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January 11, 2023

Julia DeGagné
Oregon Department of Environmental Quality
700 NE Multnomah Street, Suite 600
Portland, Oregon 97232

Re: Response to DEQ request for information dated November 8, 2022

Dear Julia:

On behalf of Eagle Foundry Company (Eagle Foundry), Maul Foster & Alongi (MFA) is providing this response to your letter, dated November 8, 2022, in which the Department of Environmental Quality (DEQ) requested additional information as well as changes to Eagle Foundry's air toxics emissions inventory. MFA received your approval of an extension to respond, dated December 21, 2022, in which you amended the November 8 request for some information needs and granted an extension to respond until January 11, 2023 for others. We very much appreciate this extension. For clarity, MFA is including in this letter a summary of all information requests from your November 8 and December 21 letters. For those items that require ongoing effort beyond January 11, MFA is providing a status update.

1. (amended) Perform source testing of the MELT and POUR/COOL TEUs, according to the following schedule and specifications:

a. Submit a source test plan to DEQ by January 15, 2023, addressing the following:

i. Sampling for metal TACs using EPA Method 29, or similar method upon DEQ approval, for the following:

1. Aluminum (CASRN 7429-90-5);
2. Antimony (CASRN 7440-36-0);
3. Arsenic (CASRN 7440-38-2);
4. Barium (CASRN 7440-39-3);
5. Beryllium (CASRN 7440-41-7);
6. Cadmium (CASRN 7440-43-9);
7. Chromium (CASRN 7440-47-3);
8. Cobalt (CASRN 7440-48-4);
9. Copper (CASRN 7440-50-8);
10. Lead (CASRN 7439-92-1);
11. Manganese (CASRN 7439-96-5);
12. Mercury (CASRN 7439-97-6);
13. Nickel (CASRN 7440-02-0);
14. Phosphorus (DEQ SEQ ID 504);
15. Selenium (CASRN 7782-49-2);
16. Silver (CASRN 7440-22-4);
17. Thallium (CASRN 7440-28-0);
18.Vanadium (CASRN 7440-62-2); and
19.Zinc (CASRN 7440-66-6).

ii. Sampling for hexavalent chromium (CASRN 18540-29-9) using EPA SW-846 Method 0061;

iii. Please review sections 2.7 and 2.8 of the DEQ Source Sampling Manual when proposing minimum sample volumes for each test method. Please consult with DEQ prior to submittal of the test plan if you have any concerns regarding sample volumes and/or analytical detection limits; and

iv. Include a proposed methodology for estimating fugitive emissions from the MELT and POUR/COOL TEUs, including determination of capture efficiency and composition of emissions;

b. Complete source testing no later than 60 days after DEQ approval of the test plan; and

c. Submit source test results, including the information required in Appendix A of the Source Sampling Manual, to DEQ no later than 60 days after the completion of source testing;

To date, Eagle Foundry has contracted with Bison Engineering to conduct source testing. Bison Engineering is on schedule to submit a source test plan by January 15, 2023 for DEQ approval. Bison is currently working on scheduling to ensure the proper resources are available, but the test is planned to be conducted within 60 days of the DEQ approval of the source test protocol.

2. (amended) Submit a revised Inventory, including updated emissions for the MELT and POUR/COOL TEUs based on source test results, no later than 30 days after DEQ approval of the source test report.

MFA will revise the emissions inventory to include updated emissions for the MELT and POUR/COOL TEUs and submit to the DEQ within 30 days following DEQ approval of the source test report.

3. (amended item 1c in the November 8, 2022 DEQ request) Baghouse dust composition analyses are not representative of the hexavalent chromium composition of emissions to air due to the potential for conversion between hexavalent and trivalent chromium. Update hexavalent chromium [CASRN 18540-29-9] emissions to use these more conservative assumptions for the following Toxics Emissions Units (TEUs): REC, TORCH, GRIND, MESH, SHOT, S_PALMER, and SCREEN: assume total chromium emissions are composed of 3 percent hexavalent chromium.

The emissions inventory, included as Attachment A, has been updated to assume total chromium emissions are composed of 3 percent hexavalent chromium for the following TEUs:

- REC
- MESH
- SHOT
- S_PALMER
- SCREEN

Eagle Foundry reserves the right to revise this assumption as site-specific data becomes available. As required in your December 21, 2022 extension letter, MFA will update the emissions inventory and form AQ520 for the AIRARC and GRIND TEUs by March 31, 2023.

4. Hot Top usage (HOTTOP TEU): because the aluminum oxide emitted is anticipated to be non-fibrous (based on information reported in the Safety Data Sheet (SDS)), report emissions for aluminum oxide as "aluminum and compounds" [CASRN 7429-90-5] rather than aluminum oxide (fibrous forms) [CASRN 1344-28-1].

The emissions inventory has been updated to report emissions of aluminum oxide as aluminum and compounds.

5. Torch (AIRARC) cutting activities (AIRARC TEU):

a. DEQ observed a significant amount of visible torch cutting emissions not being captured by controls during a site visit on July 8, 2022. Please update the baghouse capture efficiency for the AIRARC TEU to zero percent.

b. The AP-42 emission factor for PM emissions from this activity used in the Inventory is based on emissions from billet cutting in units of pounds per ton of steel produced, which may not be representative of Eagle Foundry's torch cutting process. Update the PM emission factor to 0.06 pounds total PM per hour cutting time per station, as reported in emissions data from the American Welding Society for torch cutting of clean, ½-inch steel plate.

6. Grinding activities (GRIND TEU):

a. Update the PM emission factor to 0.16 pounds per ton metal produced to reflect the median emission factor for grinding, developed from data collected in the EPA's 1998 Foundry Information Collection Request.

b. Due to the sharing of the baghouse between the grinding and rotoblast processes and the potential for daily variation in production, site-specific metal chemistry data may be more representative of the overall TAC composition of PM emissions than baghouse dust. For conservatism, update the TAC composition to match the higher of either:

i. The baghouse dust composition; or

ii. The TAC composition of the melted alloys, on a daily maximum basis and annual average basis.

Eagle Foundry is continuing to work with engineering contractors to determine ways to improve and document capture efficiency for AIRARC and GRIND TEUs. As required in your December 21, 2022 extension letter, MFA will address these items by March 31, 2023.

You will notice one change to the process flow diagram and emissions inventory. Grinding booths T1-T3 have been decommissioned, which will improve the overall capture efficiency of the grinding area when that is documented.

7. Welding activities (WELD TEU):

a. Include emissions for molybdenum (reported as molybdenum trioxide [CASRN 1313-27-5]) for consistency with the SDS information provided in Attachment C of the Inventory submittal for the following welding materials:

i. Prostar 6S Wire;
ii. Stoody Wire; and
iii. Avesta 2205.

The emissions inventory has been updated to report emissions of molybdenum (CAS 7439-98-7) as molybdenum trioxide (CAS 1313-27-5) from the use of welding materials listed in 7(a)(i) – 7(a)(iii).

b. Confirm that all welding processes used are Tungsten Inert or Gas Metal Arc Welding (TIG or GMAW, respectively), or update emission factors to reflect alternative welding processes (e.g., Flux Core Arc Welding, or FCAW).

Eagle Foundry has confirmed that all welding is either GMAW or shielded metal arc welding (SMAW). The attached emissions inventory has been updated to incorporate the appropriate calculations for each welding process.

c. Update the annual throughput, emission factors, and emissions reported in the AQ520 to be consistent with one another (i.e., emissions should equal the throughput multiplied by the emission factor).

Form AQ520 has been revised as requested in 7c. and is included as an attachment to the January 11, 2023 email with this letter.

8. Abrasive blasting activities:

a. Provide a detailed description of mesh (MESH TEU) and steel shot (SHOT TEU) abrasive blasting processes, including blasting equipment used (e.g. manufacturer make/model, type of housing and whether fully enclosed, control device type and specifications) and abrasive materials used (including type, whether materials are recycled, and how material usage is tracked).

The MESH blasting unit is Model no. DEA00813, from US Surface Preparation Group. The housing is fully enclosed, and exhaust is filtered using 16 cartridge filters, each of which is 12.75" in diameter and 36" long. The technical data sheet for the cartridge filter is included in Attachment B. The blast material is S390 steel shot from W Abrasives. The SDS for the blasting material is included as Attachment C. Material usage is tracked on an annual basis based on purchase history. Blasting materials from the MESH blast are recycled.

The SHOT blasting unit is a 28-foot Super Tumblast, Serial no. A-109579, from US Filter. The housing is fully enclosed, and exhaust is directly routed and controlled by the finishing baghouse. The blast material is S390 steel shot from W Abrasives. Material usage is tracked on an annual basis based on purchase history. Blasting materials from the SHOT blast are recycled.

Both MESH and SHOT blast units use an "Air Curtain Separator System" which separates out shot material once it has degraded to an unusable size. Depending on the remaining size of the spent shot it is either filtered out of the exhaust or drops out of the machine as waste, which is disposed of

accordingly. Both machines also have a dropout for acceptably sized shot material, which is recycled back into the machine, reducing the amount of replacement shot that must be purchased. In 2021, the facility purchased 8,000 lbs of new steel shot. All of it was used in SHOT TEU.

b. Update the process flow diagram (Attachment D of the Inventory submittal) for mesh abrasive blasting (MESH TEU) to illustrate emissions to atmosphere from this process, any applicable control devices, and type of emissions (stack or fugitive).

The process flow diagram has been updated to reflect emissions to atmosphere through the stack of the mesh abrasive blasting unit. The updated process flow diagram is included with this letter as Attachment D.

9. Based on the SDSs provided in Attachment C to the Inventory, raw materials containing respirable crystalline silica are used in the HOTTOP and MOLD TEUs. All forms of respirable crystalline silica are TACs and must be reported. CASRN 14808-60-7 and CASRN 14464-46-1 identify specific forms of crystalline silica (quartz and cristobalite), which fall under the general silica category (CASRN 7631-86-9). If TACs are not likely to be emitted, justification must be provided for exemption per OAR 340-245-0060(3)(a). Update the Inventory to include emissions from handling of the following, reported under the general CASRN 7631-86-9 ("Silica, crystalline (respirable)"):

a. HOTTOP: the Vesuvius Ferrux® 746 hot top product (contains between 1 and 5 percent crystalline silica (Quartz) [CASRN 14808-60-7]); and

Without conceding that any of the emissions are of a respirable size, the emissions inventory has been updated to report emissions of crystalline silica-Quartz (CAS 14808-60-7) as CAS 7631-86-9 from the use of Vesuvius Ferrux® 746.

b. MOLD:

i. Vesuvius Isomol® 780 (contains between 0.1 and 1 percent crystalline silica (Quartz) [CASRN 14808-60-7]); and

ii. Velvacoat™ ST 803 (contains between 0.1 and 1 percent quartz/sand [CASRN 14808-60-7]) and between 0.1 and 1 percent cristobalite [CASRN 14464-46-1].

Without conceding that any of the emissions are of a respirable size, the emissions inventory has been updated to report emissions of crystalline silica-Quartz (CAS 14808-60-7), and cristobalite (CAS 14464-46-1) as CAS 7631-86-9 from the use of Vesuvius Isomol® 780 and Velvacoat™ ST 803. In addition, the emissions inventory has been updated to report emissions (CAS 7631-86-9) from G-29 sand, Naigai Cerabeads 60, and Unibond 1350 Core Paste. SDSs for these products are included in Attachment C.

10. Pattern making activities (PATTERN TEU): Include emissions of trimethylbenzene [CASRN 25551-13-7] from use of Polyurethane Clear Varnish, for consistency with the SDS information provided in Attachment C of the Inventory submittal. CASRN 25551-13-7 indicates a mixture of the trimethylbenzene isomers 1,2,3-trimethylbenzene [CASRN 526-73-8], 1,2,4-trimethylbenzene [CASRN 95-63-6] and 1,3,5-trimethylbenzene [CASRN 108-67-8],

all of which are listed TACs. Please report emissions as one of the isomers (e.g., assume all emissions are 1,2,3-trimethylbenzene [CASRN 526-73-8]).

The emissions inventory has been updated to report emissions of trimethylbenzene (CAS 25551-13-7), as 1,2,4-trimethylbenzene (CAS 95-63-6) from the use of Polyurethane Clear Varnish in pattern making activities.

11. Propane combustion activities (PROPANE TEU): Update the process flow diagram (Attachment D of the Inventory submittal) to illustrate emissions to atmosphere from this process and indicate stack or fugitive emissions.

The process flow diagram has been updated to reflect emissions to atmosphere from propane combustion through the stacks of the heat treat furnaces.

12. Emergency diesel engine combustion activities (EGEN TEU):

a. Update assumed load factor to 100 percent; and

The emissions inventory has been updated to reflect an assumed load factor of 100 percent for the emergency generator.

b. For hourly actual throughput and for annual and hourly potential to emit throughputs, report fuel usage rates based on manufacturer's specifications, rather than a calculated average (please provide documentation of reported fuel usage rates).

A photo of the machine data plate for the emergency generator is included as Attachment E. Based on similar equipment, a 100-kW diesel emergency generator has a maximum fuel consumption rate of 7.3 gallons per hour at 100 percent load. The emissions inventory has been updated to reflect the maximum fuel consumption rate for PTE emission estimates.

13. Update the AQ520 form as follows:

a. Include additional line items for TEUs with multiple emission points. For these TEUs, designate a separate TEU ID for each stack and fugitive emission point (on Tab 2), and list individual activity information (on Tab 2), emission factor information, control efficiency, and calculated emissions (on Tab 3) for each emission point. This is necessary to ensure correspondence of emission rates between the Inventory and the Modeling Protocol. Updated TEUs should include, but may not be limited to:

i. MELT;
ii. POUR_COOL;
iii. HOTTOP;
iv. REC;
v. WELD;
vi. SCREENING; and
vii. GRIND;

The way TEUs were designated for the facility was an attempt to follow the CAO program rules. Per OAR 340-245-0060(1)(b), "An individual emissions-producing activity that exhausts through

multiple stacks or openings must be designated as an individual TEU." Therefore, we have elected not to incorporate this change into the emissions inventory and AQ520 forms. Sources called-in to the CAO program have historically broken out emissions by discharge point as part of the modeling protocol required under OAR 340-245-0210. Eagle Foundry will ensure that this is clearly delineated in the modeling protocol.

b. Update activity units in column F of Tab 2 to be a single unit (for example, pounds *or* tons, but not both), and to be consistent with both daily and annual activities and the reported emission factor units for the following TEUs:
i. MELT;
ii. POUR_COOL;
iii. REC;
iv. TORCH;
v. GRIND;
vi. MESH;
vii. S_PALMER;
viii. SCREENING;
ix. PROPANE; and
x. EGEN;

Form AQ520 has been updated as requested in 13(b)(i) – 13(b)(x).

c. Update annual and daily throughput for the S_PALMER TEU on Tab 2 to reflect "PM generated" rather than "PM collected", for consistency with the emission factor and emissions reported in Tab 3.

Form AQ520 has been updated as requested in 13(c).

d. Update the "Reference/Notes" column in Tab 3 to fully specify the source of the emission factor for each TEU and TAC (for example, "PM emission factor from AP-42, Chapter 12.10, Table 12.10-7 "Particulate Emission Factors for Ancillary Operations and Fugitive Sources at Gray Iron Foundries" – uncontrolled particulate emission factor for pouring and cooling in an electric induction furnace; TAC emissions estimated from baghouse dust analysis."); and

Form AQ520 has been updated as requested in 13(d).

e. Correct daily and annual emission factors in Tab 3 for TORCH TEU, which appear to have been transposed for manganese [CASRN 7439-96-5], nickel [CASRN 7440-02-0], and phosphorus [DEQ SEQ ID 504].

Form AQ520 has been updated as requested in 13(e).

14. Provide the following additional documentation and background information to support the Inventory [OAR 340-245-0040(b)(C)]:

a. Documentation related to baghouse and other dust collection data for both 2020 and 2021 dust-collection periods for each sample (including but not limited to:

"Foundry", "Reclaim", "Small Palmer", "Finishing", "Mesh Blast", and "Screening"), including:

i. Mass measurements and laboratory analytical reports;
ii. Corresponding TEU throughput; and
iii. Breakdown of TEU throughput by metal alloy during the collection period.

The analytical report from Apex Labs for the 2021 dust analysis is included as Attachment F. TEU throughput by metal alloy during the collection period is not available. However, daily incremental samples were collected from each hopper over a period of five days to get samples representative of facility operations. Apex laboratory used a rotary sectorial splitter to create a representative composite sample for each of the dust collection systems from the five incremental samples. Part of each composite sample was used for metals analysis. This portion was milled with a ceramic mill prior to analysis to remove any bias based on size.

b. Documentation supporting the reported capture efficiency for the following control devices/TEUs:

i. TEU MELT and TEU POUR_COOL (permitted Device IDs "Roof peak" and "Bunkers");
ii. TEU S_PALMER (permitted Device ID "Palmer"); and
iii. TEU REC (permitted Device ID "Rotary").

On October 19, 2022, MFA visited Eagle Foundry to conduct a qualitative analysis of the foundry building and reclaim capture efficiencies. Information, based on this site visit, supporting the capture efficiency of TEU MELT, TEU POUR/COOL and TEU REC is included as Attachment G. Based on the information provided in Attachment F, MFA has updated the capture efficiency for TEU REC to 97 percent. Further, when source testing is conducted on the foundry building baghouses in March 2023, Bison intends to conduct EPA Method 204 testing to provide further data for use to confirm that the foundry building capture efficiency is actually greater than 75%.

TEU S_Palmer is directly connected to a baghouse and is therefore assumed to be 100% captured.

c. Manufacturer specifications or other documentation of control efficiencies for the following control devices:

i. Foundry baghouses (permitted Device IDs "Roof peak" and "Bunkers");
ii. Reclaim baghouse (permitted Device ID "Rotary");
iii. Finishing baghouse (permitted Device ID "Finish"); and
iv. Small Palmer baghouse (permitted Device ID "Palmer").

The following information has been collected by the facility for each baghouse. The bags are from Blue Sky Filters, type RF8. Additional information is provided in Appendix G. Source testing of the two largest baghouses, used for the foundry building, will have inlet and outlet concentration results for metals. Because there will be site-specific source test data and post-control emission factors developed, control efficiency will not be necessary for the foundry baghouses.

MODEL	CFM	LOCATION	Number of Bags in Baghouse	Bag surface area square footage
Donaldson 64hpt8	10,000	**Small Palmer -** molding system (Ceramic Media)	64	637 ft2
Donaldson 128hpt8	19,000	**Reclaim -** Vibra-Drum rotary shakeout	128	1272 ft2
Donaldson 160hpt8	30,000	**Finishing** - work stations & Rotoblast	160	1590 ft2
Donaldson 484rfw10	50,000	**Main foundry building** - roof peak of building	484	6128 ft2
Donaldson 484rfw10	50,000	**Main foundry building** - casting shakeout & cooling bunkers	484	6128 ft2
Donaldson 54HPH	5,000	**Screening-** silo and screening emission control	54	537 ft2

d. SCREENING TEU: review the narrative description of the PM emission factor (see Attachment B), which includes silos and sand handling activities, and:

i. Document any changes needed to equipment, air flows, operating hours, throughputs, controls, or emission factors based on current operations;

ii. Update the PM emission factor or emission factors used in the Inventory if necessary; and

iii. Update TEU IDs and emission points reported in the PFD, AQ520, and supporting calculations to attribute emissions to specific emission points.

Eagle Foundry appreciates you raising this question because much of this system has been changed to improve worker health and environmental performance. For instance, silica sand is no longer used. Instead, a ceramic bead is used. All silos are now vented to baghouses rather than having a bin vent direct to atmosphere. The PFD, emissions inventory, and AQ520 have all been updated to include the silos shown below. Emission factors are based on the original information contained in the Draft Review Report 03-2631, Application number 016656, 10/29/1998..

Silo	Material Use	Emissions Control
D1-1	Filled from D1-4, Feeds SP. (included with S_Palmer TEU)	SP Baghouse
D1-2	No longer in use	N/A
D1-3	New ceramic bead, Feeds BP (D1-3 TEU)	Screening baghouse
D1-4	Filled from Reclaimer and D1-5, Feeds SP and BP (D1-4 TEU)	Screening baghouse
D1-5	Overflow from D1-4, feeds back to D1-4 (D1-5 TEU)	Screening baghouse
D1-6	No longer in use	N/A

SP = Small Palmer mold making machine

BP = Big Palmer mold making machine

e. SDSs for all raw materials used that have not been provided in Attachment C of the Inventory, including but not limited to:

i. Abrasive material used in the mesh blast process (MESH TEU); and

ii. Abrasive material used in the shot blast process (SHOT TEU); and

The SDS for S390 steel shot from W Abrasives abrasive used in the MESH TEU and SHOT TEU is included as Attachment H.

f. Technical basis for the assumption that 1 percent of the Vesuvius Ferrux® 746 hot top product becomes airborne (HOTTOP TEU).

Hot top is a molten metal insulation added to the casting while the casting solidifies. A small amount of hot top is burned and becomes airborne during the thermite reaction. Based on experience with other facilities, MFA knows that 1% was a reasonable estimate of the maximum loss of hot top material.

Sincerely,

Chad Darby

Attachments:
A. Revised CAO Emissions Inventory
B. Control Efficiency Documentation
C. SDS
D. Revised Process Flow Diagram
E. Emergency Generator Specifications
F. Baghouse Dust Analysis
G. Capture Efficiency Memo

cc: Jack Scott, Eagle Foundry

ATTACHMENT A

REVISED CAO EMISSIONS INVENTORY

Table 1
Input Process Rates and Parameters
Eagle Foundry Company

Source	Production or Throughput Rate									
	2021					PTE				
	Maximum Daily			Annual		Maximum Daily			Annual	
Facility										
Facility Hours of Operation	20.0	(hrs/day)	(1)	6,240	(hrs/yr) (a)	24.0	(hrs/day)	(2)	8,760	(hrs/yr) (2)
Foundry										
Total Metal Poured (metal poured)	62,000	(lb/day)	(3)	5,675	(ton/yr) (1)	62,000	(lb/day)	(3)	8,060	(ton/yr) (1)
Total Metal Processed (metal processed)	38,036	(lb/day)	(b)	3,482	(ton/yr) (b)	38,036	(lb/day)	(b)	4,945	(ton/yr) (b)
Total Hot Top	92.3	(lb/day)	(c)	24,005	(lb/yr) (1)	131	(lb/day)	(c)	34,093	(lb/yr) (d)
Heat Treat										
Total Propane Usage	584	(gal/day)	(c)	151,830	(gal/yr) (1)	829	(gal/day)	(c)	215,639	(gal/yr) (d)
Torch (AirArc)										
Total Metal Processed to AirArc	38,036	(lb/day)	(5)	3,482	(ton/yr) (5)	38,036	(lb/day)	(5)	4,945	(ton/yr) (5)
Welding										
Percentage of Welding Wire to Waste	--			5	(%) (1)	--			5	(%) (1)
Total Wire - Excluding Waste	27.5	(lb/day)	(e)	7,150	(lb/yr) (e)	39.1	(lb/day)	(e)	10,154	(lb/yr) (e)
Lincore M WIRE HF LCM 1/16 25# SP	3.08	(lb/day)	(c)	800	(lb/yr) (1)	4.37	(lb/day)	(c)	1,136	(lb/yr) (d)
Sandvik WIRE 309LSI .035 X 33 LB	0.13	(lb/day)	(c)	33.0	(lb/yr) (1)	0.18	(lb/day)	(c)	46.9	(lb/yr) (d)
Avesta 2205 ELECTR SS E2209 1/8 10#	1.15	(lb/day)	(c)	300	(lb/yr) (1)	1.64	(lb/day)	(c)	426	(lb/yr) (d)
Prostar S-6 WIRE MS 70S6 035 33# SP PRS	3.09	(lb/day)	(c)	803	(lb/yr) (1)	4.4	(lb/day)	(c)	1,140	(lb/yr) (d)
Stoody WIRE HF 965-G 045 33# SP	3.43	(lb/day)	(c)	891	(lb/yr) (1)	4.87	(lb/day)	(c)	1,265	(lb/yr) (d)
Hobart WIRE EXCELARC 71 .045 X 33 LB	0.38	(lb/day)	(c)	99.0	(lb/yr) (1)	0.54	(lb/day)	(c)	141	(lb/yr) (d)
CARBONS 1/2X17 CTD DC JTD 100	17.7	(lb/day)	(c)	4,600	(lb/yr) (1)	25.1	(lb/day)	(c)	6,533	(lb/yr) (d)
Mold Production										
Velvacoat St 803 - Mold Wash Z	45.4	(lb/day)	(c)	11,800	(lb/yr) (1)	64.5	(lb/day)	(c)	16,759	(lb/yr) (d)
Isomol - Mold Wash M	13.8	(lb/day)	(c)	3,600	(lb/yr) (1)	19.7	(lb/day)	(c)	5,113	(lb/yr) (d)
Urethane	0.23	(gal/day)	(c)	60.0	(gal/yr) (1)	0.33	(gal/day)	(c)	85.0	(gal/yr) (d)
Mar-Proof H/S Lacquer Sanding Sealer	0.020	(gal/day)	(c)	5.00	(gal/yr) (1)	0.03	(gal/day)	(c)	7.00	(gal/yr) (d)
G-29 Sand	82.0	(lb/day)	(c)	21,312	(lb/yr) (1)	116	(lb/day)	(c)	30,269	(lb/yr) (d)
Naigai Cerabead	5,093	(lb/day)	(c)	1,324,136	(lb/yr) (1)	7,233	(lb/day)	(c)	1,880,623	(lb/yr) (d)
Unibond 1350 Core Paste	43.0	(lb/day)	(c)	11,169	(lb/yr) (1)	61.0	(lb/day)	(c)	15,863	(lb/yr) (d)
Coated Cerabead	34.6	(lb/day)	(c)	9,000	(lb/yr) (1)	49.2	(lb/day)	(c)	12,782	(lb/yr) (d)
Finishing										
Grinding Booths P1-P8 (Metal Processed)	38,036	(lb/day)	(5)	3,482	(ton/yr) (5)	38,036	(lb/day)	(5)	4,945	(ton/yr) (5)
Abrasive Blasting										
Mesh Blast (Steel Shot Used)	23.1	(lb/day)	(c)	6,000	(lb/yr) (1)	27.7	(lb/day)	(c)	7,200	(lb/yr) (1)
Shot Blast (Steel Shot Used)	30.8	(lb/day)	(c)	8,000	(lb/yr) (1)	36.9	(lb/day)	(c)	9,600	(lb/yr) (1)
Silos										
Hours of Operation	20.0	(hrs/day)	(6)	4,800	(hrs/yr) (6)	20.0	(hrs/day)	(6)	4800	(hrs/yr) (6)
Emergency Generator										
Hours of Operation	2.00	(hrs/day)	(1)	65.0	(hrs/yr) (1)	2.00	(hrs/day)	(1)	100	(hrs/yr) (1)
Diesel Usage	0.92	(gal/day)	(h)	30.0	(gal/yr) (1)	14.6	(gal/day)	(h)	730	(gal/yr) (h)
Baghouse										
Small Palmer Molding Line (dust collected)	66.5	(lb/day)	(1)	10.4	(ton/yr) (j)	113	(lb/day)	(f)	14.7	(ton/yr) (d)

Filter	Control Efficiency (%)
Baghouse Control Efficiency for PM	99.0 (1)

NOTES:

(a) Annual hours of operation (hrs/yr) = (daily hours of operation [hrs/day]) x (operational days per week [days/week]) x (operational weeks per year [weeks/yr])

Operational days per week (days/week) = 6.00 (1)

Operational weeks per year [weeks/yr]) = 52.0 (1)

(b) Total metal processed (ton metal processed) = (total metal poured [ton metal poured]) x (1 - [reject percentage {%}]/100) x (1 - [percentage of metal poured for riser {%}]/100)

Reject percentage (%) = 1.05 (1)

Percentage of metal poured for riser (%) = 38.0 (1)

(c) Daily usage (unit/day) = (annual usage [unit/yr]) / (operational days per week [days/week]) / (operational weeks per year [weeks/yr]) x (1 + [short-term variability factor {%}]/100)

Short-term variability factor (%) = 20.0 (4)

(d) Annual parameter, PTE (units/yr) = (total metal poured, PTE [tons metal poured/yr]) / (total metal poured, 2020 [tons metal poured/yr]) x (annual parameter, 2020 [units/yr])

(e) Total welding wire - excluding waste (lb/day or lb/yr) = (total welding wire usage [lb/day or lb/yr]) x (1 - (percentage of welding wire waste [%] /100)

(f) Maximum daily parameter (lb/day) = (annual parameter [tons/yr]) x (2,000 lb/ton) / (operational days per week [days/week]) / (operational weeks per year [weeks/yr]) x (1 + [short-term variability factor {%}]/100)

Short-term variability factor (%) = 20.0 (4)

(g) Daily usage (unit/day) = (annual usage [unit/yr]) / (operational days per week [days/week]) / (operational weeks per year [weeks/yr])

(h) 2021 Diesel usage (gal/day) = (diesel usage [gal/yr]) / (generator hours of operation [hrs/yr]) x (daily hours of operation [hrs/day])

(i) PTE Diesel usage (gal/day) = (diesel usage [gal/hour]) x (hours of operation [hrs/unit])

Diesel usage (gal/hr) = 7.30 (7)

(j) Annual dust collected (tons/yr) = (daily dust collected [lb/day]) / (2,000 lb/ton) x (operational days per week [days/week]) x (operational weeks per year [weeks/yr])

REFERENCES:

(1) Information provided by facility.

(2) Assumes continuous operation.

(3) Information provided by facility based on the maximum production possible in one day.

(4) Based on a 20% increase for short-term variability.

(5) Value represents the total metal processed.

(6) Based on facility estimate. Bin vents only create emissions when system is operating.

(7) Based on a 100 kW emergency generator at 100 percent load.

Table 2
PTE Foundry Melting TAC Emissions Estimate
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor		Fugitive Emissions Estimate		Controlled Emissions Estimate		Total Emissions Estimate [1]	
				Maximum Daily (lb/day)	Annual (lb/yr)	Maximum Daily (lb/day)	Annual (lb/yr)	Maximum Daily (lb/day)	Annual (lb/yr)
PM	--	0.90	(lb PM/ton metal poured) [2]	6.98 [a]	1,814 [b]	0.21 [c]	54.4 [d]	7.18	1,868
Aluminum and Compounds	7429-90-5	0.75	(% of PM emitted) [5]	0.052 [e]	13.5 [f]	1.6E-03 [e]	0.41 [f]	0.054	13.9
Antimony and Compounds	7440-36-0	1.4E-04	(% of PM emitted) [5]	9.8E-06 [e]	2.5E-03 [f]	2.9E-07 [e]	7.6E-05 [f]	1.0E-05	2.6E-03
Arsenic and Compounds	7440-38-2	8.6E-05	(% of PM emitted) [5]	6.0E-06 [e]	1.6E-03 [f]	1.8E-07 [e]	4.7E-05 [f]	6.2E-06	1.6E-03
Barium and Compounds	7440-39-3	4.1E-03	(% of PM emitted) [5]	2.9E-04 [e]	0.075 [f]	8.6E-06 [e]	2.2E-03 [f]	3.0E-04	0.077
Beryllium and compounds	7440-41-7	5.2E-06	(% of PM emitted) [5]	3.6E-07 [e]	9.4E-05 [f]	1.1E-08 [e]	2.8E-06 [f]	3.7E-07	9.7E-05
Cadmium and Compounds	7440-43-9	5.2E-05	(% of PM emitted) [5]	3.6E-06 [e]	9.4E-04 [f]	1.1E-07 [e]	2.8E-05 [f]	3.7E-06	9.7E-04
Chromium	7440-47-3	0.010	(% of PM emitted) [5]	6.9E-04 [e]	0.18 [f]	2.1E-05 [e]	5.4E-03 [f]	7.1E-04	0.19
Chromium VI	18540-29-9	1.1E-05	(% of PM emitted) [5]	7.6E-07 [e]	2.0E-04 [f]	2.3E-08 [e]	5.9E-06 [f]	7.8E-07	2.0E-04
Cobalt and Compounds	7440-48-4	1.4E-04	(% of PM emitted) [5]	9.4E-06 [e]	2.4E-03 [f]	2.8E-07 [e]	7.3E-05 [f]	9.7E-06	2.5E-03
Copper and Compounds	7440-50-8	0.019	(% of PM emitted) [5]	1.3E-03 [e]	0.35 [f]	4.0E-05 [e]	0.010 [f]	1.4E-03	0.36
Lead and Compounds	7439-92-1	2.5E-03	(% of PM emitted) [5]	1.7E-04 [e]	0.045 [f]	5.2E-06 [e]	1.4E-03 [f]	1.8E-04	0.047
Manganese and Compounds	7439-96-5	0.065	(% of PM emitted) [5]	4.5E-03 [e]	1.18 [f]	1.4E-04 [e]	0.035 [f]	4.7E-03	1.21
Nickel and Compounds	7440-02-0	3.0E-03	(% of PM emitted) [5]	2.1E-04 [e]	0.055 [f]	6.3E-06 [e]	1.6E-03 [f]	2.2E-04	0.057
Phosphorus and Compounds	504	ND	(% of PM emitted) [5]	0	0	0	0	0	0
Selenium and Compounds	7782-49-2	2.6E-05	(% of PM emitted) [5]	1.8E-06 [e]	4.7E-04 [f]	5.4E-08 [e]	1.4E-05 [f]	1.9E-06	4.8E-04
Silver and Compounds	7440-22-4	5.2E-05	(% of PM emitted) [5]	3.6E-06 [e]	9.4E-04 [f]	1.1E-07 [e]	2.8E-05 [f]	3.7E-06	9.7E-04
Thallium	7440-28-0	5.2E-06	(% of PM emitted) [5]	3.6E-07 [e]	9.4E-05 [f]	1.1E-08 [e]	2.8E-06 [f]	3.7E-07	9.7E-05
Vanadium (fume or dust)	7440-62-2	5.8E-04	(% of PM emitted) [5]	4.0E-05 [e]	0.011 [f]	1.2E-06 [e]	3.2E-04 [f]	4.2E-05	0.011
Zinc and Compounds	7440-66-6	0.019	(% of PM emitted) [5]	1.3E-03 [e]	0.34 [f]	3.9E-05 [e]	0.010 [f]	1.3E-03	0.35

NOTES:

ND = non-detect

TAC = toxic air contaminant

(a) Daily fugitive emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (ton/2,000 lb) x (daily metal poured [lb/day]) x (1 - capture efficiency [%]/100)

Daily metal poured (lb/day) = 62,000 (3)

Capture efficiency (%) = 75.0 (4)

(b) Annual fugitive emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (annual metal poured [ton/yr]) x (1 - capture efficiency [%]/100)

Annual metal poured (ton/yr) = 8,060 (3)

Capture efficiency (%) = 75.0 (4)

(c) Daily controlled emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (ton/2,000 lb) x (daily metal poured [lb/day]) x (capture efficiency [%]/100) x (1 - [control efficiency of baghouse {%}]/100)

Daily metal poured (lb/day) = 62,000 (3)

Capture efficiency (%) = 75.0 (4)

Control efficiency of baghouse (%) = 99.0 (3)

(d) Annual controlled emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (annual metal poured [ton/yr]) x (capture efficiency [%]/100) x (1 - [control efficiency of baghouse {%}]/100)

Annual metal poured (ton/yr) = 8,060 (3)

Capture efficiency (%) = 75.0 (4)

Control efficiency of baghouse (%) = 99.0 (3)

(e) Daily emissions estimate (lb/day) = (daily PM emissions [lb/day]) x (emission factor [% of PM emitted]/100)

(f) Annual emissions estimate (lb/yr) = (annual PM emissions [lb/yr]) x (emission factor [% of PM emitted]/100)

REFERENCES:

(1) Value represents the sum of fugitive and controlled emission estimates.

(2) AP-42, Chapter 12.10, Table 12.10-3 "Particulate Emission Factors for Iron Furnaces". Uncontrolled particulate emission factor for melting in an electric induction furnace.

(3) See Table 1, Input Process Rates and Parameters.

(4) Information from Standard ACDP 03-2631 based in a 1998 industrial ventilation study of the foundry. Capture efficiency in the main bay was measured to be 95%. DEQ set the overall capture efficiency at 75%.

(5) Based on baghouse dust analysis conducted by Apex Laboratories, March 2021.

Table 3
PTE Foundry Pouring/Cooling TAC Emissions Estimate
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor		Fugitive Emissions Estimate		Controlled Emissions Estimate		Total Emissions Estimate [1]	
				Maximum Daily (lb/day)	Annual (lb/yr)	Maximum Daily (lb/day)	Annual (lb/yr)	Maximum Daily (lb/day)	Annual (lb/yr)
PM	--	4.20	(lb PM/ton metal poured) [2]	32.6 [a]	8,463 [b]	0.98 [c]	254 [d]	33.5	8,717
Aluminum and Compounds	7429-90-5	0.75	(% of PM emitted) [5]	0.24 [e]	63.1 [f]	7.3E-03 [e]	1.89 [f]	0.25	65.0
Antimony and Compounds	7440-36-0	1.4E-04	(% of PM emitted) [5]	4.6E-05 [e]	0.012 [f]	1.4E-06 [e]	3.6E-04 [f]	4.7E-05	0.012
Arsenic and Compounds	7440-38-2	8.6E-05	(% of PM emitted) [5]	2.8E-05 [e]	7.3E-03 [f]	8.4E-07 [e]	2.2E-04 [f]	2.9E-05	7.5E-03
Barium and Compounds	7440-39-3	4.1E-03	(% of PM emitted) [5]	1.3E-03 [e]	0.35 [f]	4.0E-05 [e]	0.010 [f]	1.4E-03	0.36
Beryllium and compounds	7440-41-7	5.2E-06	(% of PM emitted) [5]	1.7E-06 [e]	4.4E-04 [f]	5.1E-08 [e]	1.3E-05 [f]	1.7E-06	4.5E-04
Cadmium and Compounds	7440-43-9	5.2E-05	(% of PM emitted) [5]	1.7E-05 [e]	4.4E-03 [f]	5.1E-07 [e]	1.3E-04 [f]	1.7E-05	4.5E-03
Chromium	7440-47-3	0.010	(% of PM emitted) [5]	3.2E-03 [e]	0.84 [f]	9.7E-05 [e]	0.025 [f]	3.3E-03	0.87
Chromium VI	18540-29-9	1.1E-05	(% of PM emitted) [5]	3.5E-06 [e]	9.2E-04 [f]	1.1E-07 [e]	2.8E-05 [f]	3.6E-06	9.5E-04
Cobalt and Compounds	7440-48-4	1.4E-04	(% of PM emitted) [5]	4.4E-05 [e]	0.011 [f]	1.3E-06 [e]	3.4E-04 [f]	4.5E-05	0.012
Copper and Compounds	7440-50-8	0.019	(% of PM emitted) [5]	6.2E-03 [e]	1.62 [f]	1.9E-04 [e]	0.048 [f]	6.4E-03	1.66
Lead and Compounds	7439-92-1	2.5E-03	(% of PM emitted) [5]	8.1E-04 [e]	0.21 [f]	2.4E-05 [e]	6.3E-03 [f]	8.4E-04	0.22
Manganese and Compounds	7439-96-5	0.065	(% of PM emitted) [5]	0.021 [e]	5.48 [f]	6.3E-04 [e]	0.16 [f]	0.022	5.65
Nickel and Compounds	7440-02-0	3.0E-03	(% of PM emitted) [5]	9.9E-04 [e]	0.26 [f]	3.0E-05 [e]	7.7E-03 [f]	1.0E-03	0.26
Phosphorus and Compounds	504	ND	(% of PM emitted) [5]	0	0	0	0	0	0
Selenium and Compounds	7782-49-2	2.6E-05	(% of PM emitted) [5]	8.4E-06 [e]	2.2E-03 [f]	2.5E-07 [e]	6.6E-05 [f]	8.7E-06	2.3E-03
Silver and Compounds	7440-22-4	5.2E-05	(% of PM emitted) [5]	1.7E-05 [e]	4.4E-03 [f]	5.1E-07 [e]	1.3E-04 [f]	1.7E-05	4.5E-03
Thallium	7440-28-0	5.2E-06	(% of PM emitted) [5]	1.7E-06 [e]	4.4E-04 [f]	5.1E-08 [e]	1.3E-05 [f]	1.7E-06	4.5E-04
Vanadium (fume or dust)	7440-62-2	5.8E-04	(% of PM emitted) [5]	1.9E-04 [e]	0.049 [f]	5.7E-06 [e]	1.5E-03 [f]	1.9E-04	0.051
Zinc and Compounds	7440-66-6	0.019	(% of PM emitted) [5]	6.0E-03 [e]	1.57 [f]	1.8E-04 [e]	0.047 [f]	6.2E-03	1.61

NOTES:

ND = non-detect

TAC = toxic air contaminant

(a) Daily fugitive emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (ton/2,000 lb) * (daily metal poured [lb/day]) x (1 - capture efficiency [%]/100)

Daily metal poured (lb/day) = 62,000 (3)

Capture efficiency (%) = 75.0 (4)

(b) Annual fugitive emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (annual metal poured [ton/yr]) x (1 - capture efficiency [%]/100)

Annual metal poured (ton/yr) = 8,060 (3)

Capture efficiency (%) = 75.0 (4)

(c) Daily controlled emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (ton/2,000 lb) x (daily metal poured [lb/day]) x (capture efficiency [%]/100) x (1 - [control efficiency of baghouse {%}]/100)

Daily metal poured (lb/day) = 62,000 (3)

Capture efficiency (%) = 75.0 (4)

Control efficiency of baghouse (%) = 99.0 (3)

(d) Annual controlled emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (annual metal poured [ton/yr]) x (capture efficiency [%]/100) x (1 - [control efficiency of baghouse {%}]/100)

Annual metal poured (ton/yr) = 8,060 (3)

Capture efficiency (%) = 75.0 (4)

Control efficiency of baghouse (%) = 99.0 (3)

(e) Daily emissions estimate (lb/day) = (daily PM emissions [lb/day]) x (emission factor [% of PM emitted]/100)

(f) Annual emissions estimate (lb/yr) = (annual PM emissions [lb/yr]) x (emission factor [% of PM emitted]/100)

REFERENCES:

(1) Value represents the sum of fugitive and controlled emission estimates.

(2) AP-42, Chapter 12.10, Table 12.10-7 "Particulate Emission Factors for Ancillary Operations and Fugitive Sources at Gray Iron Foundries". Value for uncontrolled particulate emission factor for pouring and cooling in an electric induction furnace.

(3) See Table 1, Input Process Rates and Parameters.

(4) Information from Standard ACDP 03-2631 based in a 1998 industrial ventilation study of the foundry. Capture efficiency in the main bay was measured to be 95%. DEQ set the overall capture efficiency at 75%.

(5) Based on baghouse dust analysis conducted by Apex Laboratories, March 2021.

Table 4
PTE Hot Top TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS	Emission Factor [a] (lb/lb hot top)	Fugitive Emissions Estimate		Controlled Emissions Estimate		Total Emissions Estimate [1]	
			Maximum Daily [b] (lb/day)	Annual [c] (lb/yr)	Maximum Daily [d] (lb/day)	Annual [e] (lb/yr)	Maximum Daily (lb/day)	Annual (lb/yr)
Aluminum and Compounds	7429-90-5	2.0E-03	0.066	17.0	2.0E-03	0.51	0.067	17.6
Aluminum and Compounds	7429-90-5 [6]	4.5E-03	0.15	38.4	4.4E-03	1.15	0.15	39.5
Silica, crystalline	7631-86-9 [7]	3.0E-04	9.8E-03	2.56	2.9E-04	0.077	0.010	2.63

NOTES:

TAC = toxic air contaminant

(a) Emission factor (lb/lb hot top used) = (percentage of aluminum [%]/100) x (percentage airborne [%]/100)

Percentage of aluminum (%) = 20.0 (2)
Percentage of alumina (%) = 45.0 (2)
Percentage of quartz (%) = 3.00 (2)
Percentage of product airborne (%) = 1.00 (3)

(b) Maximum fugitive daily emissions estimate (lb/day) = (emission factor [lb/lb hot top used]) x (maximum daily hot top usage [lb hot top used/day]) x (1 - capture efficiency [%]/100)

Maximum daily hot top usage (lb hot top used/day) = 131 (4)
Capture efficiency (%) = 75.0 (5)

(c) Annual fugitive emissions estimate (lb/yr) = (emission factor [lb/lb hot top used]) x (annual hot top usage [lb hot top used/yr]) x (1 - capture efficiency [%]/100)

Annual hot top usage (lb hot top used/yr) = 34,093 (4)
Capture efficiency (%) = 75.0 (5)

(d) Maximum controlled daily emissions estimate (lb/day) = (emission factor [lb/lb hot top used]) x (maximum daily hot top usage [lb hot top used/day]) x (capture efficiency [%]/100) x (1 - control efficiency of baghouse [%]/100)

Maximum daily hot top usage (lb hot top used/day) = 131 (4)
Control efficiency of baghouse (%) = 99.0 (4)

(e) Annual controlled emissions estimate (lb/yr) = (emission factor [lb/lb hot top used]) x (annual hot top usage [lb hot top used/yr]) x (capture efficiency [%]/100) x (1 - control efficiency of baghouse [%]/100)

Annual hot top usage (lb hot top used/yr) = 34,093 (4)
Control efficiency of baghouse (%) = 99.0 (4)

REFERENCES:

(1) Value represents the sum of fugitive and controlled emission estimates.
(2) Information from product SDS.
(3) Hot top is the molten metal insulation applied after casting. Based on similar operations at other facilities, it is conservatively estimated that up to 1 percent of the total mass of the hot top used becomes airborne.
(4) See Table 1, Input Process Rates and Parameters.
(5) Information from Standard ACDP 03-2631 based in a 1998 industrial ventilation study of the foundry. Capture efficiency in the main bay was measured to be 95%. DEQ set the overall capture efficiency at 75%.
(6) CAS 7429-90-5 (aluminum and compounds) was substituted for CAS 1344-28-1 (alumina).
(7) CAS 7631-86-9 (Silica, crystalline,-respirable) was substituted for CAS 14808-60-7 (crystalline silica—Quartz). Not all crystalline silica in the product is of a respirable size. Conservatively assumes all crystalline silica emitted is of respirable size

Table 5
PTE Reclamation TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor		Fugitive Emissions Estimate		Controlled Emissions Estimate		Total Emissions Estimate [1]	
				Maximum Daily (lb/day)	Annual (lb/yr)	Maximum Daily (lb/day)	Annual (lb/yr)	Maximum Daily (lb/day)	Annual (lb/yr)
PM	--	3.20	(lb PM/ton metal poured) [2]	2.98 [a]	774 [b]	0.96 [c]	250 [d]	3.94	1,024
Aluminum and Compounds	7429-90-5	1.52	(% of PM emitted) [5]	0.045 [e]	11.8 [f]	0.015 [e]	3.80 [f]	0.060	15.6
Antimony and Compounds	7440-36-0	3.7E-04	(% of PM emitted) [5]	1.1E-05 [e]	2.9E-03 [f]	3.6E-06 [e]	9.3E-04 [f]	1.5E-05	3.8E-03
Arsenic and Compounds	7440-38-2	2.4E-04	(% of PM emitted) [5]	7.2E-06 [e]	1.9E-03 [f]	2.3E-06 [e]	6.1E-04 [f]	9.5E-06	2.5E-03
Barium and Compounds	7440-39-3	9.5E-03	(% of PM emitted) [5]	2.8E-04 [e]	0.073 [f]	9.1E-05 [e]	0.024 [f]	3.7E-04	0.097
Beryllium and compounds	7440-41-7	2.6E-05	(% of PM emitted) [5]	7.8E-07 [e]	2.0E-04 [f]	2.5E-07 [e]	6.6E-05 [f]	1.0E-06	2.7E-04
Cadmium and Compounds	7440-43-9	1.4E-04	(% of PM emitted) [5]	4.2E-06 [e]	1.1E-03 [f]	1.4E-06 [e]	3.6E-04 [f]	5.6E-06	1.5E-03
Chromium	7440-47-3	0.0454	(% of PM emitted) [5]	1.4E-03 [e]	0.35 [f]	4.4E-04 [e]	0.11 [f]	1.8E-03	0.46
Chromium VI	18540-29-9	1.4E-03	(% of PM emitted) [6]	4.1E-05 [e]	0.011 [f]	1.3E-05 [e]	3.4E-03 [f]	5.4E-05	0.014
Cobalt and Compounds	7440-48-4	3.6E-04	(% of PM emitted) [5]	1.1E-05 [e]	2.8E-03 [f]	3.5E-06 [e]	9.1E-04 [f]	1.4E-05	3.7E-03
Copper and Compounds	7440-50-8	0.031	(% of PM emitted) [5]	9.1E-04 [e]	0.24 [f]	2.9E-04 [e]	0.077 [f]	1.2E-03	0.31
Lead and Compounds	7439-92-1	0.011	(% of PM emitted) [5]	3.4E-04 [e]	0.088 [f]	1.1E-04 [e]	0.029 [f]	4.5E-04	0.12
Manganese and Compounds	7439-96-5	0.27	(% of PM emitted) [5]	7.9E-03 [e]	2.07 [f]	2.6E-03 [e]	0.67 [f]	0.011	2.73
Nickel and Compounds	7440-02-0	5.8E-03	(% of PM emitted) [5]	1.7E-04 [e]	0.045 [f]	5.5E-05 [e]	0.014 [f]	2.3E-04	0.059
Phosphorus and Compounds	504	ND	(% of PM emitted) [5]	0 [e]	0 [f]	0 [e]	0 [f]	0	0
Selenium and Compounds	7782-49-2	2.3E-04	(% of PM emitted) [5]	6.9E-06 [e]	1.8E-03 [f]	2.2E-06 [e]	5.8E-04 [f]	9.1E-06	2.4E-03
Silver and Compounds	7440-22-4	2.5E-04	(% of PM emitted) [5]	7.5E-06 [e]	2.0E-03 [f]	2.4E-06 [e]	6.3E-04 [f]	1.0E-05	2.6E-03
Thallium	7440-28-0	1.5E-05	(% of PM emitted) [5]	4.5E-07 [e]	1.2E-04 [f]	1.5E-07 [e]	3.8E-05 [f]	6.0E-07	1.6E-04
Vanadium (fume or dust)	7440-62-2	1.5E-03	(% of PM emitted) [5]	4.3E-05 [e]	0.011 [f]	1.4E-05 [e]	3.6E-03 [f]	5.7E-05	0.015
Zinc and Compounds	7440-66-6	5.9E-03	(% of PM emitted) [5]	1.8E-04 [e]	0.046 [f]	5.7E-05 [e]	0.015 [f]	2.3E-04	0.061

NOTES:

ND = non-detect

TAC = toxic air contaminant

(a) Daily fugitive emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (ton/2,000 lb) x (daily metal poured [lb/day]) x (1 - capture efficiency [%]/100)

Daily metal poured (lb/day) = 62,000 (3)

Capture efficiency (%) = 97.0 (4)

(b) Annual fugitive emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (annual metal poured [ton/yr]) x (1 - capture efficiency [%]/100)

Annual metal poured (ton/yr) = 8,060 (3)

Capture efficiency (%) = 97.0 (4)

(c) Daily controlled emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (ton/2,000 lb) x (daily metal poured [lb/day]) x (capture efficiency [%]/100) x (1 - [control efficiency of baghouse {%}]/100)

Daily metal poured (lb/day) = 62,000 (3)

Capture efficiency (%) = 97.0 (4)

Control efficiency of baghouse (%) = 99.0 (3)

(d) Annual controlled emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (annual metal poured [ton/yr]) x (capture efficiency [%]/100) x (1 - [control efficiency of baghouse {%}]/100)

Annual metal poured (ton/yr) = 8,060 (3)

Capture efficiency (%) = 97.0 (4)

Control efficiency of baghouse (%) = 99.0 (3)

(e) Daily emissions estimate (lb/day) = (daily PM emissions [lb/day]) x (emission factor [% of PM emitted]/100)

(f) Annual emissions estimate (lb/yr) = (annual PM emissions [lb/yr]) x (emission factor [% of PM emitted]/100)

REFERENCES:

(1) Value represents the sum of fugitive and controlled emission estimates.

(2) AP-42, Chapter 12.10, Table 12.10-7 "Particulate Emission Factors for Ancillary Operations and Fugitive Sources at Gray Iron Foundries". Uncontrolled particulate emission factor for shakeout.

(3) See Table 1, Input Process Rates and Parameters.

(4) Capture efficiency based on equipment configuration of enclosed, rotary shakeout.

(5) Based on baghouse dust analysis conducted by Apex Laboratories, March 2021.

(6) As a conservative estimate, Chromium VI is assumed to be 3 percent of total chromium. Eagle Foundry reserves the right to revise this assumption if site-specific data becomes available.

Table 6
PTE Air Arc Cutting TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor						Emissions Estimate			
		Daily			Annual			Maximum Daily (lb/day)		Annual (lb/yr)	
PM	--	0.032	(lb/ton metal processed)	(1)	0.032	(lb/ton metal processed)	(1)	6.1E-03	(a)	1.58	(b)
Chromium	7440-47-3	3.20	(% of PM emitted)	(3)	1.00	(% of PM emitted)	(5)	1.9E-04	(c)	0.016	(d)
Chromium VI	18540-29-9	1.1E-05	(% of PM emitted)	(4)	1.1E-05	(% of PM emitted)	(4)	6.7E-10	(c)	1.7E-07	(d)
Copper and Compounds	7440-50-8	0.50	(% of PM emitted)	(3)	0.50	(% of PM emitted)	(5)	3.0E-05	(c)	7.9E-03	(d)
Manganese and Compounds	7439-96-5	14.0	(% of PM emitted)	(3)	5.23	(% of PM emitted)	(5)	8.5E-04	(c)	0.083	(d)
Nickel and Compounds	7440-02-0	2.00	(% of PM emitted)	(3)	0.98	(% of PM emitted)	(5)	1.2E-04	(c)	0.015	(d)
Phosphorus and Compounds	504	0.070	(% of PM emitted)	(3)	0.055	(% of PM emitted)	(5)	4.3E-06	(c)	8.7E-04	(d)
Vanadium (fume or dust)	7440-62-2	0.050	(% of PM emitted)	(3)	0.050	(% of PM emitted)	(5)	3.0E-06	(c)	7.9E-04	(d)

NOTES:

TAC = toxic air contaminant

(a) Daily emissions estimate (lb/day) = (emission factor [lb/ton metal produced]) x (maximum daily metal produced [lb/day]) x (ton/2,000 lb) x (1 - [baghouse control efficiency {%}]/100)

Maximum daily metal produced (lb/day) = 38,036 (2)

Baghouse control efficiency (%) = 99.0 (2)

(b) Annual emissions estimate (lb/yr) = (emission factor [lb/ton metal produced]) x (annual metal produced [tons/yr]) x (1-[baghouse control efficiency {%}]/100)

Annual metal produced (tons/yr) = 4,945 (2)

Baghouse control efficiency (%) = 99.0 (2)

(c) Daily emissions estimate (lb/day) = (daily PM emissions [lb/day]) x (emission factor [% of PM emitted]/100)

(d) Annual emissions estimate (lb/yr) = (annual PM emissions [lb/yr]) x (emission factor [% of PM emitted]/100)

REFERENCES:

(1) AP-42 Chapter 12 (April 2009), Table 12,5.1-1, "Filterable PM Emission Factors for Minimills." Assumes uncontrolled emission factor for billet cutting torches, natural gas-fired. Facility activity is oxy-torch cutting.

(2) See Table 1, Input Process Rates and Parameters.

(3) Information provided by facility. Based on alloy composition data for manganese and low alloy steel. Value represents the maximum content for air arc cut metals.

(4) Based on a dust analysis conducted by Apex Laboratories, March 2021. Value from finishing baghouse speciation.

(5) Information provided by facility. Based on alloy composition data for manganese and low alloy steel. Value represents the average content for air arc cut metals.

Table 7
PTE Welding TAC Emission Estimates
Eagle Foundry Company

Product	Toxic Air Contaminant	CAS/DEQ ID	Weight Percentage (%)	Usage		Total Emissions Estimate	
				Maximum Daily (lb/day)	Annual (lb/yr)	Maximum Daily (lb/day)	Annual (lb/yr)
Total By Toxic Air Contaminant							
Total	Aluminum	7429-90-5	1.00 (1)	39.1 (2)	(3)	2.1E-03 (a)	7.8E-03 (3)
	Arsenic	7440-38-2	3.0E-03 (1)			6.4E-06 (a)	1.9E-04 (3)
	Chromium and Compounds	7440-47-3	20.0 (1)			0.045 (b)	1.32 (3)
	Chromium VI	18540-29-9	-- (1)			0.028 (c)	0.35 (3)
	Cobalt	7440-48-4	0.30 (1)			6.7E-04 (b)	7.3E-03 (3)
	Copper	7440-50-8	20.0 (1)			0.045 (b)	7.51 (3)
	Manganese	7439-96-5	13.0 (1)			0.029 (b)	1.06 (3)
	Molybdenum trioxide	1313-27-5	0.55 (1)			1.2E-03 (b)	0.046 (3)
	Nickel	7440-02-0	18.0 (1)			0.040 (b)	0.32 (3)
	Phosphorus	504	9.0E-03 (1)			1.9E-05 (a)	5.6E-04 (3)
	Vanadium	7440-62-2	3.0E-03 (1)			6.4E-06 (a)	1.9E-04 (3)
Individual Products							
Sandvik WIRE 309LSI .035 X 33 LB	Chromium and Compounds	7440-47-3	17.5 (9)	(10)	46.9 (11)	(10)	0.045 (a)
	Chromium VI	18540-29-9	--			(10)	2.2E-03 (d)
	Copper	7440-50-8	2.00 (9)			(10)	5.1E-03 (a)
	Manganese	7439-96-5	5.50 (9)			(10)	0.014 (a)
	Nickel	7440-02-0	18.0 (9)			(10)	0.046 (a)
Lincore M WIRE HF LCM 1/16 25# SP	Manganese	7439-96-5	13.0 (9)	(10)	1,136 (11)	(10)	0.81 (a)
	Chromium and Compounds	7440-47-3	4.90 (9)			(10)	0.30 (a)
	Chromium VI	18540-29-9	--			(10)	0.015 (d)
	Nickel	7440-02-0	0.50 (9)			(10)	0.031 (a)
Avesta 2205 ELECTR SS E2209 1/8 10#	Manganese	7439-96-5	1.70 (9)	(10)	426 (11)	(10)	0.042 (b)
	Molybdenum trioxide	1313-27-5	0.30 (9)			(10)	7.3E-03 (b)
	Chromium and Compounds	7440-47-3	20.0 (9)			(10)	0.49 (b)
	Chromium VI	18540-29-9	--			(10)	0.31 (c)
	Copper	7440-50-8	0.30 (9)			(10)	7.3E-03 (b)
	Nickel	7440-02-0	10.0 (9)			(10)	0.24 (b)
	Cobalt	7440-48-4	0.30 (9)			(10)	7.3E-03 (b)
CARBONS 1/2X17 CTD DC JTD 100	Copper	7440-50-8	20.0 (9)	(10)	6,533 (11)	(10)	7.49 (b)
Stoody WIRE HF 965-G 045 33# SP	Manganese	7439-96-5	1.10 (9)	(10)	1,265 (11)	(10)	0.076 (a)
	Molybdenum trioxide	1313-27-5	0.55 (9)			(10)	0.038 (a)
	Chromium and Compounds	7440-47-3	7.00 (9)			(10)	0.48 (a)
	Chromium VI	18540-29-9	--			(10)	0.024 (d)
Hobart WIRE EXCELARC 71 .045 X 33 LB	Aluminum	7429-90-5	1.00 (9)	(10)	141 (11)	(10)	7.7E-03 (a)
	Manganese	7439-96-5	2.50 (9)			(10)	0.019 (a)
Prostar S-6 WIRE MS 70S6 035 33# SP PRS	Phosphorus	504	9.0E-03 (9)	(10)	1,140 (11)	(10)	5.6E-04 (a)
	Aluminum	7429-90-5	2.0E-03 (9)			(10)	1.2E-04 (a)
	Chromium and Compounds	7440-47-3	0.027 (9)			(10)	1.7E-03 (a)
	Chromium VI	18540-29-9	--			(10)	8.4E-05 (d)
	Copper	7440-50-8	0.14 (9)			(10)	8.9E-03 (a)
	Manganese	7439-96-5	1.63 (9)			(10)	0.10 (a)
	Molybdenum trioxide	1313-27-5	8.0E-03 (9)			(10)	5.0E-04 (a)
	Nickel	7440-02-0	0.031 (9)			(10)	1.9E-03 (a)
	Vanadium	7440-62-2	3.0E-03 (9)			(10)	1.9E-04 (a)
	Arsenic	7440-38-2	3.0E-03 (9)			(10)	1.9E-04 (a)

NOTES:

(a) Emissions estimate (lb/unit) = (fume generation rate—GMAW [lb fume/lb wire]) x (fume correction factor—GMAW) x (weight percentage [%]/100) x (usage [lb/unit])

Fume generation rate—GMAW (lb fume/lb wire) = 0.010 (4)

Fume correction factor—GMAW = 0.5464 (5)

(b) Emissions estimate (lb/unit) = (fume generation rate—SMAW [lb fume/lb wire]) x (fume correction factor—SMAW) x (weight percentage [%]/100) x (usage [lb/unit])

Fume generation rate—SMAW (lb fume/lb wire) = 0.020 (6)

Fume correction factor—SMAW = 0.2865 (7)

(c) Emissions estimate (lb/unit) = (fume generation rate [lb fume/lb wire]) x (fume correction factor) x (chromium and compounds weight percentage [%]/100) x (usage [lb/unit]) x (chromium VI conversion rate [%]/100)

Fume generation rate—SMAW (lb fume/lb wire) = 0.020 (6)

Fume correction factor—SMAW = 0.2865 (7)

Chromium VI conversion rate—SMAW (%) = 63.0 (8)

(d) Emissions estimate (lb/unit) = (fume generation rate [lb fume/lb wire]) x (fume correction factor) x (chromium and compounds weight percentage [%]/100) x (usage [lb/unit]) x (chromium VI conversion rate [%]/100)

Fume generation rate—GMAW (lb fume/lb wire) = 0.010 (4)

Fume correction factor—GMAW = 0.5464 (5)

Chromium VI conversion rate—GMAW (%) = 5.00 (8)

REFERENCES:

(1) Information from product safety data sheets. Value represents maximum percentage in all wires/rods used at Eagle Foundry.

(2) See Table 1, Input Process Rates and Parameters. Value represents total product usage excluding waste.

(3) Total annual emission estimates are the sum of individual product annual emission estimates (see below).

(4) San Diego County Air Pollution Control District, Welding Operations, dated October 16, 1998. Based on American Welding Society information and the National Steel Shipbuilding Company (NASSCO) research. Assumes GMAW fume generation rate.

(5) San Diego County Air Pollution Control District, Welding Operations, dated October 16, 1998. Based on American Welding Society information and the NASSCO research. Assumes GMAW correction factor.

(6) San Diego County Air Pollution Control District, Welding Operations, dated October 16, 1998. Based on American Welding Society information and the NASSCO research. Assumes SMAW fume generation rate.

(7) San Diego County Air Pollution Control District, Welding Operations, dated October 16, 1998. Based on American Welding Society information and the NASSCO research. Assumes SMAW correction factor.

(8) San Diego County Air Pollution Control District, Welding Operations, dated October 16, 1998. Based on American Welding Society information and the NASSCO research. Hexavalent chromium accounts for 5 percent of total chromium emissions for GMAW welding, and 63 percent of total chromium emissions for SMAW welding.

(9) Information from product safety data sheets.

(10) Maximum daily emissions calculated based on the maximum alloy content of all products used, and the total product usage (see above).

(11) See Table 1, Input Process Rates and Parameters.

Table 8
PTE Grinding TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor		Emissions Estimate					
				Controlled		Fugitive		Total [1]	
				Maximum Daily (lb/day)	Annual (lb/yr)	Maximum Daily (lb/day)	Annual (lb/yr)	Maximum Daily (lb/day)	Annual (lb/yr)
PM	--	0.10	(lb/ton metal processed) [2]	9.5E-03 [a]	2.47 [b]	0.95 [c]	247 [d]	0.96	250
Aluminum and Compounds	7429-90-5	0.48	(% of PM emitted) [5]	4.5E-05 [e]	0.012 [f]	4.5E-03 [e]	1.18 [f]	4.6E-03	1.19
Antimony and Compounds	7440-36-0	2.6E-04	(% of PM emitted) [5]	2.5E-08 [e]	6.4E-06 [f]	2.5E-06 [e]	6.4E-04 [f]	2.5E-06	6.5E-04
Arsenic and Compounds	7440-38-2	1.6E-03	(% of PM emitted) [5]	1.5E-07 [e]	3.9E-05 [f]	1.5E-05 [e]	3.9E-03 [f]	1.5E-05	3.9E-03
Barium and Compounds	7440-39-3	0.014	(% of PM emitted) [5]	1.3E-06 [e]	3.5E-04 [f]	1.3E-04 [e]	0.035 [f]	1.3E-04	0.035
Beryllium and compounds	7440-41-7	5.2E-05	(% of PM emitted) [5]	4.9E-09 [e]	1.3E-06 [f]	4.9E-07 [e]	1.3E-04 [f]	5.0E-07	1.3E-04
Cadmium and Compounds	7440-43-9	4.1E-04	(% of PM emitted) [5]	3.9E-08 [e]	1.0E-05 [f]	3.9E-06 [e]	1.0E-03 [f]	3.9E-06	1.0E-03
Chromium	7440-47-3	1.58	(% of PM emitted) [5]	1.5E-04 [e]	0.039 [f]	0.015 [e]	3.91 [f]	0.015	3.95
Chromium VI	18540-29-9	1.1E-05	(% of PM emitted) [5]	1.1E-09 [e]	2.7E-07 [f]	1.1E-07 [e]	2.7E-05 [f]	1.1E-07	2.8E-05
Cobalt and Compounds	7440-48-4	7.6E-03	(% of PM emitted) [5]	7.2E-07 [e]	1.9E-04 [f]	7.2E-05 [e]	0.019 [f]	7.3E-05	0.019
Copper and Compounds	7440-50-8	0.075	(% of PM emitted) [5]	7.2E-06 [e]	1.9E-03 [f]	7.2E-04 [e]	0.19 [f]	7.2E-04	0.19
Lead and Compounds	7439-92-1	4.5E-04	(% of PM emitted) [5]	4.3E-08 [e]	1.1E-05 [f]	4.3E-06 [e]	1.1E-03 [f]	4.3E-06	1.1E-03
Manganese and Compounds	7439-96-5	0.72	(% of PM emitted) [5]	6.9E-05 [e]	0.018 [f]	6.9E-03 [e]	1.79 [f]	7.0E-03	1.81
Nickel and Compounds	7440-02-0	0.15	(% of PM emitted) [5]	1.4E-05 [e]	3.7E-03 [f]	1.4E-03 [e]	0.37 [f]	1.4E-03	0.37
Phosphorus and Compounds	504	ND	(% of PM emitted) [5]	-- [e]	-- [f]	-- [e]	-- [f]	--	--
Selenium and Compounds	7782-49-2	2.6E-04	(% of PM emitted) [5]	2.5E-08 [e]	6.4E-06 [f]	2.5E-06 [e]	6.4E-04 [f]	2.5E-06	6.5E-04
Silver and Compounds	7440-22-4	5.2E-05	(% of PM emitted) [5]	4.9E-09 [e]	1.3E-06 [f]	4.9E-07 [e]	1.3E-04 [f]	5.0E-07	1.3E-04
Thallium	7440-28-0	5.2E-05	(% of PM emitted) [5]	4.9E-09 [e]	1.3E-06 [f]	4.9E-07 [e]	1.3E-04 [f]	5.0E-07	1.3E-04
Vanadium (fume or dust)	7440-62-2	6.0E-03	(% of PM emitted) [5]	5.7E-07 [e]	1.5E-04 [f]	5.7E-05 [e]	0.015 [f]	5.8E-05	0.015
Zinc and Compounds	7440-66-6	3.4E-03	(% of PM emitted) [5]	3.2E-07 [e]	8.3E-05 [f]	3.2E-05 [e]	8.3E-03 [f]	3.2E-05	8.4E-03

NOTES:

TAC = toxic air contaminant

(a) Maximum daily controlled emissions estimate (lb/day) = (emission factor [lb/ton metal processed]) x (maximum daily metal processed for grinding [lb/day]) x (capture efficiency of fume extraction arms [%]/100) x (1 - [control efficiency of baghouse {%}]/100) / (2,000 lb/ton)

Maximum daily metal processed for grinding (lb/day) = 38,036 (3)
Capture efficiency of fume extraction arms (%) = 50.0 (4)
Control efficiency of baghouse (%) = 99.0 (3)

(b) Annual controlled emissions estimate (lb/yr) = (emission factor [lb/ton metal processed]) x (annual metal processed for grinding [tons/yr]) x (1 - [control efficiency of baghouse {%}]/100) x (capture efficiency of fume extraction arms [%]/100)

Annual metal processed for grinding (tons/yr) = 4,945 (3)
Capture efficiency of fume extraction arms (%) = 50.0 (4)
Control efficiency of baghouse (%) = 99.0 (3)

(c) Maximum daily fugitive emissions estimate (lb/day) = (emission factor [lb/ton metal processed]) x (maximum daily metal processed for grinding [lb/day]) / (2,000 lb/ton) x (1 - [capture efficiency of fume extraction arms {%}]/100)

Maximum daily metal processed for grinding (lb/day) = 38,036 (3)
Capture efficiency of fume extraction arms (%) = 50.0 (4)

(d) Annual fugitive emissions estimate (lb/yr) = (emission factor [lb/ton metal processed]) x (annual metal processed for grinding [tons/yr]) x (1 - [capture efficiency of fume extraction arms {%}]/100)

Annual metal processed for grinding (tons/yr) = 4,945 (3)
Capture efficiency of fume extraction arms (%) = 50.0 (4)

(e) Daily emissions estimate (lb/day) = (daily PM emissions [lb/day]) x (emission factor [% of PM emitted]/100)

(f) Annual emissions estimate (lb/yr) = (annual PM emissions [lb/yr]) x (emission factor [% of PM emitted]/100)

REFERENCES:

(1) Value represents the sum of fugitive and controlled emission estimates.

(2) Information from Standard ACDP 03-2631.

(3) See Table 1, Input Process Rates and Parameters.

(4) Based on specifications for similar equipment.

(5) Based on a dust analysis conducted by Apex Laboratories, March 2021. The finishing baghouse is assumed to be representative of grinding speciation.

Table 9
PTE Mesh Blast TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor			Total Emissions Estimate			
					Maximum Daily (lb/day)		Annual (lb/yr)	
PM	--	0.69	(lb PM/1,000 lb blast material)	(1)	0.019	(a)	4.97	(b)
Aluminum and Compounds	7429-90-5	0.064	(% of PM emitted)	(3)	1.2E-05	(c)	3.2E-03	(d)
Antimony and Compounds	7440-36-0	1.6E-03	(% of PM emitted)	(3)	3.1E-07	(c)	7.9E-05	(d)
Arsenic and Compounds	7440-38-2	4.9E-03	(% of PM emitted)	(3)	9.3E-07	(c)	2.4E-04	(d)
Barium and Compounds	7440-39-3	5.1E-04	(% of PM emitted)	(3)	9.7E-08	(c)	2.5E-05	(d)
Beryllium and compounds	7440-41-7	1.0E-04	(% of PM emitted)	(3)	2.0E-08	(c)	5.1E-06	(d)
Cadmium and Compounds	7440-43-9	1.0E-04	(% of PM emitted)	(3)	2.0E-08	(c)	5.1E-06	(d)
Chromium	7440-47-3	0.24	(% of PM emitted)	(3)	4.7E-05	(c)	0.012	(d)
Chromium VI	18540-29-9	7.3E-03	(% of PM emitted)	(4)	1.4E-06	(c)	3.6E-04	(d)
Cobalt and Compounds	7440-48-4	7.0E-03	(% of PM emitted)	(3)	1.3E-06	(c)	3.5E-04	(d)
Copper and Compounds	7440-50-8	0.27	(% of PM emitted)	(3)	5.1E-05	(c)	0.013	(d)
Lead and Compounds	7439-92-1	7.9E-04	(% of PM emitted)	(3)	1.5E-07	(c)	3.9E-05	(d)
Manganese and Compounds	7439-96-5	0.65	(% of PM emitted)	(3)	1.2E-04	(c)	0.032	(d)
Nickel and Compounds	7440-02-0	0.10	(% of PM emitted)	(3)	1.9E-05	(c)	5.1E-03	(d)
Phosphorus and Compounds	504	ND	(% of PM emitted)	(3)	--	(c)	--	(d)
Selenium and Compounds	7782-49-2	5.1E-05	(% of PM emitted)	(3)	9.7E-09	(c)	2.5E-06	(d)
Silver and Compounds	7440-22-4	1.0E-04	(% of PM emitted)	(3)	2.0E-08	(c)	5.1E-06	(d)
Thallium	7440-28-0	1.0E-04	(% of PM emitted)	(3)	2.0E-08	(c)	5.1E-06	(d)
Vanadium (fume or dust)	7440-62-2	9.1E-03	(% of PM emitted)	(3)	1.7E-06	(c)	4.5E-04	(d)
Zinc and Compounds	7440-66-6	8.9E-03	(% of PM emitted)	(3)	1.7E-06	(c)	4.4E-04	(d)

NOTES:

ND = Analyte was not detected at or above the reporting limit for any samples.

TAC = toxic air contaminant

(a) Daily emissions estimate (lb/day) = (emission factor [lb PM/1,000 lb blast material used]) x (daily blast material used [lb/day]) / 1,000
Daily blast material used (lb/day) = 27.7 (2)

(b) Annual emissions estimate (lb/yr) = (emission factor [lb PM/1,000 lb blast material used]) x (annual blast material used [lb/yr]) / 1,000
Annual blast material used (lb/yr) = 7,200 (2)

(c) Daily emissions estimate (lb/day) = (daily PM emissions [lb/day]) x (emission factor [% of PM emitted]/100)

(d) Annual emissions estimate (lb/yr) = (annual PM emissions [lb/yr]) x (emission factor [% of PM emitted]/100)

REFERENCES:

(1) AP-42 Chapter 13.2.6, Table 13.2.6-1, Particulate Emission factors for Abrasive Blasting. Value represents abrasive blasting controlled with a fabric filter. The emission factor was based on a study using mesh garnet as the blasting media. Section 13.2.6.3, Emissions and Controls, states that total PM emissions from abrasive blasting using steel shot as the abrasive material are about 10 percent of total PM emissions from abrasive blasting when using sand as the abrasive material. PM emissions when using garnet grit as the abrasive material are 24 percent of PM when using sand as the abrasive material. Eagle Foundry uses steel shot as the abrasive material, and assumed the more conservative emission factor.

(2) See Table 1, Input Process Rates and Parameters.

(3) Based on dust analysis conducted by Apex Laboratories, March 2021.

(4) As a conservative estimate, Chromium VI is assumed to be 3 percent of total chromium. Eagle Foundry reserves the right to revise this assumption if site-specific data becomes available.

Table 10
PTE RotoBlast TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor			Total Emissions Estimate			
					Maximum Daily (lb/day)		Annual (lb/yr)	
PM	--	5.77	(lb PM/1,000 lb blast material)	(a)	2.1E-03	(b)	0.55	(c)
Aluminum and Compounds	7429-90-5	0.48	(% of PM emitted)	(4)	1.0E-05	(d)	2.6E-03	(e)
Antimony and Compounds	7440-36-0	2.6E-04	(% of PM emitted)	(4)	5.5E-09	(d)	1.4E-06	(e)
Arsenic and Compounds	7440-38-2	1.6E-03	(% of PM emitted)	(4)	3.3E-08	(d)	8.7E-06	(e)
Barium and Compounds	7440-39-3	0.014	(% of PM emitted)	(4)	3.0E-07	(d)	7.8E-05	(e)
Beryllium and compounds	7440-41-7	5.2E-05	(% of PM emitted)	(4)	1.1E-09	(d)	2.9E-07	(e)
Cadmium and Compounds	7440-43-9	4.1E-04	(% of PM emitted)	(4)	8.6E-09	(d)	2.2E-06	(e)
Chromium	7440-47-3	1.58	(% of PM emitted)	(4)	3.4E-05	(d)	8.8E-03	(e)
Chromium VI	18540-29-9	0.047	(% of PM emitted)	(5)	1.0E-06	(d)	2.6E-04	(e)
Cobalt and Compounds	7440-48-4	7.6E-03	(% of PM emitted)	(4)	1.6E-07	(d)	4.2E-05	(e)
Copper and Compounds	7440-50-8	0.075	(% of PM emitted)	(4)	1.6E-06	(d)	4.2E-04	(e)
Lead and Compounds	7439-92-1	4.5E-04	(% of PM emitted)	(4)	9.6E-09	(d)	2.5E-06	(e)
Manganese and Compounds	7439-96-5	0.72	(% of PM emitted)	(4)	1.5E-05	(d)	4.0E-03	(e)
Nickel and Compounds	7440-02-0	0.15	(% of PM emitted)	(4)	3.2E-06	(d)	8.3E-04	(e)
Phosphorus and Compounds	504	ND	(% of PM emitted)	(4)	--	(d)	--	(e)
Selenium and Compounds	7782-49-2	2.6E-04	(% of PM emitted)	(4)	5.5E-09	(d)	1.4E-06	(e)
Silver and Compounds	7440-22-4	5.2E-05	(% of PM emitted)	(4)	1.1E-09	(d)	2.9E-07	(e)
Thallium	7440-28-0	5.2E-05	(% of PM emitted)	(4)	1.1E-09	(d)	2.9E-07	(e)
Vanadium (fume or dust)	7440-62-2	6.0E-03	(% of PM emitted)	(4)	1.3E-07	(d)	3.3E-05	(e)
Zinc and Compounds	7440-66-6	3.4E-03	(% of PM emitted)	(4)	7.1E-08	(d)	1.9E-05	(e)

NOTES:

ND = Analyte was not detected at or above the reporting limit for any samples.

TAC = toxic air contaminant

(a) Emission factor (lb/1,000 lb blast material) = (emission factor [lb/1,000 lb sand]) x (0.10) (1)

Emission factor (lb/1,000 lb sand) = 57.7 (2)

(b) Daily emissions estimate (lb/day) = (emission factor [lb PM/1,000 lb blast material used]) x (daily blast material used [lb/day]) / 1,000 x (1 - [control efficiency of baghouse {%}]/100)

Daily blast material used (lb/day) = 36.9 (3)

Control efficiency of baghouse (%) = 99.0 (3)

(c) Annual emissions estimate (lb/yr) = (emission factor [lb PM/1,000 lb blast material used]) x (annual blast material used [lb/yr]) / 1,000 x (1 - [control efficiency of baghouse {%}]/100)

Annual blast material used (lb/yr) = 9,600 (3)

Control efficiency of baghouse (%) = 99.0 (3)

(d) Daily emissions estimate (lb/day) = (daily PM emissions [lb/day]) x (emission factor [% of PM emitted]/100)

(e) Annual emissions estimate (lb/yr) = (annual PM emissions [lb/yr]) x (emission factor [% of PM emitted]/100)

REFERENCES:

(1) AP-42 Chapter 13.2.6, Section 13.2.6.3, Emissions and Controls. Total PM emissions from abrasive blasting using shot are about 10 percent of total PM emissions from abrasive blasting using sand.

(2) AP-42 Chapter 13.2.6, Table 13.2.6-1, Particulate Emission factors for Abrasive Blasting. Represents average value for uncontrolled sand blasting.

(3) See Table 1, Input Process Rates and Parameters.

(4) Based on a dust analysis conducted by Apex Laboratories, March 2021. The finishing baghouse is assumed to be representative of shotblast speciation.

(5) As a conservative estimate, Chromium VI is assumed to be 3 percent of total chromium. Eagle Foundry reserves the right to revise this assumption if site-specific data becomes available.

Table 11
PTE Small Palmer TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor (lb/ton PM generated)		Total Emissions Estimate	
				Maximum Daily [a] (lb/day)	Annual [b] (lb/yr)
Aluminum and Compounds	7429-90-5	10.3	(1)	5.9E-03	1.54
Antimony and Compounds	7440-36-0	1.5E-03	(1)	8.3E-07	2.2E-04
Arsenic and Compounds	7440-38-2	1.2E-03	(1)	6.9E-07	1.8E-04
Barium and Compounds	7440-39-3	0.060	(1)	3.5E-05	9.0E-03
Beryllium and compounds	7440-41-7	9.9E-05	(1)	5.7E-08	1.5E-05
Cadmium and Compounds	7440-43-9	2.3E-04	(1)	1.3E-07	3.4E-05
Chromium	7440-47-3	0.098	(1)	5.6E-05	0.015
Chromium VI	18540-29-9	2.9E-03	(3)	1.7E-06	4.4E-04
Cobalt and Compounds	7440-48-4	1.7E-03	(1)	9.5E-07	2.5E-04
Copper and Compounds	7440-50-8	0.26	(1)	1.5E-04	0.039
Lead and Compounds	7439-92-1	0.031	(1)	1.8E-05	4.6E-03
Manganese and Compounds	7439-96-5	0.78	(1)	4.5E-04	0.12
Nickel and Compounds	7440-02-0	0.037	(1)	2.1E-05	5.5E-03
Phosphorus and Compounds	504	ND	(1)	--	--
Selenium and Compounds	7782-49-2	4.9E-04	(1)	2.8E-07	7.3E-05
Silver and Compounds	7440-22-4	6.2E-04	(1)	3.5E-07	9.2E-05
Thallium	7440-28-0	9.9E-05	(1)	5.7E-08	1.5E-05
Vanadium (fume or dust)	7440-62-2	6.7E-03	(1)	3.8E-06	1.0E-03
Zinc and Compounds	7440-66-6	0.17	(1)	9.6E-05	0.025

NOTES:

ND = Analyte was not detected at or above the reporting limit for any samples.

TAC = toxic air contaminant

(a) Maximum daily emissions estimate (lb/day) = (maximum daily PM generated [lb/day]) x (emission factor [lb/ton PM generated]) x (ton/2,000 lb) x (1 - [baghouse control efficiency {%}]/100)

Maximum daily PM generated (lb PM generated/day) = 114 (1)

Baghouse control efficiency (%) = 99.0 (2)

(b) Annual emissions estimate (lb/yr) = (annual PM generated [ton/yr]) x (emission factor [lb/ton PM generated]) x (1 - [baghouse control efficiency {%}]/100)

Annual PM generated (tons PM generated/yr) = 14.9 (1)

Baghouse control efficiency (%) = 99.0 (2)

REFERENCES:

(1) See Table D2, Baghouse Emission Factors - PTE. Based on facility dust collection records and the dust analysis conducted by Apex Laboratories, March 2021 .PM generated includes emissions from the Small Palmer silo bin vent.

(2) See Table 1, Input Process Rates and Parameters.

(3) As a conservative estimate, Chromium VI is assumed to be 3 percent of total chromium. Eagle Foundry reserves the right to revise this assumption if site-specific data becomes available.

Table 12
PTE Screenng Station TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor			Total Emissions Estimate			
					Maximum Daily (lb/day)		Annual (lb/yr)	
PM	--	0.20	(lb PM/ton metal poured)	(1)	6.20	(a)	1,612	(b)
Aluminum and Compounds	7429-90-5	0.50	(% of PM emitted)	(3)	0.031	(c)	8.03	(d)
Antimony and Compounds	7440-36-0	7.0E-05	(% of PM emitted)	(3)	4.3E-06	(c)	1.1E-03	(d)
Arsenic and Compounds	7440-38-2	2.7E-05	(% of PM emitted)	(3)	1.6E-06	(c)	4.3E-04	(d)
Barium and Compounds	7440-39-3	2.4E-03	(% of PM emitted)	(3)	1.5E-04	(c)	0.039	(d)
Beryllium and compounds	7440-41-7	5.3E-06	(% of PM emitted)	(3)	3.3E-07	(c)	8.5E-05	(d)
Cadmium and Compounds	7440-43-9	5.3E-06	(% of PM emitted)	(3)	3.3E-07	(c)	8.5E-05	(d)
Chromium	7440-47-3	5.8E-03	(% of PM emitted)	(3)	3.6E-04	(c)	0.094	(d)
Chromium VI	18540-29-9	1.7E-04	(% of PM emitted)	(4)	1.1E-05	(c)	2.8E-03	(d)
Cobalt and Compounds	7440-48-4	9.2E-05	(% of PM emitted)	(3)	5.7E-06	(c)	1.5E-03	(d)
Copper and Compounds	7440-50-8	0.017	(% of PM emitted)	(3)	1.1E-03	(c)	0.28	(d)
Lead and Compounds	7439-92-1	1.2E-03	(% of PM emitted)	(3)	7.4E-05	(c)	0.019	(d)
Manganese and Compounds	7439-96-5	0.046	(% of PM emitted)	(3)	2.9E-03	(c)	0.75	(d)
Nickel and Compounds	7440-02-0	3.0E-03	(% of PM emitted)	(3)	1.8E-04	(c)	0.048	(d)
Phosphorus and Compounds	504	ND	(% of PM emitted)	(3)	0	(c)	0	(d)
Selenium and Compounds	7782-49-2	2.7E-05	(% of PM emitted)	(3)	1.6E-06	(c)	4.3E-04	(d)
Silver and Compounds	7440-22-4	3.1E-05	(% of PM emitted)	(3)	1.9E-06	(c)	4.9E-04	(d)
Thallium	7440-28-0	5.3E-06	(% of PM emitted)	(3)	3.3E-07	(c)	8.5E-05	(d)
Vanadium (fume or dust)	7440-62-2	2.8E-04	(% of PM emitted)	(3)	1.7E-05	(c)	4.5E-03	(d)
Zinc and Compounds	7440-66-6	5.7E-03	(% of PM emitted)	(3)	3.5E-04	(c)	0.092	(d)

NOTES:

ND = Analyte was not detected at or above the reporting limit for any samples.

TAC = toxic air contaminant

(a) Daily emissions estimate (lb/day) = (emission factor [lb/ton metal poured]) x (daily metal poured [lb/day]) x (ton/2,000 lb)

Daily metal poured (lb metal poured/day) = 62,000 (2)

(b) Annual emissions estimate (lb/yr) = (emission factor [lb/ton metal poured]) x (annual dust collected [ton dust collected/yr])

Annual metal poured (ton/yr) = 8,060 (2)

(c) Daily emissions estimate (lb/day) = (daily PM emissions [lb/day]) x (emission factor [% of PM emitted]/100)

(d) Annual emissions estimate (lb/yr) = (annual PM emissions [lb/yr]) x (emission factor [% of PM emitted]/100)

REFERENCES:

(1) AP-42 Chapter 12.10, Table 12.10-7. Assumes value for baghouse-controlled sand handling.

(2) See Table 1, Input Process Rates and Parameters.

(3) Based on a dust analysis conducted by Apex Laboratories, March 2021.

(4) As a conservative estimate, Chromium VI is assumed to be 3 percent of total chromium. Eagle Foundry reserves the right to revise this assumption if site-specific data becomes available.

Table 13
PTE Pattern Making TAC Emission Estimates
Eagle Foundry Company

Product	Toxic Air Contaminant	CAS	Weight Percentage (%)	Specific Gravity	Product Density (lb/gal)	Product Usage [1]		Total Emissions Estimate	
						Maximum Daily (gal/day)	Annual (gal/yr)	Maximum Daily [a] (lb/day)	Annual [b] (lb/yr)
Urethane	Toluene	108-88-3	5.50 [2]	0.907 [3]	7.56 [c]	0.33	85.0	0.14	35.3
	1,2,4-Trimethylbenzene	95-63-6	5.50 [5]					0.14	35.3
Mar-Proof H/S Lacquer Sanding Sealer	Methyl Ethyl Ketone	78-93-3	17.5 [2]	--	7.56 [3]	0.030	7.00	0.040	9.26
	Toluene	108-88-3	17.5 [2]					0.040	9.26
	Isopropanol	67-63-0	5.00 [2]					0.011	2.65
	n-Butyl Alcohol	71-36-3	5.00 [2]					0.011	2.65

NOTES:

TAC = toxic air contaminant

(a) Maximum daily emissions estimate (lb/day) = (weight percentage [%]/100) x (product density [lb/gal]) x (maximum daily product usage [gal/day])

(b) Annual emissions estimate (lb/yr) =(weight percentage [%]/100) x (product density [lb/gal]) x (maximum annual product usage [gal/yr])

(c) Product density (lb/gal) = (specific gravity) x (density of water [lb/gal])

Density of water (lb/gal) = 8.331 (4)

REFERENCES:

(1) See Table 1, Input Process Rates and Parameters.

(2) Information from product SDS. Value is midpoint of the range.

(3) Information from product SDS.

(4) Density of water at 20 degrees Celsius.

(5) Information from product SDS. CAS 95-63-6 (1,2,4-trimethylbenzene) was substituted for CAS 25551-13-7 (trimethylbenzene).

Table 14
PTE Mold TAC Emission Estimates
Eagle Foundry Company

Product	Toxic Air Contaminant	CAS	Weight Percentage [1] (%)	Product Usage [2]		Total Emissions Estimate	
				Maximum Daily (lb/day)	Annual (lb/yr)	Maximum Daily (lb/day)	Annual (lb/yr)
Velvacoat ST 803	Isopropanol	67-63-0	25.0	64.5	16,759	16.1 [a]	4,190 [b]
	Silica, crystalline	7631-86-9 [3]	0.55			6.4E-06 [c]	1.7E-03 [d]
	Silica, crystalline	7631-86-9 [3]	0.55			6.4E-06 [c]	1.7E-03 [d]
Isomol 780	Isopropanol	67-63-0	27.5	19.7	5,113	5.42 [a]	1,406 [b]
	Silica, crystalline	7631-86-9 [3]	0.55			2.0E-06 [c]	5.1E-04 [d]
Coated Cerabead	Phenol	108-95-2	0.010	49.2	12,782	4.9E-03 [a]	1.28 [b]
G-29 Sand	Silica, crystalline	7631-86-9 [3]	95.0	116.4	30,269	2.0E-03 [c]	0.52 [d]
Unibond 1350 Core Paste	Silica, crystalline	7631-86-9 [3]	55.0	61.0	15,863	6.0E-04 [c]	0.16 [d]
Naigai Cerabead	Silica, crystalline	7631-86-9 [3]	36.0	7,233.2	1,880,623	0.047 [c]	12.2 [d]

NOTES:

TAC = toxic air contaminant

(a) Maximum daily emissions estimate (lb/day) = (weight percentage [%]/100) x (maximum daily product usage [lb/day])

(b) Annual emissions estimate (lb/yr) =(weight percentage [%]/100) x (maximum annual product usage [lb/yr])

(c) Daily emissions estimate (lb/day) = (PM emission factor [lb/ton]) x (maximum daily product usage [lb/day]) x (ton/2,000 lb) x (weight percent [%])/100 x (1 - [baghouse control efficiency {%}]/100)

PM emission factor (lb/ton sand handled) = 3.6 (4)

Baghouse control efficiency (%) = 99.0 (2)

(d) Annual emissions estimate (lb/yr) = (PM emission factor [lb/ton]) x (maximum annual product usage [lb/yr]) x (ton/2,000 lb) x (weight percent [%])/100 x (1 - [baghouse control efficiency {%}]/100)

PM emission factor (lb/ton sand handled) = 3.6 (4)

Baghouse control efficiency (%) = 99.0 (2)

REFERENCES:

(1) Information from product SDS. Value is midpoint of the range.

(2) See Table 1, Input Process Rates and Parameters.

(3) CAS numbers have been updated to the CAS for silica, crystalline- respirable. Not all crystalline silica in the product is of a respirable size. Conservatively assumes all crystalline silica emitted is of respirable size

(4) AP-42 Chapter 12.10, Table 12.10-7, Particulate Emission factors for Ancillary Operations and Fugitive Sources at Gray Iron Foundries. Value for sand handling, uncontrolled.

Table 15
PTE Heat Treat—Propane Combustion TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS	Emission Factor [1] (lb/Mgal)	Total Emissions Estimate	
			Maximum Daily [a] (lb/day)	Annual [b] (lb/yr)
Benzene	71-43-2	7.1E-04	5.9E-04	0.15
Formaldehyde	50-00-0	1.5E-03	1.3E-03	0.33
PAHs (excluding Naphthalene)	401	1.0E-05	8.3E-06	2.2E-03
Naphthalene	91-20-3	3.0E-05	2.5E-05	6.5E-03
Acetaldehyde	75-07-0	3.8E-04	3.2E-04	0.082
Acrolein	107-02-8	2.4E-04	2.0E-04	0.052
Ammonia	7664-41-7	0.30	0.25	64.7
Ethylbenzene	100-41-4	8.4E-04	7.0E-04	0.18
Hexane	110-54-3	5.6E-04	4.6E-04	0.12
Toluene	108-88-3	3.3E-03	2.7E-03	0.70
Xylene (mixture), including m-xylene, o-xylene, p-xylene	1330-20-7	2.4E-03	2.0E-03	0.52

NOTES:

Mgal = thousand gallons.

TAC = toxic air contaminant

(a) Daily emissions estimate (lb/day) = (emission factor [lb/Mgal]) x (maximum daily propane usage [gal/day]) x (Mgal/1,000 gal)

Maximum daily propane usage (gal/day) = 829 (2)

(b) Annual emissions estimate (lb/yr) = (emission factor [lb/Mgal]) x (annual propane usage [gal/yr]) x (Mgal/1,000 gal)

Annual propane usage (gal/yr) = 215,639 (2)

REFERENCES:

(1) Emission factors provided by Oregon Department of Environmental Quality for Propane External Combustion Sources. Emission factors for sources <10 MMBtu/hr were used.

(2) See Table 1, Input Process Rates and Parameters.

Table 16
PTE Diesel Emergency Generator TAC Emission Estimates
Eagle Foundry Company

TAC	CAS	Emission Factor (lb/Mgal)		Emissions Estimates	
				Daily [a] (lb/day)	Annual [b] (lb/yr)
Arsenic	7440-38-2	1.6E-03	[3]	2.3E-05	1.2E-03
Cadmium	7440-43-9	1.5E-03	[3]	2.2E-05	1.1E-03
Chromium VI	18540-29-9	1.0E-04	[3]	1.5E-06	7.3E-05
Copper	7440-50-8	4.1E-03	[3]	6.0E-05	3.0E-03
Lead	7439-92-1	8.3E-03	[3]	1.2E-04	6.1E-03
Manganese	7439-96-5	3.1E-03	[3]	4.5E-05	2.3E-03
Mercury	7439-97-6	2.0E-03	[3]	2.9E-05	1.5E-03
Nickel	7440-02-0	3.9E-03	[3]	5.7E-05	2.8E-03
Selenium	7782-49-2	2.2E-03	[3]	3.2E-05	1.6E-03
Acetaldehyde	75-07-0	0.78	[3]	0.011	0.57
Acrolein	107-02-8	0.034	[3]	4.9E-04	0.025
Benzene	71-43-2	0.19	[3]	2.7E-03	0.14
1,3-Butadiene	106-99-0	0.22	[3]	3.2E-03	0.16
Ethylbenzene	100-41-4	0.011	[3]	1.6E-04	8.0E-03
Formaldehyde	50-00-0	1.73	[3]	0.025	1.26
Hexane	110-54-3	0.027	[3]	3.9E-04	0.020
Toluene	108-88-3	0.11	[3]	1.5E-03	0.077
Xylenes (mixed isomers)	1330-20-7	0.042	[3]	6.2E-04	0.031
Ammonia	7664-41-7	0.80	[4]	0.012	0.58
Hydrochloric Acid	7647-01-0	0.19	[3]	2.7E-03	0.14
PAHs	401	0.036	[3]	5.3E-04	0.026
Benzo(a)pyrene	50-32-8	3.6E-05	[3]	5.2E-07	2.6E-05
Naphthalene	91-20-3	0.020	[3]	2.9E-04	0.014
DPM	200	33.5	[3]	0.49	24.5

NOTES:

DMP = Diesel particulate matter

Mgal = thousand gallons.

TAC = toxic air contaminant.

(a) Daily emissions estimate (lb/day) = (emission factor [lb/Mgal]) x (Mgal/1,000 gal) x (daily fuel consumption [gal/day])

Daily fuel consumption (gal/day) = 14.6 (1)

(b) Annual emissions estimate (lb/yr) = (emission factor [lb/Mgal]) x (Mgal/1,000 gal) x (annual fuel consumption [gal/yr])

Annual fuel consumption (gal/yr) = 730 (1)

REFERENCES:

(1) See Table 1, Input Process Rates and Parameters.

(2) California Emissions Estimator Model, Appendix D, Default Data Tables.

(3) DEQ approved diesel combustion emission factors for stationary and portable internal combustion engines.

(4) Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory published by the South Coast Air Quality Management District (SCAQMD) in December 2016. See Appendix B, Table B-2 "Default EF for Diesel/Distillate Oil Fuel Combustion (lb/1000 gal)" for stationary and portable internal combustion engines (ICE). Assumes no control.

Table 17
PTE Reclaimed Bead Silo TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor			Total Emissions Estimate			
					Maximum Daily (lb/day)		Annual (lb/yr)	
PM	--	2.1E-04	(lb/hr)	(a)	4.2E-03	(b)	1.01	(c)
Aluminum and Compounds	7429-90-5	0.50	(% of PM emitted)	(3)	2.1E-05	(d)	5.0E-03	(e)
Antimony and Compounds	7440-36-0	7.0E-05	(% of PM emitted)	(3)	2.9E-09	(d)	7.0E-07	(e)
Arsenic and Compounds	7440-38-2	2.7E-05	(% of PM emitted)	(3)	1.1E-09	(d)	2.7E-07	(e)
Barium and Compounds	7440-39-3	2.4E-03	(% of PM emitted)	(3)	1.0E-07	(d)	2.5E-05	(e)
Beryllium and compounds	7440-41-7	5.3E-06	(% of PM emitted)	(3)	2.2E-10	(d)	5.3E-08	(e)
Cadmium and Compounds	7440-43-9	5.3E-06	(% of PM emitted)	(3)	2.2E-10	(d)	5.3E-08	(e)
Chromium	7440-47-3	5.8E-03	(% of PM emitted)	(3)	2.4E-07	(d)	5.9E-05	(e)
Chromium VI	18540-29-9	1.7E-04	(% of PM emitted)	(4)	7.3E-09	(d)	1.8E-06	(e)
Cobalt and Compounds	7440-48-4	9.2E-05	(% of PM emitted)	(3)	3.9E-09	(d)	9.3E-07	(e)
Copper and Compounds	7440-50-8	0.017	(% of PM emitted)	(3)	7.3E-07	(d)	1.8E-04	(e)
Lead and Compounds	7439-92-1	1.2E-03	(% of PM emitted)	(3)	5.0E-08	(d)	1.2E-05	(e)
Manganese and Compounds	7439-96-5	0.046	(% of PM emitted)	(3)	1.9E-06	(d)	4.7E-04	(e)
Nickel and Compounds	7440-02-0	3.0E-03	(% of PM emitted)	(3)	1.2E-07	(d)	3.0E-05	(e)
Phosphorus and Compounds	504	ND	(% of PM emitted)	(3)	0	(d)	0	(e)
Selenium and Compounds	7782-49-2	2.7E-05	(% of PM emitted)	(3)	1.1E-09	(d)	2.7E-07	(e)
Silver and Compounds	7440-22-4	3.1E-05	(% of PM emitted)	(3)	1.3E-09	(d)	3.1E-07	(e)
Thallium	7440-28-0	5.3E-06	(% of PM emitted)	(3)	2.2E-10	(d)	5.3E-08	(e)
Vanadium (fume or dust)	7440-62-2	2.8E-04	(% of PM emitted)	(3)	1.2E-08	(d)	2.8E-06	(e)
Zinc and Compounds	7440-66-6	5.7E-03	(% of PM emitted)	(3)	2.4E-07	(d)	5.7E-05	(e)

NOTES:

ND = Analyte was not detected at or above the reporting limit for any samples.

TAC = toxic air contaminant

(a) Emission factor (lb/hr) = (PM discharge rate [lb/10^6 ft^3]) x (bin vent airflow rate [ft^3/hr]) x (10^6) x (1 - [baghouse control efficiency {%}]/100)

Bin vent airflow rate (ft^3/hr) = 30,000 (1)

PM discharge rate (lb/10^6 ft^3) = 0.70 (1)

Baghouse control efficiency (%) = 99.0 (2)

(b) Daily emissions estimate (lb/day) = (emission factor [lb/hr]) x (daily hours of operation [hrs/day])

Daily hours of operation (hrs/day) = 20.0 (2)

(c) Annual emissions estimate (lb/yr) = (emission factor [lb/hr]) x (annual hours of operation [hrs/yr])

Annual hours of operation (hrs/yr) = 4,800 (2)

(d) Daily emissions estimate (lb/day) = (daily PM emissions [lb/day]) x (emission factor [% of PM emitted]/100)

(e) Annual emissions estimate (lb/yr) = (annual PM emissions [lb/yr]) x (emission factor [% of PM emitted]/100)

REFERENCES:

(1) Draft Review Report 03-2631, Application no. 016656, October 29, 1998.

(2) See Table 1, Input Process Rates and Parameters.

(3) Based on a dust analysis conducted by Apex Laboratories, March 2021.

(4) As a conservative estimate, Chromium VI is assumed to be 3 percent of total chromium. Eagle Foundry reserves the right to revise this assumption if site-specific data becomes available.

Table 18
PTE Reclaimed Bead Overflow Silo TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor			Total Emissions Estimate			
					Maximum Daily (lb/day)		Annual (lb/yr)	
PM	--	2.1E-04	(lb/hr)	(a)	4.2E-03	(b)	1.01	(c)
Aluminum and Compounds	7429-90-5	0.50	(% of PM emitted)	(3)	2.1E-05	(d)	5.0E-03	(e)
Antimony and Compounds	7440-36-0	7.0E-05	(% of PM emitted)	(3)	2.9E-09	(d)	7.0E-07	(e)
Arsenic and Compounds	7440-38-2	2.7E-05	(% of PM emitted)	(3)	1.1E-09	(d)	2.7E-07	(e)
Barium and Compounds	7440-39-3	2.4E-03	(% of PM emitted)	(3)	1.0E-07	(d)	2.5E-05	(e)
Beryllium and compounds	7440-41-7	5.3E-06	(% of PM emitted)	(3)	2.2E-10	(d)	5.3E-08	(e)
Cadmium and Compounds	7440-43-9	5.3E-06	(% of PM emitted)	(3)	2.2E-10	(d)	5.3E-08	(e)
Chromium	7440-47-3	5.8E-03	(% of PM emitted)	(3)	2.4E-07	(d)	5.9E-05	(e)
Chromium VI	18540-29-9	1.7E-04	(% of PM emitted)	(4)	7.3E-09	(d)	1.8E-06	(e)
Cobalt and Compounds	7440-48-4	9.2E-05	(% of PM emitted)	(3)	3.9E-09	(d)	9.3E-07	(e)
Copper and Compounds	7440-50-8	0.017	(% of PM emitted)	(3)	7.3E-07	(d)	1.8E-04	(e)
Lead and Compounds	7439-92-1	1.2E-03	(% of PM emitted)	(3)	5.0E-08	(d)	1.2E-05	(e)
Manganese and Compounds	7439-96-5	0.046	(% of PM emitted)	(3)	1.9E-06	(d)	4.7E-04	(e)
Nickel and Compounds	7440-02-0	3.0E-03	(% of PM emitted)	(3)	1.2E-07	(d)	3.0E-05	(e)
Phosphorus and Compounds	504	ND	(% of PM emitted)	(3)	0	(d)	0	(e)
Selenium and Compounds	7782-49-2	2.7E-05	(% of PM emitted)	(3)	1.1E-09	(d)	2.7E-07	(e)
Silver and Compounds	7440-22-4	3.1E-05	(% of PM emitted)	(3)	1.3E-09	(d)	3.1E-07	(e)
Thallium	7440-28-0	5.3E-06	(% of PM emitted)	(3)	2.2E-10	(d)	5.3E-08	(e)
Vanadium (fume or dust)	7440-62-2	2.8E-04	(% of PM emitted)	(3)	1.2E-08	(d)	2.8E-06	(e)
Zinc and Compounds	7440-66-6	5.7E-03	(% of PM emitted)	(3)	2.4E-07	(d)	5.7E-05	(e)

NOTES:

ND = Analyte was not detected at or above the reporting limit for any samples.

TAC = toxic air contaminant

(a) Emission factor (lb/hr) = (PM discharge rate [lb/10^6 ft^3]) x (bin vent airflow rate [ft^3/hr]) x (10^6) x (1 - [baghouse control efficiency {%}]/100)

Bin vent airflow rate (ft^3/hr) = 30,000 (1)

PM discharge rate (lb/10^6 ft^3) = 0.70 (1)

Baghouse control efficiency (%) = 99.0 (2)

(b) Daily emissions estimate (lb/day) = (emission factor [lb/hr]) x (daily hours of operation [hrs/day])

Daily hours of operation (hrs/day) = 20.0 (2)

(c) Annual emissions estimate (lb/yr) = (emission factor [lb/hr]) x (annual hours of operation [hrs/yr])

Annual hours of operation (hrs/yr) = 4,800 (2)

(d) Daily emissions estimate (lb/day) = (daily PM emissions [lb/day]) x (emission factor [% of PM emitted]/100)

(e) Annual emissions estimate (lb/yr) = (annual PM emissions [lb/yr]) x (emission factor [% of PM emitted]/100)

REFERENCES:

(1) Draft Review Report 03-2631, Application no. 016656, October 29, 1998.

(2) See Table 1, Input Process Rates and Parameters.

(3) Based on a dust analysis conducted by Apex Laboratories, March 2021.

(4) As a conservative estimate, Chromium VI is assumed to be 3 percent of total chromium. Eagle Foundry reserves the right to revise this assumption if site-specific data becomes available.

Table 19
PTE New Bead Silo TAC Emission Estimates
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emission Factor			Total Emissions Estimate			
					Maximum Daily (lb/day)		Annual (lb/yr)	
PM	--	2.1E-04	(lb/hr)	(a)	4.2E-03	(b)	1.01	(c)
Silica, crystalline	7631-86-9	36.0	(% of PM emitted)	(2)	1.5E-03	(d)	0.36	(e)

NOTES:

ND = Analyte was not detected at or above the reporting limit for any samples.

TAC = toxic air contaminant

(a) Emission factor (lb/hr) = (PM discharge rate [lb/10^6 ft^3]) x (bin vent airflow rate [ft^3/hr]) x (10^6) x (1 - [baghouse control efficiency {%}]/100)

Bin vent airflow rate (ft^3/hr) = 30,000 (1)

PM discharge rate (lb/10^6 ft^3) = 0.70 (1)

Baghouse control efficiency (%) = 99.0 (3)

(b) Daily emissions estimate (lb/day) = (emission factor [lb/hr]) x (daily hours of operation [hrs/day])

Daily hours of operation (hrs/day) = 20.0 (3)

(c) Annual emissions estimate (lb/yr) = (emission factor [lb/hr]) x (annual hours of operation [hrs/yr])

Annual hours of operation (hrs/yr) = 4,800 (3)

(d) Daily emissions estimate (lb/day) = (daily PM emissions [lb/day]) x (emission factor [% of PM emitted]/100)

(e) Annual emissions estimate (lb/yr) = (annual PM emissions [lb/yr]) x (emission factor [% of PM emitted]/100)

REFERENCES:

(1) Draft Review Report 03-2631, Application no. 016656, October 29, 1998.

(2) Based on vendor information.

(3) See Table 1, Input Process Rates and Parameters.

Table 20
PTE TAC Emissions Summary
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emissions Estimate																	
		Foundry Melt		Foundry Pour/Cool		Hot Top		Reclamation		Torch Cut		Welding		Grinding (Controlled)		Grinding (Fugitive)		Mesh Blast	
		(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)
ORGANIC COMPOUNDS																			
Acetaldehyde	75-07-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acrolein	107-02-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	71-43-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Butadiene	106-99-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	100-41-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Formaldehyde	50-00-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexane	110-54-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropanol	67-63-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl Ethyl Ketone	78-93-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Butyl Alcohol	71-36-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenol	108-95-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	108-88-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	95-63-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene (mixed)	1330-20-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
INORGANIC COMPOUNDS																			
Ammonia	7664-41-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hydrochloric Acid	7647-01-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum trioxide	1313-27-5	--	--	--	--	--	--	--	--	--	--	1.2E-03	0.046	--	--	--	--	--	--
Silicon dioxide (respirable)	7631-86-9	--	--	--	--	0.010	2.63	--	--	--	--	--	--	--	--	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)																			
Benzo(a)pyrene	50-32-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	91-20-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs (excluding Naphthalene)*	401	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
METALS																			
Aluminum and Compounds	7429-90-5	0.054	13.9	0.25	65.0	0.22	57.1	0.060	15.6	--	--	2.1E-03	7.8E-03	4.5E-05	0.012	4.5E-03	1.18	1.2E-05	3.2E-03
Antimony and Compounds	7440-36-0	1.0E-05	2.6E-03	4.7E-05	0.012	--	--	1.5E-05	3.8E-03	--	--	--	--	2.5E-08	6.4E-06	2.5E-06	6.4E-04	3.1E-07	7.9E-05
Arsenic and Compounds	7440-38-2	6.2E-06	1.6E-03	2.9E-05	7.5E-03	--	--	9.5E-06	2.5E-03	--	--	6.4E-06	1.9E-04	1.5E-07	3.9E-05	1.5E-05	3.9E-03	9.3E-07	2.4E-04
Barium and Compounds	7440-39-3	3.0E-04	0.077	1.4E-03	0.36	--	--	3.7E-04	0.097	--	--	--	--	1.3E-06	3.5E-04	1.3E-04	0.035	9.7E-08	2.5E-05
Beryllium and compounds	7440-41-7	3.7E-07	9.7E-05	1.7E-06	4.5E-04	--	--	1.0E-06	2.7E-04	--	--	--	--	4.9E-09	1.3E-06	4.9E-07	1.3E-04	2.0E-08	5.1E-06
Cadmium and Compounds	7440-43-9	3.7E-06	9.7E-04	1.7E-05	4.5E-03	--	--	5.6E-06	1.5E-03	--	--	--	--	3.9E-08	1.0E-05	3.9E-06	1.0E-03	2.0E-08	5.1E-06
Chromium	7440-47-3	7.1E-04	0.19	3.3E-03	0.87	--	--	1.8E-03	0.46	1.9E-04	0.016	0.045	1.32	1.5E-04	0.039	0.015	3.91	4.7E-05	0.012
Chromium VI	18540-29-9	7.8E-07	2.0E-04	3.6E-06	9.5E-04	--	--	5.4E-05	0.014	6.7E-10	1.7E-07	0.028	0.35	1.1E-09	2.7E-07	1.1E-07	2.7E-05	1.4E-06	3.6E-04
Cobalt and Compounds	7440-48-4	9.7E-06	2.5E-03	4.5E-05	0.012	--	--	1.4E-05	3.7E-03	--	--	6.7E-04	7.3E-03	7.2E-07	1.9E-04	7.2E-05	0.019	1.3E-06	3.5E-04
Copper and Compounds	7440-50-8	1.4E-03	0.36	6.4E-03	1.66	--	--	1.2E-03	0.31	3.0E-05	7.9E-03	0.045	7.51	7.2E-06	1.9E-03	7.2E-04	0.19	5.1E-05	0.013
Lead and Compounds	7439-92-1	1.8E-04	0.047	8.4E-04	0.22	--	--	4.5E-04	0.12	--	--	--	--	4.3E-08	1.1E-05	4.3E-06	1.1E-03	1.5E-07	3.9E-05
Manganese and Compounds	7439-96-5	4.7E-03	1.21	0.022	5.65	--	--	0.011	2.73	8.5E-04	0.083	0.029	1.06	6.9E-05	0.018	6.9E-03	1.79	1.2E-04	0.032
Mercury	7439-97-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel and Compounds	7440-02-0	2.2E-04	0.057	1.0E-03	0.26	--	--	2.3E-04	0.059	1.2E-04	0.015	0.040	0.32	1.4E-05	3.7E-03	1.4E-03	0.37	1.9E-05	5.1E-03
Phosphorus and Compounds	504	--	--	--	--	--	--	--	--	4.3E-06	8.7E-04	1.9E-05	5.6E-04	--	--	--	--	--	--
Selenium and Compounds	7782-49-2	1.9E-06	4.8E-04	8.7E-06	2.3E-03	--	--	9.1E-06	2.4E-03	--	--	--	--	2.5E-08	6.4E-06	2.5E-06	6.4E-04	9.7E-09	2.5E-06
Silver and Compounds	7440-22-4	3.7E-06	9.7E-04	1.7E-05	4.5E-03	--	--	1.0E-05	2.6E-03	--	--	--	--	4.9E-09	1.3E-06	4.9E-07	1.3E-04	2.0E-08	5.1E-06
Thallium	7440-28-0	3.7E-07	9.7E-05	1.7E-06	4.5E-04	--	--	6.0E-07	1.6E-04	--	--	--	--	4.9E-09	1.3E-06	4.9E-07	1.3E-04	2.0E-08	5.1E-06
Vanadium (fume or dust)	7440-62-2	4.2E-05	0.011	1.9E-04	0.051	--	--	5.7E-05	0.015	3.0E-06	7.9E-04	6.4E-06	1.9E-04	5.7E-07	1.5E-04	5.7E-05	0.015	1.7E-06	4.5E-04
Zinc and Compounds	7440-66-6	1.3E-03	0.35	6.2E-03	1.61	--	--	2.3E-04	0.061	--	--	--	--	3.2E-07	8.3E-05	3.2E-05	8.3E-03	1.7E-06	4.4E-04
DIESEL PARTICULATE MATTER (DPM)																			
DPM	200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total TAC Emissions Estimate		**0.062**	**16.2**	**0.29**	**75.8**	**0.23**	**59.7**	**0.075**	**19.5**	**1.2E-03**	**0.12**	**0.19**	**10.6**	**2.9E-04**	**0.075**	**0.029**	**7.52**	**2.6E-04**	**0.068**

Table 20
PTE TAC Emissions Summary
Eagle Foundry Company

Toxic Air Contaminant	CAS/DEQ ID	Emissions Estimate																					
		Rotoblast		Small Palmer		Screening Station		Pattern Making		Core/Mold		Reclaimed Bead Silo		Reclaimed Bead Overflow Silo		New Bead Silo		Emergency Generator		Propane		Facility Total	
		(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)	(lb/day)	(lb/yr)
ORGANIC COMPOUNDS																							
Acetaldehyde	75-07-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.011	0.57	3.2E-04	0.082	0.012	0.65
Acrolein	107-02-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.9E-04	0.025	2.0E-04	0.052	6.9E-04	0.077
Benzene	71-43-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.7E-03	0.14	5.9E-04	0.15	3.3E-03	0.29
1,3-Butadiene	106-99-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.2E-03	0.16	--	--	3.2E-03	0.16
Ethylbenzene	100-41-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.6E-04	8.0E-03	7.0E-04	0.18	8.6E-04	0.19
Formaldehyde	50-00-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.025	1.26	1.3E-03	0.33	0.026	1.59
Hexane	110-54-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.9E-04	0.020	4.6E-04	0.12	8.6E-04	0.14
Isopropanol	67-63-0	--	--	--	--	--	--	0.011	2.65	21.5	5,596	--	--	--	--	--	--	--	--	--	--	21.6	5,598
Methyl Ethyl Ketone	78-93-3	--	--	--	--	--	--	0.040	9.26	--	--	--	--	--	--	--	--	--	--	--	--	0.040	9.26
n-Butyl Alcohol	71-36-3	--	--	--	--	--	--	0.011	2.65	--	--	--	--	--	--	--	--	--	--	--	--	0.011	2.65
Phenol	108-95-2	--	--	--	--	--	--	--	--	4.9E-03	1.28	--	--	--	--	--	--	--	--	--	--	4.9E-03	1.28
Toluene	108-88-3	--	--	--	--	--	--	0.040	9.26	--	--	--	--	--	--	--	--	1.5E-03	0.077	2.7E-03	0.70	0.044	10.0
1,2,4-Trimethylbenzene	95-63-6	--	--	--	--	--	--	0.14	35.3	--	--	--	--	--	--	--	--	--	--	--	--	0.14	35.3
Xylene (mixed)	1330-20-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6.2E-04	0.031	2.0E-03	0.52	2.6E-03	0.55
INORGANIC COMPOUNDS																							
Ammonia	7664-41-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.012	0.58	0.25	64.7	0.26	65.3
Hydrochloric Acid	7647-01-0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.7E-03	0.14	--	--	2.7E-03	0.14
Molybdenum trioxide	1313-27-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.2E-03	0.046
Silicon dioxide (respirable)	7631-86-9	--	--	--	--	--	--	--	--	0.049	12.9	--	--	--	--	1.5E-03	0.36	--	--	--	--	0.061	15.9
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)																							
Benzo(a)pyrene	50-32-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.2E-07	2.6E-05	--	--	5.2E-07	2.6E-05
Naphthalene	91-20-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.9E-04	0.014	2.5E-05	6.5E-03	3.1E-04	0.021
PAHs (excluding Naphthalene)*	401	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.3E-04	0.026	8.3E-06	2.2E-03	5.4E-04	0.029
METALS																							
Aluminum and Compounds	7429-90-5	1.0E-05	2.6E-03	5.9E-03	1.54	0.031	8.03	--	--	--	--	2.1E-05	5.0E-03	2.1E-05	5.0E-03	--	--	--	--	--	--	0.63	162
Antimony and Compounds	7440-36-0	5.5E-09	1.4E-06	8.3E-07	2.2E-04	4.3E-06	1.1E-03	--	--	--	--	2.9E-09	7.0E-07	2.9E-09	7.0E-07	--	--	--	--	--	--	8.0E-05	0.021
Arsenic and Compounds	7440-38-2	3.3E-08	8.7E-06	6.9E-07	1.8E-04	1.6E-06	4.3E-04	--	--	--	--	1.1E-09	2.7E-07	1.1E-09	2.7E-07	--	--	2.3E-05	1.2E-03	--	--	9.3E-05	0.018
Barium and Compounds	7440-39-3	3.0E-07	7.8E-05	3.5E-05	9.0E-03	1.5E-04	0.039	--	--	--	--	1.0E-07	2.5E-05	1.0E-07	2.5E-05	--	--	--	--	--	--	2.4E-03	0.62
Beryllium and compounds	7440-41-7	1.1E-09	2.9E-07	5.7E-08	1.5E-05	3.3E-07	8.5E-05	--	--	--	--	2.2E-10	5.3E-08	2.2E-10	5.3E-08	--	--	--	--	--	--	4.1E-06	1.1E-03
Cadmium and Compounds	7440-43-9	8.6E-09	2.2E-06	1.3E-07	3.4E-05	3.3E-07	8.5E-05	--	--	--	--	2.2E-10	5.3E-08	2.2E-10	5.3E-08	--	--	2.2E-05	1.1E-03	--	--	5.3E-05	9.2E-03
Chromium	7440-47-3	3.4E-05	8.8E-03	5.6E-05	0.015	3.6E-04	0.094	--	--	--	--	2.4E-07	5.9E-05	2.4E-07	5.9E-05	--	--	--	--	--	--	0.067	6.93
Chromium VI	18540-29-9	1.0E-06	2.6E-04	1.7E-06	4.4E-04	1.1E-05	2.8E-03	--	--	--	--	7.3E-09	1.8E-06	7.3E-09	1.8E-06	--	--	1.5E-06	7.3E-05	--	--	0.028	0.37
Cobalt and Compounds	7440-48-4	1.6E-07	4.2E-05	9.5E-07	2.5E-04	5.7E-06	1.5E-03	--	--	--	--	3.9E-09	9.3E-07	3.9E-09	9.3E-07	--	--	--	--	--	--	8.2E-04	0.046
Copper and Compounds	7440-50-8	1.6E-06	4.2E-04	1.5E-04	0.039	1.1E-03	0.28	--	--	--	--	7.3E-07	1.8E-04	7.3E-07	1.8E-04	--	--	6.0E-05	3.0E-03	--	--	0.056	10.4
Lead and Compounds	7439-92-1	9.6E-09	2.5E-06	1.8E-05	4.6E-03	7.4E-05	0.019	--	--	--	--	5.0E-08	1.2E-05	5.0E-08	1.2E-05	--	--	1.2E-04	6.1E-03	--	--	1.7E-03	0.41
Manganese and Compounds	7439-96-5	1.5E-05	4.0E-03	4.5E-04	0.12	2.9E-03	0.75	--	--	--	--	1.9E-06	4.7E-04	1.9E-06	4.7E-04	--	--	4.5E-05	2.3E-03	--	--	0.077	13.4
Mercury	7439-97-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.9E-05	1.5E-03	--	--	2.9E-05	1.5E-03
Nickel and Compounds	7440-02-0	3.2E-06	8.3E-04	2.1E-05	5.5E-03	1.8E-04	0.048	--	--	--	--	1.2E-07	3.0E-05	1.2E-07	3.0E-05	--	--	5.7E-05	2.8E-03	--	--	0.044	1.15
Phosphorus and Compounds	504	--	--	--	--	0	0	--	--	--	--	0	0	0	0	--	--	--	--	--	--	2.3E-05	1.4E-03
Selenium and Compounds	7782-49-2	5.5E-09	1.4E-06	2.8E-07	7.3E-05	1.6E-06	4.3E-04	--	--	--	--	1.1E-09	2.7E-07	1.1E-09	2.7E-07	--	--	3.2E-05	1.6E-03	--	--	5.6E-05	7.9E-03
Silver and Compounds	7440-22-4	1.1E-09	2.9E-07	3.5E-07	9.2E-05	1.9E-06	4.9E-04	--	--	--	--	1.3E-09	3.1E-07	1.3E-09	3.1E-07	--	--	--	--	--	--	3.4E-05	8.8E-03
Thallium	7440-28-0	1.1E-09	2.9E-07	5.7E-08	1.5E-05	3.3E-07	8.5E-05	--	--	--	--	2.2E-10	5.3E-08	2.2E-10	5.3E-08	--	--	--	--	--	--	3.6E-06	9.4E-04
Vanadium (fume or dust)	7440-62-2	1.3E-07	3.3E-05	3.8E-06	1.0E-03	1.7E-05	4.5E-03	--	--	--	--	1.2E-08	2.8E-06	1.2E-08	2.8E-06	--	--	--	--	--	--	3.8E-04	0.098
Zinc and Compounds	7440-66-6	7.1E-08	1.9E-05	9.6E-05	0.025	3.5E-04	0.092	--	--	--	--	2.4E-07	5.7E-05	2.4E-07	5.7E-05	--	--	--	--	--	--	8.2E-03	2.14
DIESEL PARTICULATE MATTER (DPM)																							
DPM	200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.49	24.5	--	--	0.49	24.5
Total TAC Emissions Estimate		**6.6E-05**	**0.017**	**6.7E-03**	**1.75**	**0.036**	**9.36**	**0.24**	**59.1**	**21.6**	**5,610**	**2.4E-05**	**5.9E-03**	**2.4E-05**	**5.9E-03**	**1.5E-03**	**0.36**	**0.55**	**27.5**	**0.26**	**66.8**	**23.6**	**5,965**

Table D-1
Baghouse Dust Results
Eagle Foundry

Pollutant	CAS/ DEQ ID	Sample (mg/kg) [1]					
		Foundry	Reclaim	Small Palmer	Finishing	Mesh Blast	Screening
		FND	REC	SP	FIN	MESH	SCR
Aluminum	7429-90-5	7,460	15,200	5,170	4,780	641	4,980
Antimony	7440-36-0	1.40	3.72	0.729	ND (5.21)	16.0	0.699
Arsenic	7440-38-2	0.860	2.42	0.600	15.7	48.8	ND (0.532)
Barium	7440-39-3	41.2	94.5	30.2	140	ND (10.2)	24.4
Beryllium	7440-41-7	ND (0.104)	0.262	ND (0.0988)	ND (1.04)	ND (2.05)	ND (0.106)
Cadmium	7440-43-9	ND (1.04)	1.42	0.114	4.05	ND (2.05)	ND (0.106)
Chromium	7440-47-3	99.5	454	48.9	15,800	2,440	58.1
Chromium VI	18540-29-9	ND (0.217)	2.74	0.985	ND (0.221)	0.281	0.401
Cobalt	7440-48-4	1.35	3.63	0.828	76.0	70.3	0.920
Copper	7440-50-8	191	306	130	753	2,660	174
Lead	7439-92-1	25.0	114	15.6	4.51	7.86	12.0
Manganese	7439-96-5	648	2,670	389	7,240	6,520	464
Mercury	7439-97-6	ND (0.0415)	ND (0.0430)	ND (0.0395)	ND (0.417)	ND (0.820)	ND (0.0426)
Molybdenum	7439-98-7	16.6	11.0	7.84	980	373	11.1
Nickel	7440-02-0	30.3	57.6	18.6	1,490	1,020	29.7
Phosphorus	504	ND (51.9)	ND (53.8)	ND (49.4)	ND (52.1)	ND (102)	ND (53.2)
Selenium	7782-49-2	ND (0.519)	2.31	ND (0.494)	ND (5.21)	ND (1.02)	ND (0.532)
Silver	7440-22-4	ND (1.04)	2.53	0.309	ND (1.04)	ND (2.05)	0.306
Thallium	7440-28-0	ND (0.104)	0.152	ND (0.0988)	ND (1.04)	ND (2.05)	ND (0.106)
Vanadium	7440-62-2	5.80	14.5	3.36	60.2	90.9	2.79
Zinc	7440-66-6	185	59.4	83.9	33.5	89.4	57.0

Pollutant	CAS/ DEQ ID	Sample (% of PM)					
		Foundry	Reclaim	Small Palmer	Finishing	Mesh Blast	Screening
		FND	REC	SP	FIN	MESH	SCR
Aluminum	7429-90-5	0.746	1.52	0.517	0.478	0.0641	0.498
Antimony	7440-36-0	1.40E-04	3.72E-04	7.29E-05	2.61E-04	1.60E-03	6.99E-05
Arsenic	7440-38-2	8.60E-05	2.42E-04	6.00E-05	1.57E-03	4.88E-03	2.66E-05
Barium	7440-39-3	4.12E-03	9.45E-03	3.02E-03	0.014	5.10E-04	2.44E-03
Beryllium	7440-41-7	5.20E-06	2.62E-05	4.94E-06	5.20E-05	1.03E-04	5.30E-06
Cadmium	7440-43-9	5.20E-05	1.42E-04	1.14E-05	4.05E-04	1.03E-04	5.30E-06
Chromium	7440-47-3	9.95E-03	0.0454	4.89E-03	1.58	0.244	5.81E-03
Chromium VI	18540-29-9	1.09E-05	2.74E-04	9.85E-05	1.11E-05	2.81E-05	4.01E-05
Cobalt	7440-48-4	1.35E-04	3.63E-04	8.28E-05	7.60E-03	7.03E-03	9.20E-05
Copper	7440-50-8	0.0191	0.0306	0.013	0.0753	0.266	0.0174
Lead	7439-92-1	2.50E-03	0.0114	1.56E-03	4.51E-04	7.86E-04	1.20E-03
Manganese	7439-96-5	0.0648	0.267	0.0389	0.724	0.652	0.0464
Mercury	7439-97-6	ND	ND	ND	ND	ND	ND
Molybdenum	7439-98-7	1.66E-03	1.10E-03	7.84E-04	0.098	0.0373	1.11E-03
Nickel	7440-02-0	3.03E-03	5.76E-03	1.86E-03	0.149	0.102	2.97E-03
Phosphorus	504	ND	ND	ND	ND	ND	ND
Selenium	7782-49-2	2.60E-05	2.31E-04	2.47E-05	2.61E-04	5.10E-05	2.66E-05
Silver	7440-22-4	5.20E-05	2.53E-04	3.09E-05	5.20E-05	1.03E-04	3.06E-05
Thallium	7440-28-0	5.20E-06	1.52E-05	4.94E-06	5.20E-05	1.03E-04	5.30E-06
Vanadium	7440-62-2	5.80E-04	1.45E-03	3.36E-04	6.02E-03	9.09E-03	2.79E-04
Zinc	7440-66-6	0.0185	5.94E-03	8.39E-03	3.35E-03	8.94E-03	5.70E-03
Total % of PM		**0.871**	**1.90**	**0.590**	**3.14**	**1.40**	**0.582**
Hex/Chromium		**ND**	**6.04E-03**	**0.0201**	**ND**	**1.15E-04**	**6.90E-03**

Table D2
Baghouse Emission Factors - PTE
Eagle Foundry Company

TAC		Dust Analysis (units)				Emission Factor [a] (lb/ton PM generated)	
		Daily		Annual		Daily	Annual
Small Palmer							
Small Palmer - Dust Collected		**113**	**(lb PM collected/day)** [1]	**14.7**	**(tons PM collected/yr)** [1]	**--**	**--**
PM		114	(lb PM generated/day) [b]	14.9	(tons PM generated/yr) [c]	--	--
Aluminum	7429-90-5	0.52	(% of PM) [2]	0.52	(% of PM) [2]	10.3	10.3
Antimony	7440-36-0	7.3E-05	(% of PM) [2]	7.3E-05	(% of PM) [2]	1.5E-03	1.5E-03
Arsenic	7440-38-2	6.0E-05	(% of PM) [2]	6.0E-05	(% of PM) [2]	1.2E-03	1.2E-03
Barium	7440-39-3	3.0E-03	(% of PM) [2]	3.0E-03	(% of PM) [2]	0.060	0.060
Beryllium	7440-41-7	4.9E-06	(% of PM) [2]	4.9E-06	(% of PM) [2]	9.9E-05	9.9E-05
Cadmium	7440-43-9	1.1E-05	(% of PM) [2]	1.1E-05	(% of PM) [2]	2.3E-04	2.3E-04
Chromium	7440-47-3	4.9E-03	(% of PM) [2]	4.9E-03	(% of PM) [2]	0.098	0.098
Chromium VI	18540-29-9	9.9E-05	(% of PM) [2]	9.9E-05	(% of PM) [2]	2.0E-03	2.0E-03
Cobalt	7440-48-4	8.3E-05	(% of PM) [2]	8.3E-05	(% of PM) [2]	1.7E-03	1.7E-03
Copper	7440-50-8	0.013	(% of PM) [2]	0.013	(% of PM) [2]	0.26	0.26
Lead	7439-92-1	1.6E-03	(% of PM) [2]	1.6E-03	(% of PM) [2]	0.031	0.031
Manganese	7439-96-5	0.039	(% of PM) [2]	0.039	(% of PM) [2]	0.78	0.78
Mercury	7439-97-6		ND [2]		ND [2]	ND	ND
Molybdenum	7439-98-7	7.8E-04	(% of PM) [2]	7.8E-04	(% of PM) [2]	0.016	0.016
Nickel	7440-02-0	1.9E-03	(% of PM) [2]	1.9E-03	(% of PM) [2]	0.037	0.037
Phosphorus	504		ND [2]		ND [2]	ND	ND
Selenium	7782-49-2	2.5E-05	(% of PM) [2]	2.5E-05	(% of PM) [2]	4.9E-04	4.9E-04
Silver	7440-22-4	3.1E-05	(% of PM) [2]	3.1E-05	(% of PM) [2]	6.2E-04	6.2E-04
Thallium	7440-28-0	4.9E-06	(% of PM) [2]	4.9E-06	(% of PM) [2]	9.9E-05	9.9E-05
Vanadium	7440-62-2	3.4E-04	(% of PM) [2]	3.4E-04	(% of PM) [2]	6.7E-03	6.7E-03
Zinc	7440-66-6	8.4E-03	(% of PM) [2]	8.4E-03	(% of PM) [2]	0.17	0.17

Filter	Control Efficiency (%) [1]
Baghouse Control Efficiency for PM	99.0

NOTES:

(a) Emission factor (lb/ton PM generated) = (percentage of PM [% of PM]/100) x (2,000 lb/ton)

(b) Maximum daily PM generated (lb PM generated/day) = (maximum daily PM collected [lb PM collected/day])
+ (maximum daily PM collected [lb PM collected/day]) x (1- baghouse control efficiency/100)

(c) Annual PM generated (tons PM generated/yr) = (annual PM collected [tons PM collected/yr])
+ (annual PM collected [tons PM collected/yr]) x (1- baghouse control efficiency/100)

REFERENCES:

(1) See Table 1, Input Process Rates and Parameters.

(2) Based on baghouse dust analysis conducted by Apex Laboratories, March 2021.

ATTACHMENT B

CONTROL EFFICIENCY DOCUMENTATION

Filtration Fabric

Blue Sky Filters, Inc. is a manufacturer and recycler of filter bags. We purchase material used in our manufacturing plant from various material manufacturers. We manufacture bags for customer's world wide using various types of materials and our bags are installed in all different types of baghouses. Blue Sky Filters, Inc. does not guarantee or warranty any materials as we are not the material manufacturer. We have provided companies with manufactured filter bags using 12 oz polyester felt. The specs on this felt supplied by the manufacturer are as follows:

Style	PEF-12
Fiber	100% polyester
Weight	12 oz per sq yd
Construction	Scrim supported
Count	n/a
Air permeability	50-65 CFM
Mullen burst strength	300 PSI
Tensile strength	
Warp direction	120 PPSI
Fill direction	140 PPSI
Thermal stability	3%
Maximum operating temperature	275 degrees F
Finish	Heat set; calendared/glazed

We have been advised that the 12 oz polyester felt used to manufacture bags if properly installed with a proper installation cake, under normal operating conditions, will emit no more parts per million than 0.005 GR/DSCF of air based on dry dust particles sizes of 1 micron and larger. Blue Sky Filters, Inc, as well as the material manufacturers, does not have control over the operating conditions in your baghouse. All operating conditions in your baghouse must meet the baghouse manufacturer's specifications. Blue Sky Filters, Inc., as well as the material manufacturers, does not control how bags are installed, if a proper installation of cake is maintained, any moisture problems, malfunctions of baghouse parts, or anything else that changes operating conditions. Because Blue Sky Filters, Inc. and the material manufacturers do not have control over or are involved in the operation of your baghouse, we cannot make any warranties or guarantees or accept any liability for the operation thereof.

Donaldson®
Torit®

RF BAGHOUSE DUST COLLECTORS

DURA-LIFE™
Twice The Life Filter Bags

ULTRA-WEB®
High Efficiency **Fine Fiber Filters** Built to Last

ENABLED WITH
iCue™
CONNECTED FILTRATION SERVICES

ENERGY EFFICIENT, HIGH VOLUME DUST COLLECTOR

The rugged Donaldson® Torit® RF baghouse collector handles heavy dust loads and large volumes of air more effectively than any collector on the market.

The small footprint of the RF combines a cyclone precleaner and a baghouse into one unit. It features a powerful yet energy-efficient cleaning system, eliminating the need for compressed air to clean the bags. Combined with the revolutionary Dura-Life™ "Twice the Life" bag filters, or our new Ultra-Web SB pleated bag filter offering, the award-winning RF gets the job done while using much less energy than competitor collectors.

Side by side, no other baghouse provides more performance than the Donaldson Torit RF baghouse collector.

THE RF FEATURES:

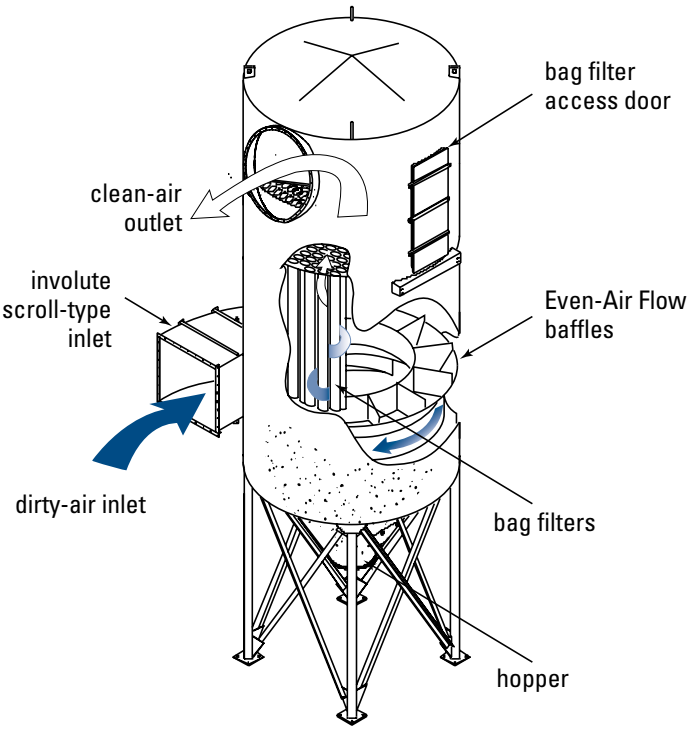
- High-Body inlet option for abrasive dust
- Even-Air™ Flow Straightener reduces wear on bag filters
- Award winning Dura-Life™ "Twice the Life" bag filters
- Oval shaped bags provide better snap for better bag cleaning
- Ultra-Web SB Pleated Bag Option
- Clean-air bag access for easier bag service
- Single inlet, outlet and hopper reduces duct and hopper outlet costs
- 60° conical hopper reduces dust build-up
- Requires less energy than comparable sized units
- RF cleaning system requires no compressed air
- 10-year warranty

156RFW8

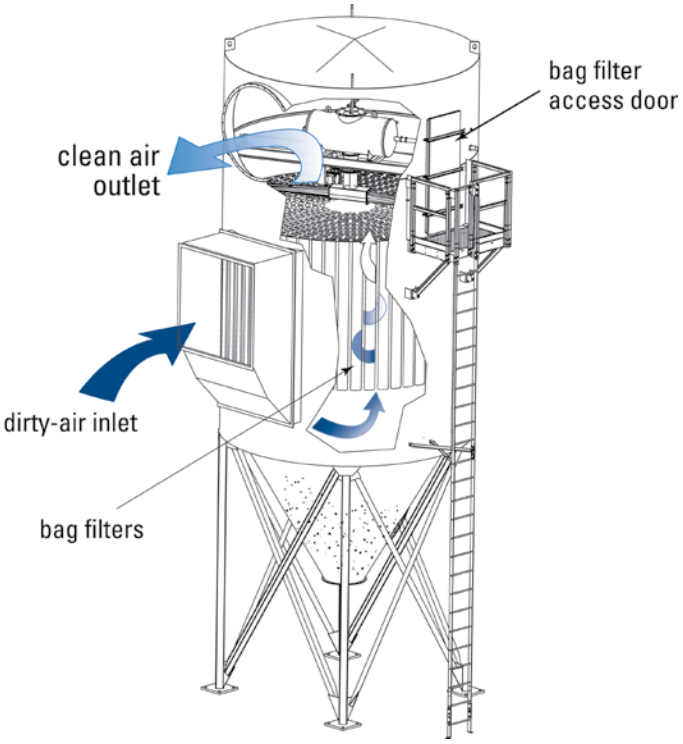
iCUE™ CONNECTED FILTRATION SERVICE

Now available with the option of Donaldson's iCue connected filtration service, an IoT enabled service designed to prompt timely maintenance, helping improve production uptime and reduce operating costs.

OPERATIONS & FEATURES



Normal Operation with Involute Scroll Inlet



Normal Operation with High Body Inlet

BAGHOUSE OPERATIONS THAT WORK

The RF collector works so well that many competitors strive to copy its award winning design, but no one has been able to duplicate the RF's performance.

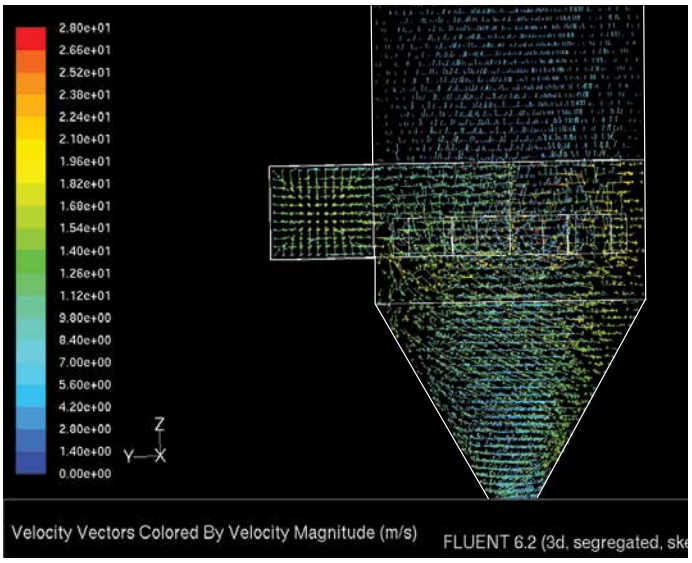
An involute scroll inlet puts dust into a cyclonic spin allowing for heavier particles to fall into the hopper, thus eliminating the need for a cyclone precleaner (for some applications with abrasive dusts, the optional high body inlet may be preferred). The remaining dust is then collected on oval shaped filter bags that provide greater snap during pulsing resulting in better bag cleaning. Rather than using expensive compressed air, the RF comes complete with a pump that provides a medium pressure/high volume pulse of air to a rotating cleaning arm timed to clean non-adjacent bag filters, thus reducing dust re-entrainment.

HIGH-VOLUME **PERFORMANCE**
WITH DURA-LIFE™ "TWICE THE LIFE" BAG FILTERS
OR OUR ***NEW*** ULTRA-WEB SB PLEATED BAGS

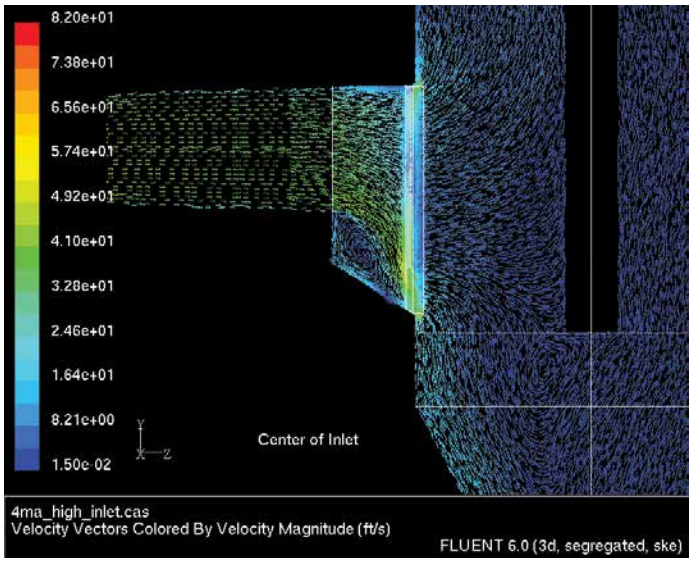
OPERATIONS & FEATURES

EVEN AIRFLOW DISTRIBUTION

To prevent bag filter wear and abrasion that can occur in other collectors, the RF baghouse collector comes standard with our proprietary Even-Air™ Flow Straightener or high body inlet. Designed using sophisticated FLUENT®* computer airflow analysis, the RF provides the most uniform airflow possible resulting in reduced bag abrasion, longer filter bag life and lower maintenance costs.



FLUENT computer airflow analysis showing airflow with involute scroll inlet and Even-Air Flow Straightener.

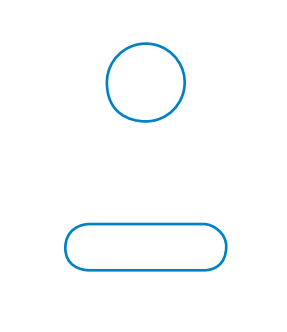


FLUENT computer airflow analysis showing airflow with high body inlet.

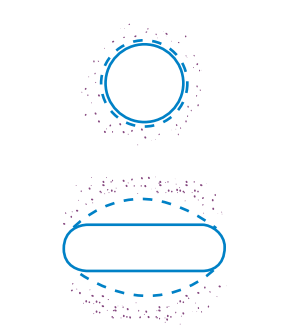
BENEFITS OF THE OVAL-SHAPED BAG

Oval shaped bag filters provide better snap during cleaning as compared to round bags— allowing the dust to be more easily knocked off the bags. This results in lower pressure drop and longer bag filter life.

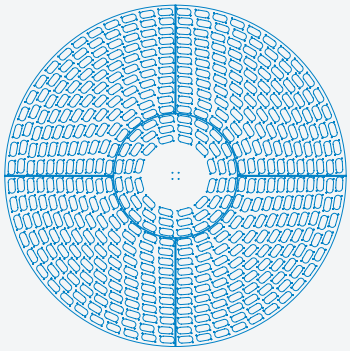
Oval shaped bag filters increase the amount of bag material that can fit in a given area, thus increasing collector capacity.



Normal Operation



Pulse Bag Operation



* FLUENT is a registered trademark of Fluent, Inc.

OPERATING ADVANTAGES

The RF cleaning system uses much less energy when compared to compressed air cleaning systems. The charts below illustrate the energy savings that can be realized for various annual operation scenarios.

RF CLEANING SYSTEM USES LESS ENERGY THAN COMPRESSED AIR CLEANING SYSTEMS

Weekly Operation	Annual Cleaning System vs. Compressed Air System Costs				
	Operating Hours	RF Cleaning System Operating Costs	Competitor Compressed Air Operating Costs	Savings with RF	Annual Savings
8 hrs. per day 5 days per week	2080	$885	$2,342	$1,457	62%
16 hrs. per day 5 days per week	4160	$1,771	$4,685	$2,914	62%
24 hrs. per day 5 days per week	6240	$2,656	$7,027	$4,371	62%

Assumes the use of a 484 RF compared to a similar size collector with compressed air cleaning system.
Assumes U.S. Energy Average Cost of 6.68 cents per kilowatt hour and a Baldor motor that is operating at full-load amps.
Your savings may vary based on your costs per kilowatt hour and the efficiency of your motor.

62% LESS ENERGY | **50% ENERGY SAVINGS**

RF WITH ULTRA-WEB SB PLEATED BAGS RUNS AT A LOWER PRESSURE DROP SAVING FAN ENERGY

Weekly Operation	Annual RF Fan vs. Competitor Fan Operating Costs				
	Operating Hours	RF Fan Operating Costs	Competitor Fan Operating Costs	Savings with RF	Annual Savings
8 hrs. per day 5 days per week	2080	$2,237	$4,474	$2,237	50%
16 hrs. per day 5 days per week	4160	$4,474	$8,984	$4,474	50%
24 hrs. per day 5 days per week	6240	$6,711	$13,442	$6,711	50%

Assumes the use of a 484 RF running 50,000 cfm (84,933 m^3/h) at a 2" (50.8 mm) pressure drop versus a competitor collector running at a 4" (101.6 mm) pressure drop.
Assumes the use of a variable frequency drive, a fan efficiency of 81%, 0.746 watts of energy per horsepower and a 90% electrical transmission efficiency.
Assumes U.S. Energy Average Cost of 6.68 cents per kilowatt hour and a Baldor motor that is operating at full-load amps.
Your savings may vary based on your costs per kilowatt hour and the efficiency of your motor.

TWO BREAKTHROUGH FILTER OPTIONS FOR YOUR RF

DURA-LIFE FILTER BAGS PROVIDE TWICE THE LIFE OVER STANDARD 16 OZ POLYESTER BAGS

Traditional 16 oz polyester bags are produced via a needling process that creates larger pores where dust can embed into the fabric, inhibiting cleaning and reducing bag life. Dura-Life bags are engineered with a unique hydroentanglement process that uses water jets to blend the fibers. This process creates a felt with smaller pores which keeps more dust on the surface of the filter resulting in better pulse cleaning and longer bag life.

DURA-LIFE BENEFITS

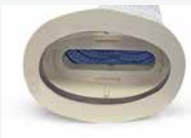
- Up to two times longer bag life
- Energy savings due to lower pressure drop
- Reduced replacement bag and maintenance costs due to longer bag life

PLEATED BAGS WITH ULTRA-WEB SB PROVIDE LONGER LIFE AND REDUCED EMISSIONS

For more than two decades, Donaldson Torit has advanced the proven Ultra-Web fine fiber technology. Ultra-Web provides a very fine, continuous fiber of 0.2-0.3 micron in diameter to form a web-like net that traps dust on the surface of the media. Combining Ultra-Web technology with a sturdy spunbond polyester substrate, Ultra-Web SB pleated bag filters provide longer life, reduced downtime and reduced emissions.

ULTRA-WEB SB PLEATED BAG BENEFITS

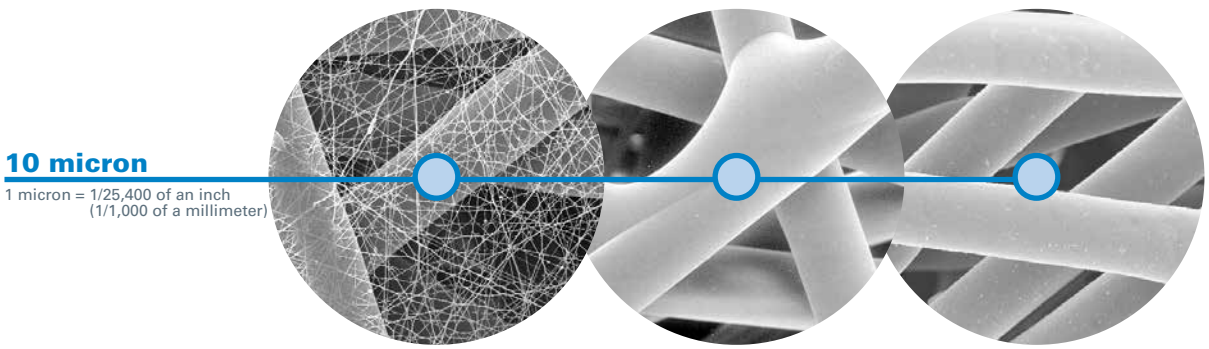
- Up to two times longer filter life
- Energy savings due to lower pressure drop
- Reduced maintenance and downtime costs
- Reduced emissions
- Snap-in design for tool free installation
- Fully synthetic snap-in design eliminates the need to provide bonding points



Snap-In

Fully Synthetic Snap-In

Bolt Safe



Ultra-Web SB Fine fiber Technology (600x)

Spunbond Media (600x)

Standard 16 oz. Polyester Media (600x)

PROVEN PERFORMANCE ON HUNDREDS OF APPLICATIONS

776RF at Wood Furniture Plant

156RF on Grain Processing

356RF on Wood Dust with High Inlet & Custom Color

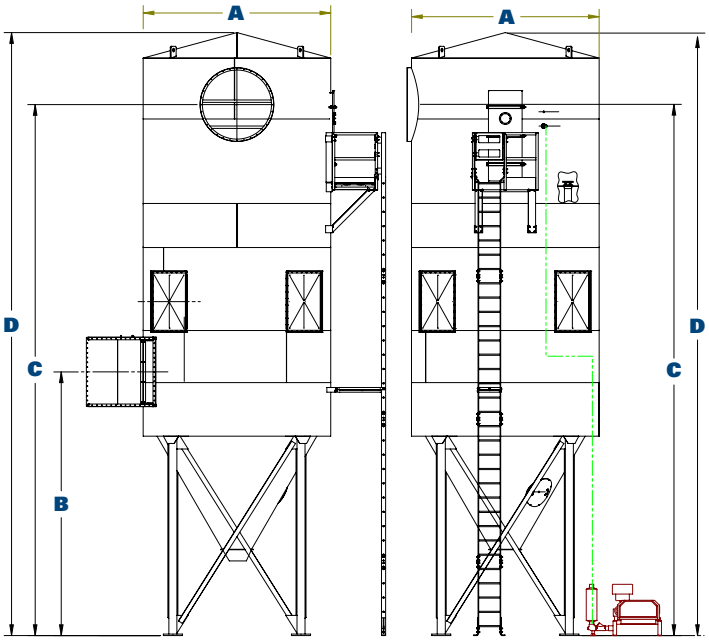
124RF on Quarrying

376RF at Cabinet Shop

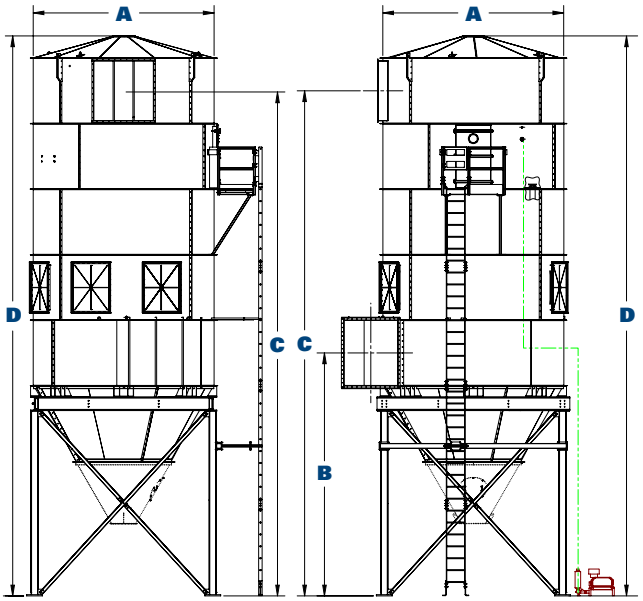
484RF - Two High Temperature Collectors on Secondary Aluminum Processing

DIMENSIONS & SPECIFICATIONS

MODEL 484RFW & 608RFWP (WALK-IN)

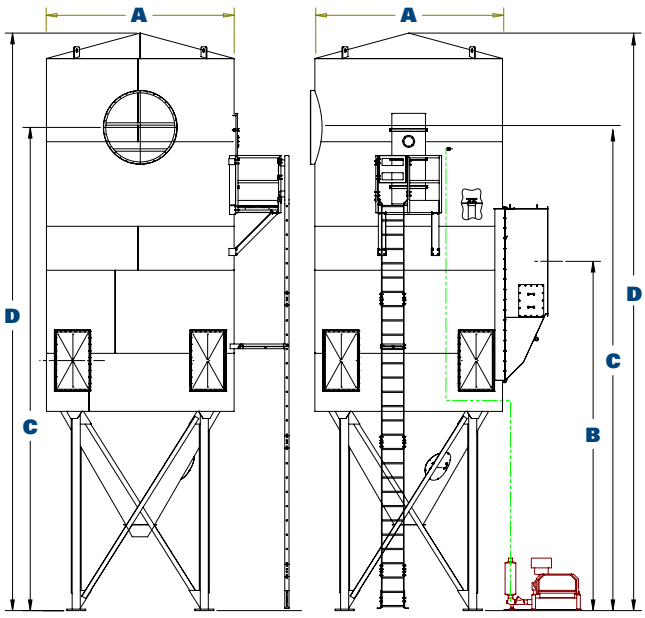


484RFW

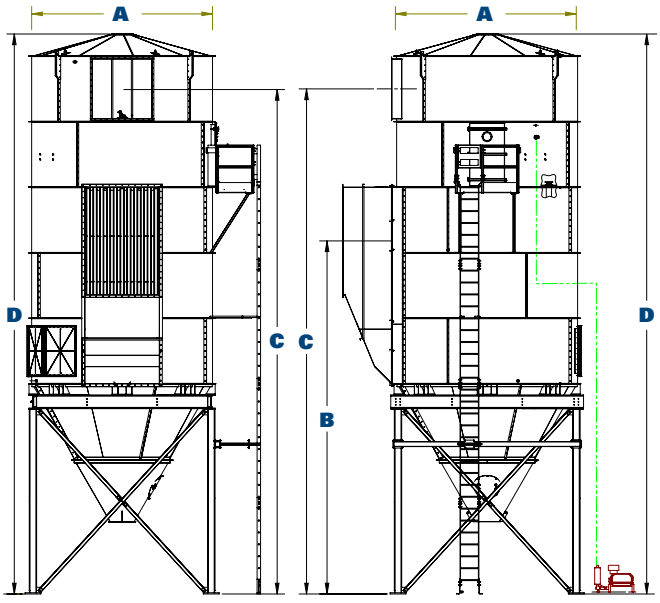


Front View - 608 RFWP

MODEL 458RFWH & 570RFWPH (WALK-IN HIGH BODY INLET)



458RFWH



570 RFWPH

RF Model Nomenclature:
First number denotes the number of bags and last number denotes the bag length in feet. W = walk-in plenum for sheltered bag removal; H = high body inlet; P = panelized construction for field assembly.

Model*	RFW Dimensions							
	A		B		C		D	
	in	mm	in	mm	in	mm	in	mm
118RFWH8	96.0	2,438.4	228.0	5,791.2	321.0	8,153.4	366.0	9,296.4
118RFWH10	96.0	2,438.4	254.0	6,451.6	351.0	8,915.4	420.0	10,668.0
124RF8	96.0	2,438.4	156.0	3,962.4	343.0	8,712.2	388.0	9,855.2
124RF10	96.0	2,438.4	156.0	3,962.4	367.0	9,321.8	436.0	11,074.4
146RFWH8	96.0	2,438.4	228.0	5,791.2	321.0	8,153.4	366.0	9,296.4
146RFWH10	96.0	2,438.4	254.0	6,451.6	351.0	8,915.4	420.0	10,668.0
156RF8	96.0	2,438.4	156.0	3,962.4	343.0	8,712.2	388.0	9,855.2
156RF10	96.0	2,438.4	156.0	3,962.4	367.0	9,321.8	436.0	11,074.4
226RFWH8	123.0	3,124.2	239.4	6,080.8	344.4	8,747.8	395.1	10,035.5
226RFWH10	123.0	3,124.2	257.4	6,538.0	374.4	9,509.8	449.1	11,407.1
226RFWH12	123.0	3,124.2	275.4	6,995.2	404.4	10,271.8	503.1	12,778.7
232RF8	123.0	3,124.2	184.8	4,693.9	378.4	9,611.4	429.1	10,899.1
232RF10	123.0	3,124.2	184.8	4,693.9	402.4	10,221.0	477.1	12,118.3
232RF12	123.0	3,124.2	184.8	4,693.9	426.4	10,830.6	525.1	13,337.5
266RFWH8	123.0	3,124.2	239.4	6,080.8	344.4	8,747.8	395.1	10,035.5
266RFWH10	123.0	3,124.2	257.4	6,538.0	374.4	9,509.8	449.1	11,407.1
266RFWH12	123.0	3,124.2	275.4	6,995.2	404.4	10,271.8	503.1	12,778.7
276RF8	123.0	3,124.2	184.8	4,693.9	378.4	9,611.4	429.1	10,899.1
276RF10	123.0	3,124.2	184.8	4,693.9	402.4	10,221.0	477.1	12,118.3
276RF12	123.0	3,124.2	184.8	4,693.9	426.4	10,830.6	525.1	13,337.5
356RFWH8	139.6	3,545.8	253.8	6,446.5	358.8	9,113.5	413.1	10,492.7
356RFWH10	139.6	3,545.8	271.8	6,903.7	388.8	9,875.5	467.1	11,864.3
356RFWH12	139.6	3,545.8	289.8	7,360.9	418.8	10,637.5	521.1	13,235.9
376RF8	139.6	3,545.8	202.8	5,151.1	398.8	10,129.5	453.1	11,508.7
376RF10	139.6	3,545.8	202.8	5,151.1	423.1	10,746.7	501.1	12,727.9
376RF2	139.6	3,545.8	202.8	5,151.1	446.8	11,348.7	549.1	13,947.1
458RFWH8	157.6	4,003.0	269.4	6,842.8	374.6	9,514.8	431.4	10,957.6
458RFWH10	157.6	4,003.0	288.4	7,325.4	404.4	10,271.8	485.1	12,321.5
458RFWH12	157.6	4,003.0	305.4	7,757.2	434.4	11,033.8	539.1	13,693.1
484RF8	157.6	4,003.0	221.4	5,623.6	420.4	10,678.2	477.1	12,118.3
484RF10	157.6	4,003.0	221.4	5,623.6	444.4	11,287.8	525.1	13,337.5
484RF12	157.6	4,003.0	221.4	5,623.6	468.4	11,897.4	573.1	14,556.7
570RFWPH10	188.0	4,775.2	345.1	8,765.5	498.5	12,661.9	553.5	14,058.9
570RFWPH12	188.0	4,775.2	345.1	8,765.5	498.5	12,661.9	577.5	14,668.5
608RFWP10	188.0	4,775.2	234.2	5,948.7	498.5	12,661.9	553.3	14,053.8
608RFWP12	188.0	4,775.2	234.2	5,948.7	522.5	13,271.5	601.3	15,273.0
776RFWPH10	228.5	5,803.9	380.4	9,662.2	533.8	13,558.5	594.3	15,095.2
776RFWPH12	228.5	5,803.9	380.4	9,662.2	533.8	13,558.5	618.3	15,704.8
825RFWP10	228.5	5,803.9	269.6	6,847.8	533.8	13,558.5	594.3	15,095.2
825RFWP12	228.5	5,803.9	269.6	6,847.8	557.8	14,168.1	642.3	16,314.4
851RFWPH10	228.5	5,803.9	380.4	9,662.2	533.8	13,558.5	594.3	15,095.2
851RFWPH12	228.5	5,803.9	380.4	9,662.2	533.8	13,558.5	642.3	16,314.4
905RFWP10	228.5	5,803.9	269.6	6,847.8	533.8	13,558.5	594.3	15,095.2
905RFWP12	228.5	5,803.9	269.6	6,847.8	557.8	14,168.1	642.3	16,314.4

* All units 570 and larger are of panelized construction and dimension "B" is from center of the inlet to bottom of the 36-in (914.4 mm) hopper outlet.

Model*	Bag Cloth Area		Pleated Bag Media Area								No. of Bags	Air Pump (hp)	Shipping Weight	
			30" UW		40" UW		60" UW		80" SB				RFW	
	ft^2	m^2	ft^2	m^2	ft^2	m^2	ft^2	m^2	ft^2	m^2			lb	kg
118RFH8	1228	114	1,569	146	2,053	191	3,139	292	4,118	383	118	3.0	10,000	4,535.9
118RFH10	1535	143	1,569	146	2,053	191	3,139	292	4,118	383	118	3.0	10,900	4,944.2
124RF8	1290	120	1,649	153	2,158	200	3,298	306	4,328	402	124	3.0	10,048	4,557.7
124RF10	1613	150	1,649	153	2,158	200	3,298	306	4,328	402	124	3.0	10,910	4,948.7
146RFH8	1519	141	1,942	180	2,540	236	3,883	361	5,095	473	146	3.0	10,300	4,672.0
146RFH10	1899	176	1,942	180	2,540	236	3,883	361	5,095	473	146	3.0	11,200	5,080.2
156RF8	1623	151	2,075	193	2,714	252	4,149	385	5,444	506	156	3.0	10,298	4,671.1
156RF10	2029	189	2,075	193	2,714	252	4,149	385	5,444	506	156	3.0	11,217	5,087.9
226RFH8	2352	218	3,006	279	3,932	365	6,011	558	7,887	733	226	5.0	15,300	6,940.0
226RFH10	2940	273	3,006	279	3,932	365	6,011	558	7,887	733	226	5.0	16,600	7,529.6
226RFH12	3528	328	3,006	279	3,932	365	6,011	558	7,887	733	226	5.0	17,800	8,073.9
232RF8	2414	224	3,086	287	4,037	375	6,171	573	8,097	752	232	5.0	15,304	6,941.8
232RF10	3018	280	3,086	287	4,037	375	6,171	573	8,097	752	232	5.0	16,591	7,525.6
232RF12	3621	336	3,086	287	4,037	375	6,171	573	8,097	752	232	5.0	17,825	8,085.3
266RFH8	2768	257	3,538	329	4,628	430	7,075	657	9,283	862	266	5.0	15,600	7,076.0
266RFH10	3460	321	3,538	329	4,628	430	7,075	657	9,283	862	266	5.0	17,000	7,711.1
266RFH12	4152	386	3,538	329	4,628	430	7,075	657	9,283	862	266	5.0	18,300	8,300.7
276RF8	2872	267	3,671	341	4,802	446	7,341	682	9,632	895	276	5.0	15,614	7,082.4
276RF10	3590	334	3,671	341	4,802	446	7,341	682	9,632	895	276	5.0	16,975	7,699.7
276RF12	4308	400	3,671	341	4,802	446	7,341	682	9,632	895	276	5.0	18,290	8,296.2
356RFH8	3705	344	4,735	440	6,194	575	9,469	880	12,424	1,154	356	7.5	19,600	8,890.4
356RFH10	4631	430	4,735	440	6,194	575	9,469	880	12,424	1,154	356	7.5	21,200	9,616.2
356RFH12	5557	516	4,735	440	6,194	575	9,469	880	12,424	1,154	356	7.5	22,900	10,387.3
376RF8	3913	364	5,001	465	6,542	608	10,001	929	13,122	1,219	376	7.5	19,617	8,898.1
376RF10	4891	454	5,001	465	6,542	608	10,001	929	13,122	1,219	376	7.5	21,248	9,637.9
376RF12	5869	545	5,001	465	6,542	608	10,001	929	13,122	1,219	376	7.5	22,868	10,372.8
458RFH8	4766	443	6,091	566	7,969	740	12,182	1,132	15,984	1,485	458	7.5	25,400	11,521.2
458RFH10	5958	553	6,091	566	7,969	740	12,182	1,132	15,984	1,485	458	7.5	27,800	12,609.9
458RFH12	7149	664	6,091	566	7,969	740	12,182	1,132	15,984	1,485	458	7.5	30,100	13,653.1
484RF8	5037	468	6,437	598	8,422	782	12,874	1,196	16,892	1,569	484	7.5	25,458	11,547.6
484RF10	6296	585	6,437	598	8,422	782	12,874	1,196	16,892	1,569	484	7.5	27,796	12,608.1
484RF12	7555	702	6,437	598	8,422	782	12,874	1,196	16,892	1,569	484	7.5	30,115	13,659.9
570RFH10	7415	689	7,581	704	9,918	921	15,161	1,409	19,893	1,848	570	15.0	40,049	18,165.9
570RFH12	8897	827	7,581	704	9,918	921	15,161	1,409	19,893	1,848	570	15.0	42,029	19,064.0
608RF10	7909	735	8,086	751	10,579	983	16,172	1,502	21,219	1,971	608	15.0	41,505	18,826.4
608RF12	9491	882	8,086	751	10,579	983	16,172	1,502	21,219	1,971	608	15.0	44,278	20,084.2
776RFH10	10094	938	10,321	959	13,502	1,254	20,641	1,918	27,082	2,516	776	20.0	50,792	23,038.9
776RFH12	12113	1125	10,321	959	13,502	1,254	20,641	1,918	27,082	2,516	776	20.0	53,220	24,140.2
825RF10	10732	997	10,973	1,019	14,355	1,334	21,944	2,039	28,793	2,675	825	20.0	53,446	24,242.7
825RF12	12878	1196	10,973	1,019	14,355	1,334	21,944	2,039	28,793	2,675	825	20.0	56,969	25,840.7
851RFH10	11070	1028	11,318	1,052	14,807	1,376	22,636	2,103	29,700	2,759	851	20.0	51,544	23,380.0
851RFH12	13284	1234	11,318	1,052	14,807	1,376	22,636	2,103	29,700	2,759	851	20.0	54,095	24,537.1
905RF10	11772	1094	12,037	1,118	15,747	1,463	24,072	2,236	31,585	2,934	905	20.0	54,255	24,609.7
905RF12	14127	1312	12,037	1,118	15,747	1,463	24,072	2,236	31,585	2,934	905	20.0	57,909	26,267.1

* All units 570 and larger are of panelized construction. ** Based on clean filters.

STANDARD FEATURES & AVAILABLE OPTIONS

Collector Design	Std	Opt
All-Welded or Panelized Construction	X	
Heavy-Duty 1/4-in (6.4 mm) Tubesheet Construction	X	
Air Pump (TEFC Motor Drive) for Cleaning System	X	
1/3 HP TEFC Motor* for Manifold Drive	X	
Involute Scroll Inlet	X	
Round Outlet for RFW	X	
Rectangular Outlet for RFP	X	
Rectangular Outlet for RFW		X
High Body Inlet		X
Ladders & Platform Assemblies		X
Stainless Steel Construction		X
Internal Service Light		X
Bags & Cages		
Dura-Life Twice the Life Polyester Felt Oval-Shaped Bag Filters	X	
Galvanized Grounded Bag Filter Cages with Positive Seal Boltsafe™ Hardware	X	
Ultra-Web® SB Pleated Bags with Boltsafe Hardware		X
Ultra-Web® SB Fully Synthetic Snap-In Pleated Bags		X
Variety of Bag Filter and Pleated Bag Media Options		X
Hopper Design		
60° Conical Hoppers	X	
Hopper Manhole	X	
Outlet Transitions		X
Hopper Service Port		X
Hopper Level Indicators		X
3" (76.2 mm) Hopper Water Overflow Check Valve		X

Support Structure†	Std	Opt
Steel Support Legs		X
Electrical Controls, Gauges and Enclosures		
Magnehelic®** Gauge	X	
Pulse Solenoid Valve in NEMA 9 Enclosure	X	
Solid-State Timer in Type (NEMA/UL) 4 Enclosure	X	
Photohelic®** Gauge		X
RF Electrical Control Panel		X
iCue™ Connected Filtration Service		X
Safety Features		
Sprinkler Taps		X
Explosion Vents		X
Ladder Safety System		X
Paint System		
Prime Coated Interior	X	
Textured Multi-Coat Paint Finish with 2,000-Hour Salt Spray Performance	X	
Premium Duty Finish		X
Custom Colors		X
Ceramic Insulation Finish		X
Warranty		
10-Year Warranty	X	

* All 60 Hz motors 1 HP and above are EISA compliant and considered NEMA Premium® per Table 12-12. NEMA Premium is a registered trademark of National Electrical Manufacturers Association.

** Magnehelic and Photohelic are registered trademarks of Dwyer Instruments, Inc.

† Donaldson Torit equipment is designed to IBC guidelines for specific wind speed exposure and seismic spectral acceleration at grade level. Contact your Donaldson Torit representative for detailed information available on the equipment's Spec Control drawings. Equipment may be customized to meet unique, customer-specified site requirements.

Industry-Leading Technology

- Advanced filtration technology for optimal performance
- Reduced energy consumption and cost of ownership
- Advanced design and testing capabilities

The Most Filters and Parts

- For every brand and style of collector
- Wide range of filtration media for any application
- 90,000 filters and parts in stock and ready to ship

Unparalleled Support

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- Comprehensive pre- and post-sale support
- 40 manufacturing plants and 14 distribution centers worldwide

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North America
Email: donaldsontorit@donaldson.com
Phone: (USA): +1-800-365-1331 • (MX): +1-800-343-36-39

Australasia
Email: marketing.australia@donaldson.com
Phone: +61-2-4350-2000
Toll Free: (AU) +1800-345-837 • (NZ) +0800-743-387

China
Email: info.cn@donaldson.com
Phone: +86-400-820-1038

Donaldson Europe B.V.B.A.
Email: IAF-europe@donaldson.com
Phone: +32-16-38-3811

India
Email: info.difs@donaldson.com
Phone: +91-124-4807-400 • +18001035018

Japan
Email: jp-ndl.ifsweb@donaldson.com
Phone: +81-42-540-4112

Korea
Email: iaf-kr@donaldson.com
Phone: +82-2-517-3333

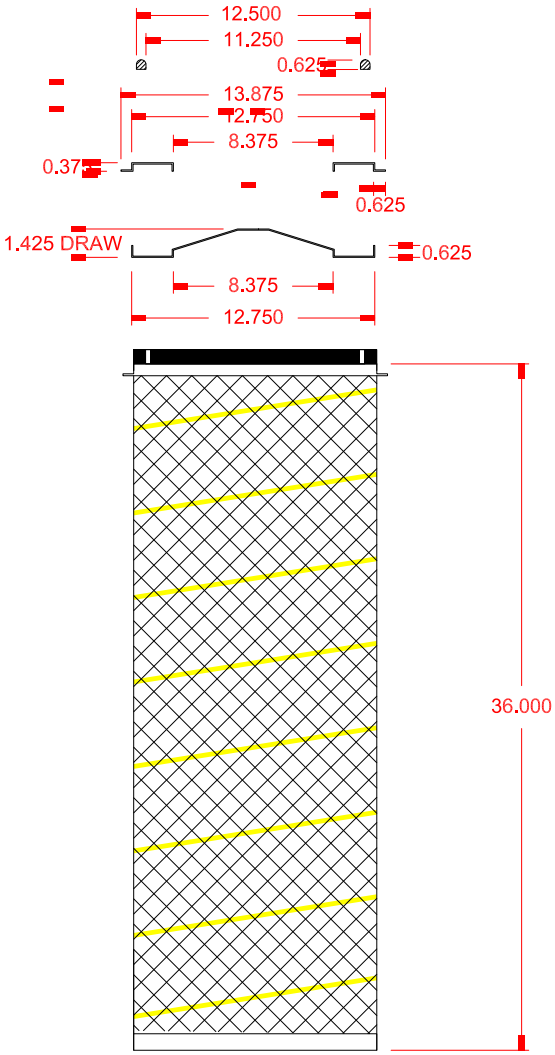
Latinoamerica
Email: IndustrialAir@donaldson.com
Phone: +52-449-300-2442

South Africa
Email: SAMarketing@donaldson.com
Phone: +27-11-997-6000

Southeast Asia
Email: IAF.SEA@donaldson.com
Phone: +65-6311-7373

F118036 ENG (10/21) RF Baghouse Dust Collector

FA 600883



CONSTRUCTION:

ELECTROPLATED GALVANIZED OPEN END CAP WITH ROUND MOUNTING FLANGE
ELECTROPLATED GALVANIZED CLOSED END CAP
G-90 GALVANIZED EXPANDED METAL OUTER BODY
G-90 GALVANIZED EXPANDED METAL INNER CORE
225 SQ FT (225 PLEATS) CELLULOSE/SYNTHETIC 80/20 MEDIA
EPDM RUBBER SEALING GASKET APPLIED TO THE FLANGED END CAP
PVC SEALANT APPLIED TO BOTH ENDS
HOT MELT ADHESIVE BEAD APPLIED OUTSIDE ONLY
PACKAGED ONE PER CARTON
WEIGHT: 21 POUNDS

EFFICIENCY: (PER ASHRAE 52.1-1992)

TEST FLOW RATE: 750 CFM
INITIAL RESISTANCE: .72 INCHES W.G.
INITIAL DUST SPOT EFFICIENCY: 43.9%
DUST SPOT EFFICIENCY AT 1" W.G.: 98%
DUST SPOT EFFICIENCY AT 2" W.G.: 99%
DUST SPOT EFFICIENCY AT 4" W.G.: 100%
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY: 97%
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE: 100%
ASHRAE DUST HOLDING CAPACITY: 5900 GRAMS

MINIMUM EFFICIENCY REPORTING VALUE (PER ASRAE 52.2-2012): MERV 11

ATTACHMENT C

SDS

Safety Data Sheet

Revision: FEB. 2014

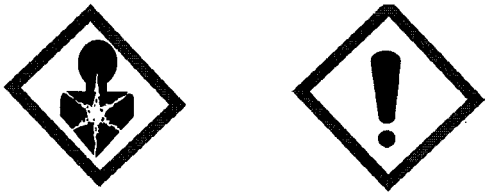
SECTION 1.—Product and Company Identification

Product Name	**NAIGAI CERABEADS 60**
Chemical Name	Mullite
Manufacturer/Supplier	ITOCHU CERATECH CORPORATION
Address	12-8 Shiokusa-cho, Seto-shi, Aichi, 489-0895, JAPAN
Phone Number	+81-561-21-4134
Fax Number	+81-561-21-4141
Emergency Phone Number	+81-561-21-3715

SECTION 2.—Hazard Identification

GHS Classification

Hazard pictograms



Signal word: Danger

Hazard statements:
- May cause respiratory irritation.
- Causes damage to lung through prolonged or repeated exposure.

Precautionary statements:
- Do not eat, drink or smoke when using this product.
- Use only outdoors or in a well-ventilated area.
- Do not breath dust.
- Wash hands thoroughly after handling.

Response Precautionary statements:
- IF INHALED, Remove victims to fresh air and keep comfortable for breathing
- Get medical attention / advice if you feel unwell.

Storage precautionary statements:
- Keep container tightly closed and store in a well-ventilated place.

Disposal precautionary statements:
- Dispose of contents / container to relevant local and national regulations.

SECTION 3.—Composition/Information on the Components

Compositions

Mineral Name	Chemical Formula	CAS Number
Mullite	$3Al_2O_3 \cdot 2SiO_2$	1302-93-8

SECTION 4.—First Aid Measures

Inhalation

Remove to fresh air.

Skin contact

Wash skin thoroughly with soap and water.

Eye contact

Immediately flood the eye with plenty of water for at least 10 minutes, holding the eye open. Obtain medical attention if soreness or redness persists.

Ingestion

Wash out mouth with water. If accidentally swallowed, drink large quantities of water, then stack fingers down throat to vomit. Obtain medical attention.

SECTION 5.—Fire Fighting Measures

Flash Point	N/A
Extinguishing agent	Any type of agent can be used.
Protection for Fireman	Use appropriate protective equipment

SECTION 6.—Accidental Release Measures

Carefully sweep up and remove. Avoid raising dust.

Use Filter respirator, Safety goggles and Gloves.

Floors covered with the product may become slippery. Avoid walking on the product.

SECTION 7.—Handling and Storage

Handling

Use Filter respirator, Safety goggles and Gloves.

Avoid breakage of package.

Avoid raising dust.

Avoid water to keep better fluidity on handling.

Storage

Use some method to avoid dust hanging in the air.

SECTION 8.—Exposure Controls/Personal Protection

Permissive Concentration

Mineral Name	CAS Number	OSHA PEL	ACGIH TLV
Mullite	1302-93-8	15 mg/m^3 (total) 5 mg/m^3 (respirable)	Not established

Engineering Measure

Use exhaust ventilation to keep airborne concentration below exposure limit.

Personal protective equipment

Respiratory protection	Filter respirator, Dust respirator.
Hand Protection	Gloves
Skin protection	Full-body suit.
Eye Protection	Face shields, Safety goggles.

SECTION 9.—Physical and Chemical Properties

Appearance:	Free flowing sand	**Color:**	Brown
Bulk Density:	1.7 g/cm^3 / 106 lb/ft^3	**Odor:**	None
Melting Point:	1825 C / 3317 F	**Flash Point:**	N/A
Flammability:	Non flammable Solid	**Explosive Property:**	N/A
Volatility:	N/A	**Solubility in water:**	Insoluble

SECTION 10.—Stability and Reactivity

Stability/Reactivity: Stable

Hazardous Decomposition or byproducts: Mullite dissolves in hydrofluoric acid and produces a corrosive gas (silicon tetrafluoride).

SECTION 11.—Toxicological Information

Acute toxicity: None

SECTION 12.—Ecological Information

Involatile, insoluble and resistant to biodegradation.

SECTION 13.—Disposal

In case of disposal by subcontractor, choose an appropriate industrial waste management contractor approved by the organ of government, and make sure that the disposal is carried out properly, with related laws and ordinances being observed.

SECTION 14.—Transport Information

Check there is no leak nor load shift.

SECTION 15.—Regulatory Information

All the components are on the TSCA inventory.

SECTION 16.—Other Information

This information herein is given in good faith, but no warranty, express or implied, is made. All materials may present unknown hazards and should be used in caution.

SAFETY DATA SHEET

JUL 16 2015

SAND - G29

G29

SHELL CORE

1. Identification

Product identifier	**Super F G29M1269**
Other means of identification	
SDS number	000000107062
Material Number	305606
Recommended use	Coated Sand for Foundry Molds and Cores
Recommended restrictions	Workers (and your customers or users in the case of resale) should be informed of the potential presence of respirable dust and respirable crystalline silica as well as their potential hazards. Appropriate training in the proper use and handling of this material should be provided as required under applicable regulations.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name	HA International, LLC	
Address	630 Oakmont Lane Westmont, IL 60559 United States	
Telephone	General Assistance	(630) 575-5700
	EH&S	(630) 575-5705
	Regulatory Affairs	(630) 575-5722
	Customer Service	(800)323-6863
Website	www.ha-international.com	
E-mail	msdsquestions@ha-international.com	
Contact person	Jacqueline Ramirez 630-575-5722, Jeff Krause 630-575-5705	
Emergency phone number	Medical Emergency	(303)-389-1396
	Toll Free	(866)595-5738

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, oral	Category 4
	Sensitization, respiratory	Category 1
	Sensitization, skin	Category 1
	Carcinogenicity	Category 1A
Environmental hazards	Not classified.	
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	Harmful if swallowed. May cause an allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause cancer.

Precautionary statement

Prevention	This is a hazardous chemical product. It is important that all employees working with this product receive initial and periodic refresher training in its safe use and handling, both for basic risk management purposes and for compliance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200. Model training materials are available upon request for many of our products. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation wear respiratory protection. Take precautionary measures, such as capturing dust at generation points, practicing good housekeeping, controlling sources of ignition (including static electricity), and grounding equipment, to minimize dust accumulation, airborne dust, and static discharges during handling and/or conveyance. Prevent personnel exposure to dust, smoke, and fumes generated from pouring, cooling and shakeout operations through the use of effective local and general exhaust ventilation systems and/or personal protective equipment. Personnel exposure monitoring should be conducted periodically to verify these systems are operating in a manner that prevents employee exposures above applicable criteria.
Response	If swallowed: Call a poison center/doctor if you feel unwell. If on skin: Wash with plenty of water. If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. If exposed or concerned: Get medical advice/attention. Specific treatment (see this label). Rinse mouth. If skin irritation or rash occurs: Get medical advice/attention. If experiencing respiratory symptoms: Call a poison center/doctor. Wash contaminated clothing before reuse.
Storage	Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	Hazardous emissions are normally generated when cores or molds are exposed to molten metal during pouring, cooling and shakeout operations. Formaldehyde may be released from this product during processing. THIS PRODUCT IS COATED WITH A PHENOLIC RESIN WHICH MAY ABRADE DURING HANDLING OR MECHANICAL CONVEYANCE GENERATING ORGANIC DUST. WHEN HANDLING OR CONVEYING IN ENCLOSED SPACES, ANY ABRADED PHENOLIC RESIN DUST FROM THIS PRODUCT CAN BE COMBUSTIBLE AND MAY PRESENT A FIRE OR EXPLOSION HAZARD WHEN DISPERSED AND IGNITED IN AIR.
Supplemental information	96.31% of the mixture consists of component(s) of unknown acute oral toxicity.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Quartz (SiO2)		14808-60-7	90 - 100
Kaolin		1332-58-7	1 - < 3
Hexamethylenetetramine		100-97-0	< 1
Other components below reportable levels			3 - < 5

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation	If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
Skin contact	Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions.
Eye contact	Rinse with water. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
Most important symptoms/effects, acute and delayed	May cause an allergic skin reaction. Dermatitis. Rash. May cause allergic respiratory reaction.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	IF exposed or concerned: Get medical advice/attention. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire-fighting equipment/instructions	Use water spray to cool unopened containers.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	This product is miscible in water. Stop the flow of material, if this is without risk. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places where dust is formed. Do not breathe dust. Do not taste or swallow. Avoid contact with skin. Avoid contact with eyes. Avoid prolonged exposure. Avoid contact with clothing. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. When using, do not eat, drink or smoke. Wash hands thoroughly after handling. Core and mold production operations may yield formaldehyde and ammonia vapors through the decomposition of hexamethylenetetramine. Phenol vapors may also be generated during core production operations. Hazardous airborne concentrations of crystalline silica may be generated during shakeout operations, and during casting cleaning and grinding operations. Review ASTM E 1132-99, Standard Practice for Health Requirements Relating to Occupational Exposure to Respirable Crystalline Silica This product is coated with a phenolic resin. The phenolic resin surface may abrade during handling or mechanical conveyance. Such abrasion may allow dispersion of organic dust. Take precautionary measures, such as capturing dust at generation points, practicing good housekeeping, controlling sources of ignition (including static electricity), and grounding equipment, to minimize dust accumulation, airborne dust, and static discharges during handling and/or conveyance as instructed in NFPA Pamphlet No. 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, UK HSE Guidance HSG 103, approved Codes of Practice (ACOPS) established for Explosive Atmospheres under the ATEX Directive 1999/92/EC for worker protection and ATEX Directive 94/9/EC that regulates equipment and protection systems used in potentially explosive atmospheres or other national guidance on safe handling of combustible dusts.
Conditions for safe storage, including any incompatibilities	Store locked up. Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Kaolin (CAS 1332-58-7)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.

US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value	Form
Quartz (SiO2) (CAS 14808-60-7)	TWA	0.3 mg/m3	Total dust.
		0.1 mg/m3	Respirable.
		2.4 millions of particle	Respirable.

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Kaolin (CAS 1332-58-7)	TWA	2 mg/m3	Respirable fraction.

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Quartz (SiO2) (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value	Form
Kaolin (CAS 1332-58-7)	TWA	5 mg/m3	Respirable.
		10 mg/m3	Total
Quartz (SiO2) (CAS 14808-60-7)	TWA	0.05 mg/m3	Respirable dust.

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines Occupational exposure to nuisance dust (total and respirable) and respirable crystalline silica should be monitored and controlled.

Appropriate engineering controls Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection Chemical resistant gloves. Heat resistant work gloves are recommended for core room operations where heated cores or dies are handled.

Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended. Chemical resistant gloves.

Respiratory protection Respiratory protection is not normally required for general core room workers when sufficient ventilation is provided to consistently maintain exposures below acceptable exposure criteria. Periodic exposure monitoring should be conducted to ensure exposures remain below relevant criteria.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations When using, do not eat, drink or smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance

Physical state Solid.

Form Free flowing granules

Color Tan

Odor Odorless

Odor threshold Not available.

pH Not available.

pH concentration Not Available

Melting point/freezing point Not Available

Initial boiling point and boiling range Not Available

Flash point Not Available

Evaporation rate Not Available

Flammability (solid, gas) Not available.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not available.

Flammability limit - upper (%) Not available.

Explosive limit - lower (%) Not Available

Explosive limit - upper (%) Not Available

Vapor pressure Not Available

Vapor density Not Available

Relative density 2.65

Solubility(ies)	
Solubility (water)	Not Available
Partition coefficient (n-octanol/water)	Not Available
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Dynamic viscosity	Not Available
Thermal hazards	
Relative self-ignition temperature	Not Available

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Powerful oxidizers. Chlorine.
Hazardous decomposition products	Hazardous emissions are normally generated when cores or molds are exposed to molten metal during pouring, cooling and shakeout operations through the partial combustion and/or pyrolysis of the binder system and other components of the mold package. These emissions may potentially include but are not limited to carbon monoxide, carbon dioxide, benzene, aldehydes including formaldehyde, phenol, hydrogen cyanide, ammonia, and a wide variety of organic compounds including benzo(a) pyrene. Oxygen may be deficient in pouring, cooling and shakeout areas. Hazardous particulate matter is also normally generated in pouring, cooling and shakeout operations including, but not limited to smoke, soot, polycyclic organic compounds, particulates, nitrogen oxides and crystalline silica.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Harmful if swallowed.
Inhalation	Prolonged inhalation may be harmful. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Exposure to emissions from mold and core production operations, and pouring, cooling and shakeout operations, may be hazardous.
Skin contact	May cause an allergic skin reaction.
Eye contact	Direct contact with eyes may cause temporary irritation.
Symptoms related to the physical, chemical and toxicological characteristics	May cause an allergic skin reaction. Dermatitis. Rash.

Information on toxicological effects

Acute toxicity	Harmful if swallowed. May cause an allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Components	Species	Test Results
Kaolin (CAS 1332-58-7)		
Acute		
Dermal		
LD50	Rat	> 5000 mg/kg
Oral		
LD50	Rat	> 5000 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation.
Respiratory or skin sensitization	
Respiratory sensitization	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Skin sensitization	May cause an allergic skin reaction.

Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans. However in making the overall evaluation, IARC noted that "carcinogenicity was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.) In June 2003, SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk..." (SCOEL SUM Doc 94-final, June 2003) May cause cancer. According to the current state of the art, worker protection against silicosis can be consistently assured by respecting the existing regulatory occupational exposure limits. Occupational exposure to respirable dust and respirable crystalline silica should be monitored and controlled.

IARC Monographs. Overall Evaluation of Carcinogenicity

Quartz (SiO2) (CAS 14808-60-7) 1 Carcinogenic to humans.

US. National Toxicology Program (NTP) Report on Carcinogens

Quartz (SiO2) (CAS 14808-60-7) Known To Be Human Carcinogen.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not available.
Chronic effects	Prolonged inhalation may be harmful. Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components		Species	Test Results
Hexamethylenetetramine (CAS 100-97-0)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	29868 - 43390 mg/l, 48 hours
Fish	LC50	Bleak (Alburnus alburnus)	> 10000 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

Persistence and degradability	No data is available on the degradability of this product.
Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

Not regulated as dangerous goods

TDG

Not regulated as dangerous goods

IATA

Not regulated as dangerous goods

IMDG

Not regulated as dangerous goods

15. Regulatory information

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Chemical name	CAS number	Reportable quantity	Threshold planning quantity	Threshold planning quantity, lower value	Threshold planning quantity, upper value
Phenol	108-95-2	1000	500 lbs		
Formaldehyde	50-00-0	100	500 lbs		

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Formaldehyde	50-00-0	< 0.1

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Kaolin (CAS 1332-58-7)
Quartz (SiO2) (CAS 14808-60-7)

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. Pennsylvania RTK - Hazardous Substances

Kaolin (CAS 1332-58-7)
Quartz (SiO2) (CAS 14808-60-7)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

Formaldehyde (CAS 50-00-0)	Listed: January 1, 1988
Quartz (SiO2) (CAS 14808-60-7)	Listed: October 1, 1988
Titanium dioxide (CAS 13463-67-7)	Listed: September 2, 2011

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

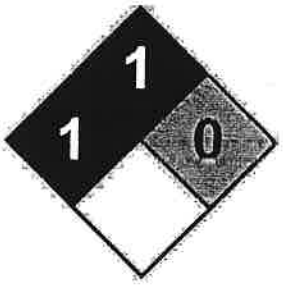
Issue date 01-07-2015

Revision date 07-16-2015

Version # 02

HMIS® ratings Health: 1*
Flammability: 1
Physical hazard: 0

NFPA Ratings



Disclaimer SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE, except that the product shall conform to contracted specifications, and that the product does not infringe any valid United States or Canadian patent. No claim of any kind shall be greater in amount than the purchase price of the quantity of product in respect of which damages are claimed. In no event shall Seller be liable for incidental or consequential damages, whether Buyer's claim is based on contract, breach of warranty, negligence or otherwise.

Revision Information Hazard(s) identification: <INDENT>Prevention
Physical & Chemical Properties: Multiple Properties

W Abrasives
a brand of winoa

SAFETY DATA SHEET

SECTION 1. Product and Business Information

Substance

Cast Steel Abrasive, shot (spherical) and grit (angular) or shot/grit blends.

Manufacturer

WINOA USA Inc.

1 Abrasive Avenue
Bedford, Virginia 24523 USA
www.wabrasives.com
Emergency phone number
(540) 586-0856

650 Rusholme Road
Welland, Ontario, L3B 5R4 Canada
www.wabrasives.com
Emergency phone number
(905) 735-4691

SECTION 2. Hazard Identification

Winoa currently knows of no risk connected to the product. Cast steel abrasive itself is chemically inert and does not present any risk to people or to the environment.
Risks are dependent upon the user's process and application.
Potential health risks are linked to the exposure to dust, produced by the fragmentation of the abrasives and particles removed from the blasted parts or during surface treatment.
Projection of abrasives exposes the operator to possible skin and eye lesions if no protection is worn.
Risk of slipping/falling due to abrasives spilled on floors.

SECTION 3. Composition of Substances

Composition: Cast Steel Abrasive Shot (SAE J827) and Grit (SAE J1993)
Chemical composition: All chemical elements in our abrasives are in alloyed form and not in a free form,

Substance	Chemical Symbol	CAS Number	% Weight
Iron	Fe	7439-89-6	> 95
Carbon	C	7440-44-0	<1.2
Manganese	Mn	7439-96-5	<1.2
Silicon	Si	7440-21-3	<1.2

SECTION 4. First-aid Measures

Lungs: If inhaled, move to fresh air, and if symptoms persist, consult a qualified medical person.
Eyes: If shot, grit or dust particles get in the eyes, do not rub, flush eyes with running water for at least 15 minutes and have any remaining particles removed from eyes by a qualified medical person.
Skin: Wash with soap and water after contact with dust. If irritation occurs consult a qualified medical person.

SECTION 5. Fire-fighting Measures

These products are non-flammable. Select media appropriate for the surrounding materials/area. Fine metal dust that is created as a waste stream and/or contaminants that are removed during the blasting process may pose a small risk of fire or explosion.

SECTION 6. Accidental Release Measures

Steel abrasives on horizontal surfaces can create slip and fall hazards. It is recommended to keep floors, stairs and work areas clean at all times.
The material may be reused, recycled or disposed of in compliance with local, federal and state regulations.

SECTION 7. Handling and Storage

Store in a dry place. No safety risk but oxidation and aggregation may occur in the presence of moisture. Handle with care to avoid damage to packaging to avoid spillage.

SECTION 8. Exposure Control/Personal Protection

There are no specific threshold limit values (TLV) or permissible exposure limits (PEL) for cast steel abrasives. As the type of equipment used, surfaces/parts being processed and the operating conditions are the responsibility of the user, it is the user who must determine the appropriate thresholds, types of controls and the nature of the personal protection required.

Ventilation: Adequate ventilation and exhaust of the dust and fumes generated during operations should be provided to reduce the exposure levels.
Respiratory protection: NIOSH approved respirator is recommended.
Eye protection: Approved safety eye protection (ANSI-Z87) with side shields should be worn.
Other protective measures: Protective gloves, work suits and work boots.

SECTION 9. Physical and Chemical Properties

Appearance:	Spherical or angular steel particles of varied shades/hues of grey.		
Physical state:	Solid, Non-flammable and inert (non-explosive)		
Specific gravity:	> 7 g/cc	Flash Point:	Not applicable
Melting Point:	1371-1482°C	Flammable limits:	Not applicable
Boiling Point:	approx. 3000°C	Auto-ignition temp:	Not applicable
Solubility in water:	Negligible	Evaporation rate:	Not applicable
Odor:	Odorless	Vapor Pressure:	Not applicable
PH:	Not applicable	Vapor density:	Not applicable
Viscosity:	Not applicable	% Volatile:	Not applicable
Partition coefficient:	Not applicable	Decomposition temp:	Not applicable

SECTION 10. Stability and Reactivity

Under normal storage or working conditions, steel abrasives are stable and do not present any danger of hazardous reactions occurring.

W Abrasives
a brand of winoa

SAFETY DATA SHEET

SECTION 11. Toxicological Information

No known specific indications or counter indications.

SECTION 12. Ecological Information

The product, as delivered, does not present any threat to the environment.
This product should be used under the best possible working conditions to avoid releasing it into the environment.

SECTION 13. Disposal

Disposal or recycling of this product must be done in compliance with local, federal and/or state regulations.
Operating Wastes: Each user must study the problem of waste in relation to their specific activity.

SECTION 14. Transport

There are no special conditions.

SECTION 15. Regulations

No regulations apply.

SECTION 16. Miscellaneous Information

Date of Preparation: May 4, 2015
Prepared in accordance with, OSHA CFR 1910.1200 (USA), NOM-018-STPS-2000 (Mexico), WHIMIS 2015 (Canada).
This Safety Data Sheet is available in English, French and Spanish.
The information contained in this Safety Data Sheet applies only to cast steel abrasive as delivered and its unused state. The information contained in this Safety Data Sheet is our most up to date. The information and was obtained from sources Winoa believes to be reliable however Winoa makes no guarantee, representation or warranty as to the correctness or accuracy of the information. Winoa Inc. does not assume responsibility and disclaims liability for any losses, damages or expense associated with the use of these products.

winoa
steel with you

GLUE, MOLD ASSEMBLY

United Western Supply Company
5245 EAST MARGINAL WAY SOUTH • SEATTLE, WASHINGTON 98134 • (206) 767-9880 • FAX (206) 762-6901

Safety Data Sheet

UniBond 1350 Core Paste	SDS # Revision: 1 Legacy #

Preparation Information

Site: All	Contact Chuck Mckeever at (206) 767-9880 for further product information or medical emergency during normal business hours

Section 1: Product and Company Identification

Product Name:	**Chemical Name:**	**Formula:**	**CAS Number:**
UniBond 1350 Core Paste	Silicates of Alumina, Silica, and Sodium	Mixture	

Product Use: Typically used in the metal casting industry as a paste to glue core and mold sections.

Manufacturer/Supplier Information:

Manufacturer/Supplier Name:	**Manufacturer/Supplier Phone:**
United Western Supply Company	(206) 767-9880

Manufacturer/Supplier Address:
5245 E Marginal Way S
Seattle, WA 98134

Emergency Contact Information:

Section 2: Hazards Identification

Hazard Classification: Irritating to skin and eyes

Signal Word: Warning

Hazard Statement(s): Causes eye irritation, causes skin irritation, harmful if swallowed

Pictograms:

Precautionary Statement(s):

Prevention	Response	Storage	Disposal
Wash thoroughly after handling. Do not eat, drink, or smoke when using this product. Avoid creating and inhaling dust. Avoid contact with skin.		Store in a secure area suitable for corrosives	Dispose of in accordance with all applicable Federal, State, and Local regulations.

Hazards not Otherwise Classified:

Percentage of mixture consisting of ingredients of unknown toxicity:

Section 3: Composition/Information on Ingredients

Ingredient:	CAS No. / Other Identifier:	%Weight
Sodium Silicate	1344-09-8	40-70
Kaolin Clay	1332-58-7	30-50
Water	7732-18-5	10-15

Section 4: First Aid Measures

Emergency Overview:
Potential Health Effects: This product contains sodium silicate. Sodium silicate solutions are alkaline. Exposure to alkaline solutions may result in irritation to any contacted tissue, including possible burns, depending on the concentration, duration, and nature of the exposure.
Chronic Health Hazards: Repeated and prolonged skin contact may cause dermatitis
Medical Conditions Generally Aggravated by Exposure: May aggravate preexisting conditions such as: Eye disorders that decrease tear production or have reduced integrity. Skin disorders that compromise the integrity of the skin such as: psoriasis, rashes, eczema, skin infections. Pulmonary disorders that compromise the integrity of the lungs, such as asthma.

Routes of Entry:

Eyes?	**Skin?**	**Inhalation?**	**Ingestion?**	**Other?**
YES	YES	YES	YES	

Carcinogenicity:

NTP?	**IARC?**	**OSHA?**	**WHMIS?**	**Other?**
NO	NO	NO		

Details:

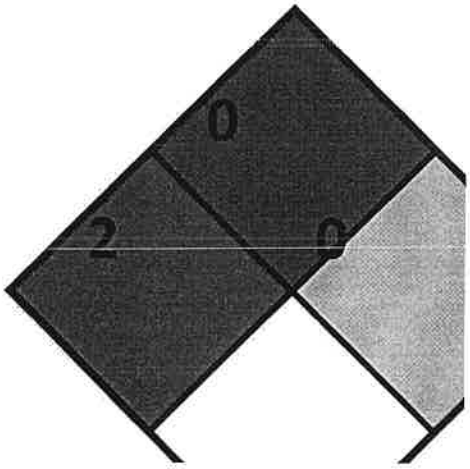
Eye Contact: *Liquid and vapor contact produces irritation* Flush eyes immediately with water for at least 15 minutes. If irritation persists, call a physician
Skin Contact: *Contact may result in skin irritation* Immediately wash skin with large amounts of soap and water. Remove contaminated clothing and shoes; wash before reuse. Get medical attention if irritation persists after washing
Inhalation: *Vapors are irritation to the nose, throat, and respiratory tract, and may produce headache and nausea in areas of poor ventilation* If adverse; effects such as dizziness, nausea, or irritation are noted, move person to fresh air. If not breathing, give artificial respiration. Get medical attention!
Ingestion: *Ingestion of large amounts caused gastric disturbances. Nausea, vomiting, and diarrhea may result.* If swallowed, dilute with water. Never give fluids if the victim is unconscious or having convulsions. Contact a physician immediately!

Section 5: Fire-Fighting Measures

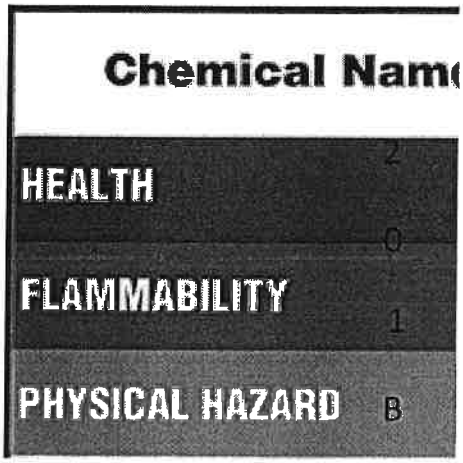
Auto-Ignition: None	**LEL:** N/E	**UEL:** N/E

N/A = not applicable N/E = not established

HFPA Hazard Classification:



HMIS Hazard Classification:



Extinguishing Media: Use media most appropriate for surrounding fire.
Special Fire Fighting Procedures: Wear a self-contained breathing apparatus when fighting fire in an enclosed area.
Unusual Fire and Explosion Hazards: Low fire hazard when exposed to heat and flame. Product is not flammable or combustible.

Section 6: Accidental Release Measures

In case of spill, sweep, scoop, or vacuum up spilled material for recovery or disposal. Avoid creating dusty conditions and inhalation of dust. Use good ventilation. Wetting spill with water spray may help to keep airborne dust levels down.

Section 7: Handling and Storage

Handling – Avoid contact with skin and eyes; wash thoroughly after handling. Avoid breathing vapor; use adequate ventilation. **Storage** – Store in a dry location at room temperature. Keep container closed and maintain all original markings and labels. **Other** – Do not reuse container without recycling or reconditioning. Handle empty containers as if they were full.

Section 8: Exposure Controls/Personal Protection

Exposure Limits per Ingredient	PEL-OSHA	TLV-ACGIH	Other
Sodium Silicate	5mg/m3(resp 10mg/m3)	N/E	
Kaolin Clay	5mg/m3(resp 2mg/m3)	N/E	

Details:
Respiratory Protection: Use NIOSH/MSHA approved respirator where high vapor or mist concentrations are present.
Ventilation: Mechanical ventilation should be sufficient to maintain exposure levels below exposure limits.
Protective Equipment: Wear chemical resistant gloves and safety glasses with side shields. Do NOT wear contact lenses. Chemical goggles and/or face-shield should be worn where splashing is possible. Eye wash and safety shower should be readily available.
Personal Sampling Procedure:

PPE Symbols Displayed:

Section 9: Physical and Chemical Properties

Characteristic	Physical and Chemical Properties
Appearance:	Cream colored paste
Odor:	Slight to none
Odor threshold:	N/E
pH:	10-12
Melting point/freezing point:	30 F
Initial boiling point/boiling range:	214-216 F
Flash point:	none
Evaporation rate:	same as water
Flammability (solid, gas):	none
Upper/lower flammability (or explosive limits):	N/A
Vapor Pressure:	N/E
Vapor Density:	N/E
Solubility(ies)	Slightly soluble in water
Specific Gravity (water = 1) **Density, wt/gal**	1.6-1.8 10-11
Auto ignition temperature	N/A
Decomposition temperature	N/E
Viscosity	N/E
Analytical VOC (EPA method 24) **Theoretical VOC** (>0.1 mm Hg @ 20 C)	0 lbs/gal 0 lbs/gal

Section 10: Stability and Reactivity

Stability: Stable	**Avoid:** none known
Reactivity:	**Avoid:**
Other:	
Incompatibility: Strong acids and nonferrous metals, such as copper and aluminum and their alloys	
Hazardous Decomposition of By-products: Hydrogen	
Polymerization: Will not occur	**Avoid:**

Section 11: Toxicological Information

Chemical Name	% Wt.	LD50	LC50	Route of Exposure	Short/Long Term Exposure Effects	Known Carcinogen:
Sodium silicate	40-70	N/E	N/E	Ingestion, inhalation, skin & eye contact	N/E	N/A
Kaolin Clay	30-50	N/E	N/E		N/E	N/A

Other Studies:

Section 12: Ecological Information

Eco-toxicity:
N/A
Environmental Fate:
N/A

Section 13: Disposal Considerations

Dispose of in accordance with local, state and federal regulations.

Section 14: Transport Information

International
N/A
United States
N/A
Canada
N/A
European Community
N/A

Section 15: Regulatory Information

US Federal Regulations

TSCA **All Components of this product are included on the EPA TSCA Chemical Substance Inventory.**

Sara 311 and 312 Hazard Categories:

Immediate (Acute) Health Hazard:	
Delayed (Chronic) Health Hazard:	
Fire Hazard:	
Reactivity:	
Sudden Release of Pressure:	

SARA Section 313 Notification: This product contains no toxic chemical or chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372, based upon our knowledge of the raw materials comprising this product.
Ozone Depleting Substances: N/A
Volatile Organic Compounds (VOC): N/A
US State Regulation: N/A
Canadian Regulation: **WHMIS CLASSIFICATION: D 2B: TOXIC EFFECTS / E: CORROSIVE MATERIAL** This Product has been classified in accordance with the hazard criteria of the CPR and the SDS contains all the information required by the CPR
European Regulation: N/A
Other Regulation: N/A
MITI: N/A

Section 16: Other Information

Document Revision History:

Revision: 1	**Date Created** 09/01/2015 **Date of Last Revision:** 09/01/2015	**Last Approval Date:** 09/01/2015

Document Author:	**Document Manager:**

David Ashbaugh	Chuck Mckeever

SDS Status:
Revised Sections
Canadian Label Codes

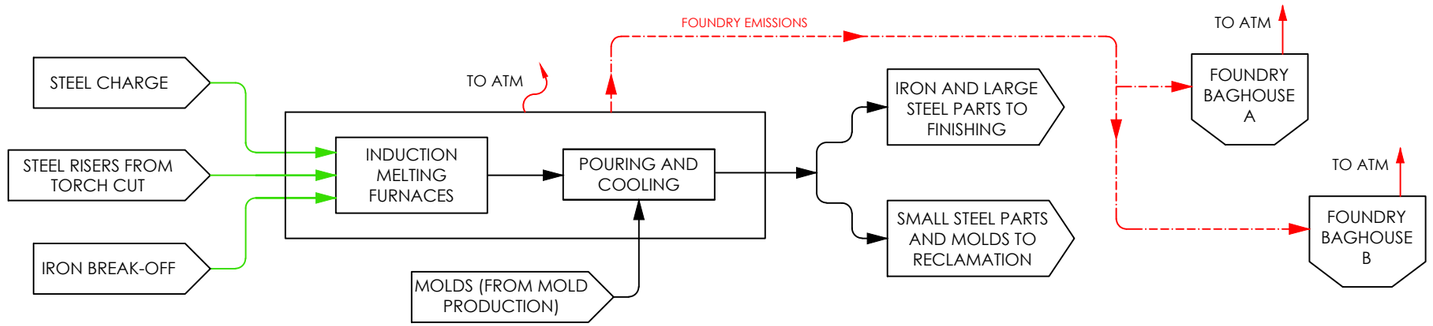
Disclaimer

Information contained within this safety data sheet is based on the current state of knowledge and relates to such products, their intended usage and the required safety precautions. Although every effort has been made to ensure that this information is correct and gives adequate safety margins in line with current knowledge, it does not constitute a specification and no information for other purposes, particularly information regarding properties of the delivered materials, may be inferred. Determination of the technical suitability of each material and complying with any guidance relating to safe usage remain the sole responsibility of the user. Consequently, beyond any separately agreed contractual arrangements, the aforementioned manufacturer and its subsidiaries exclude any and all liability resulting from the use of the product. Unknown hazards may be inherent in all materials; therefore this materials shall be treated with caution. Although certain hazards are described herein, we are unable to guarantee that these are the only hazard.

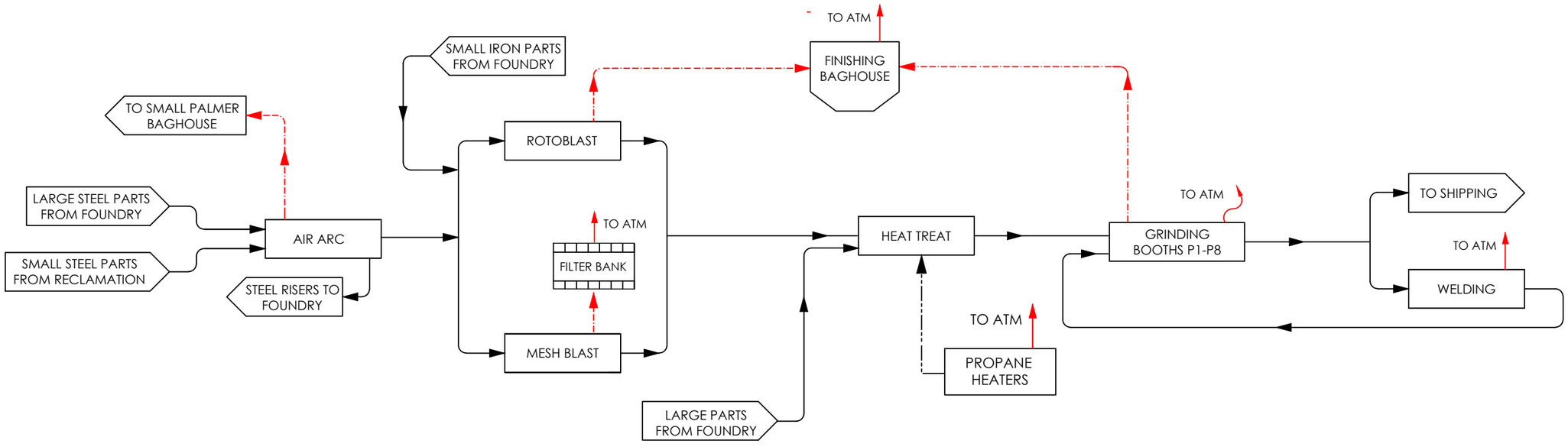
ATTACHMENT D

REVISED PROCESS FLOW DIAGRAM

FOUNDRY



FINISHING



MAUL FOSTER ALONGI
971.544.2139 (phone) | www.maulfoster.com

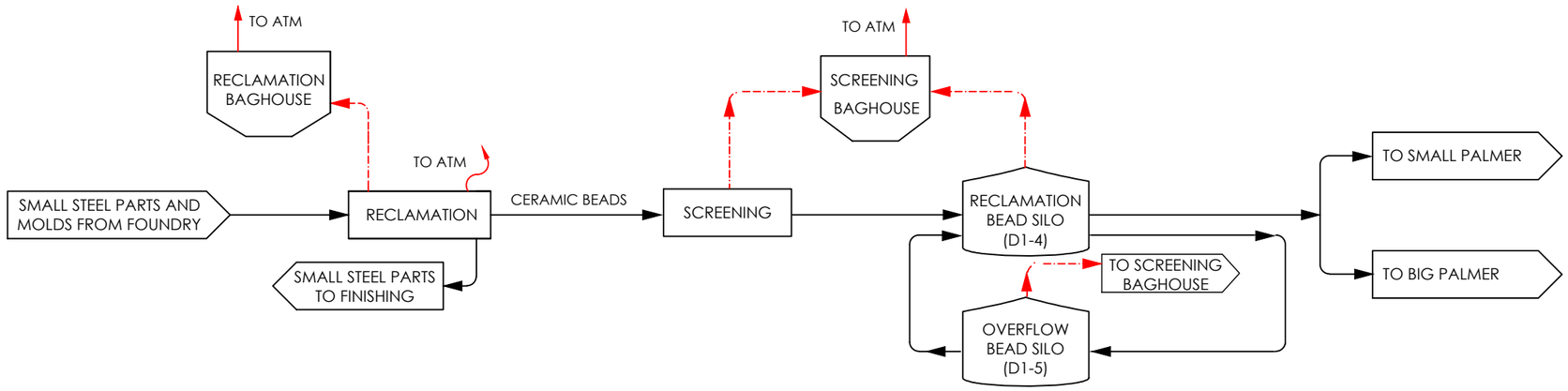
LEGEND:

- PRODUCT
- RAW MATERIALS
- EMISSIONS
- ATM ATMOSPHERE
- EMISSIONS TO ATMOSPHERE (VENT OR STACK)
- EMISSIONS TO ATMOSPHERE (FUGITIVE SOURCE)

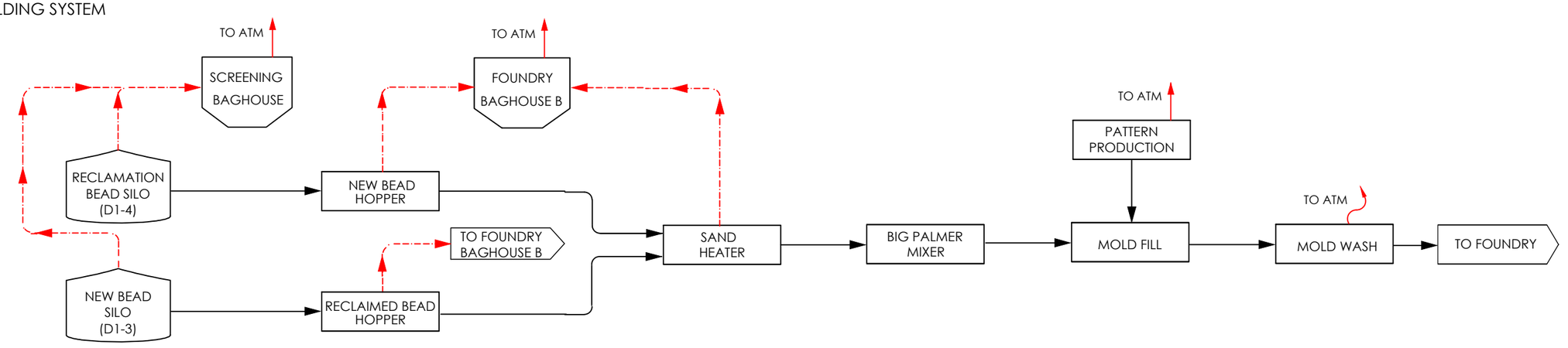
Figure 1
Process Flow Diagram - Foundry and Finishing

Eagle Foundry
Eagle Creek, Oregon

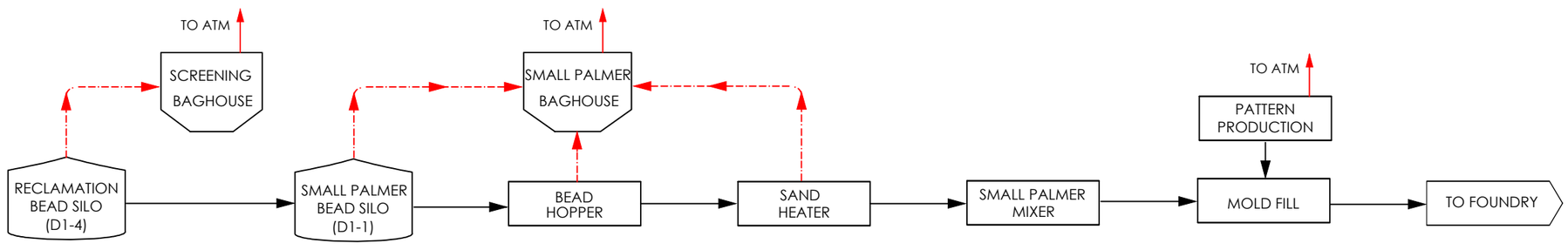
CERAMIC BEAD RECLAMATION



BIG PALMER MOLDING SYSTEM



SMALL PALMER MOLDING SYSTEM



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LEGEND:

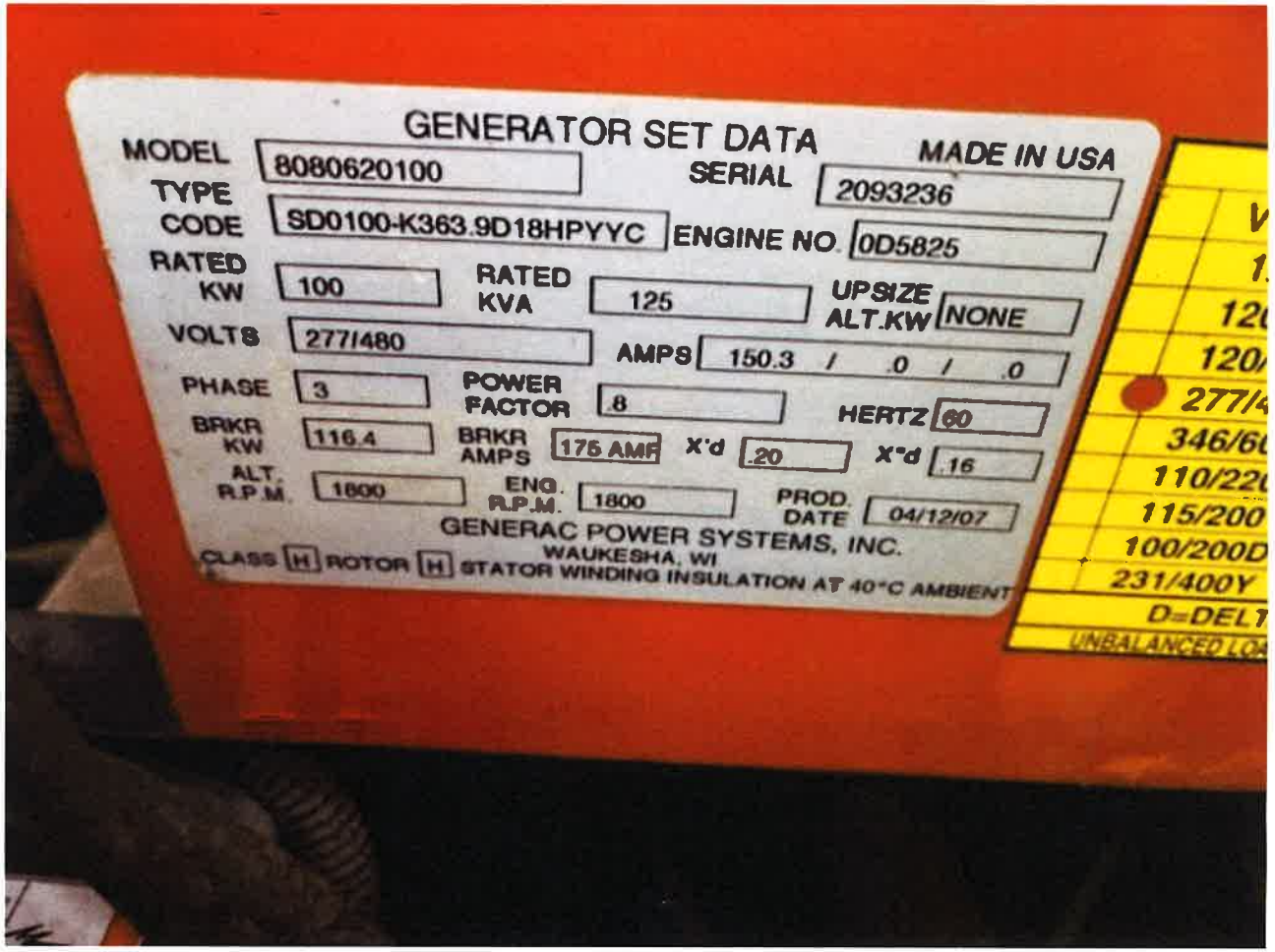
- PRODUCT
- EMISSIONS
- ATM ATMOSPHERE
- EMISSIONS TO ATMOSPHERE (VENT OR STACK)
- EMISSIONS TO ATMOSPHERE (FUGITIVE SOURCE)

Figure 2
Process Flow Diagram - Reclamation and Mold Stations

Eagle Foundry Eagle Creek, Oregon

ATTACHMENT E

EMERGENCY GENERATOR SPECIFICATIONS


GENERATOR SET DATA
MADE IN USA
MODEL 8080620100
SERIAL 2093236
TYPE
CODE SD0100-K363.9D18HPYYC
ENGINE NO. 0D5825
RATED KW 100
RATED KVA 125
UPSIZE ALT.KW NONE
VOLTS 277/480
AMPS 150.3 / .0 / .0
PHASE 3
POWER FACTOR .8
HERTZ 60
BRKR KW 116.4
BRKR AMPS 175 AMP
X'd .20
X"d .16
ALT. R.P.M. 1800
ENG. R.P.M. 1800
PROD. DATE 04/12/07
GENERAC POWER SYSTEMS, INC.
WAUKESHA, WI
CLASS H ROTOR H STATOR WINDING INSULATION AT 40°C AMBIENT
277/4
346/6
110/22
115/200
100/200D
231/400Y
D=DELT
UNBALANCED LO

ATTACHMENT F

BAGHOUSE DUST ANALYSIS

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

Monday, April 5, 2021

Geoffrey Tichenor
Stoel Rives
900 SW 5th Ave # 2600
Portland, OR 97204

RE: A1C0075 - Metal Foundry-2021 - 8006.63.01

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A1C0075, which was received by the laboratory on 3/2/2021 at 12:29:00PM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	1.0 degC	Cooler #2	1.0 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.
All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: Metal Foundry-2021	
900 SW 5th Ave # 2600	Project Number: 8006.63.01	Report ID:
Portland, OR 97204	Project Manager: Geoffrey Tichenor	A1C0075 - 04 05 21 1104

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
FND-2---As Received	A1C0075-01	Solid	02/24/21 13:20	03/02/21 12:29
FND-2---After Processing	A1C0075-02	Solid	02/24/21 13:20	03/02/21 12:29
SP-2---As Received	A1C0075-03	Solid	02/24/21 13:29	03/02/21 12:29
SP-2---After Processing	A1C0075-04	Solid	02/24/21 13:29	03/02/21 12:29
REC-2---As Received	A1C0075-05	Solid	02/24/21 13:25	03/02/21 12:29
REC-2---After Processing	A1C0075-06	Solid	02/24/21 13:25	03/02/21 12:29
SCR-2---As Received	A1C0075-07	Solid	02/24/21 13:31	03/02/21 12:29
SCR-2---After Processing	A1C0075-08	Solid	02/24/21 13:31	03/02/21 12:29
FIN-2---After Processing	A1C0075-10	Solid	02/24/21 13:36	03/02/21 12:29
FND-3---As Received	A1C0075-11	Solid	02/25/21 12:10	03/02/21 12:29
FND-3---After Processing	A1C0075-12	Solid	02/25/21 12:10	03/02/21 12:29
SP-3---As Received	A1C0075-13	Solid	02/25/21 12:30	03/02/21 12:29
SP-3---After Processing	A1C0075-14	Solid	02/25/21 12:30	03/02/21 12:29
REC-3---As Received	A1C0075-15	Solid	02/25/21 12:13	03/02/21 12:29
REC-3---After Processing	A1C0075-16	Solid	02/25/21 12:13	03/02/21 12:29
SCR-3---As Received	A1C0075-17	Solid	02/25/21 12:17	03/02/21 12:29
SCR-3---After Processing	A1C0075-18	Solid	02/25/21 12:17	03/02/21 12:29
FIN-3---As Received	A1C0075-19	Solid	02/25/21 12:20	03/02/21 12:29
FIN-3---After Processing	A1C0075-20	Solid	02/25/21 12:20	03/02/21 12:29
FND-4---As Received	A1C0075-21	Solid	02/26/21 13:45	03/02/21 12:29
FND-4---After Processing	A1C0075-22	Solid	02/26/21 13:45	03/02/21 12:29
REC-4---As Received	A1C0075-23	Solid	02/26/21 13:48	03/02/21 12:29
REC-4---After Processing	A1C0075-24	Solid	02/26/21 13:48	03/02/21 12:29
SCR-4---As Received	A1C0075-25	Solid	02/26/21 13:50	03/02/21 12:29
SCR-4---After Processing	A1C0075-26	Solid	02/26/21 13:50	03/02/21 12:29
FIN-4---As Received	A1C0075-27	Solid	02/26/21 13:55	03/02/21 12:29
FIN-4---After Processing	A1C0075-28	Solid	02/26/21 13:55	03/02/21 12:29
SP-4---After Processing	A1C0075-30	Solid	02/26/21 14:05	03/02/21 12:29
FND-5---As Received	A1C0075-31	Solid	03/01/21 14:35	03/02/21 12:29
FND-5---After Processing	A1C0075-32	Solid	03/01/21 14:35	03/02/21 12:29
REC-5---As Received	A1C0075-33	Solid	03/01/21 14:40	03/02/21 12:29
REC-5---After Processing	A1C0075-34	Solid	03/01/21 14:40	03/02/21 12:29
SCR-5---As Received	A1C0075-35	Solid	03/01/21 14:44	03/02/21 12:29

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SCR-5---After Processing	A1C0075-36	Solid	03/01/21 14:44	03/02/21 12:29
FIN-5---As Received	A1C0075-37	Solid	03/01/21 14:47	03/02/21 12:29
FIN-5---After Processing	A1C0075-38	Solid	03/01/21 14:47	03/02/21 12:29
SP-5---As Received	A1C0075-39	Solid	03/01/21 14:55	03/02/21 12:29
SP-5---After Processing	A1C0075-40	Solid	03/01/21 14:55	03/02/21 12:29
FND-1---As Received	A1C0075-41	Solid	02/23/21 10:15	03/02/21 12:29
FND-1---After Processing	A1C0075-42	Solid	02/23/21 10:15	03/02/21 12:29
SP-1---As Received	A1C0075-43	Solid	02/23/21 10:25	03/02/21 12:29
SP-1---After Processing	A1C0075-44	Solid	02/23/21 10:25	03/02/21 12:29
REC-1---As Received	A1C0075-45	Solid	02/23/21 10:20	03/02/21 12:29
REC-1---After Processing	A1C0075-46	Solid	02/23/21 10:20	03/02/21 12:29
SCR-1---As Received	A1C0075-47	Solid	02/23/21 10:30	03/02/21 12:29
SCR-1---After Processing	A1C0075-48	Solid	02/23/21 10:30	03/02/21 12:29
FIN-1---As Received	A1C0075-49	Solid	02/23/21 10:48	03/02/21 12:29
FIN-1---After Processing	A1C0075-50	Solid	02/23/21 10:48	03/02/21 12:29
MESH-1---As Received	A1C0075-51	Solid	02/23/21 10:36	03/02/21 12:29
MESH-1---RSM Processed	A1C0075-52	Solid	02/23/21 10:36	03/02/21 12:29
FND---RSM Processed	A1C0075-53	Solid	02/23/21 10:15	03/02/21 12:29
SP---RSM Processed	A1C0075-54	Solid	02/23/21 10:25	03/02/21 12:29
REC---RSM Processed	A1C0075-55	Solid	02/23/21 10:20	03/02/21 12:29
SCR---RSM Processed	A1C0075-56	Solid	02/23/21 10:30	03/02/21 12:29
FIN---RSM Processed	A1C0075-57	Solid	02/23/21 10:48	03/02/21 12:29

Apex Laboratories

Lisa Domenighini, Client Services Manager

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Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

ANALYTICAL CASE NARRATIVE

Work Order: A1C0075

Amended Final Report #1

This report supersedes all previous reports.

The original report did not include Antimony or Molybdenum in sample FND-After Processing (Apex # A1C0075-53).
This amended report now includes these analytes.

Lisa Domenighini
Client Services Manager
4-5-2021

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MESH-1---RSM Processed (A1C0075-52)				**Matrix: Solid**				
Batch: 1030764								
Selenium	ND	1.02	2.05	mg/kg	10	03/19/21 14:55	EPA 6020B	
Phosphorus	ND	102	205	mg/kg	10	03/25/21 12:38	EPA 6020B	
MESH-1---RSM Processed (A1C0075-52RE1)				**Matrix: Solid**				
Batch: 1030764								
Aluminum	**641**	512	1020	mg/kg	100	03/22/21 17:39	EPA 6020B	**J, R-04**
Antimony	**16.0**	10.2	20.5	mg/kg	100	03/22/21 17:39	EPA 6020B	**J, R-04**
Arsenic	**48.8**	10.2	20.5	mg/kg	100	03/22/21 17:39	EPA 6020B	
Barium	ND	10.2	20.5	mg/kg	100	03/22/21 17:39	EPA 6020B	R-04
Beryllium	ND	2.05	4.10	mg/kg	100	03/22/21 17:39	EPA 6020B	R-04
Cadmium	ND	2.05	4.10	mg/kg	100	03/22/21 17:39	EPA 6020B	R-04
Chromium	**2440**	10.2	20.5	mg/kg	100	03/22/21 17:39	EPA 6020B	
Cobalt	**70.3**	10.2	20.5	mg/kg	100	03/22/21 17:39	EPA 6020B	
Copper	**2660**	20.5	41.0	mg/kg	100	03/22/21 17:39	EPA 6020B	
Lead	**7.86**	2.05	4.10	mg/kg	100	03/22/21 17:39	EPA 6020B	
Manganese	**6520**	10.2	20.5	mg/kg	100	03/22/21 17:39	EPA 6020B	
Mercury	ND	0.820	1.64	mg/kg	100	03/22/21 17:39	EPA 6020B	R-04
Molybdenum	**373**	10.2	20.5	mg/kg	100	03/22/21 17:39	EPA 6020B	
Nickel	**1020**	20.5	41.0	mg/kg	100	03/22/21 17:39	EPA 6020B	
Silver	ND	2.05	4.10	mg/kg	100	03/22/21 17:39	EPA 6020B	R-04
Sodium	**1110**	1020	2050	mg/kg	100	03/22/21 17:39	EPA 6020B	**J, R-04**
Thallium	ND	2.05	4.10	mg/kg	100	03/22/21 17:39	EPA 6020B	R-04
Vanadium	**90.9**	20.5	41.0	mg/kg	100	03/22/21 17:39	EPA 6020B	
Zinc	**89.4**	41.0	82.0	mg/kg	100	03/22/21 17:39	EPA 6020B	
FND---RSM Processed (A1C0075-53)				**Matrix: Solid**				
Batch: 1030764								
Aluminum	**7460**	25.9	51.9	mg/kg	10	03/19/21 15:00	EPA 6020B	
Antimony	**1.40**	0.519	1.04	mg/kg	10	03/19/21 15:00	EPA 6020B	
Arsenic	**0.860**	0.519	1.04	mg/kg	10	03/19/21 15:00	EPA 6020B	**J**
Barium	**41.2**	0.519	1.04	mg/kg	10	03/19/21 15:00	EPA 6020B	
Beryllium	ND	0.104	0.207	mg/kg	10	03/19/21 15:00	EPA 6020B	
Chromium	**99.5**	0.519	1.04	mg/kg	10	03/19/21 15:00	EPA 6020B	

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Lisa Domenighini, Client Services Manager

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ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
FND---RSM Processed (A1C0075-53)				**Matrix: Solid**				
Cobalt	**1.35**	0.519	1.04	mg/kg	10	03/19/21 15:00	EPA 6020B	
Copper	**191**	1.04	2.07	mg/kg	10	03/19/21 15:00	EPA 6020B	
Lead	**25.0**	0.104	0.207	mg/kg	10	03/19/21 15:00	EPA 6020B	
Manganese	**648**	0.519	1.04	mg/kg	10	03/19/21 15:00	EPA 6020B	
Mercury	ND	0.0415	0.0830	mg/kg	10	03/19/21 15:00	EPA 6020B	
Molybdenum	**16.6**	0.519	1.04	mg/kg	10	03/19/21 15:00	EPA 6020B	
Nickel	**30.3**	1.04	2.07	mg/kg	10	03/19/21 15:00	EPA 6020B	
Selenium	ND	0.519	1.04	mg/kg	10	03/19/21 15:00	EPA 6020B	
Thallium	ND	0.104	0.207	mg/kg	10	03/19/21 15:00	EPA 6020B	
Phosphorus	ND	51.9	104	mg/kg	10	03/25/21 12:44	EPA 6020B	
Vanadium	**5.80**	1.04	2.07	mg/kg	10	03/19/21 15:00	EPA 6020B	
Zinc	**185**	2.07	4.15	mg/kg	10	03/19/21 15:00	EPA 6020B	
FND---RSM Processed (A1C0075-53RE1)				**Matrix: Solid**				
Batch: 1030764								
Cadmium	ND	1.04	2.07	mg/kg	100	03/22/21 17:44	EPA 6020B	R-04
Silver	ND	1.04	2.07	mg/kg	100	03/22/21 17:44	EPA 6020B	R-04
Sodium	**105000**	519	1040	mg/kg	100	03/22/21 17:44	EPA 6020B	
SP---RSM Processed (A1C0075-54)				**Matrix: Solid**				
Batch: 1030764								
Aluminum	**5170**	24.7	49.4	mg/kg	10	03/19/21 15:05	EPA 6020B	
Antimony	**0.729**	0.494	0.988	mg/kg	10	03/19/21 15:05	EPA 6020B	**J**
Arsenic	**0.600**	0.494	0.988	mg/kg	10	03/19/21 15:05	EPA 6020B	**J**
Barium	**30.2**	0.494	0.988	mg/kg	10	03/19/21 15:05	EPA 6020B	
Beryllium	ND	0.0988	0.198	mg/kg	10	03/19/21 15:05	EPA 6020B	
Cadmium	**0.114**	0.0988	0.198	mg/kg	10	03/19/21 15:05	EPA 6020B	**J**
Chromium	**48.9**	0.494	0.988	mg/kg	10	03/19/21 15:05	EPA 6020B	
Cobalt	**0.828**	0.494	0.988	mg/kg	10	03/19/21 15:05	EPA 6020B	**J**
Copper	**130**	0.988	1.98	mg/kg	10	03/19/21 15:05	EPA 6020B	
Lead	**15.6**	0.0988	0.198	mg/kg	10	03/19/21 15:05	EPA 6020B	
Manganese	**389**	0.494	0.988	mg/kg	10	03/19/21 15:05	EPA 6020B	
Mercury	ND	0.0395	0.0791	mg/kg	10	03/19/21 15:05	EPA 6020B	
Molybdenum	**7.84**	0.494	0.988	mg/kg	10	03/19/21 15:05	EPA 6020B	

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Lisa Domenighini, Client Services Manager

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503-718-2323
ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: Metal Foundry-2021	
900 SW 5th Ave # 2600	Project Number: 8006.63.01	Report ID:
Portland, OR 97204	Project Manager: Geoffrey Tichenor	A1C0075 - 04 05 21 1104

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
SP---RSM Processed (A1C0075-54)				**Matrix: Solid**				
Nickel	**18.6**	0.988	1.98	mg/kg	10	03/19/21 15:05	EPA 6020B	
Selenium	ND	0.494	0.988	mg/kg	10	03/19/21 15:05	EPA 6020B	
Silver	**0.309**	0.0988	0.198	mg/kg	10	03/19/21 15:05	EPA 6020B	
Thallium	ND	0.0988	0.198	mg/kg	10	03/19/21 15:05	EPA 6020B	
Phosphorus	ND	49.4	98.8	mg/kg	10	03/25/21 12:50	EPA 6020B	
Vanadium	**3.36**	0.988	1.98	mg/kg	10	03/19/21 15:05	EPA 6020B	
Zinc	**83.9**	1.98	3.95	mg/kg	10	03/19/21 15:05	EPA 6020B	
SP---RSM Processed (A1C0075-54RE1)				**Matrix: Solid**				
Batch: 1030764								
Sodium	**88000**	494	988	mg/kg	100	03/22/21 17:49	EPA 6020B	
REC---RSM Processed (A1C0075-55)				**Matrix: Solid**				
Batch: 1030764								
Aluminum	**15200**	26.9	53.8	mg/kg	10	03/19/21 15:10	EPA 6020B	
Antimony	**3.72**	0.538	1.08	mg/kg	10	03/19/21 15:10	EPA 6020B	
Arsenic	**2.42**	0.538	1.08	mg/kg	10	03/19/21 15:10	EPA 6020B	
Barium	**94.5**	0.538	1.08	mg/kg	10	03/19/21 15:10	EPA 6020B	
Beryllium	**0.262**	0.108	0.215	mg/kg	10	03/19/21 15:10	EPA 6020B	
Cadmium	**1.42**	0.108	0.215	mg/kg	10	03/19/21 15:10	EPA 6020B	
Chromium	**454**	0.538	1.08	mg/kg	10	03/19/21 15:10	EPA 6020B	
Cobalt	**3.63**	0.538	1.08	mg/kg	10	03/19/21 15:10	EPA 6020B	
Copper	**306**	1.08	2.15	mg/kg	10	03/19/21 15:10	EPA 6020B	
Lead	**114**	0.108	0.215	mg/kg	10	03/19/21 15:10	EPA 6020B	
Manganese	**2670**	0.538	1.08	mg/kg	10	03/19/21 15:10	EPA 6020B	
Mercury	ND	0.0430	0.0860	mg/kg	10	03/19/21 15:10	EPA 6020B	
Nickel	**57.6**	1.08	2.15	mg/kg	10	03/19/21 15:10	EPA 6020B	
Selenium	**2.31**	0.538	1.08	mg/kg	10	03/19/21 15:10	EPA 6020B	
Silver	**2.53**	0.108	0.215	mg/kg	10	03/19/21 15:10	EPA 6020B	
Thallium	**0.152**	0.108	0.215	mg/kg	10	03/19/21 15:10	EPA 6020B	**J**
Phosphorus	ND	53.8	108	mg/kg	10	03/25/21 12:55	EPA 6020B	
Vanadium	**14.5**	1.08	2.15	mg/kg	10	03/19/21 15:10	EPA 6020B	
REC---RSM Processed (A1C0075-55RE1)				**Matrix: Solid**				

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Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
REC---RSM Processed (A1C0075-55RE1)				**Matrix: Solid**				
Batch: 1030764								
Molybdenum	**11.0**	5.38	10.8	mg/kg	100	03/22/21 17:54	EPA 6020B	
Sodium	**21900**	538	1080	mg/kg	100	03/22/21 17:54	EPA 6020B	
Zinc	**59.4**	21.5	43.0	mg/kg	100	03/22/21 17:54	EPA 6020B	
SCR---RSM Processed (A1C0075-56)				**Matrix: Solid**				
Batch: 1030764								
Aluminum	**4980**	26.6	53.2	mg/kg	10	03/19/21 15:15	EPA 6020B	
Antimony	**0.699**	0.532	1.06	mg/kg	10	03/19/21 15:15	EPA 6020B	**J**
Arsenic	ND	0.532	1.06	mg/kg	10	03/19/21 15:15	EPA 6020B	Q-42
Barium	**24.4**	0.532	1.06	mg/kg	10	03/19/21 15:15	EPA 6020B	**Q-39, Q-42**
Beryllium	ND	0.106	0.213	mg/kg	10	03/19/21 15:15	EPA 6020B	
Cadmium	ND	0.106	0.213	mg/kg	10	03/19/21 15:15	EPA 6020B	Q-42
Chromium	**58.1**	0.532	1.06	mg/kg	10	03/19/21 15:15	EPA 6020B	**Q-42**
Cobalt	**0.920**	0.532	1.06	mg/kg	10	03/19/21 15:15	EPA 6020B	**J, Q-42**
Copper	**174**	1.06	2.13	mg/kg	10	03/19/21 15:15	EPA 6020B	**Q-42**
Lead	**12.0**	0.106	0.213	mg/kg	10	03/19/21 15:15	EPA 6020B	**Q-39, Q-42**
Manganese	**464**	0.532	1.06	mg/kg	10	03/19/21 15:15	EPA 6020B	
Mercury	ND	0.0426	0.0851	mg/kg	10	03/19/21 15:15	EPA 6020B	
Molybdenum	**11.1**	0.532	1.06	mg/kg	10	03/19/21 15:15	EPA 6020B	**Q-42**
Nickel	**29.7**	1.06	2.13	mg/kg	10	03/19/21 15:15	EPA 6020B	**Q-42**
Selenium	ND	0.532	1.06	mg/kg	10	03/19/21 15:15	EPA 6020B	
Silver	**0.306**	0.106	0.213	mg/kg	10	03/19/21 15:15	EPA 6020B	
Sodium	**21400**	53.2	106	mg/kg	10	03/19/21 15:15	EPA 6020B	**Q-42**
Thallium	ND	0.106	0.213	mg/kg	10	03/19/21 15:15	EPA 6020B	
Phosphorus	ND	53.2	106	mg/kg	10	03/25/21 13:01	EPA 6020B	
Vanadium	**2.79**	1.06	2.13	mg/kg	10	03/19/21 15:15	EPA 6020B	**Q-42**
Zinc	**57.0**	2.13	4.26	mg/kg	10	03/19/21 15:15	EPA 6020B	**Q-39, Q-42**
SCR---RSM Processed (A1C0075-56RE1)				**Matrix: Solid**				
Batch: 1030764								
Sodium	**48200**	266	532	mg/kg	50	03/24/21 21:53	EPA 6020B	
FIN---RSM Processed (A1C0075-57)				**Matrix: Solid**				

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
FIN---RSM Processed (A1C0075-57)				**Matrix: Solid**				
Batch: 1030764								
Phosphorus	ND	52.1	104	mg/kg	10	03/25/21 13:24	EPA 6020B	
FIN---RSM Processed (A1C0075-57RE1)				**Matrix: Solid**				
Batch: 1030764								
Aluminum	**4780**	260	521	mg/kg	100	03/22/21 18:14	EPA 6020B	
Antimony	ND	5.21	10.4	mg/kg	100	03/22/21 18:14	EPA 6020B	R-04
Arsenic	**15.7**	5.21	10.4	mg/kg	100	03/22/21 18:14	EPA 6020B	
Barium	**140**	5.21	10.4	mg/kg	100	03/22/21 18:14	EPA 6020B	
Beryllium	ND	1.04	2.08	mg/kg	100	03/22/21 18:14	EPA 6020B	R-04
Cadmium	**4.05**	1.04	2.08	mg/kg	100	03/22/21 18:14	EPA 6020B	
Cobalt	**76.0**	5.21	10.4	mg/kg	100	03/22/21 18:14	EPA 6020B	
Copper	**753**	10.4	20.8	mg/kg	100	03/22/21 18:14	EPA 6020B	
Lead	**4.51**	1.04	2.08	mg/kg	100	03/22/21 18:14	EPA 6020B	
Manganese	**7240**	5.21	10.4	mg/kg	100	03/22/21 18:14	EPA 6020B	
Mercury	ND	0.417	0.833	mg/kg	100	03/22/21 18:14	EPA 6020B	R-04
Molybdenum	**980**	5.21	10.4	mg/kg	100	03/22/21 18:14	EPA 6020B	
Nickel	**1490**	10.4	20.8	mg/kg	100	03/22/21 18:14	EPA 6020B	
Selenium	ND	5.21	10.4	mg/kg	100	03/22/21 18:14	EPA 6020B	R-04
Silver	ND	1.04	2.08	mg/kg	100	03/22/21 18:14	EPA 6020B	R-04
Sodium	**924**	521	1040	mg/kg	100	03/22/21 18:14	EPA 6020B	**J, R-04**
Thallium	ND	1.04	2.08	mg/kg	100	03/22/21 18:14	EPA 6020B	R-04
Vanadium	**60.2**	10.4	20.8	mg/kg	100	03/22/21 18:14	EPA 6020B	
Zinc	**33.5**	20.8	41.7	mg/kg	100	03/22/21 18:14	EPA 6020B	**J, R-04**
FIN---RSM Processed (A1C0075-57RE2)				**Matrix: Solid**				
Batch: 1030764								
Chromium	**15800**	10.4	20.8	mg/kg	200	03/23/21 14:58	EPA 6020B	

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Lisa A Domenighini

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ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

ANALYTICAL SAMPLE RESULTS

Total Hexavalent Chromium by Colorimetric Spectrophotometry

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
MESH-1---RSM Processed (A1C0075-52)				**Matrix: Solid**		**Batch: 1030426**		
Chromium (VI)	**0.281**	0.222	0.443	mg/kg wet	1	03/11/21 15:59	EPA 7196A	**J**
FND---RSM Processed (A1C0075-53)				**Matrix: Solid**		**Batch: 1030426**		
Chromium (VI)	ND	0.217	0.434	mg/kg wet	1	03/11/21 16:01	EPA 7196A	Q-57
SP---RSM Processed (A1C0075-54)				**Matrix: Solid**		**Batch: 1030426**		
Chromium (VI)	**0.985**	0.224	0.448	mg/kg wet	1	03/11/21 16:01	EPA 7196A	
REC---RSM Processed (A1C0075-55)				**Matrix: Solid**		**Batch: 1030426**		
Chromium (VI)	**2.74**	0.220	0.439	mg/kg wet	1	03/11/21 16:02	EPA 7196A	
SCR---RSM Processed (A1C0075-56)				**Matrix: Solid**		**Batch: 1030426**		
Chromium (VI)	**0.401**	0.218	0.437	mg/kg wet	1	03/11/21 15:55	EPA 7196A	**J**
FIN---RSM Processed (A1C0075-57)				**Matrix: Solid**		**Batch: 1030426**		
Chromium (VI)	ND	0.221	0.442	mg/kg wet	1	03/11/21 16:03	EPA 7196A	Q-57

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Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1030764 - EPA 3051A							**Solid**					
Blank (1030764-BLK1)			Prepared: 03/19/21 09:22 Analyzed: 03/19/21 14:30									
EPA 6020B												
Aluminum	ND	24.0	48.1	mg/kg	10	---	---	---	---	---	---	
Antimony	ND	0.481	0.962	mg/kg	10	---	---	---	---	---	---	
Arsenic	ND	0.481	0.962	mg/kg	10	---	---	---	---	---	---	
Barium	ND	0.481	0.962	mg/kg	10	---	---	---	---	---	---	
Beryllium	ND	0.0962	0.192	mg/kg	10	---	---	---	---	---	---	
Cadmium	ND	0.0962	0.192	mg/kg	10	---	---	---	---	---	---	
Chromium	ND	0.481	0.962	mg/kg	10	---	---	---	---	---	---	
Cobalt	ND	0.481	0.962	mg/kg	10	---	---	---	---	---	---	
Copper	ND	0.962	1.92	mg/kg	10	---	---	---	---	---	---	
Lead	ND	0.0962	0.192	mg/kg	10	---	---	---	---	---	---	
Manganese	ND	0.481	0.962	mg/kg	10	---	---	---	---	---	---	
Mercury	ND	0.0385	0.0769	mg/kg	10	---	---	---	---	---	---	
Molybdenum	ND	0.481	0.962	mg/kg	10	---	---	---	---	---	---	
Nickel	ND	0.962	1.92	mg/kg	10	---	---	---	---	---	---	
Selenium	ND	0.481	0.962	mg/kg	10	---	---	---	---	---	---	
Silver	ND	0.0962	0.192	mg/kg	10	---	---	---	---	---	---	
Sodium	ND	48.1	96.2	mg/kg	10	---	---	---	---	---	---	
Thallium	ND	0.0962	0.192	mg/kg	10	---	---	---	---	---	---	
Vanadium	ND	0.962	1.92	mg/kg	10	---	---	---	---	---	---	
Zinc	ND	1.92	3.85	mg/kg	10	---	---	---	---	---	---	
Blank (1030764-BLK3)			Prepared: 03/19/21 09:22 Analyzed: 03/25/21 12:10									
EPA 6020B												
Phosphorus	ND	48.1	96.2	mg/kg	10	---	---	---	---	---	---	
Blank (1030764-BLK4)			Prepared: 03/19/21 09:22 Analyzed: 03/25/21 12:16									
EPA 6020B												
Phosphorus	ND	51.5	103	mg/kg	10	---	---	---	---	---	---	
LCS (1030764-BS1)			Prepared: 03/19/21 09:22 Analyzed: 03/19/21 14:50									
EPA 6020B												
Aluminum	2460	25.0	50.0	mg/kg	10	2500	---	98	80-120%	---	---	
Antimony	26.2	0.500	1.00	mg/kg	10	25.0	---	105	80-120%	---	---	

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Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1030764 - EPA 3051A							**Solid**					
LCS (1030764-BS1)			Prepared: 03/19/21 09:22		Analyzed: 03/19/21 14:50							
Arsenic	50.8	0.500	1.00	mg/kg	10	50.0	---	102	80-120%	---	---	
Barium	51.9	0.500	1.00	mg/kg	10	50.0	---	104	80-120%	---	---	
Beryllium	27.4	0.100	0.200	mg/kg	10	25.0	---	109	80-120%	---	---	
Cadmium	49.1	0.100	0.200	mg/kg	10	50.0	---	98	80-120%	---	---	
Chromium	46.9	0.500	1.00	mg/kg	10	50.0	---	94	80-120%	---	---	
Cobalt	48.0	0.500	1.00	mg/kg	10	50.0	---	96	80-120%	---	---	
Copper	54.5	1.00	2.00	mg/kg	10	50.0	---	109	80-120%	---	---	
Lead	52.8	0.100	0.200	mg/kg	10	50.0	---	106	80-120%	---	---	
Manganese	50.4	0.500	1.00	mg/kg	10	50.0	---	101	80-120%	---	---	
Mercury	1.05	0.0400	0.0800	mg/kg	10	1.00	---	105	80-120%	---	---	
Molybdenum	26.0	0.500	1.00	mg/kg	10	25.0	---	104	80-120%	---	---	
Nickel	51.3	1.00	2.00	mg/kg	10	50.0	---	103	80-120%	---	---	
Selenium	24.4	0.500	1.00	mg/kg	10	25.0	---	98	80-120%	---	---	
Silver	26.8	0.100	0.200	mg/kg	10	25.0	---	107	80-120%	---	---	
Sodium	2540	50.0	100	mg/kg	10	2500	---	102	80-120%	---	---	
Thallium	27.5	0.100	0.200	mg/kg	10	25.0	---	110	80-120%	---	---	
Vanadium	48.1	1.00	2.00	mg/kg	10	50.0	---	96	80-120%	---	---	
Zinc	49.8	2.00	4.00	mg/kg	10	50.0	---	100	80-120%	---	---	
LCS (1030764-BS2)			Prepared: 03/19/21 09:22		Analyzed: 03/25/21 12:32							
EPA 6020B												
Phosphorus	2600	50.0	100	mg/kg	10	2500	---	104	80-120%	---	---	
Duplicate (1030764-DUP1)			Prepared: 03/19/21 09:22		Analyzed: 03/19/21 15:20							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
EPA 6020B												
Aluminum	**5260**	24.4	48.8	mg/kg	10	---	4980	---	---	5	20%	
Antimony	**0.676**	0.488	0.977	mg/kg	10	---	0.699	---	---	3	20%	J
Arsenic	**0.643**	0.488	0.977	mg/kg	10	---	ND	---	---		**20%**	Q-05, J
Barium	**30.3**	0.488	0.977	mg/kg	10	---	24.4	---	---	**22**	**20%**	Q-01
Beryllium	ND	0.0977	0.195	mg/kg	10	---	ND	---	---	---	20%	
Cadmium	**0.118**	0.0977	0.195	mg/kg	10	---	ND	---	---		**20%**	Q-05, J
Chromium	**47.1**	0.488	0.977	mg/kg	10	---	58.1	---	---	**21**	**20%**	Q-01
Cobalt	**0.874**	0.488	0.977	mg/kg	10	---	0.920	---	---	5	20%	J

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ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1030764 - EPA 3051A							**Solid**					
Duplicate (1030764-DUP1)			Prepared: 03/19/21 09:22		Analyzed: 03/19/21 15:20							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
Copper	**135**	0.977	1.95	mg/kg	10	---	174	---	---	**25**	**20%**	Q-01
Lead	**15.4**	0.0977	0.195	mg/kg	10	---	12.0	---	---	**25**	**20%**	Q-01
Manganese	**389**	0.488	0.977	mg/kg	10	---	464	---	---	18	20%	
Mercury	ND	0.0391	0.0781	mg/kg	10	---	ND	---	---	---	20%	
Molybdenum	**6.81**	0.488	0.977	mg/kg	10	---	11.1	---	---	**48**	**20%**	Q-01
Nickel	**19.9**	0.977	1.95	mg/kg	10	---	29.7	---	---	**39**	**20%**	Q-01
Selenium	ND	0.488	0.977	mg/kg	10	---	ND	---	---	---	20%	
Silver	**0.348**	0.0977	0.195	mg/kg	10	---	0.306	---	---	13	20%	
Thallium	ND	0.0977	0.195	mg/kg	10	---	ND	---	---	---	20%	
Vanadium	**3.34**	0.977	1.95	mg/kg	10	---	2.79	---	---	18	20%	
Zinc	**83.2**	1.95	3.91	mg/kg	10	---	57.0	---	---	**37**	**20%**	Q-01
Duplicate (1030764-DUP2)			Prepared: 03/19/21 09:22		Analyzed: 03/19/21 15:25							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
EPA 6020B												
Aluminum	**5770**	25.6	51.1	mg/kg	10	---	4980	---	---	15	20%	
Antimony	**0.742**	0.511	1.02	mg/kg	10	---	0.699	---	---	6	20%	J
Arsenic	**0.592**	0.511	1.02	mg/kg	10	---	ND	---	---		**20%**	Q-05, J
Barium	**30.9**	0.511	1.02	mg/kg	10	---	24.4	---	---	**24**	**20%**	Q-01
Beryllium	ND	0.102	0.204	mg/kg	10	---	ND	---	---	---	20%	
Cadmium	**0.117**	0.102	0.204	mg/kg	10	---	ND	---	---		**20%**	Q-05, J
Chromium	**55.5**	0.511	1.02	mg/kg	10	---	58.1	---	---	5	20%	
Cobalt	**0.840**	0.511	1.02	mg/kg	10	---	0.920	---	---	9	20%	J
Copper	**124**	1.02	2.04	mg/kg	10	---	174	---	---	**34**	**20%**	Q-01
Lead	**15.6**	0.102	0.204	mg/kg	10	---	12.0	---	---	**26**	**20%**	Q-01
Manganese	**410**	0.511	1.02	mg/kg	10	---	464	---	---	12	20%	
Mercury	ND	0.0409	0.0818	mg/kg	10	---	ND	---	---	---	20%	
Molybdenum	**7.25**	0.511	1.02	mg/kg	10	---	11.1	---	---	**42**	**20%**	Q-01
Nickel	**20.4**	1.02	2.04	mg/kg	10	---	29.7	---	---	**37**	**20%**	Q-01
Selenium	ND	0.511	1.02	mg/kg	10	---	ND	---	---	---	20%	
Silver	**0.297**	0.102	0.204	mg/kg	10	---	0.306	---	---	3	20%	
Thallium	ND	0.102	0.204	mg/kg	10	---	ND	---	---	---	20%	
Vanadium	**3.57**	1.02	2.04	mg/kg	10	---	2.79	---	---	**25**	**20%**	Q-05

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503-718-2323
ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1030764 - EPA 3051A							**Solid**					
Duplicate (1030764-DUP2)			Prepared: 03/19/21 09:22		Analyzed: 03/19/21 15:25							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
Zinc	**89.6**	2.04	4.09	mg/kg	10	---	57.0	---	---	**45**	**20%**	Q-01
Duplicate (1030764-DUP3)			Prepared: 03/19/21 09:22		Analyzed: 03/22/21 17:59							
QC Source Sample: SCR---RSM Processed (A1C0075-56RE1)												
EPA 6020B												
Sodium	**50800**	244	488	mg/kg	50	---	48200	---	---	5	20%	Q-16
Duplicate (1030764-DUP4)			Prepared: 03/19/21 09:22		Analyzed: 03/22/21 18:04							
QC Source Sample: SCR---RSM Processed (A1C0075-56RE1)												
EPA 6020B												
Sodium	**49900**	256	511	mg/kg	50	---	48200	---	---	3	20%	Q-16
Duplicate (1030764-DUP5)			Prepared: 03/19/21 09:22		Analyzed: 03/25/21 13:07							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
EPA 6020B												
Phosphorus	ND	48.8	97.7	mg/kg	10	---	ND	---	---	---	20%	
Duplicate (1030764-DUP6)			Prepared: 03/19/21 09:22		Analyzed: 03/25/21 13:12							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
EPA 6020B												
Phosphorus	ND	51.1	102	mg/kg	10	---	ND	---	---	---	20%	
Matrix Spike (1030764-MS1)			Prepared: 03/19/21 09:22		Analyzed: 03/19/21 15:30							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
EPA 6020B												
Aluminum	11300	26.4	52.9	mg/kg	10	2640	4980	**241**	**75-125%**	---	---	Q-03
Antimony	26.5	0.529	1.06	mg/kg	10	26.4	0.699	98	75-125%	---	---	
Arsenic	51.9	0.529	1.06	mg/kg	10	52.9	ND	98	75-125%	---	---	
Barium	88.5	0.529	1.06	mg/kg	10	52.9	24.4	121	75-125%	---	---	
Beryllium	26.8	0.106	0.211	mg/kg	10	26.4	ND	101	75-125%	---	---	
Cadmium	48.8	0.106	0.211	mg/kg	10	52.9	ND	92	75-125%	---	---	

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ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020B (ICPMS)

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1030764 - EPA 3051A							**Solid**					
Matrix Spike (1030764-MS1)			Prepared: 03/19/21 09:22		Analyzed: 03/19/21 15:30							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
Chromium	116	0.529	1.06	mg/kg	10	52.9	58.1	109	75-125%	---	---	
Cobalt	50.2	0.529	1.06	mg/kg	10	52.9	0.920	93	75-125%	---	---	
Copper	186	1.06	2.11	mg/kg	10	52.9	174	**23**	**75-125%**	---	---	A-01, Q-01
Lead	67.0	0.106	0.211	mg/kg	10	52.9	12.0	104	75-125%	---	---	
Manganese	513	0.529	1.06	mg/kg	10	52.9	464	92	75-125%	---	---	
Mercury	1.04	0.0423	0.0846	mg/kg	10	1.06	ND	98	75-125%	---	---	
Molybdenum	34.5	0.529	1.06	mg/kg	10	26.4	11.1	89	75-125%	---	---	
Nickel	73.5	1.06	2.11	mg/kg	10	52.9	29.7	83	75-125%	---	---	
Selenium	25.7	0.529	1.06	mg/kg	10	26.4	ND	97	75-125%	---	---	
Silver	27.2	0.106	0.211	mg/kg	10	26.4	0.306	102	75-125%	---	---	
Thallium	27.3	0.106	0.211	mg/kg	10	26.4	ND	103	75-125%	---	---	
Vanadium	54.9	1.06	2.11	mg/kg	10	52.9	2.79	99	75-125%	---	---	
Zinc	162	2.11	4.23	mg/kg	10	52.9	57.0	**198**	**75-125%**	---	---	A-01, Q-01
Matrix Spike (1030764-MS2)			Prepared: 03/19/21 09:22		Analyzed: 03/22/21 18:09							
QC Source Sample: SCR---RSM Processed (A1C0075-56RE1)												
EPA 6020B												
Sodium	52500	264	529	mg/kg	50	2640	48200	**163**	**75-125%**	---	---	Q-03, Q-16
Matrix Spike (1030764-MS3)			Prepared: 03/19/21 09:22		Analyzed: 03/25/21 13:18							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
EPA 6020B												
Phosphorus	582	52.9	106	mg/kg	10	2640	ND	**22**	**75-125%**	---	---	A-01, Q-01

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ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: Metal Foundry-2021	
900 SW 5th Ave # 2600	Project Number: 8006.63.01	Report ID:
Portland, OR 97204	Project Manager: Geoffrey Tichenor	A1C0075 - 04 05 21 1104

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Hexavalent Chromium by Colorimetric Spectrophotometry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1030426 - EPA 3060A							**Soil**					
Blank (1030426-BLK1)			Prepared: 03/11/21 07:38		Analyzed: 03/11/21 15:53							
EPA 7196A												
Chromium (VI)	ND	0.225	0.450	mg/kg wet	1	---	---	---	---	---	---	
Blank (1030426-BLK2)			Prepared: 03/11/21 07:38		Analyzed: 03/11/21 15:53							
EPA 7196A												
Chromium (VI)	ND	0.223	0.446	mg/kg wet	1	---	---	---	---	---	---	
LCS (1030426-BS1)			Prepared: 03/11/21 07:38		Analyzed: 03/11/21 15:54							
EPA 7196A												
Chromium (VI)	16.3	0.225	0.450	mg/kg wet	1	20.0	---	82	80-120%	---	---	
Duplicate (1030426-DUP1)			Prepared: 03/11/21 07:38		Analyzed: 03/11/21 15:55							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
EPA 7196A												
Chromium (VI)	**0.587**	0.224	0.447	mg/kg wet	1	---	0.401	---	---	**38**	**20%**	Q-05
Duplicate (1030426-DUP2)			Prepared: 03/11/21 07:38		Analyzed: 03/11/21 15:56							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
EPA 7196A												
Chromium (VI)	**1.71**	0.221	0.443	mg/kg wet	1	---	0.401	---	---	**124**	**20%**	Q-05
Matrix Spike (1030426-MS1)			Prepared: 03/11/21 07:38		Analyzed: 03/11/21 15:57							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
EPA 7196A												
Chromium (VI)	12.1	0.223	0.446	mg/kg wet	1	19.8	0.401	**59**	**75-125%**	---	---	Q-01
Matrix Spike (1030426-MS2)			Prepared: 03/11/21 07:38		Analyzed: 03/11/21 15:57							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
EPA 7196A												
Chromium (VI)	1950	21.9	43.9	mg/kg wet	100	2080	ND	94	75-125%	---	---	
Post Spike (1030426-PS1)			Prepared: 03/11/21 07:38		Analyzed: 03/11/21 15:58							

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Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Hexavalent Chromium by Colorimetric Spectrophotometry

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 1030426 - EPA 3060A							**Soil**					
Post Spike (1030426-PS1)			Prepared: 03/11/21 07:38		Analyzed: 03/11/21 15:58							
QC Source Sample: SCR---RSM Processed (A1C0075-56)												
EPA 7196A												
Chromium (VI)	18.0	0.219	0.438	mg/kg wet	1	17.2	0.401	102	85-115%		---	

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Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

SAMPLE PREPARATION INFORMATION

Total Metals by EPA 6020B (ICPMS)

Prep: EPA 3051A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1030764							
A1C0075-52	Solid	EPA 6020B	02/23/21 10:36	03/19/21 09:22	0.244g/50mL	0.5g/50mL	2.05
A1C0075-52RE1	Solid	EPA 6020B	02/23/21 10:36	03/19/21 09:22	0.244g/50mL	0.5g/50mL	2.05
A1C0075-53	Solid	EPA 6020B	02/23/21 10:15	03/19/21 09:22	0.482g/50mL	0.5g/50mL	1.04
A1C0075-53RE1	Solid	EPA 6020B	02/23/21 10:15	03/19/21 09:22	0.482g/50mL	0.5g/50mL	1.04
A1C0075-54	Solid	EPA 6020B	02/23/21 10:25	03/19/21 09:22	0.506g/50mL	0.5g/50mL	0.99
A1C0075-54RE1	Solid	EPA 6020B	02/23/21 10:25	03/19/21 09:22	0.506g/50mL	0.5g/50mL	0.99
A1C0075-55	Solid	EPA 6020B	02/23/21 10:20	03/19/21 09:22	0.465g/50mL	0.5g/50mL	1.08
A1C0075-55RE1	Solid	EPA 6020B	02/23/21 10:20	03/19/21 09:22	0.465g/50mL	0.5g/50mL	1.08
A1C0075-56	Solid	EPA 6020B	02/23/21 10:30	03/19/21 09:22	0.47g/50mL	0.5g/50mL	1.06
A1C0075-56RE1	Solid	EPA 6020B	02/23/21 10:30	03/19/21 09:22	0.47g/50mL	0.5g/50mL	1.06
A1C0075-57	Solid	EPA 6020B	02/23/21 10:48	03/19/21 09:22	0.48g/50mL	0.5g/50mL	1.04
A1C0075-57RE1	Solid	EPA 6020B	02/23/21 10:48	03/19/21 09:22	0.48g/50mL	0.5g/50mL	1.04
A1C0075-57RE2	Solid	EPA 6020B	02/23/21 10:48	03/19/21 09:22	0.48g/50mL	0.5g/50mL	1.04

Total Hexavalent Chromium by Colorimetric Spectrophotometry

Prep: EPA 3060A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1030426							
A1C0075-52	Solid	EPA 7196A	02/23/21 10:36	03/11/21 07:38	2.5373g/111mL	2.5g/111mL	0.99
A1C0075-53	Solid	EPA 7196A	02/23/21 10:15	03/11/21 07:38	2.593g/111mL	2.5g/111mL	0.96
A1C0075-54	Solid	EPA 7196A	02/23/21 10:25	03/11/21 07:38	2.5087g/111mL	2.5g/111mL	1.00
A1C0075-55	Solid	EPA 7196A	02/23/21 10:20	03/11/21 07:38	2.5624g/111mL	2.5g/111mL	0.98
A1C0075-56	Solid	EPA 7196A	02/23/21 10:30	03/11/21 07:38	2.576g/111mL	2.5g/111mL	0.97
A1C0075-57	Solid	EPA 7196A	02/23/21 10:48	03/11/21 07:38	2.5481g/111mL	2.5g/111mL	0.98

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Lisa Domenighini, Client Services Manager

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Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

ANALYTICAL REPORT

AMENDED REPORT

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

A-01	Serial dilution was performed and passes acceptance criteria. Data are acceptable.
J	Estimated Result. Result detected below the lowest point of the calibration curve, but above the specified MDL.
Q-01	Spike recovery and/or RPD is outside acceptance limits.
Q-03	Spike recovery and/or RPD is outside control limits due to the high concentration of analyte present in the sample.
Q-05	Analyses are not controlled on RPD values from sample and duplicate concentrations that are below 5 times the reporting level.
Q-16	Reanalysis of an original Batch QC sample.
Q-39	Results for sample duplicate are significantly higher than the sample results. See duplicate results in QC section of the report.
Q-42	Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or RPD for this analyte is outside laboratory control limits. (Refer to the QC Section of Analytical Report.)
Q-57	Compensation for background color and/or turbidity has been made by subtracting the absorbance of a second aliquot of sample to which all reagents except the color producing reagent have been added, in accordance with the method.
R-04	Reporting levels elevated due to preparation and/or analytical dilution necessary for analysis.

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Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

REPORTING NOTES AND CONVENTIONS:

Abbreviations:

DET Analyte DETECTED at or above the detection or reporting limit.

ND Analyte NOT DETECTED at or above the detection or reporting limit.

NR Result Not Reported

RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.

" dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.

" wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.

" " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

" --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.

" *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to ½ the Reporting Limit (RL).
-For Blank hits falling between ½ the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

Apex Laboratories

Lisa Domenighini, Client Services Manager

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Stoel Rives	Project: **Metal Foundry-2021**	
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Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

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503-718-2323
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ANALYTICAL REPORT

AMENDED REPORT

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900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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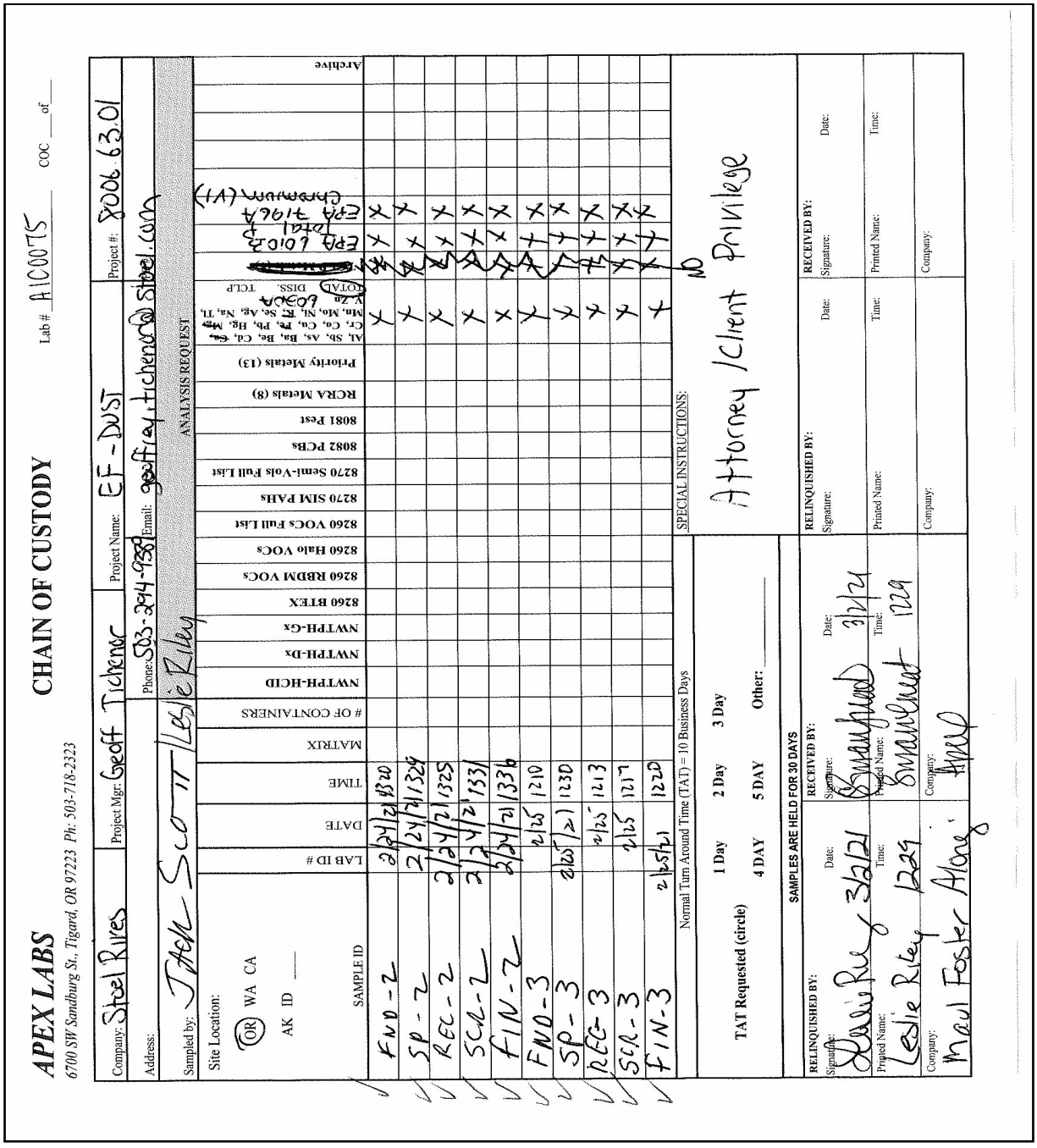
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**



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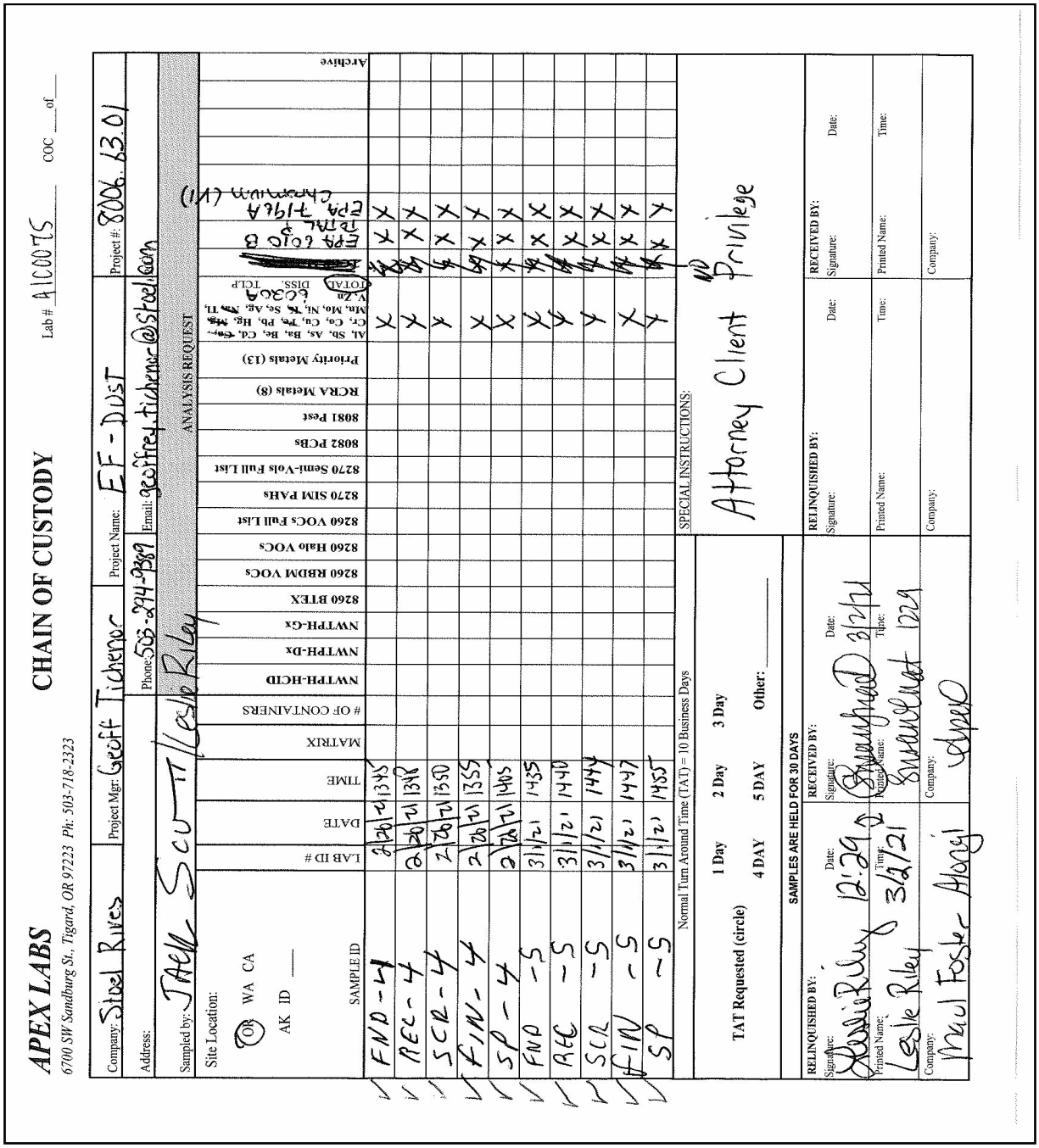

APEX LABS — 6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

CHAIN OF CUSTODY — Lab # A1C0075 — COC ___ of ___

Company: Stoel Rives | Project Mgr: Geoff Tichenor | Project Name: EF - Dust | Project #: 8006.63.01
Address: | Phone: 503-294-9389 | Email: geoffrey.tichenor@stoel.com
Sampled by: Jaell Scott / Leslie Riley
Site Location: WA CA AK ID ___

ANALYSIS REQUEST

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	Al, Sb, As, Ba, Be, Cd, Co, Cr, Co, Cu, Fe, Pb, Hg, Mn, Mo, Ni, Se, Ag, Tl, V, Zn (TOTAL / DISS. / TCLP)	EPA 6010C Chromium (1/1)	EPA 7196A Chromium (VI)	Archive
FND-4		3/26/21	1345																X	X	X	
REC-4		3/26/21	1348																X	X	X	
SCR-4		3/26/21	1350																X	X	X	
FIN-4		3/26/21	1355																X	X	X	
SP-4		3/26/21	1405																X	X	X	
FND-S		3/1/21	1435																X	X	X	
REC-S		3/1/21	1440																X	X	X	
SCR-S		3/1/21	1444																X	X	X	
FIN-S		3/1/21	1447																X	X	X	
SP-S		3/1/21	1455																X	X	X	

Normal Turn Around Time (TAT) = 10 Business Days

TAT Requested (circle): 1 Day | 2 Day | 3 Day | 4 DAY | 5 DAY | Other: ___

SPECIAL INSTRUCTIONS: Attorney Client Privilege

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY: Signature: Jaell Scott Date: 3/26/21 Time: 12:39 Printed Name: Leslie Riley Company: Stoel Rives

RECEIVED BY: Signature: Date: Time: Printed Name: Company:

RELINQUISHED BY: Signature: Date: Time: Printed Name: Company:

RECEIVED BY: Signature: Date: Time: Printed Name: Company:

RELINQUISHED BY: Signature: Date: Time: Printed Name: Company:

RECEIVED BY: Signature: Date: 3/27/21 Time: 1229 Printed Name: Samantha Hart Company: Apex

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Lisa Domenighini, Client Services Manager

ANALYTICAL REPORT

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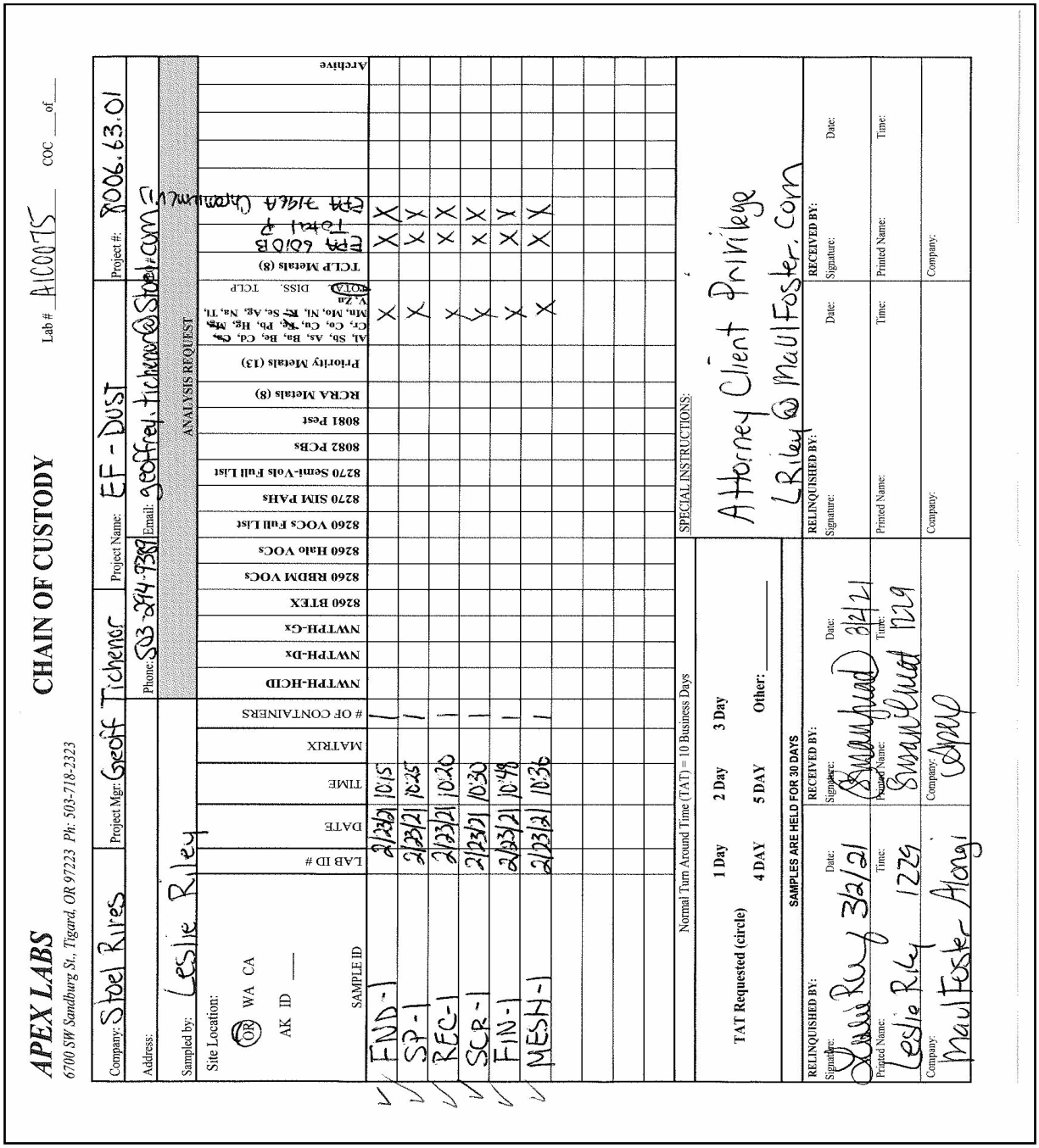
503-718-2323
ORELAP ID: **OR100062**

Stoel Rives	Project: **Metal Foundry-2021**	
900 SW 5th Ave # 2600	Project Number: **8006.63.01**	**Report ID:**
Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**



APEX LABS
6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

CHAIN OF CUSTODY

Lab # A1C0075 COC ___ of ___

Company: Stoel Rives | Project Mgr: Geoff Tichenor | Project Name: EF - Dust | Project #: 8006.63.01
Address: | Phone: 503-294-9389 | Email: geoffrey.tichenor@stoel.com
Sampled by: Leslie Riley
Site Location: (OR) WA CA AK ID ___

ANALYSIS REQUEST

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTA DISS TCLP	TCLP Metals (8)	EPA 6010B Total ? EPA 3164A (Chromium)	Archive
END-1		2/23/21	10:15		1														X	X	
SP-1		2/23/21	10:25		1														X	X	
REC-1		2/23/21	10:20		1														X	X	
SCR-1		2/23/21	10:30		1														X	X	
FIN-1		2/23/21	10:48		1														X	X	
MESH-1		2/23/21	10:36		1														X	X	

Normal Turn Around Time (TAT) = 10 Business Days

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: ___

SPECIAL INSTRUCTIONS: Attorney Client Privilege LRiley@MaulFoster.com

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY:	Date:	Time:	RECEIVED BY:	Date:	Time:	RELINQUISHED BY:	Date:	Time:	RECEIVED BY:	Date:	Time:
Signature: Leslie Riley	3/2/21	1225	Signature: Swamiphad	3/2/21	1129	Signature:			Signature:		
Printed Name: Leslie Riley			Printed Name: Swamiphad			Printed Name:			Printed Name:		
Company: Maul Foster Along			Company: COMP			Company:			Company:		

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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Portland, OR 97204	Project Manager: **Geoffrey Tichenor**	**A1C0075 - 04 05 21 1104**

APEX LABS COOLER RECEIPT FORM

Client: Stoel Rives Element WO#: A1C0075

Project/Project #: EF-Dust / 8006.63.01

Delivery Info:

Date/time received: 3/2/21 @ 1229 By: SC

Delivered by: Apex____Client X ESS____FedEx____UPS____Swift___Senvoy ___SDS___Other_____

Cooler Inspection Date/time inspected: 3/2/21 @ 1235 By: SC

Chain of Custody included? Yes X No _____ Custody seals? Yes_____ No X

Signed/dated by client? Yes X No _____

Signed/dated by Apex? Yes X No _____

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	1.0	1.0					
Received on ice? (Y/N)	Y	Y					
Temp. blanks? (Y/N)	Y	Y					
Ice type: (Gel/Real/Other)	real	real					
Condition:	good	good					

Cooler out of temp? (Y/(N)) Possible reason why:_____

Green dots applied to out of temperature samples? Yes/(No)

Out of temperature samples form initiated? Yes/(No)

Sample Inspection: Date/time inspected: 3/2/21 @ 1755 By: HAS

All samples intact? Yes X No ___ Comments:_____

Bottle labels/COCs agree? Yes X No ___ Comments: _____

COC/container discrepancies form initiated? Yes ___ No X

Containers/volumes received appropriate for analysis? Yes ___ No X Comments: _____

Do VOA vials have visible headspace? Yes ___ No ___ NA X

Comments_____

Water samples: pH checked: Yes___No___NA X pH appropriate? Yes___No___NA X

Comments: _____

Additional information: _____

Labeled by: SC Witness: AM Cooler Inspected by: KRS

Apex Laboratories

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Lisa Domenighini, Client Services Manager

ATTACHMENT G

CAPTURE EFFICIENCY MEMO

MEMORANDUM

To: Julia DeGagné

Date: January 11, 2023

From: Chad Darby

Project No.: M8006.63.001

RE: Eagle Foundry Building Capture Efficiency

Eagle Foundry Company (Eagle Foundry) received a letter dated November 8, 2022, from the Oregon Department of Environmental Quality (DEQ) relating to the Cleaner Air Oregon Emissions Inventory that Eagle Foundry submitted on May 16, 2022 (the EI). Eagle Foundry is an iron/steel casting foundry located at 23123 SE Eagle Creek Road in Eagle Creek, Oregon 97022 (the facility). The DEQ requested that Eagle Foundry provide justification for the assumption that 75 percent of foundry melting and pouring/cooling emissions are captured, which was used in the EI and listed in Air Contaminant Discharge Permit no. 03-2631-ST-01 (Permit), dated June 11, 2020.

Maul Foster & Alongi, Inc. (MFA) visited Eagle Foundry on October 19, 2022, during normal operating hours. During the visit, MFA verified that air flowed into the building at all entrances and accessible openings, which confirmed that the building was under negative pressure. MFA reviewed the potential routing of emissions from foundry activities and evaluated the sources of fresh air supplied to the building. Our observations and conclusions are summarized below.

FOUNDRY PROCESS DESCRIPTION

Foundry operations at Eagle Foundry are conducted in batches, completely within the foundry building. Alloy is melted in one of two electric induction furnaces, then transferred to an insulated ladle. A bridge crane is used to move the ladle across the casting floor and position it above the casting molds. Casting personnel release the molten metal from the ladle to fill the molds. Molten metal insulation, or hot top, is applied to open portions of the mold. Castings are moved to bunkers within the foundry building for further cooling.

Emissions from the induction furnaces are discharged inside of the building, and indoor air is collected by baghouses. Two Donaldson baghouses control foundry emissions, both of which are rated at 50,000 cubic feet per minute. The pick-up for one baghouse is located at the roof peak above the casting area, and the other is above the bunker area.

AIR FLOW ANALYSIS

Foundry Building

During the October 19, 2022 visit, MFA conducted an air flow analysis (also referred to as a "smoke test") at each accessible building opening and at each location noted on Figure 1 (attached). The purpose of the analysis was to confirm that the baghouses maintain a negative pressure inside the building, ensuring that outside air is drawn inward through all building openings. The foundry building has a bay door and two man doors on the east side, and a bay door and one man door on the north side of the building. The bay doors are partially covered with PVC freezer strips to limit airflow out of the building, but with openings that still accommodate forklift traffic. The man doors on the east side were typically held open for movement of personnel during the site visit, while the man door on the north side is normally closed during operation.

MFA personnel used Sensidyne No. 5100 Smoke Tubes and a rubber aspirator bulb to produce puffs of smoke while standing immediately outside building entrances. The behavior of the smoke plume was observed while the doors were open. For the test, smoke was generated adjacent to the edges and the center of each doorway. At each location, the smoke was clearly pulled into the building, confirming that outside air is drawn inwards at these openings.

RECLAMATION (SHAKEOUT)

Eagle Foundry uses an enclosed rotary shakeout reclamation system that exhausts to and is controlled by a baghouse. Historically, Eagle Foundry has calculated emissions from this system using the uncontrolled PM emission factor of 3.2 pounds per ton of metal[1], assumed the 75 percent capture efficiency for the foundry building enclosure as listed in their permit, and 99 percent control of PM by the baghouse. This emission factor is based on open deck systems with no capture. According to EPA's Alternative Control Techniques Document for PM-10 Emissions from Ferrous Foundries (1992), Table 2-15, Baseline Control Systems for Gray Iron Model Plants for Selected Processes, open systems with a side draft hood have capture efficiencies of 85 percent. Table 4-1 in the same document, Option I Control Systems for Gray Iron Foundry Model Plants for Selected Processes, lists a double side draft hood as having 97 percent capture efficiency. Additionally, Eagle Foundry has made several improvements to increase the capture efficiency of the rotary shakeout reclamation system, covering all seals and openings with rubber stripping. As the rotary shakeout system at Eagle Foundry is an enclosed system ducted to a baghouse, with additional capture improvements, it is reasonable to assume a capture efficiency equal to or greater than that of a double side draft hood, 97 percent.

During the October 19, 2022 visit, MFA conducted a smoke test at a seal on the rotary shakeout system as it was operating. At this location, the smoke was clearly pulled into the rotary drum,

[1] AP-42, Chapter 12.10 Gray Iron Foundries, Table 12.10-7 (English Units). Particulate Emission Factors for Ancillary Operations and Fugitive Sources at Gray Iron Foundries.

confirming that a negative pressure is maintained inside the drum and outside air is drawn inwards at these seals.

CONCLUSIONS

The foundry building is maintained under negative pressure by the operation of the baghouses, which provide the primary ventilation for the building. This negative pressure and the draw from the baghouses demonstrate that emissions released inside the foundry building, such as emissions from melting, pouring and cooling, are captured by the building and subsequently controlled by the baghouses.

An industrial ventilation study was performed on the foundry building in 1998 by Worth Technical Services, which established 95 percent capture in the main bay. However, overall capture efficiency was set at 75 percent by the DEQ. The facility has made improvements to their overall capture efficiency, using plastic sheeting to cover building openings and bay doors. Assuming that only 75 percent of all melting, pouring and cooling emissions in the foundry building at Eagle Foundry are controlled by the baghouses is a conservative estimate. To further verify this assertion, Eagle Foundry has contracted Bison Engineering to perform EPA Method 204 testing.

The rotary shakeout reclamation system at Eagle Foundry is an enclosed system ducted to a baghouse, with additional capture improvements. Although it is reasonable to assume a capture efficiency of 97 percent, equal to that of a double side draft hood, with an additional 75 percent capture of the fugitive emissions due to the assumed capture efficiency of the building enclosure, Eagle Foundry is assuming a 97 percent capture efficiency for the system.

Figure 1
Foundry Building Enclosure

Eagle Foundry Company
Eagle Creek, OR

Legend

- Bay Door
- General Opening
- Man Door
- Building

Key Map

0 10 20
Meters

Data Sources:
Aerial photo obtained from the Oregon Statewide Imagery Program.

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Print Date: 1/6/2023
Reviewed by: kriley
Produced By: sturner
Project: M8006.63.001

DESIGN ENGINEERING PLANNING

WORTH TECHNICAL SERVICES

OCT - 8 1998

Eagle Foundry Company
P.O. Box 250
Eagle Creek, OR 97022

October 5, 1998

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

OCT 12 1998

NORTHWEST REGION

attn.: Mr. Jack Scott

re.: Industrial Ventilation - Foundry Building

Jack:

At the request of Eagle Foundry Company, Worth Technical Services has performed an industrial ventilation study of the dust collection system installed in the main foundry building (EP2-3,EP2-4).

As a part of this study, (2) smoke bombs were used inside of the referenced building. The smoke bombs produced 20,000 cu. ft. of smoke in three minutes. A smoke bomb was placed in front of the furnace area; a second smoke bomb was placed on the opposite end of the main foundry bay near the dust collection inlets.

OBSERVATIONS

The smoke produced by these bombs was bright white, distinguishable from smoke given off by the other foundry operations. At both locations, the smoke plume migrated towards the dust collector inlets indicating an overall draft in that direction. The smoke released near the inlets, of course, was removed more rapidly, but all smoke captured in the closed roof and rafters was removed by the dust collection system.

SUMMARY

* The smoke & dust produced in the foundry operation is contained within the building & is effectively removed by the dust collection system.

* The capture efficiency is estimated to be about 95%. The time it takes to clear the bay is a function of the distance from the source, but does not change the overall capture efficiency.

* Strip curtains have been installed on two of the door openings to reduce any effects of outside drafts.

* It is proposed to close up openings in the upper wall behind the melting operation & install supply fans to cool the air inside the building and direct the smoke & dust towards the dust collector inlets.

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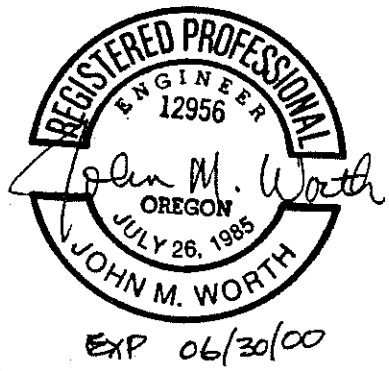
This will decrease the time it takes to "clear the building and provided a more favorable environment for the workers.

* The building has an overall negative pressure due to the dust collector systems, thereby, minimizing any fugitive emissions.

Jack, please contact me at 771-8255 if you have any questions regarding this report.

Sincerely,

John M. Worth, P.E.
Worth Technical Services



EXP 06/30/00