts.

Since the maximum estimated acute hazard index is less than 1.0 for both the pre-abatement and post-RTO installation scenarios, acute health impacts are not expected to occur for either case. Mercury and benzene are the major contributors to the maximum acute hazard index for the reproductive and development systems. Mercury emissions were estimated for the shredding operation, but mercury should be removed by de-pollution of the feedstock prior to transfer to the shredder. Benzene emissions from the shredder are controlled by the RTOs. Potential impacts to other organ systems, such as the immune system, central nervous system, and blood were small compared to the potential impacts to the reproductive and development systems.



PROJECT DESCRIPTIONS

This report evaluates health risks for two scenarios: pre-project and post-project. The pre-project scenario is the Air District's best estimate of actual emissions from the metal shredder prior to this abatement project. The post-project scenario is based on the maximum permitted throughput rate for the shredder and proposed stack emission limits. This section describes these two project scenarios in more detail and explains assumptions used to calculate emissions that could not be measured.

Pre-Project Equipment Description:

For the purposes of this report, the following equipment configuration is identified as the pre-project scenario. The current metal shredder (S-6) was built in 2006 and replaced an older metal shredder at this facility. In 2017, Schnitzer installed an enclosure around the metal shredder, two large blowers, and two venturi scrubbers (A-11 and A-12). The enclosure and high-capacity blowers capture emissions generated during shredding operations. The enclosure and blowers were designed to capture a minimum of 95% of the emissions generated by the shredder. The remaining 5% or less of the emissions generated by the shredder are fugitive emissions that escape to the atmosphere through openings in the enclosure that are necessary to accommodate material transfer to and from the shredder. Each high-capacity blower vents the captured emissions to a venturi scrubber that controls at least 90% of the particulate emissions. Emission streams from the two venturi scrubbers are combined and emit from a single stack (P-15).

In accordance with Regulation 2-5-602.2.1, the Air District determined that the baseline period for the pre-project scenario would be the 3-year period before the RTO and AGS abatement systems were installed (2019-2021). The average throughput rate to the shredder is determined based on throughput rates provided by Schnitzer in response to annual information update requests.

Table 4. Baseline Throughput Rate for the Metal Shredder

Year	Throughput to S-6 Metal Shredder (tons/year)
2019	688,579
2020	670,150
2021	715,214
3-Year Average	691,314

For calculating annual emissions, stack emission factors ($EF_{uncontrolled}$, lbs/ton) for the pre-project scenario were developed based on average source test data at stack P-15 and the reported metal shredder processing rate during the test. Maximum 1-hour emissions were based on maximum test results and an assumed maximum processing rate of 400 tons per hour. If a TAC was not tested for at stack P-15 but test data was available due to post-abatement testing, then this controlled emission factor ($EF_{controlled}$) and thermal oxidizer destruction efficiency (DE_{RTO}) assumptions were used to estimate an uncontrolled emission factor for that compound:
$EF_{uncontrolled} = EF_{controlled} / (1-DE_{RTO})$.

Fugitive emission rates from the metal shredder enclosure cannot be measured and must be estimated based on the stack emission factors above. The fugitive emission factor ($EF_{fugitive}$) is estimated based on the venturi scrubber control efficiency ($DE_{venturi}$), 90% for particulate TACs or 0% for organic TACs, and the enclosure capture efficiency ($CE_{enclosure}$) of 95%.
$EF_{fugitive} = EF_{uncontrolled} / (1-DE_{venturi}) / CE_{enclosure} * (1-CE_{enclosure})$

The stack emission factor and fugitive emissions factors are multiplied by the 3-year average baseline throughput rate to determine average annual emissions.

Applications that had permitting actions occurring during the 3-year period prior to the December 7, 2020 completeness date for Application #30009 are considered related projects. New or modified sources from these related applications that have toxic air contaminant emissions are included in a new source review HRA. The pre-project scenario included the S-16 diesel-fired emergency standby engine from Application #30401 and the Joint Products Plant (sources S-11 and S-13) from Application #29870. Emissions from these sources were the maximum permitted emission rates described in the referenced applications.

Post-Project Equipment Description:

For the purposes of this report, the following equipment configuration is identified as the post-project scenario. The S-6 metal shredder, enclosure, venturi scrubbers, and related sources (S-16, S-11, and S-13) are the same as described above for the pre-project scenario. Schnitzer replaced the blowers with equivalent capacity but more energy efficient blowers. The enclosure and blower capture efficiency for the post-project scenario is the same as described above for the pre-project scenario (a minimum of 95% capture with 5% or less fugitive emissions). After the venturi scrubbers, Schnitzer installed two regenerative thermal oxidizers (RTOs: A-15 and A-16) to control organic emissions and toxic organic emissions from the shredding operations, followed by two packed-bed scrubbers (A-17 and A-18) to control acid gas emissions generated by the RTOs, and two new stacks (P-17 and P-18). Each blower

is now abated by a venturi scrubber, a regenerative thermal oxidizer, and a packed-bed scrubber, and vents to the atmosphere through a new stack.

Fugitive emission rates from the metal shredder enclosure cannot be measured and must be estimated based on the stack emission factors measured between 2018 and 2024, including source tests after the RTO operation in April 2022. The fugitive emission factor ($EF_{fugitive}$) is estimated based on the venturi scrubber control efficiency ($DE_{venturi}$), 90% for particulate TACs or 0% for organic TACs; and the enclosure capture efficiency ($CE_{enclosure}$) of 95%.

$EF_{fugitive} = EF_{uncontrolled} / (1\text{-}DE_{venturi}) / CE_{enclosure} * (1\text{-}CE_{enclosure})$

Annual emissions were calculated using the updated TAC emission factors and the maximum permitted annual throughput rate of 720,000 tons per year, instead of the baseline throughput rate.

The Air District conducted a revised HRA in connection with the draft Permit to Operate, and the revised HRA showed a cancer risk at the Maximally Exposed Individual Resident (MEIR) receptor of 7.6 in a million, which exceeds the maximum health risk limit of 6.0 in a million for projects within an Overburdened Community specified in Air District Regulation 2-5-302.1. To ensure that the post-project scenario does not cause a cancer risk exceeding the 6.0-in-a-million limit, the Air District is imposing revised TAC permit conditions to limit cancer-causing TAC emissions to keep the risk below 6.0 in one million.

To accomplish this, the Air District has identified appropriate TAC emission rates corresponding to a cancer risk of 5.9 in one million. The Air District reviewed all of the source test data collected between 2018 and 2024 to determine representative emission rates for each TAC (normalized to the shredder's maximum processing rate of 400 tons/hr), and then scaled those rates to a level that produced an outcome of 5.9 in one million for the project cancer risk. TAC emissions at or below those emission rates will ensure compliance with Regulation 2-5-302.

The new emissions limits being imposed in subparts 11.b and 11.c of permit condition 27348 are toxicity-weighted emissions limits corresponding to the TAC emissions rates derived in this manner, as were evaluated in the HRA. Subpart 11.b imposes a toxicity-weighted TAC limit of 1,014 lb/year to address carcinogenic toxicity, and subpart 11.c. imposes a toxicity-weighted TAC limit of 29,464 lb/year to address chronic non-cancer toxicity. If total toxicity-weighted TAC emissions remain below these limits, the associated risk will remain within the maximum risk levels reported in this revised HRA report.

DETAILED HRA RESULTS

Results from the Pre-Project and Post-Project HRAs are compared in Table 1 above and summarized in Tables 6 and 7, respectively. Overall, this abatement project results in risk reductions for each type of health risk for residential and worker receptors and for the acute point of maximum impact (PMI).

As discussed in the Toxics New Source Review Requirements section above, Application #30009 is subject to project risk limits of 6.0 in a million cancer risk, 1.0 chronic hazard index, and 1.0 acute hazard index. In previous analysis, the maximum exposed individual resident (MEIR) was identified at the Waterfront Hotel in Oakland. The revised HRA updated health risks at the new MEIR located at the Phoenix Lofts. With the new emission stack limits, the maximum post-project health impacts are estimated at: **5.9 in a million cancer risk, 0.10 chronic hazard index**, and **0.13 acute hazard index**. This project complies with each applicable project risk limit. Since the residual source risk for Metal

Shredder and Abatement Systems is greater than 1.0 in a million cancer risk, TBACT is required for this source pursuant to Regulation 2-5-301.

Table 6. Project Risks for Pre-Project Scenario

Receptor	NAD 83 UTM Coordinates (meters)		Cancer Risk (in a million)	Chronic Non-Cancer Hazard Index	Acute Hazard Index
	Easting (x)	Northing (y)			
Resident	563117	4183697	37.3	0.043	NA
Worker (WAF= 1, 1.8, 4.2 for 3 source groups)	562697	4183639	7.1	0.127	NA
1-hr PMI	562697	4183639	NA	NA	0.42

Table 7. Project Risks for Post-Project Scenario

Receptor	NAD 83 UTM Coordinates (meters)		Cancer Risk (in a million)	Chronic Non-Cancer Hazard Index	Acute Hazard Index
	Easting (x)	Northing (y)			
Resident	563117	4183697	5.9	0.037	NA
Worker (WAF= 1, 1.8, 4.2 for 3 source groups)	562697	4183639	1.9	0.10	NA
1-hr PMI	562697	4183639	NA	NA	0.13

Table 8. Source Risks for Post-Project Scenario

Risk Category	Maximum Source Risk [5]					
	Total Source Risk for Metal Shredder and Abatement Systems	RTO #1 (A15/P17)	RTO #2 (A16/P18)	Shredder Enclosure Fugitive Emissions (FUG1, FUG2 & FUG3)	JPP (S131, S132 & S11)	Generator (S16)
Resident Cancer (in a million)	5.9	1.4	1.2	3.1	0.14	0.033
Worker Cancer (in a million)	1.9	0.18	0.12	1.1	0.40	0.099
Resident Chronic HI	0.037	0.0052	0.0046	0.027	0.0000020	0.0000089
Worker Chronic HI	0.10	0.0069	0.0044	0.088	0.0023	0.000076
Acute HI	0.13	0.011	0.0090	0.11	0.0064	NA

In addition, 30-day lead concentrations were estimated in the model, where the maximum 30-day lead exposure was found to be **0.0062 µg/m^3**, which is well below the 0.12 µg/m^3 Hot Spots approvable level for areas with high lead exposure. In accordance with the OEHHA guidelines for analysis of lead non-cancer risk, this is an acceptable concentration.

MODELING PROCEDURES

The AERMOD air dispersion computer model (version 21112) was used to estimate annual average and hourly ambient air concentrations. The model was run with OAKLAND STP (2009-2013) AERMOD ready meteorological data. BAAQMD meteorology staff processed the meteorological data set using Oakland International Airport station upper air data for the same time-period.

The model was referenced in NAD 83 UTM coordinates and used 10-meter NED terrain data files for Alameda County.

Model runs were made with urban dispersion coefficients. The classification determination involves assessing land use by Auer's categories within a 3-km radius of the facility site. USEPA's AERSURFACE tool (version 20060) with USGS National Land Cover Data (NLCD_2016) was used to summarize the land use classifications. The land use was determined to be urban because Auer Urban land use categories made up more than 50% of the total area (79.6%). The site was modeled as an

[5] The sum of the maximum individual source cancer risks does not equal the maximum project cancer risk because the maximum source risks for the Joint Products Plan and the Emergency Standby Engine occur at different locations than the maximum impacts from the Metal Shredder and Abatement Systems. For non-cancer impacts, the maximum chronic hazard index and maximum acute hazard index for the Joint Products Plant and the Emergency Standby Generator occur for different target organ systems than the maximum impacts from the Metal Shredder and Abatement Systems. Impacts from different target organ systems are not additive.

urban area (Oakland, 2010 population 390,724) with a surface roughness length of 1.0 using the AER Urban option.

Stack and building parameters for the analysis were based on information provided by the applicant.

For the pre-project scenario, the model includes three point-sources (S11, S16, and P15) and five volume-sources (S131, S132, FUG1, FUG2 and FUG3). For the post-project scenario, the model includes four point-sources (S11, S16, P17 and P18), and five volume-sources (S131, S132, FUG1, FUG2 and FUG3).

Table 9. Emission Release Points in the Post-Project HRA

Source	Source Description	Modelled source	Modelled source description
S-6 Metal Shredder	Fugitive emissions from the Shredder Enclosure	FUG1	Volume source, Shredder Enclosure opening 1
		FUG2	Volume source, Shredder Enclosure opening 2
		FUG3	Volume source, Shredder Enclosure opening 3
A-15, A-16, A-17 and A-18	2 RTOs with 2 Acid Gas Scrubbers	P17	Point source, RTO A15 exhaust
		P18	Point source, RTO A16 exhaust
S-11 and S-13	Material Separation Operations at Joint Products Plant (JPP)	S11	Point source, JPP plant bag house exhaust
		S131	Volume source, JPP plant opening 1
		S132	Volume source, JPP plant opening 2
S-16	Diesel Emergency Generator	S16	Point source, generator S16 exhaust

HEALTH RISK CALCULATIONS:

The HARP2 Air Dispersion Modeling and Risk Tool (ADMRT) was used to evaluate risk in the following categories: (1) Cancer Risk and (2) Chronic Hazard Index for Residential and Off-site Worker receptors; and (3) Acute Hazard Index for the maximally exposed receptor. Health risk estimates were calculated in accordance with the BAAQMD's Air Toxics NSR Program HRA Guidelines, dated December 2021.

Estimates of residential risk assume potential exposure to annual average TAC concentrations occurs 350 days per year, for 30 years. In addition, residential risk estimates assume a 95th percentile breathing rate for age groups younger than two years old, and 80th percentile breathing rate for age groups that are older than or equal to two years of age.

Risk estimates for offsite workers assume potential exposure occurs 8 hours per day, 250 days per year, for 25 years. For offsite workers, the 95th percentile 8-hour breathing rate based on moderate activity was assumed.

Residential cancer risk estimates include age sensitivity factors (ASFs) and fraction of time at home (FAH) adjustments. The ASFs are age-specific weighting factors used in calculating cancer risks from

exposures of infants, children and adolescents, to reflect their anticipated special sensitivity to carcinogens.

For the RTO and Shredder fugitive emissions, the operating schedule is conservatively assumed to be 24 hours per day. Therefore, the worker adjustment factor (WAF) is assumed to be 1.0 for these source groups. The JPP is operating 19 hours/day, 5 days/week, and WAF is 1.8 for this source group. The S-16 generator is operating 1 hour/day, 1 day/week, and WAF is 4.2 for this source group. Worker Cancer risk reflected sum of these three source groups with different WAFs.

Student risk was not calculated because there are no K-12 schools within 1,000 feet of the source.

Non-Cancer Lead Exposure Guidance:

The OEHHA guidelines for analysis of lead non-cancer health risk includes analyzing census data to determine whether the Maximum Exposure Area coincides with a census tract with a potential for "high exposure" or "average exposure" to lead. Per CARB's lead risk management guideline (Table 8-Air Concentrations Associated with Proposed Neurodevelopmental Risk Management Levels), the approvable average lead concentration is < 0.12 µg/m^3 for high exposure areas and < 0.30 µg/m^3 for average exposure areas. The maximum one-month average lead concentration for this project (**0.0062 µg/m^3**) is far below the screening levels for areas with high lead exposures.

Appendix A
Emission Rates for Application # 30009
Health Risk Assessments for
Permit to Operate Issuance

Table A-1 – Pre-Project Emissions with Fugitive Emissions Derived from 95% Minimum Building Capture Efficiency

				3 Fugitive Release Points			
Pollutant	**Overall Detection Status [a]**	**Maximum Fugitive Emissions** (lb/hr)	**Average Fugitive Emissions** (lb/yr)	**Emissions per Fugitive** Release Point (lb/hr)	**Emissions per Fugitive** Release Point (lb/yr)	**Uncontrolled Stack P-15 Maximum (lb/hr)**	**Uncontrolled Stack P-15 Baseline Avg (lb/yr)**
Acetaldehyde [d]	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrylonitrile	PD	3.34E-03	2.59E+00	1.11E-03	8.62E-01	6.34E-02	1.10E+02
Allyl chloride	ND	1.04E-04	1.79E-01	3.46E-05	5.98E-02	1.97E-03	3.41E+00
Arsenic	PD [o]	5.58E-05	4.08E-02	1.86E-05	1.36E-02	0.00E+00	0.00E+00
Benzene	D	1.07E-01	9.11E+01	3.56E-02	3.04E+01	2.03E+00	3.50E+03
Benzyl Chloride	ND	1.52E-03	1.47E+00	5.08E-04	4.89E-01	2.90E-02	5.01E+01
Beryllium	PD [o]	2.21E-06	3.47E-03	7.37E-07	1.16E-03	0.00E+00	0.00E+00
Butadiene, 1,3-	PD	1.68E-03	2.10E+00	5.61E-04	7.01E-01	3.20E-02	5.52E+01
Cadmium	D	2.32E-05	4.00E-01	7.72E-06	1.33E-01	4.40E-04	7.60E-01
Carbon Disulfide	PD	2.23E-03	1.67E+00	7.45E-04	5.57E-01	4.24E-02	7.33E+01
Carbon Tetrachloride	ND	1.89E-03	1.81E+00	6.29E-04	6.04E-01	3.59E-02	6.20E+01
Chlorobenzene	ND	1.38E-03	1.32E+00	4.60E-04	4.41E-01	2.62E-02	4.53E+01
Chloroethane	ND	9.36E-04	8.85E-01	3.12E-04	2.95E-01	1.78E-02	3.08E+01
Chloroform	ND	1.49E-03	1.43E+00	4.96E-04	4.75E-01	2.83E-02	4.89E+01
Chromium (VI)	D	1.33E-05	1.24E-01	4.42E-06	4.13E-02	2.52E-04	4.36E-01
Cobalt	PD [o]	2.95E-05	2.27E-02	9.82E-06	7.55E-03	0.00E+00	0.00E+00
Copper	PD [o]	1.58E-04	1.42E-01	5.26E-05	4.74E-02	0.00E+00	0.00E+00
Dibromoethane, 1,2-	ND	2.25E-03	2.16E+00	7.50E-04	7.22E-01	4.28E-02	7.39E+01
Dichlorobenzene, 1,4-	PD	6.90E-03	5.12E+00	2.30E-03	1.71E+00	1.31E-01	2.27E+02
Dichloroethane, 1,1- (ethylidene dichloride)	ND	1.21E-03	1.16E+00	4.02E-04	3.86E-01	2.29E-02	3.96E+01
Dichloroethane, 1,2- (ethylene dichloride)	PD	2.80E-03	2.35E+00	9.33E-04	7.84E-01	5.32E-02	9.20E+01
Dichloroethene, 1,1- (vinylidene chloride)	PD	3.05E-03	2.49E+00	1.02E-03	8.29E-01	5.80E-02	1.00E+02
Dioxane, 1,4-	PD	2.66E-03	2.08E+00	8.87E-04	6.92E-01	5.06E-02	8.74E+01
Dioxins/Furans (total) [d, f]	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl Benzene	D	2.43E-01	2.39E+02	8.11E-02	7.96E+01	4.62E+00	7.99E+03
Formaldehyde [d]	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Hexane	PD	2.49E-01	2.55E+02	8.30E-02	8.48E+01	4.73E+00	8.18E+03
Hydrogen Chloride [d]	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hydrogen Fluoride [d]	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isopropyl Alcohol	PD	1.86E-01	8.08E+01	6.19E-02	2.69E+01	3.53E+00	6.10E+03
Lead	D	1.68E-04	2.91E+00	5.61E-05	9.70E-01	3.20E-03	5.53E+00
Manganese	D [o]	6.00E-04	7.72E-01	2.00E-04	2.57E-01	0.00E+00	0.00E+00
Mercury	PD [o]	1.79E-03	3.04E+00	5.96E-04	1.01E+00	0.00E+00	0.00E+00
Methanol	D	5.59E-02	4.81E+01	1.86E-02	1.60E+01	1.06E+00	1.83E+03
Methyl bromide	ND [o]	5.11E-03	7.32E+00	1.70E-03	2.44E+00	0.00E+00	0.00E+00
Methyl Ethyl Ketone	PD	3.91E-02	3.96E+01	1.30E-02	1.32E+01	7.42E-01	1.28E+03
Methyl Tert Butyl Ether	ND	1.07E-03	1.03E+00	3.56E-04	3.42E-01	2.03E-02	3.50E+01
Methylene Chloride	PD	4.97E-02	3.94E+01	1.66E-02	1.31E+01	9.45E-01	1.63E+03
Naphthalene	D [o]	7.89E-03	1.09E+01	2.63E-03	3.64E+00	0.00E+00	0.00E+00
Nickel	D [o]	2.53E-04	3.12E-01	8.42E-05	1.04E-01	0.00E+00	0.00E+00
PAHs, as benzo(a)pyrene [d, e]	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PCBs (polychlorinated biphenyls)	D	1.42E-03	1.28E+00	4.75E-04	4.28E-01	2.71E-02	4.68E+01
Perchloroethylene	PD	2.29E-02	9.89E+00	7.63E-03	3.30E+00	4.35E-01	7.52E+02
Propylene	D	6.18E-02	5.86E+01	2.06E-02	1.95E+01	1.17E+00	2.03E+03
Selenium	ND [o]	2.53E-05	4.27E-02	8.42E-06	1.42E-02	0.00E+00	0.00E+00
Styrene	PD	1.99E-02	2.29E+01	6.65E-03	7.62E+00	3.79E-01	6.55E+02
Tetrachloroethane, 1,1,2,2-	ND	2.03E-03	1.95E+00	6.78E-04	6.51E-01	3.86E-02	6.67E+01
Toluene	D	9.38E-01	7.93E+02	3.13E-01	2.64E+02	1.78E+01	3.08E+04
Trichloroethane, 1,1,1-	ND	2.22E-02	9.37E+00	7.41E-03	3.12E+00	4.22E-01	7.30E+02
Trichloroethane, 1,1,2-	ND	1.63E-03	1.56E+00	5.42E-04	5.21E-01	3.09E-02	5.34E+01
Trichloroethene	ND	1.62E-03	1.55E+00	5.40E-04	5.18E-01	3.08E-02	5.32E+01
Vanadium	ND [o]	1.00E-04	1.68E-01	3.33E-05	5.61E-02	0.00E+00	0.00E+00
Vinyl Acetate	ND	5.15E-03	4.66E+00	1.72E-03	1.55E+00	9.79E-02	1.69E+02
Vinyl Chloride	ND	7.62E-04	7.32E-01	2.54E-04	2.44E-01	1.45E-02	2.50E+01
Xylenes	D	1.24E+00	1.05E+03	4.13E-01	3.49E+02	2.35E+01	4.07E+04

Table A-2 – Post-Project Emissions with Fugitive Emissions Derived from 95% Minimum Building Capture Efficiency

				3 Fugitive Release Points			
Pollutant	**Overall Detection Status [a]**	**Average Fugitive Emissions** (lb/hr)	**Average Fugitive Emissions** (lb/yr)	**Emissions per Fugitive** Release Point (lb/hr)	**Emissions per Fugitive** Release Point (lb/yr)	P17 or P18 **Outlet PTE Per Stack (lb/hr)**	P17 or P18 **Outlet PTE Per Stack (lb/yr)**
Acetaldehyde [d]	NA	0.00E+00	0.00E+00	*0.00E+00*	0.00E+00	3.44E-02	6.19E+01
Acrylonitrile	PD	2.79E-03	5.03E+00	9.32E-04	1.68E+00	1.94E-03	3.49E+00
Allyl chloride	ND	3.37E-03	6.06E+00	1.12E-03	2.02E+00	1.45E-03	2.62E+00
Arsenic	PD [o]	1.55E-05	2.80E-02	5.18E-06	9.32E-03	4.30E-05	7.74E-02
Benzene	D	4.21E-02	7.59E+01	1.40E-02	2.53E+01	1.01E-02	1.82E+01
Benzyl Chloride	ND	1.83E-03	3.30E+00	6.11E-04	1.10E+00	2.87E-04	5.16E-01
Beryllium	PD [o]	1.59E-06	2.86E-03	5.29E-07	9.52E-04	2.06E-06	3.70E-03
Butadiene, 1,3-	PD	1.57E-03	2.82E+00	5.22E-04	9.40E-01	5.08E-04	9.15E-01
Cadmium	D	1.14E-04	2.05E-01	3.80E-05	6.84E-02	1.41E-05	2.53E-02
Carbon Disulfide	PD	3.43E-03	6.17E+00	1.14E-03	2.06E+00	3.33E-03	6.00E+00
Carbon Tetrachloride	ND	3.98E-03	7.16E+00	1.33E-03	2.39E+00	1.78E-03	3.20E+00
Chlorobenzene	ND	3.02E-03	5.43E+00	1.01E-03	1.81E+00	1.28E-03	2.30E+00
Chloroethane	ND	1.67E-03	3.01E+00	5.57E-04	1.00E+00	7.57E-04	1.36E+00
Chloroform	ND	5.92E-03	1.07E+01	1.97E-03	3.55E+00	4.69E-03	8.44E+00
Chromium (VI)	D	3.33E-05	5.99E-02	1.11E-05	2.00E-02	3.16E-05	5.69E-02
Cobalt	PD [o]	1.31E-05	2.36E-02	4.37E-06	7.87E-03	2.25E-05	4.06E-02
Copper	PD [o]	2.27E-04	4.09E-01	7.57E-05	1.36E-01	1.26E-04	2.27E-01
Dibromoethane, 1,2-	ND	5.00E-03	9.00E+00	1.67E-03	3.00E+00	2.18E-03	3.93E+00
Dichlorobenzene, 1,4-	PD	4.49E-03	8.08E+00	1.50E-03	2.69E+00	1.78E-03	3.20E+00
Dichloroethane, 1,1- (ethylidene dichloride)	ND	2.65E-03	4.78E+00	8.85E-04	1.59E+00	1.14E-03	2.05E+00
Dichloroethane, 1,2- (ethylene dichloride)	PD	2.30E-03	4.14E+00	7.66E-04	1.38E+00	1.14E-03	2.05E+00
Dichloroethene, 1,1- (vinylidene chloride)	PD	2.24E-03	4.04E+00	7.48E-04	1.35E+00	1.12E-03	2.01E+00
Dioxane, 1,4-	PD	2.81E-03	5.05E+00	9.35E-04	1.68E+00	1.68E-03	3.03E+00
Dioxins/Furans (total) [d, f]	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.86E-09	1.60E-05
Ethyl Benzene	D	1.16E-01	2.08E+02	3.85E-02	6.93E+01	1.70E-02	3.06E+01
Formaldehyde [d]	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.61E-03	1.55E+01

Hexane	PD	1.40E-01	2.53E+02	4.68E-02	8.42E+01	3.29E-02	5.92E+01
Hydrogen Chloride [d]	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.84E-01	1.05E+03
Hydrogen Fluoride [d]	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-01	2.38E+02
Isopropyl Alcohol	PD	3.73E-02	6.71E+01	1.24E-02	2.24E+01	1.12E-02	2.02E+01
Lead	D	8.74E-04	1.57E+00	2.91E-04	5.24E-01	2.91E-04	5.24E-01
Manganese	D [o]	3.97E-04	7.15E-01	1.32E-04	2.38E-01	5.20E-04	9.35E-01
Mercury	PD [o]	2.77E-03	4.98E+00	9.23E-04	1.66E+00	1.71E-03	3.08E+00
Methanol	D	2.51E-02	4.53E+01	8.38E-03	1.51E+01	5.79E-03	1.04E+01
Methyl bromide	ND [o]	4.20E-03	7.56E+00	1.40E-03	2.52E+00	9.06E-04	1.63E+00
Methyl Ethyl Ketone	PD	2.06E-02	3.70E+01	6.86E-03	1.23E+01	3.48E-03	6.26E+00
Methyl Tert Butyl Ether	ND	2.32E-03	4.18E+00	7.75E-04	1.39E+00	1.02E-03	1.83E+00
Methylene Chloride	PD	4.24E-02	7.63E+01	1.41E-02	2.54E+01	3.67E-03	6.61E+00
Naphthalene	D [o]	6.25E-03	1.13E+01	2.08E-03	3.75E+00	1.39E-03	2.50E+00
Nickel	D [o]	2.10E-04	3.78E-01	6.99E-05	1.26E-01	2.17E-04	3.90E-01
PAHs, as benzo(a)pyrene [d, e]	NA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.60E-04	1.37E+00
PCBs (polychlorinated biphenyls)	D	5.99E-04	1.08E+00	2.00E-04	3.59E-01	1.70E-03	3.06E+00
Perchloroethylene	PD	6.24E-03	1.12E+01	2.08E-03	3.74E+00	1.91E-03	3.44E+00
Propylene	D	2.50E-02	4.50E+01	8.33E-03	1.50E+01	3.22E-03	5.79E+00
Selenium	ND [o]	2.51E-05	4.52E-02	8.38E-06	1.51E-02	2.40E-05	4.31E-02
Styrene	PD	1.12E-02	2.01E+01	3.73E-03	6.71E+00	2.12E-03	3.81E+00
Tetrachloroethane, 1,1,2,2-	ND	4.33E-03	7.79E+00	1.44E-03	2.60E+00	1.91E-03	3.43E+00
Toluene	D	4.29E-01	7.72E+02	1.43E-01	2.57E+02	9.32E-02	1.68E+02
Trichloroethane, 1,1,1-	ND	5.48E-03	9.86E+00	1.83E-03	3.29E+00	1.50E-03	2.70E+00
Trichloroethane, 1,1,2-	ND	3.47E-03	6.25E+00	1.16E-03	2.08E+00	1.50E-03	2.70E+00
Trichloroethene	ND	3.47E-03	6.24E+00	1.16E-03	2.08E+00	1.50E-03	2.70E+00
Vanadium	ND [o]	9.73E-05	1.75E-01	3.24E-05	5.84E-02	9.42E-05	1.69E-01
Vinyl Acetate	ND	8.67E-03	1.56E+01	2.89E-03	5.20E+00	2.07E-03	3.73E+00
Vinyl Chloride	ND	1.61E-03	2.89E+00	5.36E-04	9.64E-01	7.23E-04	1.30E+00
Xylenes	D	5.31E-01	9.56E+02	1.77E-01	3.19E+02	9.05E-02	1.63E+02