TECHNICAL SUPPORT DOCUMENT

Air Discharge Permit 22-3531
Air Discharge Permit Application CO-1050

Issued: September 14, 2022

PNW METAL RECYCLING

SWCAA ID – 2734

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ABBREVIATIONS

List of Acronyms

ADP .... Air Discharge Permit

AP-42 .... Compilation of Emission Factors, AP-42, 5th Edition, Volume 1, Stationary Point and Area Sources – published by EPA

ASIL............. Acceptable Source Impact Level

BACT........... Best available control technology

BART .... Best Available Retrofit Technology

CAM .... Compliance Assurance Monitoring

CAS No......... Chemical Abstracts Service registry number

CFR.............. Code of Federal Regulations

EPA.............. U.S. Environmental Protection Agency

EU .... Emission Unit

LAER........... Lowest achievable emission rate

MACT.......... Maximum Achievable Control Technologies

NESHAP...... National Emission Standards for Hazardous Air Pollutants

NSPS............ New Source Performance Standard

PSD.............. Prevention of Significant Deterioration

RACT........... Reasonably Available Control Technology

RCW .... Revised Code of Washington

SQER .... Small Quantity Emission Rate listed in WAC 173-460

Standard .... Standard conditions at a temperature of 68°F (20°C) and a pressure of 29.92 in Hg (760 mm Hg)

SWCAA....... Southwest Clean Air Agency

T-BACT....... Best Available Control Technology for toxic air pollutants

WAC .... Washington Administrative Code

List of Units and Measures

µm .... Micrometer (10^{-6} meter)

acfm .... Actual cubic foot per minute

gpm .... gallons per minute

gr/dscf .... grains per dry standard cubic foot

lb/hr.............. Pounds per hour

lb/VMT .... Pounds per vehicle mile traveled

tpy ....Tons per year

ppmvd...........parts per million, dry volume basis

scfm ....standard cubic feet per minute (68°F)

List of Chemical Symbols, Formulas, and Pollutants

CO .... Carbon monoxide

CO_2 .... Carbon dioxide

CO_2e .... Carbon dioxide equivalent

HAP .... Hazardous air pollutant listed pursuant to Section 112 of the Federal Clean Air Act

NO_X .... Nitrogen oxides

O_2 .... Oxygen

PM................ Particulate Matter with an aerodynamic diameter 100 µm or less

PM_{10} .... PM with an aerodynamic diameter 10 µm or less

$PM_{2.5}$ .... PM with an aerodynamic diameter 2.5 µm or less

SO_2 .... Sulfur dioxide

SO_X .... Sulfur oxides

TAP.............. Toxic air pollutant pursuant to Chapter 173-460 WAC

VOC............. Volatile organic compound

Terms not otherwise defined have the meaning assigned to them in the referenced regulations or the dictionary definition, as appropriate.

1. FACILITY IDENTIFICATION

Applicant Name:	PNW Metal Recycling
Applicant Address:	10105 SE Mather Road Clackamas, OR 97015
Facility Name:	PNW Metal Recycling – Paper Way
Facility Address:	100 Paper Way Longview, WA 98632
SWCAA Identification:	2734
Contact Person:	Hank Doane – Senior Vice President
Primary Process:	Metal Recycling
SIC/NAICS Code:	5093: Scrap and waste materials 423930: Recyclable materials merchant wholesalers
Facility Classification:	Natural Minor

2. FACILITY DESCRIPTION

PNW Metal Recycling is a scrap metal facility that receives, prepares, and sorts recyclable material for export to off-site recycling. The addition of a metal shredder to the facility is proposed.

3. CURRENT PERMITTING ACTION

This permitting action is in response to Air Discharge Permit (ADP) application number CO-1050 received April 1, 2022. ADP application CO-1050 requests approval to install a hammermill shredder equipped with fabric filtration, a regenerative thermal oxidizer, and an acid gas scrubber. Operation of the shredder will be associated with increased material handling.

4. PROCESS DESCRIPTION

Recyclable metal commodities will be brought to the site via truck or rail and will be handled on-site using trucks, forklifts, grapples, and/or magnetic material handlers. Material transfer activities at the site will consist of the segregation of recyclable metal commodities into piles according to metal type, level of preparation, and ultimate shipping destination. Recyclable metal commodities may be cut using an electric shear or torch cutter or simply packaged and shipped off-site without additional processing.

Up to four torch cutting stations may be used. A water misting system will be used to reduce visible emissions when torch cutting metal products that are more likely to produce significant visible emissions.

Whole automobiles brought to the site will be drained of fluids, have batteries and mercury switches removed, and dismantled or shredded.

An enclosed hammermill shredder will be installed and used to process vehicles, appliances, etc. The shredder infeed conveyor will be loaded via magnetic or grapple loader outside of the shredder enclosure. Shredded material will be conveyed out of the shredder enclosure to be separated into three piles, ferrous material, heavy non-ferrous materials (termed Automotive Shredder Residue (ASR)), and light ASR. The following descriptions was provided by the applicant:

First, shredded material passes through the Poker Picker and then through two rotary magnetic drum separators atop the "magstand" that pull out ferrous material. Non-ferrous heavier materials ("heavy-ASR") are sent to the heavy-ASR stacking conveyor. A ferrous reclaim system consisting of an overhead magnetic conveyor routes ferrous materials that were not removed by the magnetic drum separators from this conveyor back to the "magstand." Second, a z-box chute with a recirculating cyclonic air system separates ferrous material from remaining light non-ferrous material ("light-ASR") that has passed through the magnetic drum separators. The z-box air system, described in Appendix E, is a closed-loop system that routes excess air and emissions back to the particulate control system. The light-ASR is transferred from the z-box system to the light-ASR stacking conveyor. The separated ferrous material continues through two ballistic magnetic separators that further separate ferrous from high-copper ferrous material. The ferrous shredded material continues down the ferrous collection conveyor, through a hand-picking station, and then passes to the ferrous stacking conveyor. The high-copper ferrous material separated by the ballistic magnetic separators passes through an additional magnetic drum separator for separating ferrous material from the copper material. From the single magnetic drum and magstand, the copper materials are routed back to the light-ASR stacking conveyor and ferrous materials are routed back to the ferrous stacking conveyor for final deposition to their respective piles.

5. EQUIPMENT/ACTIVITY IDENTIFICATION

5.a. Hammermill Shredder. The hammermill shredder will be enclosed within a building, providing for an estimated 95% capture of pollutants emitted during the shredding process. The shredder infeed conveyor and the shredder outfeed conveyor penetrate the building envelope through openings measuring approximately 18' wide by 14' high, and 14' wide by 7' high respectively and are the source of potential fugitive emissions. Much of these openings (estimated at 50%) will be filled with equipment, framing, or rubber skirting. Using the criteria of EPA Method 204 (Criteria for and Verification of a Permanent or Temporary Total Enclosure), the proposed building exceeds the facial velocity requirement, and all openings appear to be at least four equivalent diameters from the shredder emission point. However, for conservativism and to account for any wind impacts, a 95% capture efficiency was estimated rather than 100%.

Rubber skirting or curtains will be included at the conveyor building penetrations to minimize the possibility of fugitive emissions.

The building is vented to a fabric filter to control particulate matter emissions, followed by a regenerative thermal oxidizer (RTO) to control emissions of volatile organic compounds, followed by a wet scrubber to control acid gases (primarily HCl and HF) generated in the RTO. The following equipment details were provided:

<u>Hammermill Shredder</u>

Description:	Hammermill shredder using 10 rotary hammers. Water is sprayed into the shredder during normal operation. A fire water deluge with 300+ gpm capacity is included.
Location:	46° 6'43.62"N, 122°56'48.20"W

<u>Fabric Filter</u>

The following italicized description was provided by the applicant:
The particulate control system is made up of a PM drop box and two filter roll units. A PM drop box will be used to remove large-diameter PM from the exhaust air stream via inertial dissipation, reducing particulate loading upstream of the filter roll units. Removed particulate material drops through an airlock into a hopper where the material will be shipped off the Site for further processing. Following the PM drop box, captured emissions are routed to the roll filter building. Two ultra high-efficiency roll filter units will be installed in series to remove coarse and fine particulates, including sub-micron-size particulates. The filter media will be stored on a roll that automatically advances a clean section of filter into the filtration chamber when the differential pressure deviates from the target value of 30 inches of water column by more than 1 inch. The guaranteed outlet concentration from the filter system is less than 0.005 grains per dry standard cubic foot, and the filtration system is designed to handle 100 percent humidity and temperatures up to 100 degrees Fahrenheit higher than ambient.

Gas Flow:	65,000 scfm from shredder building 10,000 scfm from Z-box cyclone

Exhaust Design Concentration: 0.005 gr/dscf filterable PM (estimated 99+% control)

<u>Regenerative Thermal Oxidizer</u>

The following italicized description was provided by the applicant:
Downstream of the particulate control system, an RTO will be installed for control of VOCs. The RTO was designed to match the system air flow capacity of 75,000 standard cubic feet per minute and VOC loading of up to 44 pounds per hour, a guaranteed solvent destruction efficiency of 98 percent, and a typical combustion chamber operating temperature of 1,600 degrees Fahrenheit. The RTO contains one Access Combustion model KX14 low NOx, low CO burner with an operating capacity of 19 million British thermal units per hour (MMBtu/hr) (total capacity of 20 MMBtu/hr).

Burner Description:	Lean premix, surface combustion burner
Operating Temp:	1,600 °F design (maximum of 2,000 °F)
Residence Time:	> 0.5 seconds
Max VOC Load:	14,500 MMBtu/hr

<u>Scrubber</u>

The following italicized description was provided by the applicant:
An AGS will be installed to control acid gases that could potentially form in the RTO due

to the breakdown of halogenated compounds (e.g., CFCs and HCFCs). The AGS consists of a packed tower scrubber with packing media. The AGS was designed for 75,000 standard cubic feet per minute of air flow and has a maximum loading of 70 parts per million (ppm) hydrochloric acid and 100 ppm hydrofluoric acid. The guaranteed acid gas removal efficiency is 99 percent.

Controlled air emissions will exit the AGS through a 75-foot above grade level, 74-inch-diameter stack.

The RTO design exhaust temperature is 300 °F. A quench section will be provided to cool the gas stream upstream of the scrubber inlet.

Packing depth:	10′
Diameter:	14′
Packing:	3.5″ high efficiency polypropylene HeilPak or Tri-Packs[1]
Flow direction:	Vertical countercurrent
Recirculation flow:	924 gpm
Blowdown:	3 gpm
Scrubbing liquor:	dilute caustic
Scrubber pH:	> 8.0
Stack Location:	46°6'43.62"N, 122°56'50.02"W

[1] HCl is harder to scrub than HF. The height of a transfer unit (HTU) in an HCl scrubber using this packing and dilute caustic is listed as 10″. This means that with a packing depth of 10′, the number of transfer units in the scrubber is 12. This packing depth appears to be roughly twice the amount needed (assuming perfect conditions) to achieve a 99% control efficiency. Using a 10′ packing depth should provide adequate margin for compliance.

5.b. Torch Cutting (existing). Metal pieces that need to be reduced in size but cannot be accommodated by the electric shear will be reduced in size by hand torch. It is expected that all torches will operate on propane. The following description was provided in ADP application CO-1044:

Up to four propane torch cutting stations may be used, with the total annual cutting time for all cutting stations limited to 7,300 hours. This conservative estimate of operating hours assumes that cutting continues without stopping, changing fuel supply, staging, or removing metal pieces. A portable atomized misting system (BossTek Dust Boss, "DB-60" or equivalent) will be used to control visible emissions from metal torch cutting when visual emissions are observed within a reasonable distance of the torch cutting area, or for torch cutting of metal that is more likely to produce smoke. The DB-60 uses atomized mist in the 50- to 200-micron range to adsorb fume particles and pull them to the ground. Visual emissions from torch cutting will not exceed 20 percent opacity for more than 3 minutes in any 1-hour period. The torch cutting process will generally be as follows:

- Recyclable metal commodities identified for torch cutting will be placed near the torch table in the torch cutting area. The torch table will be composed of several thick steel plates that provide an appropriate cutting surface.
- The torch table will be in view of employees who are trained to be aware of visible emissions and to intercede if visible emissions are noticed.
- If present, materials will be cleaned of oils, greases, or coatings in the area to be cut prior to cutting.
- When materials that are more likely to produce smoke are cut, or when visible emissions are observed within a reasonable distance of the torch cutting area, the wet suppression system will be employed. Additionally, the wet suppression system will be proactively employed when cutting cable, cast iron, suspected cast-iron materials, and metal greater than 3 inches thick. The location of the wet suppression system within the torch cutting area will depend on local winds and position of the cutting and will be determined by staff on a case-by-case basis. The wet suppression system will be moved as needed during cutting to ensure visible emissions are controlled.
- Cut metal pieces will be allowed to cool and will then be placed in the appropriate staging pile for shipment off the site.
- Cutting operations will cease at least 30 minutes before the end of a shift to allow completion of fire watch, conducted for hot work safety.

Location: ~46°6'46.51"N, 122°56'44.02"W. The perimeter of the torch cutting area will be over 100 meters from any property boundary.
Federal Regulations: None

5.c. Material Handling (modified). Scrap metal is moved into piles and loaded into the shredder infeed with grapple loaders and magnetic loaders. The following primary transfer points were identified:

Transfer Point	**Controls**
Material receipt / unload	None
Shredder infeed	Wet suppression as necessary
Ferrous conveyor to pile	Wet suppression
Ferrous conveyor to stacker	Wet suppression
Heavy non-ferrous ASR to pile	Wet suppression
Light non-ferrous ASR to pile	Wet suppression
Truck loadout	Wet suppression as necessary
Transfer to torch cutting area or electric shear (non-shred)	Wet suppression as necessary
Transfer from torch cutting area or electric shear	Wet suppression as necessary

Equipment operators use best practices to avoid dust creation while handling material. Wet suppression may be used as necessary to control fugitive dust.

Location: Throughout the facility
Federal Regulations: None

5.d. Roads and Yard Surface (existing). All road and yard surfaces where vehicles travel on site will be paved. Wet suppression and a street sweeper will be used as necessary to control fugitive dust from roadways.

Location: Throughout the facility
Federal Regulations: None

5.e. Equipment/Activity Summary.

ID No.	Equipment/Activity	Control Equipment/Measure
1	Shredder	Fabric filtration, regenerative thermal oxidizer, wet scrubber
2	Propane or Acetylene Torch Cutting	Wet suppression, surface cleaning
3	Material Handling	Wet suppression
4	Roads and Yard Surface (fugitive emissions)	Sweeping, wet suppression

6. EMISSIONS DETERMINATION

Unless otherwise specified by SWCAA, actual emissions must be determined using the specified input parameter listed for each emission unit and the following hierarchy of methodologies:

(a) Continuous emissions monitoring system (CEMS) data;
(b) Source emissions test data (EPA reference method). When source emissions test data conflicts with CEMS data for the time period of a source test, source test data must be used;
(c) Source emissions test data (other test method); and
(d) Emission factors or methodology provided in this TSD.

6.a. Torch Cutting. Potential annual emissions from torch cutting were calculated with the assumption that up to four torch cutters could be operating at any one time, and that annual man-hours of torch cutting would not exceed 7,300 per year.

Torch Cutting of Metal

# of Torches =			4		
Torch-hours per year =			7,300		
Percent of Cr fume emitted as Cr^{+6}			4%	Estimate based on PNW measurements	

Pollutant	lb/hr/torch	lb/hr	tpy	Emission Factor Source
NO_X	0.030542	0.122	0.111	Note 1
$PM/PM_{10}/PM_{2.5}$	0.0503	0.201	0.183	Note 2

Toxic Compounds	% of PM	lb/hr/torch	lb/hr	tpy	Emission Factor Source
Cr (Assumed Cr^{+3})	0.020%	1.01E-05	4.02E-05	3.67E-05	Note 2
Cr^{+6}	0.00080%	4.02E-07	1.61E-06	1.47E-06	Note 2
Nickel	0.05%	2.51E-05	1.01E-04	9.17E-05	Note 2
Zinc Oxide	0.36%	1.81E-04	7.24E-04	6.60E-04	Note 2

[1] "Oxides of Nitrogen in Welding, Cutting and Oxy-Acetylene Heating Processes, A Review of Emission Rates, Exposure Levels and Control Measures" Eric Hansen, Han Thernøe. Undated.
[2] "Final Report, Development of Emission Inventory for Metal Welding, Cutting and Spraying Operations" prepared by Pacific Environmental Services, Inc. May 31, 2000.

Annual emissions must be calculated by multiplying the number of man-hours of torch cutting by the emission factors provided above unless new emission factors are developed through source emissions testing, or an alternative methodology is specified or approved by SWCAA.

6.b. Material Handling. Potential annual emissions from material handling were calculated with the assumption that material will be handled 2.2 times on average, and the maximum facility throughput was 1,600,000 tons per year. The average number of times material might be handled was calculated by assuming that 20% of the non-shred material is handled four times (unload, transfer to the torch cutting area or electric shear, transfer from the torch cutting area or electric shear, and load for shipping) and comprises 50% of the total material throughput. It was assumed that the remaining non-shred material and all of the shredded material will be handled only twice outside of the shredding building (once upon receipt and once for shipping out).

Material Handling			
Material Received =	1,600,000	tons per year	
Number of Transfers =	2.2	(average)	
Emission Point	% Materia	Emission Factor lb/ton	Emissions lb/yr
Fugitive PM	100%	0.003	10,560
Fugitive $PM_{10}/PM_{2.5}$	100%	0.0011	3,872
Emission Factor Source: AP-42 Table 11.19.2-2 for crushed stone processing.			

Annual emissions must be calculated by multiplying the amount of material handled by the emission factors identified above and the average number of transfers unless new emission factors are developed and approved by SWCAA.

6.c. Shred Drop Points. Shredded material is dropped from a conveyor, and subsequently dropped into trucks (total of 2 drop points). The moisture content of the material during the initial drop from the conveyor is assumed to be higher than when the material is dropped into a truck because wet suppression is used at the conveyor drop point, and the material can dry significantly (in summer months) before being loaded onto a truck. Wet suppression would only be used as necessary to achieve the 0% opacity visible emission standard at the truck loadout. There are no process-specific emission factors available for this activity. SWCAA used the "drop batch" formula for aggregate in AP-42 Section 13.2.4 (11/06) to estimate emissions from this activity. The resulting emission estimate is highly uncertain and are presented here primarily for completeness. The Permittee will be required to maintain visible emissions at 0% opacity; when this level is achieved fugitive dust emissions are expected to be relatively minor.

Emissions of fugitive dust were estimated using the following formula from AP-42 Section 13.2.4 (11/06):

$$E = k(0.0032)\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Where: E = emission factor (lbs PM per ton coal unloaded)
k = particle size multiplier (dimensionless). k=1.0 for PM, 0.35 for PM_{10}, 0.053 for $PM_{2.5}$
U = mean wind speed (miles per hour)
M = coal moisture content (%)

Meteorological data indicates that the mean wind speed at this site is 5.1 miles per hour. It was assumed that wet suppression will provide for 80% control of fugitive dust emissions (a range of 70 to 95% is provided in AP-42 Section 11.19.1 (11/95), and the facility will process up to 800,000 tons of shredded material.

Drop Points

Moisture Content (conveyor drop) =	15.0%	
Moisture Content (truck loadout) =	5.0%	
Wind Speed (mph)=	5.1	
Effective Wind Speed (mph) =	5.1	(reduced to account for 3-sided enclosure)
Total Coal Transferred =	500,000	
Wet Supression Control Efficiency =	90%	

Transfer Point	Material Throughput tpy	Control Effiicency	PM emissions tpy	PM_{10} emissions tpy	$PM_{2.5}$ emissions tpy	Control Notes
Conveyor to pile	800,000	80%	0.016	0.005	0.0008	Wet suppression
Truck loadout	800,000	80%	0.073	0.025	0.004	Wet suppression as nec.
Maximum Scenario Total =			**0.0885**	**0.0310**	**0.0047**	tons

6.d. Roads and Yard Surfaces. Emissions of particulate matter from the operation of vehicles on paved roads and surfaces in the facility can be estimated using equation 2 from AP-42 Section 13.2.1 (1/11). For the purposes of these calculations, SWCAA did not subtract out the emissions from exhaust, brake wear and tire wear. These emissions are insignificant compared to the potential for re-suspended dust from roadways. The assumed vehicle miles traveled over the course of a year was 14,400 miles.

$$E = k\,(sL)^{0.91} \times (w)^{1.02}$$

Where: E = pounds of pollutant per vehicle mile traveled
k = particle size multiplier (lb/vehicle mile traveled (VMT))
sL = road surface silt loading (g/m^2)
W = average vehicle weight (tons)

k = 0.011 lb/VMT for PM
k = 0.0022 lb/VMT for PM_{10}
k = 0.00054 lb/VMT for $PM_{2.5}$

sL is assumed to be 0.6 g/m^2 (from Table 13.2.1-2)
W is assumed to be 31.5 tons

The facility will use wet suppression/water truck or street sweeper as necessary to control fugitive dust, which provides an 80% control efficiency.

Vehicle Traffic on Roadways
Note: yard will be paved

Average Truck Weight =	31.5	tons
Silt Loading =	0.6	g/m^2 (AP-42 Table 13.2.1-4 (11/06)
Distance Traveled per Truck =	3,168	feet (0.6 miles)
Control Effiiciency =	80%	Based on combination of wet suppression and street sweeping

Truck Miles	Load Size (tons)	Annual Throughput (tons)	% by Truck	# of Trips	Vehicle Miles Traveled	Average Daily Miles
Transfer to facility	12.50	1,600,000	100%	128,000	76,800	351

Pollutant	Particle Size Multiplier lb/VMT	Uncont. Emissions lb/yr/VMT	Controlled Emissions lb/yr	Emissions tpy	Emission Factor Source
PM	0.0110	0.23	3,582	1.79	AP-42 Sec. 13.2.1 (1/11), Eq. 2
PM_{10}	0.0022	0.047	716	0.358	AP-42 Sec. 13.2.1 (1/11), Eq. 2
$PM_{2.5}$	0.00054	0.011	176	0.088	AP-42 Sec. 13.2.1 (1/11), Eq. 2

Annual emissions must be calculated using the methodology identified above, unless new emission factors are developed through source emissions testing, or an alternative methodology is specified or approved by SWCAA.

6.e. Shredder. The shredder is a potential source of the following emissions:

1. Combustion emissions (primarily NO_X and CO) from the burning of natural gas and VOCs in the RTO.
2. VOCs from organic liquids evaporated from shredded vehicles, appliances, and other scrap sources. It is expected that the heat of the shredder will cause all VOCs to be evaporated within the shredder enclosure. It was conservatively assumed that the speciation profile of the VOCs matches gasoline. This assumption is supported by the fact that the ratios of benzene, toluene, ethylbenzene and xylene to total VOC measured in a source test in 2009 at

OmniSource in Jackson, Michigan roughly matched the expected ratios of these pollutants to total VOC in liquid gasoline.

3. Particulate matter from material handling within the shredding enclosure, and the shredding activity itself.
4. Acid gases (primarily HCl and HF) from the combustion of refrigerants in the RTO. Although recovery of these refrigerants is required from vehicles and appliances prior to shredding, some residual amount of refrigerant will not be collected. The maximum HCl and HF values would be significantly higher if refrigerants were not removed and recovered prior to shredding. These refrigerants are organic molecules containing chlorine and fluorine, which will form HCl and HF respectively when burned in the RTO.

Fugitive Emissions. Although the shredder building appears to meet the criteria of a permanent enclosure using the criteria of EPA Method 204, it was conservatively estimated that up to 5% of the emissions generated within the building could be emitted fugitively. This could account for wind events or other unforeseen circumstances.

Shredder

Annual Throughput =	800,000	tons per year
Exhaust Flow =	75,000	scfm
Enclosure Capture Efficiency =	95%	
PM Control Efficiency =	99%	
VOC Control Efficiency =	98%	
Acid Gas Control Efficiency =	99%	
RTO Natural Gas Rate =	19.0	MMBtu/hr
Max. Operating Hours Per Year =	5,840	(5:00 a.m. - 9:00 p.m. daily)
Natural gas heat content =	1,020	Btu/scf for AP-42 and criteria emiss. factors
Natural Gas Heat Content =	1,026	Btu/scf for 40 CFR 98 GHG emiss. factors
Annual Fuel Consumption =	109	MMscf/yr (based on 1,20 Btu/scf)

Pollutant	EF lb/MMBtu	lb/hr	tpy	Emission Factor Source
NO_X (comb.)	0.036	0.69	2.02	30 ppm NO_X gas burner
CO (comb)	0.074	1.40	4.10	100 ppm CO gas burner
SO_2 (comb)	0.00059	0.011	0.033	AP-42 Section 1.4 (07/98)
$PM/PM_{10}/PM_{2.5}$ (comb)	0.00745	0.14	0.41	AP-42 Section 1.4 (07/98)
Benzene (comb)	2.1E-06	3.9E-05	1.1E-04	AP-42 Section 1.4 (07/98)
Formaldehyde (comb.)	7.4E-05	1.4E-03	4.1E-03	AP-42 Section 1.4 (07/98)

	lb/ton	lb/hr	tpy	Emission Factor Source
Stack VOC as C_3H_8	0.0051	1.08	2.05	Based on General Iron May 25, 2018 Test
Fugitive VOC as C_3H_8	0.0128	2.69	5.12	Based on General Iron May 25, 2018 Test
Total VOC as C_3H_8	0.0177	3.71	7.07	Sum of Stack and Fugitive
Stack $PM/PM_{10}/PM_{2.5}$	0.0153	3.21	6.12	Assumes a discharge of 0.005 gr/dscf
Fugitive $PM/PM_{10}/PM_{2.5}$	0.0806	16.92	32.22	Assumes 95% capture rate
Total $PM/PM_{10}/PM_{2.5}$		20.27	38.76	Sum of Stack and Fugitive
HCl	0.00203	0.43	0.81	Assumed 100 ppm before scrubber
HF	0.00078	0.16	0.31	Assumed 70 ppm before scrubber
VOC TAP	0.00002	0.00	0.01	VOC assumed to be gasoline
VOC HAP	0.00002	0.00	0.01	VOC assumed to be gasoline

Greenhouse Gases	kg/MMBtu	GWP	CO_2e lb/MMBtu	CO_2e lb/MMscf	CO_2e tpy	Emission Factor Source
CO_2	53.06	1	116.98	120,019	6,490	40 CFR 98
CH_4	0.001	25	0.055	57	3.1	40 CFR 98
N_2O	0.0001	298	0.066	67	3.6	40 CFR 98
Total GHG - CO_2e			117.098	120,143	6,497	

Shredder - Speciated Toxic Air Pollutants

Assumed Capture Effiicency =	95%
VOC Control Efficiency =	98%
PM Control Efficiency =	99%
Annual Amount Shredded =	800,000 tpy

			Uncontrolled			
			Shredder	Stack	Fugitive	Total
Toxic Air Pollutant	CAS	Form	lb/ton	lb/yr	lb/yr	lb/yr
1,1,1-Trichloroethane (Methyl chloroform)	71-55-6	VOC	2.11E-04	3.2E+00	8.4E+00	1.2E+01
1,1-dichloroethane (Ethylidene dichloride)	75-34-3	VOC	1.40E-05	2.1E-01	5.6E-01	7.7E-01
1,2,4-trimethylbenzene	95-63-6	VOC	2.61E-03	4.0E+01	1.0E+02	1.4E+02
1,3,5-trimethylbenzene	108-67-8	VOC	9.04E-04	1.4E+01	3.6E+01	5.0E+01
1,3-butadiene	106-99-0	VOC	4.83E-06	7.3E-02	1.9E-01	2.7E-01
1,4-dichlorobenzene	106-46-7	VOC	6.76E-06	1.0E-01	2.7E-01	3.7E-01
2-butanone (Methyl ethyl ketone)	78-93-3	VOC	8.63E-04	1.3E+01	3.5E+01	4.8E+01
2-propanol	67-63-0	VOC	3.25E-03	4.9E+01	1.3E+02	1.8E+02
2-propanone (Acetone)	67-64-1	VOC	1.40E-05	2.1E-01	5.6E-01	7.7E-01
Acrolein	107-02-8	VOC	5.79E-06	8.8E-02	2.3E-01	3.2E-01
Antimony	7440-36-0	PM	9.21E-07	7.0E-03	3.7E-02	4.4E-02
Arsenic	7440-38-2	PM	3.68E-07	2.8E-03	1.5E-02	3.5E-02
Barium and soluble compounds, as Ba	7440-39-3	PM	8.21E-06	6.2E-02	3.3E-01	3.9E-01
Benzene	71-43-2	VOC	1.14E-03	1.7E+01	4.6E+01	6.3E+01
Beryllium	7440-41-7	PM	7.68E-08	5.8E-04	3.1E-03	7.3E-03
Cadmium and compounds	7440-43-9	PM	3.41E-06	2.6E-02	1.4E-01	3.2E-01
Chlorodifluormethane	75-45-6	VOC	2.96E-03	4.5E+01	1.2E+02	1.6E+02
Chromium (VI)	7440-47-3	PM	1.92E-07	1.5E-03	7.7E-03	1.8E-02
Chromium metal (III)	7440-47-3	PM	3.66E-06	2.8E-02	1.5E-01	1.7E-01
Cobalt (metal dust and fume)	7440-48-4	PM	3.35E-07	2.5E-03	1.3E-02	1.6E-02
Copper (dusts and mists)	7440-50-8	PM	8.11E-06	6.2E-02	3.2E-01	3.9E-01
Cumene (Isopropylbenzene)	98-82-8	VOC	1.58E-04	2.4E+00	6.3E+00	8.7E+00
Cyclohexane	110-82-7	VOC	4.62E-04	7.0E+00	1.8E+01	2.6E+01
Dichlorodifluoromethane	75-71-8	VOC	3.00E-03	4.6E+01	1.2E+02	1.7E+02
Dichloromethane (Methylene chloride)	75-09-2	VOC	6.32E-05	9.6E-01	2.5E+00	3.5E+00
Dichlorotetrafluoroethane	76-14-2	VOC	5.01E-05	7.6E-01	2.0E+00	2.8E+00
Ethanol	64-17-5	VOC	8.37E-03	1.3E+02	3.3E+02	4.6E+02
Ethyl acetate	141-78-6	VOC	1.16E-04	1.8E+00	4.6E+00	6.4E+00
Ethyl benzene	100-41-4	VOC	1.41E-03	2.1E+01	5.6E+01	7.8E+01
Heptane	142-82-5	VOC	1.34E-03	2.0E+01	5.4E+01	7.4E+01

Shredder - Speciated Toxic Air Pollutants

Assumed Capture Effiicency =	95%
VOC Control Efficiency =	98%
PM Control Efficiency =	99%
Annual Amount Shredded =	800,000 tpy

Toxic Air Pollutant	CAS	Form	Uncontrolled Shredder lb/ton	Stack lb/yr	Fugitive lb/yr	Total lb/yr
Hexane	110-54-3	VOC	2.36E-03	3.6E+01	9.5E+01	1.3E+02
Lead and compounds	No CAS -	PM	1.51E-05	1.1E-01	6.0E-01	7.2E-01
Manganese	7439-96-5	PM	1.26E-05	9.6E-02	5.0E-01	6.0E-01
Mercury	7439-97-6	PM	2.62E-04	2.0E+00	1.0E+01	1.2E+01
Methyl isobutyl ketone (MIBK, Hexone)	108-10-1	VOC	4.18E-04	6.4E+00	1.7E+01	2.3E+01
Methyl methacrylate	80-62-6	VOC	3.53E-05	5.4E-01	1.4E+00	1.9E+00
Naphthalene	91-20-3	VOC	1.89E-04	2.9E+00	7.5E+00	1.0E+01
n-Butyl Acetate	123-86-4	VOC	4.42E-04	6.7E+00	1.8E+01	2.4E+01
Nickel	7440-02-0	PM	4.63E-06	3.5E-02	1.9E-01	4.4E-01
Nonane	111-84-2	VOC	8.67E-04	1.3E+01	3.5E+01	4.8E+01
Octane	111-65-9	VOC	7.36E-04	1.1E+01	2.9E+01	4.1E+01
Phosphorus and compounds	7723-14-0	PM	4.74E-05	3.6E-01	1.9E+00	2.3E+00
Polychlorinated biphenyls (PCBs)	1336-36-3	VOC	9.19E-05	1.4E+00	3.7E+00	5.1E+00
Selenium	7782-49-2	PM	1.58E-06	1.2E-02	6.3E-02	7.5E-02
Silver	7440-22-4	PM	1.34E-06	1.0E-02	5.4E-02	6.4E-02
Styrene	100-42-5	VOC	6.52E-04	9.9E+00	2.6E+01	3.6E+01
Tetrachloroethene (Perchloroethylene)	127-18-4	VOC	2.81E-06	4.3E-02	1.1E-01	1.6E-01
Tetrahydrofuran	109-99-9	VOC	2.79E-04	4.2E+00	1.1E+01	1.5E+01
Thallium	7440-28-0	PM	3.07E-07	2.3E-03	1.2E-02	1.5E-02
Toluene	108-88-3	VOC	5.66E-03	8.6E+01	2.3E+02	3.1E+02
Trichloroethene (TCE, Trichloroethylene)	79-01-6	VOC	1.08E-04	1.6E+00	4.3E+00	5.9E+00
Trichlorofluoromethane	75-69-4	VOC	4.79E-03	7.3E+01	1.9E+02	2.6E+02
Vinylidene chloride	75-35-4	VOC	3.24E-05	4.9E-01	1.3E+00	1.8E+00
Xylene	1330-20-7	VOC	6.82E-03	1.0E+02	2.7E+02	3.8E+02
Zinc oxide	1314-13-2	PM	8.89E-04	6.8E+00	3.6E+01	4.2E+01

Emission factors for solid (PM) phase pollutants was taken from the June 2018 source test at General Iron Industries in Chicago, Illinois and assumes an 80% PM control efficiency during that test. Emission factors for VOCs were taken from the following three sources:

1. OmniSource tested in Jackson, Michigan in April 2010;
2. The Institute of Scrap Recycling Industry workbook if no emission factor was available from the OmniSource test; or
3. The SMM New England source test in Johnston, Rhode Island in September 2017 if emission factors were available from neither of the above sources.

<u>Mercury</u>

Mercury can be emitted from mercury switches remaining in vehicles or appliances. Mercury switches have not been included in vehicles since the 2002 model year, and their use in appliances was mostly ended in 2000, so their potential presence in the scrap feed will diminish over the years. Mercury that enters the shredder will be emitted to the environment at the shredder, or in downstream processes (e.g., an offsite steel mill) unless additional mercury controls are added to the shredder or the downstream process.

The permit will require that all accessible mercury switches be removed from vehicles prior to crushing. SWCAA assumed that this would remove 90% of the mercury switches from the scrap vehicles feed. The calculation below conservatively assumes the following:

1. That all mercury that enters the shredder is emitted to the air (in reality some will probably be retained in the scrap or adsorbed in the scrubber);
2. 11,823 mercury switches (2023 estimate) in 200,000 vehicles scrapped in Washington (a 2023 estimate made in 2008); and
3. The shredder feed consists 100% of automobiles.

% of Hg volatilized in Shredder =	100%	(conservative)	
% of Switches Removed =	90%		
% of Scrap from Vehicles =	100%		
# of Vehicles =	400,000	vehicles per year	
Vehicles per hour (potential) =	105	vehicles per hour	
	Hg in Switches	Emissions	Emissions
	g/vehicle	lb/hr	lb/yr
Mercury	0.005912	0.0014	5.21

The number of mercury switches in vehicles scrapped in Washington is estimated to drop from 11,823 in 2023 to 2,813 in 2030 based on a model prepared by the National Vehicle Mercury Switch Recovery Program. The above estimate indicates a somewhat lower potential mercury emission rate than presented by the applicant based on past source test results. This is probably in part due to the fact that the number of mercury switches is decreasing, and partly due to the assumed efficiency of the mercury switch recovery. For emission inventory purposes, source emission test results at this facility will be used to estimate mercury emission unless sufficient data is available to refine the emissions estimate using the material balance approach above.

6.f. Emissions Summary

Air Pollutant	Potential to Emit (tpy)	Project Impact (tpy)
NO_X	2.13	2.02
CO	4.10	4.10
VOC	7.07	7.07
SO_2	0.03	0.03
PM	46.10	44.50
PM_{10}	41.27	40.62
$PM_{2.5}$	40.97	40.38
CO_2/CO_2e	6,496	6,496

Toxic/Hazardous Air Pollutant	CAS #	Potential to Emit (lb/yr)	Project Impact (lb/yr)
1,1,1-Trichloroethane (Methyl chloroform)	71-55-6	11.62	11.62
1,1-dichloroethane (Ethylidene dichloride)	75-34-3	0.77	0.77
1,2,4-trimethylbenzene	95-63-6	144.21	144.21
1,3,5-trimethylbenzene	108-67-8	49.88	49.88
1,3-butadiene	106-99-0	0.27	0.27
1,4-dichlorobenzene	106-46-7	0.37	0.37
2-butanone (Methyl ethyl ketone)	78-93-3	47.63	47.63
2-propanol	67-63-0	179.15	179.15
2-propanone (Acetone)	67-64-1	0.77	0.77
Acrolein	107-02-8	0.32	0.32
Antimony	7440-36-0	0.04	0.04
Arsenic	7440-38-2	0.035	0.035
Barium and soluble compounds, as Ba	7440-39-3	0.39	0.39
Benzene	71-43-2	63.10	63.10
Beryllium	7440-41-7	0.0073	0.0073
Cadmium and compounds	7440-43-9	0.32	0.32
Chlorodifluormethane	75-45-6	163.28	163.28
Chromium (VI) compounds	No CAS	0.018	0.018
Chromium metal (III) and compounds	No CAS	0.25	0.17

Toxic/Hazardous Air Pollutant	CAS #	Potential to Emit (lb/yr)	Project Impact (lb/yr)
Cobalt (metal dust and fume)	7440-48-4	0.02	0.02
Copper (dusts and mists)	7440-50-8	0.39	0.39
Cumene (Isopropylbenzene)	98-82-8	8.70	8.70
Cyclohexane	110-82-7	25.51	25.51
Dichlorodifluoromethane	75-71-8	165.60	165.60
Dichloromethane (Methylene chloride)	75-09-2	3.49	3.49
Dichlorotetrafluoroethane	76-14-2	2.77	2.77
Ethanol	64-17-5	461.79	461.79
Ethyl acetate	141-78-6	6.41	6.41
Ethyl benzene	100-41-4	77.85	77.85
Heptane	142-82-5	74.19	74.19
Hexane	110-54-3	130.47	130.47
Lead and compounds	No CAS	0.72	0.72
Manganese	7439-96-5	0.60	0.60
Mercury	7439-97-6	5.21	5.21
Methyl isobutyl ketone (MIBK, Hexone)	108-10-1	23.07	23.07
Methyl methacrylate	80-62-6	1.95	1.95
Naphthalene	91-20-3	10.41	10.41
n-Butyl Acetate	123-86-4	24.38	24.38
Nickel	7440-02-0	0.62	0.44
Nonane	111-84-2	47.84	47.84
Octane	111-65-9	40.63	40.63
Phosphorus and compounds	7723-14-0	2.25	2.25
Polychlorinated biphenyls (PCBs)	1336-36-3	5.07	5.07
Selenium	7782-49-2	0.08	0.08
Silver	7440-22-4	0.06	0.06
Styrene	100-42-5	35.97	35.97
Tetrachloroethene (Perchloroethylene)	127-18-4	0.16	0.16
Tetrahydrofuran	109-99-9	15.40	15.40
Thallium	7440-28-0	0.01	0.01
Toluene	108-88-3	312.34	312.34

Toxic/Hazardous Air Pollutant	CAS #	Potential to Emit (lb/yr)	Project Impact (lb/yr)
Trichloroethene (TCE, Trichloroethylene)	79-01-6	5.93	5.93
Trichlorofluoromethane	75-69-4	264.38	264.38
Vinylidene chloride	75-35-4	1.79	1.79
Xylene	1330-20-7	376.36	376.36
Zinc oxide	1314-13-2	43.66	42.34
HCl	7647-01-0	1621.86	1621.86
HF	7664-39-3	623.11	623.11

7. REGULATIONS AND EMISSION STANDARDS

Regulations have been established for the control of emissions of air pollutants to the ambient air. Regulations applicable to the proposed facility that have been used to evaluate the acceptability of the proposed facility and establish emission limits and control requirements include, but are not limited to, the following regulations, codes, or requirements. These items establish maximum emissions limits that could be allowed and are not to be exceeded for new or existing facilities. More stringent limits are established in this ADP consistent with implementation of Best Available Control Technology (BACT):

7.a. Revised Code of Washington (RCW) 70A.15.2040 empowers any activated air pollution control authority to prepare and develop a comprehensive plan or plans for the prevention, abatement and control of air pollution within its jurisdiction. An air pollution control authority may issue such orders as may be necessary to effectuate the purposes of the Washington Clean Air Act (RCW 70A.15) and enforce the same by all appropriate administrative and judicial proceedings subject to the rights of appeal as provided in Chapter 62, Laws of 1970 Ex. Sess. This law applies to the facility.

7.b. RCW 70A.15.2210 provides for the inclusion of conditions of operation as are reasonably necessary to assure the maintenance of compliance with the applicable ordinances, resolutions, rules and regulations when issuing an ADP for installation and establishment of an air contaminant source. This law applies to the facility.

7.c. Washington Administrative Code (WAC) 173-460 "Controls for New Sources of Toxic Air Pollutants" (as in effect August 21, 1998) requires Best Available Control Technology (BACT) for toxic air pollutants (T-BACT), identification and quantification of emissions of toxic air pollutants and demonstration of protection of human health and safety. The facility emits Toxic Air Pollutants (TAPs); therefore, this regulation applies to the facility.

7.d. WAC 173-476 "Ambient Air Quality Standards" establishes ambient air quality standards for PM_{10}, $PM_{2.5}$, lead, SO_2, NO_X, ozone, and CO in the ambient air, which must not be exceeded. The facility emits all of these pollutants except ozone; therefore, this regulation applies to the facility.

7.e. SWCAA 400-040 "General Standards for Maximum Emissions" requires all new and existing sources and emission units to meet certain performance standards with respect to Reasonably Available Control Technology (RACT), visible emissions, fallout, fugitive emissions, odors, emissions detrimental to persons or property, SO_2, concealment and masking, and fugitive dust. This regulation applies to the facility.

7.f. SWCAA 400-040(1) "Visible Emissions" requires that emissions of an air contaminant from any emissions unit must not exceed twenty percent opacity for more than three minutes in any one hour at the emission point, or within a reasonable distance of the emission point. This regulation applies to the facility.

7.g. SWCAA 400-040(2) "Fallout" requires that emissions of PM from any source must not be deposited beyond the property under direct control of the owner(s) or operator(s) of the source in sufficient quantity to interfere unreasonably with the use and enjoyment of the property upon which the material is deposited. This regulation applies to the facility.

7.h. SWCAA 400-040(3) "Fugitive Emissions" requires that reasonable precautions be taken to prevent the fugitive release of air contaminants to the atmosphere. This regulation applies to the facility.

7.i. SWCAA 400-040(4) "Odors" requires any source which generates odors that may unreasonably interfere with any other property owner's use and enjoyment of their property to use recognized good practice and procedures to reduce these odors to a reasonable minimum. This regulation applies to the facility.

7.j. SWCAA 400-040(8) "Fugitive Dust Sources" requires that reasonable precautions be taken to prevent fugitive dust from becoming airborne and minimize emissions. This regulation applies to the facility.

7.k. SWCAA 400-050 "Emission Standards for Combustion and Incineration Units" requires that all provisions of SWCAA 400-040 be met and that no person is allowed to cause or permit the emission of PM from any combustion or incineration unit in excess of 0.23 g/Nm^3_{dry} (0.1 gr/dscf) of exhaust gas at standard conditions.

The regenerative thermal oxidizer is a combustion unit subject to this standard.

7.l. SWCAA 400-109 "Air Discharge Permit Applications" requires that an ADP application be submitted for all new installations, modifications, changes, or alterations to process and emission control equipment consistent with the definition of "new source." Sources wishing to modify existing permit terms may submit an ADP application to request such changes. An ADP must be issued, or written confirmation of exempt status must be received, before beginning any actual construction, or implementing any other modification, change, or alteration of existing equipment, processes, or permits. This regulation applies to the facility.

7.m. SWCAA 400-110 "New Source Review" requires that SWCAA issue an ADP in response to an ADP application prior to establishment of the new source, emission unit, or modification. The new units meet the definition of a new source; therefore, this regulation applies to the facility.

7.n. SWCAA 400-113 "Requirements for New Sources in Attainment or Nonclassifiable Areas" requires that no approval to construct or alter an air contaminant source will be granted unless it is evidenced that:

(1) The equipment or technology is designed and will be installed to operate without causing a violation of the applicable emission standards;
(2) BACT will be employed for all air contaminants to be emitted by the proposed equipment;
(3) The proposed equipment will not cause any ambient air quality standard to be exceeded; and
(4) If the proposed equipment or facility will emit any toxic air pollutant regulated under WAC 173-460, the proposed equipment and control measures will meet all the requirements of that Chapter.

8. RACT/BACT/BART/LAER/PSD/CAM DETERMINATIONS

The proposed equipment and control systems incorporate BACT for the types and amounts of air contaminants emitted by the processes as described below:

New BACT Determinations

8.a. BACT Determination – Metal Shredder. The shredder generates emissions of particulate matter, volatile organic compounds and toxic air pollutants during the process of shredding. The applicant has proposed to enclose the shredder with a building meeting the permanent enclosure standards of EPA Method 204 to allow emissions from the activity to be captured and controlled. The applicant's proposed controls are discussed below:

Roll Filter System. The applicant proposed to filter the shredder exhaust through two roll filters in series, providing for 99% control (to a level not to exceed 0.005 gr/dscf) of particulate matter (including fine particulate matter) from the shredder. The use of two filters in series will reduce the possibility of particulate matter bypassing filtration and entering the regenerative thermal oxidizer downstream. To SWCAA's knowledge, this system will provide a level of particulate matter control at or above any system in place or proposed for a metal shredder. SWCAA concurs with the applicant's conclusion that this system meets the requirements of BACT for the control of particulate matter.

Regenerative Thermal Oxidizer. The applicant proposed to install a regenerative thermal oxidizer (RTO) downstream of the roll filter system to destroy volatile organic compounds, organic toxic air pollutants, and refrigerants released during the shredding process. The RTO is designed to provide for a residence time of greater than 0.5 seconds at an operating temperature of 1,600°F, combusting at least 98% of the incoming organic pollutants. To SWCAA's knowledge, this system will provide a level of emission control at or above any system in place or proposed for a metal shredder or comparable equipment and therefore meets the requirements of BACT for the control of volatile organic compounds, organic toxic air pollutants, and refrigerants.

NO_X and CO emissions will be generated in the RTO from the combustion of natural gas and pollutants. The applicant has proposed NO_X and CO emission rates of 30 ppmvd @ 3% O_2, and 100 ppmvd @ 3% O_2 respectively. The basis of the estimate was the maximum potential CO generation from the auxiliary gas burner. SWCAA expects this estimate to be conservative since CO generated by the auxiliary burner and combustion of organic pollutants will have to pass through at least some of the RTO bed at temperatures high enough to oxidize CO to CO_2, providing further reduction in CO emissions. The proposed NO_X levels are relatively low and will require the RTO design to minimize the generation of "hot spots" in the RTO that could lead to increased generation of thermal NO_X. Based on a review of RTO installations and source emissions test data from units operating in SWCAA's jurisdiction, these emission levels meet the requirements of BACT.

Wet Scrubber. The applicant proposed to install a wet scrubber downstream of the RTO to control emissions of HCl and HF. HCl and HF emissions are generated primarily from the combustion of refrigerants in the RTO. The wet scrubber is designed to provide for at least 99% control of HCl and HF emissions. This level of control using a wet scrubber would be the top choice in a top-down BACT analysis and therefore other, less effective control measures were not evaluated.

Previous BACT Determinations

8.b. BACT Determination – Torch Cutting (ADP 21-3500). The following equipment control options were considered for the control of emissions from torch cutting:

Control Option	**Assumed Control**	**Cost Effectiveness (\$/ton PM_{10})**	**Notes**
Full enclosure vented to filter	~99%	\$4,349,528	Some items would be too large to be moved into the building.
Dry fogging	~50%	\$2,564,721	Control is an engineering estimate.
Portable multi-clone / HEPA filter unit	Low	No additional cost	This equipment was permitted in ADP 18-3306 for PNW Metal Recycling's 3500 Hoehne Ave. location.
Water mist cannon	Unknown	No additional cost	This is the facility's current practice.

Notes:

Full Enclosure Vented to Filter: This option consisted of a building to enclose the activity and a baghouse or similar device to filter emissions from the building. This option would not apply to items too large to be moved into the building. This option is complicated by the need to move materials into, and out of, the building.

Dry Fogging: This technology produces very fine water droplets that can be extremely effective at controlling dust, so theoretically the small droplet size would work well for controlling fume from torch cutting. One challenge with this option is maintaining the fog in the work area during changing winds. As with any wet suppression technology, freezing temperatures would limit the practical application.

Portable Multi-Clone / HEPA Filter Unit: This was a custom-built unit used outdoors that was permitted in ADP 18-3306 for PNW Metal Recycling's 3500 Hoehne Ave., Longview, WA site. Fume from torch cutting adjacent to the air intake was filtered and exhausted vertically. In practice, the HEPA filters would plug, blocking airflow, when water (rain or mist) was drawn into the unit. This limits the ability to use this option during wet weather, or the ability to use this unit in conjunction with water misting. In addition, this option could only work when the work material was immediately adjacent the air intake (see photo below). Moving all metal pieces close enough to the air intake to allow for fume capture is a significant operational cost. A piece of yard equipment would need to be dedicated to moving materials to the air intake or frequently available, and only one employee could work in the area at a time. For these reasons, SWCAA concurred that this option is not cost-effective or practical to use for all torch cutting. This option that may be used for select items at the discretion of the Permittee as necessary to comply with visible emission limits.

Multi-Clone / HEPA Filter System – January 30, 2020

Water Mist Cannon: The Permittee proposed that operational practices (e.g., cleaning cut areas, cutting on torch table) and misting the work area with a water mist cannon as necessary to maintain visible emissions below 20% opacity meets the requirements of BACT for the control of emissions from torch cutting. SWCAA concurs. SWCAA's observations of this activity on two occasions in 2021 have indicated that the water mist appears to reduce visible emissions significantly, although the degree of particulate matter control is highly speculative. To SWCAA's knowledge, one other facility in Washington uses this method to control fume, and no active control measures are used at other facilities.

8.c. BACT Determination - Material Handling (ADP 21-3500). Wet suppression in the scrap yard under conditions that would not result in runoff, and limitation of visible emissions to 0% opacity have been determined to meet the requirements of BACT for the control of fugitive particulate matter emissions from material handling.

8.d. BACT Determination - Fugitive Emissions from Vehicle Traffic (ADP 21-3500). Wet suppression or streetsweeper use on the scrap yard, as necessary, has been determined to meet the requirements of BACT for the control of fugitive particulate matter emission from vehicle traffic. Consistent with this BACT determination, visual emissions from vehicle traffic on paved roads will be limited to 0% opacity.

PSD/CAM Determinations

8.e. Prevention of Significant Deterioration (PSD) Applicability Determination. This permitting action will not result in a potential increase in emissions equal to or greater than the PSD thresholds. Therefore, PSD review is not applicable to this action.

8.f. Compliance Assurance Monitoring (CAM) Applicability Determination. CAM is not applicable to any emission unit at this facility because it will not be a major source and is not required to obtain a Part 70 (Title V) permit.

9. AMBIENT IMPACT ANALYSIS

9.a. Criteria Air Pollutant Review. Potential emissions of criteria air pollutants (nitrogen oxides, carbon monoxide, sulfur dioxide, $PM_{10}/PM_{2.5}$) and volatile organic compounds are all at or below PSD significance rates. At these emission rates, no adverse ambient air quality impact is anticipated. Of note, the most impactful emissions would be fugitive emissions from the shredder building assuming a 95% capture efficiency. The shredder building meets the standards for a "permanent total enclosure," therefore the capture efficiency is expected to approach 100% except under very unusual circumstances (e.g., high wind conditions). In high wind conditions, the ambient impact of any fugitive emissions would be greatly reduced relative to those same emissions under calm wind conditions.

9.b. Toxic Air Pollutant Review. Eleven toxic air pollutants were identified with emissions over their respective small quantity emission rate (SQER), or without an SQER. The Permittee used AERMOD version 21112 to model the maximum ambient impact of these pollutants. The results of the model indicate that the maximum potential concentration (annual average) of each pollutant is below their respective Acceptable Source Impact Levels (ASILs).

Conclusions

9.c. Operation of the metal recycling facility as proposed in ADP application CO-1050 will not cause the ambient air quality standards established by 40 CFR 50, "National Primary and Secondary Ambient Air Quality Standards" to be violated.

9.d. Operation of the metal recycling facility as proposed in ADP application CO-1050 and in accordance with the Air Discharge Permit will not cause the requirements of WAC 173-460 "Controls for New Sources of Toxic Air Pollutants," (in effect August 21, 1998) or WAC 173-476 "Ambient Air Quality Standards" to be violated.

9.e. The metal recycling facility proposed in ADP application CO-1050 can be operated without causing a violation of the applicable emission standards, which include the limits established under SWCAA 400-040 "General Standards for Maximum Emissions."

10. DISCUSSION OF APPROVAL CONDITIONS

SWCAA has made a determination to issue ADP 22-3531 in response to ADP application CO-1050. ADP 22-3531 contains approval requirements deemed necessary to assure compliance with applicable regulations and emission standards, as discussed below.

10.a. Supersession of Previous Permits. ADP 21-3500 will be superseded in this permitting action.

10.b. Emission Limits.

Facility-wide: Facility-wide emission limits were provided for VOCs and particulate matter. The particulate matter included emissions from the shredder and fugitive source (torch cutting, material handling, and roadways). The VOC limit is based entirely on emissions from the shredder. These limits represent the maximum level of emissions assuming a total material throughput of 1,600,000 tons per year, 50% of which passes through the shredder.

Shredder TAPs: With the exception of those pollutants where dispersion modeling was required, HCl, and HF, TAP emissions must not exceed the applicable SQER from WAC 173-460 (as in effect August 21, 1998). For those metallic pollutants where dispersion modeling was required, either because emissions could exceed the SQER, or there is no SQER, emissions were limited to twice the emission rates modeled. The applicant's dispersion model indicated that the Acceptable Source Impact Level (ASIL) would not be exceeded at these emission rates. The two-fold multiplier was used to account for the high likelihood of variation from the emission factors used for the initial estimate. HCl and HF emissions were limited to levels representative of a 99% reduction from the RTO outlet concentrations.

Shredder Criteria Pollutants and VOCs: NO_X and CO emission limits are based on the potential emission rates from the RTO supplemental heat burner (30 ppmvd NO_X @ 3% O_2 and 100 ppmvd CO at 3% O_2.) The VOC emission limits are based on data from a General Iron source test conducted in May 2018. The PM emission limits are conservatively based on a discharge concentration of 0.005 gr/dscf and an assumed filtration efficiency of 99%. Both PM and VOC emission limits assume a 95% enclosure capture efficiency.

Non-Shredder Emission Sources: No short-term emission limits other than the opacity of visible emissions were imposed because:

- Tracking hourly emission from all but the torch cutting would be impractical;
- Hourly emissions from all activities do not threaten to cause an exceedance of any ambient air quality standard; and

- No BACT measure relies on an hourly emission limit.

Annual emission limits were established at the maximum levels of activity proposed by the Permittee. Compliance with the emission limits is determined by rounding actual emissions to the same number of significant figures as the emission limit.

The opacity of visible emissions from torch cutting was limited to 20% consistent with BACT. This standard is enforced in the manner of SWCAA 400-040(1). SWCAA 400-040(1) requires that compliance be determined "…at the emission point, or within a reasonable distance of the emission point…." For a fugitive source such as torch cutting, the "reasonable distance" can vary, but would not include a reading in the immediate vicinity of the torch tip and would need to be read in an area not containing fog or mist from the emission control equipment.

10.c. Operational Limits and Requirements.

Shredder Enclosure: The greatest potential source of emissions is fugitive dust and VOCs escaping the shredder building. For this reason, curtains, skirting, or other physical barriers to airflow must be installed in areas that do not need to be open. For example, areas between the framed opening in the building and the conveyor frame must be enclosed. At a minimum, the building enclosure must meet the requirements for a permanent enclosure in EPA Method 204. This will minimize fugitive emissions from the shredder.

Information provided with the application would indicate that the initial design easily meets this requirement. If 50% of the framed opening is covered with skirting, curtains, framing or other materials as suggested by the applicant, the total open area would be approximately 175ft^2, providing for an average facial velocity of 371 feet per minute (well above the 200 feet per minute requirement in Method 204). Both openings are also more than four equivalent diameters from the source of emissions; meeting the other criteria of Method 204.

The airflow to the emission control system can vary due to changing differential pressures across the control equipment or could be purposefully adjusted by operators. For this reason the permit requires that the flow be maintained within 10% of the minimum flow at which compliance with EPA Method 204 criteria was demonstrated.

Filter Leak Detector: A filter leak detector was considered because it is a relatively low-cost and effective method to immediately detect filter problems that not only can immediately impact air emissions, but also adversely impact the RTO. Unfortunately, this option had to be rejected because the gas stream will have a high relative humidity, or potentially be saturated, downstream of the filter system. SWCAA did not believe that a location downstream of the RTO, which would have a lower relatively humidity due to the higher gas temperature, would provide the desired sensitivity.

RTO Operation: Minimum and maximum operating temperatures will be based on source test results. Temperatures that are too low will not provide adequate destruction of volatile organic compounds. Temperatures that are too high can result in excessive NO_X generation and unnecessary fuel consumption.

Scrubber Operation: A minimum scrubber pH of 8.0 was established to assure that HCl and HF are in solution as sodium salts rather than as acids. This will ensure that the scrubber efficiency is at least 99% by virtually eliminating the vapor pressure of these acids that would be in equilibrium with the scrubbing liquor.

A minimum scrubber blowdown of 2.0 gpm was required because the concentration of NaF in the scrubbing liquor would approach the solubility limit at lower blowdown rates if the inlet loading was at the design concentration of 70 ppm HF for a long period of time.

Scrubber Acid Loading Calculations						
Gas Flow =		75,000	scfm			
Gas Flow =		11,678	lb-mol/hr			
Blowdown Rate =		2	gpm			
Recirculation Rate =		924	gpm			
					Blowdown	
			as Na Salt	as Na Salt	Concentration	Solubility
Pollutant	ppm	lb-mol/hr	Mwt	lb/hr	%	%
HCl	100	1.17	58.44	68.25	6.82%	36%
HF	70	0.82	42	34.33	3.43%	4.04%

Vehicle Preparation: The permit requires removal of all batteries, fluids, refrigerants, and mercury-containing switches from vehicles. This ensures that these materials are not released to the air or other environmental media when the vehicles are dismantled, crushed, shredded, or otherwise processed.

Torch Cutting: SWCAA required monthly inspections of torch cutting by the Permittee. This practice will help assure that operational practices are being followed consistently. If there are compliance issues or validated complaints regarding this activity, SWCAA could investigate the installation of a video camera to increase oversight.

The maximum number of man-hours of torch cutting, and maximum amount of material received are based on the level proposed by the Permittee in ADP application CO-1044.

Torch cutting of stainless steel and metal plated in nickel or chromium is prohibited because these activities can generate levels of pollutants (especially Cr^{+6} and Ni compounds) that would justify HEPA level filtration.

Because torch cutting is inherently more emissive than sheering, which produces virtually no emissions, torch cutting is limited to those pieces that cannot be processed with hydraulic sheers.

10.d. Monitoring and Recordkeeping Requirements. Sufficient monitoring and recordkeeping was established to document compliance with the emission and operating limits and provide for general requirements (e.g., upset reporting, annual emission inventory submission).

Shredder Emission Control System Flow: The performance of the shredder building as a permanent total enclosure is dependent on a minimum airflow through this system. A simple Annubar or pitot tube can be used to monitor the differential pressure caused by the airflow. The airflow is proportional to the square root of the differential pressure in such devices, so a simple calculation can be made to determine the minimum differential pressure that must be maintained (in relation to the value during the EPA Method 204 test).

10.e. Reporting Requirements. Specific reporting deadlines were established for each reporting requirement. The submittal date refers to the earlier of the date the report is delivered to SWCAA or the postmarked date if sent through the US Post Office.

Upset conditions with the potential to cause excess emissions must be reported immediately in order to qualify for relief from penalty in accordance with SWCAA 400-107 for unavoidable exceedances. In addition, prompt reporting allows for prompt and accurate investigation into the cause of the event and the prevention of similar future incidents.

The ADP requires reporting of the annual air emissions inventory; and reporting of the data necessary to develop the emission inventory.

11. START-UP AND SHUTDOWN/ALTERNATIVE OPERATING SCENARIOS/POLLUTION PREVENTION

11.a. Start-up and Shutdown Provisions. Pursuant to SWCAA 400-081 "Start-up and Shutdown," technology-based emission standards and control technology determinations shall take into consideration the physical and operational ability of a source to comply with the applicable standards during start-up or shutdown. Where it is determined that a source is not capable of achieving continuous compliance with an emission standard during start-up or shutdown, SWCAA shall include appropriate emission limitations, operating parameters, or other criteria to regulate performance of the source during start-up or shutdown.

The RTO must be pre-warmed to ensure VOCs are adequately destroyed when the shredding process starts. All other equipment is capable of achieving continuous compliance with all applicable requirements; therefore, no other start-up or shutdown provisions were included in the ADP.

11.b. Alternate Operating Scenarios. SWCAA conducted a review of alternate operating scenarios applicable to equipment affected by this permitting action. The permittee did not propose or identify any applicable alternate operating scenarios. Therefore, none were included in the approval conditions.

11.c. Pollution Prevention Measures. SWCAA conducted a review of possible pollution prevention measures for the facility. No pollution prevention measures were identified by either the permittee or SWCAA separate or in addition to those measures required under BACT considerations. Therefore, none were included in the approval conditions.

12. EMISSION MONITORING AND TESTING

Initial and periodic (once every five years) source emissions testing is required for particulate matter, VOCs, and metals emitted from the shredder and combustion products and acid gases generated in the RTO. Additional NO_X emission testing must be conducted at the highest RTO operating temperature because NO_X emissions can rise significantly across the temperature range of an RTO. Since all of the shredder emission controls are dependent on capturing the pollutants in the first place, EPA Method 204 must be used to assure the shredder enclosure/building meets the standards for a permanent enclosure. The enclosure evaluation is repeated only because building modifications necessitated or caused by wear and tear might be expected.

13. FACILITY HISTORY

This will be a new facility.

13.a. Previous Approvals/Permits/Orders. The following approvals, Permits, and Orders have been issued for this facility:

Permit / Order #	Application #	Date Issued	Description
21-3500	CO-1044	1-25-2022	Approval for a new metal recycling facility in which material handling and size reduction using sheers or torch cutting takes place. A metal shredder was not part of this proposal.

Bold font indicates that the Order or Air Discharge Permit will have been superseded or will no longer be in effect when Air Discharge Permit 22-3531 is issued.

14. PUBLIC INVOLVEMENT OPPORTUNITY

14.a. Public Notice for ADP Application CO-1050. Public notice for ADP application CO-1050 was published on the SWCAA website for a minimum of 15 days, beginning on April 21, 2022.

14.b. Public/Applicant Comment for ADP Application CO-1050. A minimum (30) day public comment period was provided for this permitting action pursuant to SWCAA 400-171(3) beginning on July 28, 2022. SWCAA did not receive any comment from the applicant or the public during the public comment period for this permitting action.

14.c. State Environmental Policy Act. On June 8, 2022, Cowlitz County issued a Determination of Nonsignificance for the proposed metal shredding and sorting equipment. Cowlitz County's DNS indicated it was associated with Permit #0000091-006.