EVREN NORTHWEST INC.
environmental & natural resource consultants

Main Office: PO BOX 14488, Portland, Oregon 97293
Main Tel: (503) 452-5561 / E-Mail: ENW@EVREN-NW.com
Offices in Portland, Oregon (Headquarters)
Satellite Offices in Bend Oregon and San Rafael, California

November 22, 2024

Oregon Department of Environmental Quality (ODEQ)
Attn: Amy DeVita-McBride, Cleaner Air Oregon (CAO) Project Engineer
700 NE Multnomah St., Suite 600,
Portland, Oregon 97232 - 4100

(SENT VIA ELECTRONIC MAIL)

RE: **CAO Emissions Inventory**
Orchid Orthopedic Solutions Oregon, Inc.
13963 S Fir Street, Oregon City, OR 97045

Dear Amy DeVita-McBride:

Orchid Orthopedic Solutions Oregon, Inc. (Orchid) is submitting the following information in support of the CAO Emissions Inventory.

ODEQ AIR QUALITY FORMS

- AQ520 CAO Emissions Inventory *(excel file*)
- AQ523 Categorically Exempt Toxics Emissions Units (PDF)

FIGURES (attached to this letter)

- Figure 1 – Site Vicinity Map
- Figure 2 – Site Plan
- Figure 3 – Process and Emission Control Areas

SUPPORTING INFORMATION

- **Orchid Ortho CAO – Process Flows**. This '**Master Document'** takes the place of a process flow diagram. It details each sub-step of each process, and identifies the room or area the activity occurs, whether there is potential to emit (PTE) ODEQ pollutants, names any toxic emission units (TEU), and then provides a detailed explanation of the methodology for estimating any air emissions.
- **Orchid Ortho CAO – TEU Summary**. This table provides a one-page summary of TEUs, their control devices (for point sources) and if emissions are calculated using material balance or emission factor.

- **Orchid Ortho CAO – Product List & SDS Review** *(excel file).* This table provides a comprehensive list of all the products used at Orchid, broken out by general processes. Each product includes the name, manufacturer, media, the safety data sheet (SDS) review for ODEQ Pollutants, determination of inclusion in the Emissions Inventory and an explanation of the product use.
    - *Note 1: Most products have an Orchid SDS number assigned with an "M-#" designation. For those products that don't have an Orchid SDS number, a "U-#" was assigned for ease of finding provided SDSs.*
    - *Note 2: Any and all products being submitted under Oregon Administrative Rule (OAR) 340-214-0130 (Confidential Business Information Exemption) have already been submitted to CAO for review.*
- **Orchid Ortho CAO - Supporting Calcs for Emissions** *(excel file).* This file contains multiple tabs documenting approach to estimating emissions:
    - Dewax – presents the estimation methodology for emissions at the Flashfire Dewax furnace afterburner.
    - TIG Weld (Production) – describes the background and assumptions for estimating emissions for alloy welding.
    - MIG Weld (Maintenance) – describes the background and assumptions for estimating emissions for occasional maintenance welding of equipment.
    - Ceramic Molds STEP 1 through STEP 4 (four separate tabs) – document the investigation and calculations used to estimate the percentage of ODEQ Pollutants in the ceramic molds (specific to the knockoff process).
    - Scrubber – documents the information provided by the scrubber manufacturer and approach to estimating emissions from the Kolene process.
- **210720 Orchid HI Report** – Report by Sharpe Industrial Hygiene Solutions documenting the methodology and findings of an exposure assessment for hexavalent chromium conducted in 2021 for OSHA. Based on the results of this assessment, hexavalent chromium was excluded from TIG welding emissions.
- **SDSs.** Safety data sheets have been organized into folders matching the general processes outlined in the Product List & SDS Review excel file. A link to access the SDS folders is provided in the submittal email.

- **Manufacturer's Literature.** Manufacturer's literature has been organized into folders as outlined below. A link to access the folders is provided in the submittal email.
    - Dust Control Filters
        - DC1 through DC7 – technical brochure and statement of emission control rate of Donaldson filters use at these seven dust collectors
        - DC8 – not included. This is a very small dust collector behind the NDT building. As described in the Process Flows document, grinding emissions at this location are anticipated to be <1% of all grinding emissions.
        - DC9 – technical brochure and statement of emission control rate of Parker Hannifin filters use at this dust collector.
    - Pacific Kiln - Flashfire Dewax Furnace
        - Furnace Specifications
        - Afterburner Data Report
        - Letter of Efficiency (demonstrating 99% destruction rate)
    - Viron Scrubber
        - Letter from Viron International Corporation documenting the expected removal efficiency of sodium hydroxide.

If you have any questions about the material being submitted, please do not hesitate to phone me.

Kind regards,

EVREN Northwest, Inc.

LYNN D. GREEN

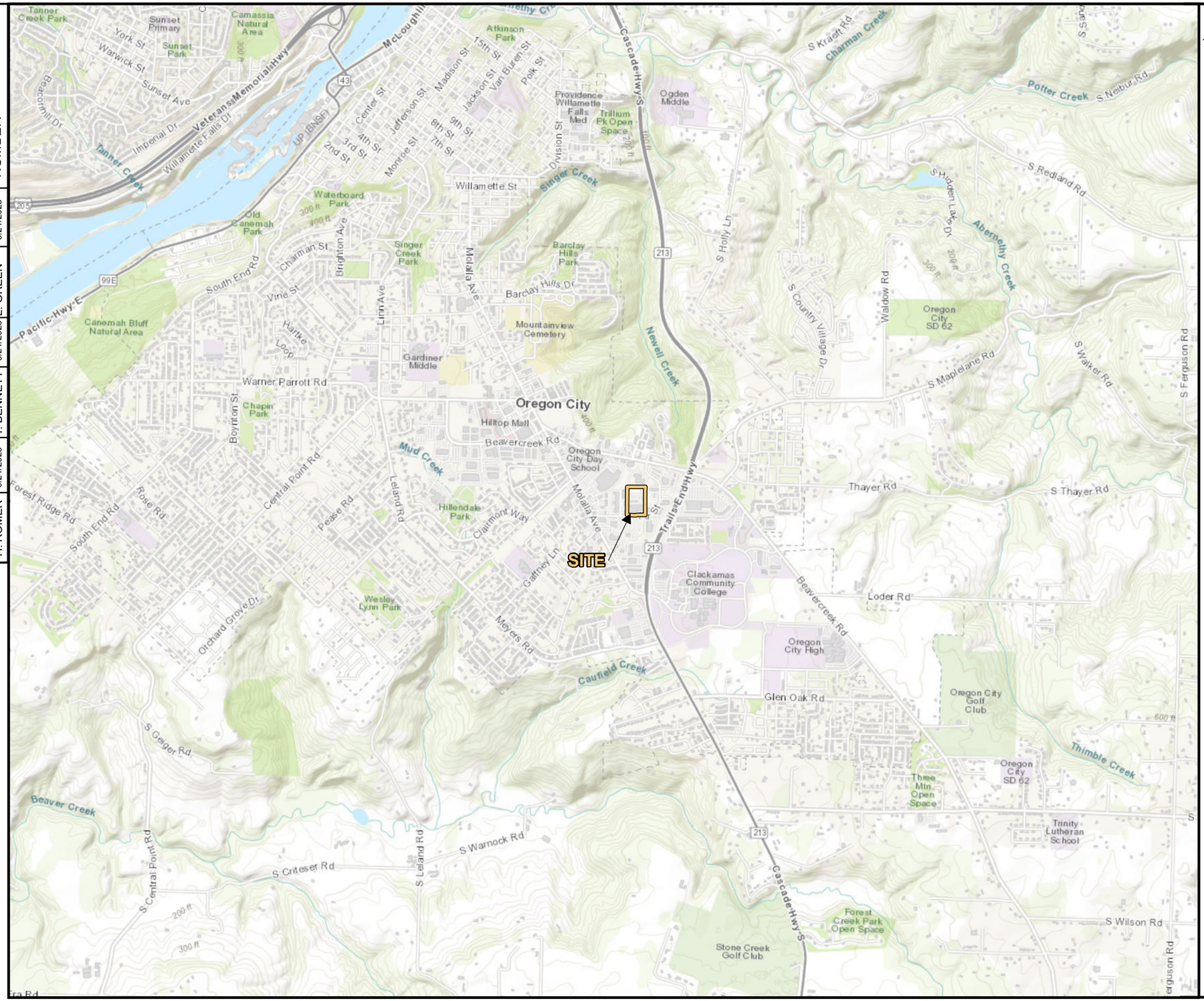
Lynn Green, C.E.G.
Principal Engineering Geologist

CC: Nathan Holwege, **Orchid Orthopedic** (sent electronically)

FIGURES

- Figure 1 – Site Vicinity Map
- Figure 2 – Site Plan
- Figure 3 – Process and Emission Control Areas

DRAWING NUMBER	APPROVED BY	CHECKED BY	DRAWN BY
1827-23001(V01)	L. GREEN 9/21/2023	T. BENNETT 9/21/2023	H. ROMER 9/21/2023



LEGEND:

SUBJECT PROPERTY BOUNDARY

NOTES:

1. BASE MAP DEVELOPED BY ESRI (OREGON CITY, 1:30000, 2023)

0 1,700 3,400 6,800

Feet

N

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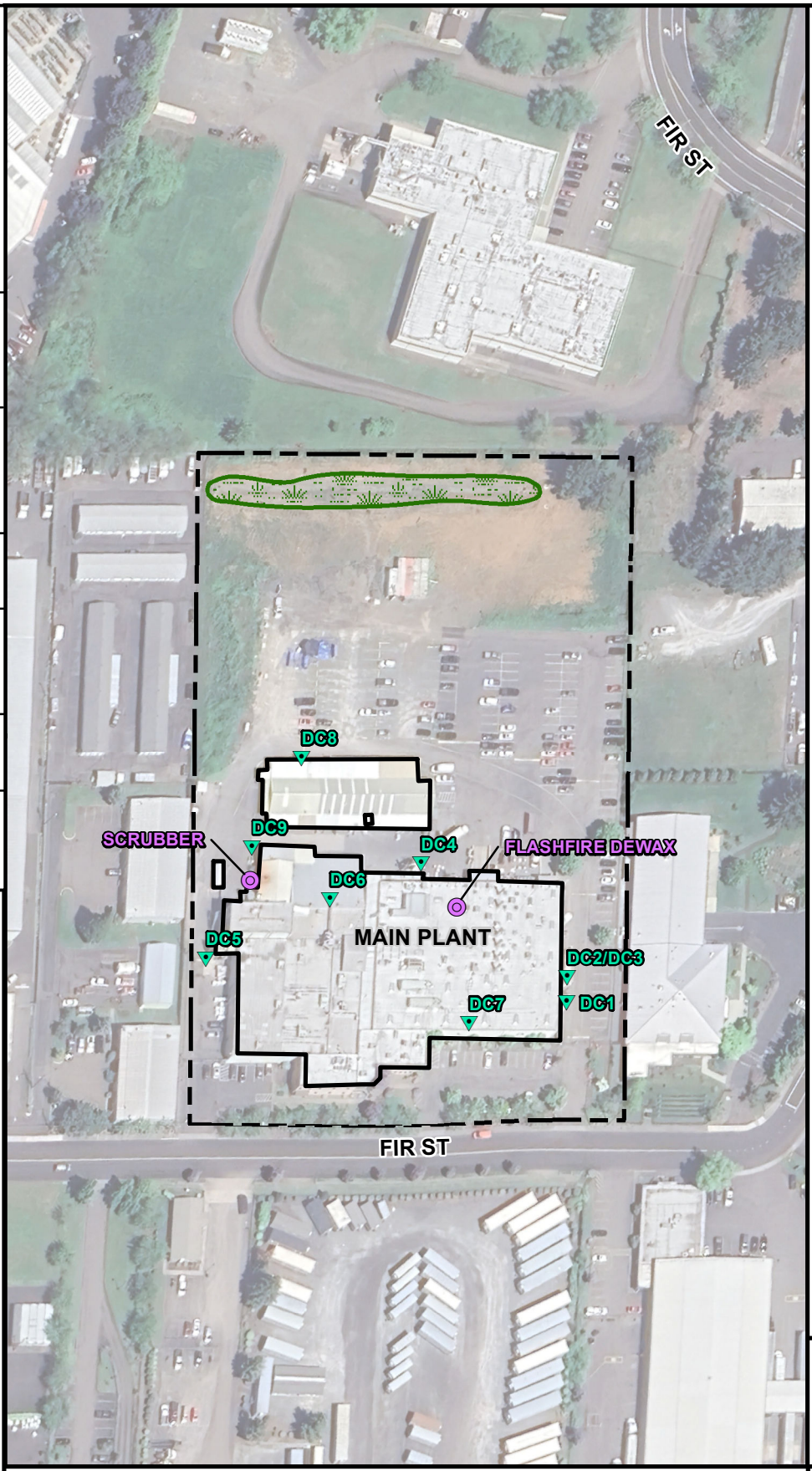
FIGURE 1

SITE VICINITY MAP

ORCHID ORTHOPEDIC
13963 FIR STREET
OREGON CITY, OREGON

DRAWING NUMBER	1827-23001(V03)	
APPROVED BY	L. GREEN	11/19/2024
CHECKED BY	E. BRUGGEMAN	11/19/2024
DRAWN BY	H. ROMER	11/19/2024



LEGEND:

- SUBJECT PROPERTY BOUNDARY
- SUBJECT BUILDING
- DUST COLLECTOR
- EMISSION CONTROL

0 65 130 260 Feet

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NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTO (2023) AND ENW FIELD NOTES.
2. ALL BUILDING, STREET, AND FEATURE LOCATIONS ARE APPROXIMATE.
3. SYMBOLS REPRESENT LOCATION AND DO NOT ALWAYS REPRESENT EXACT SHAPE, SIZE, OR ORIENTATION

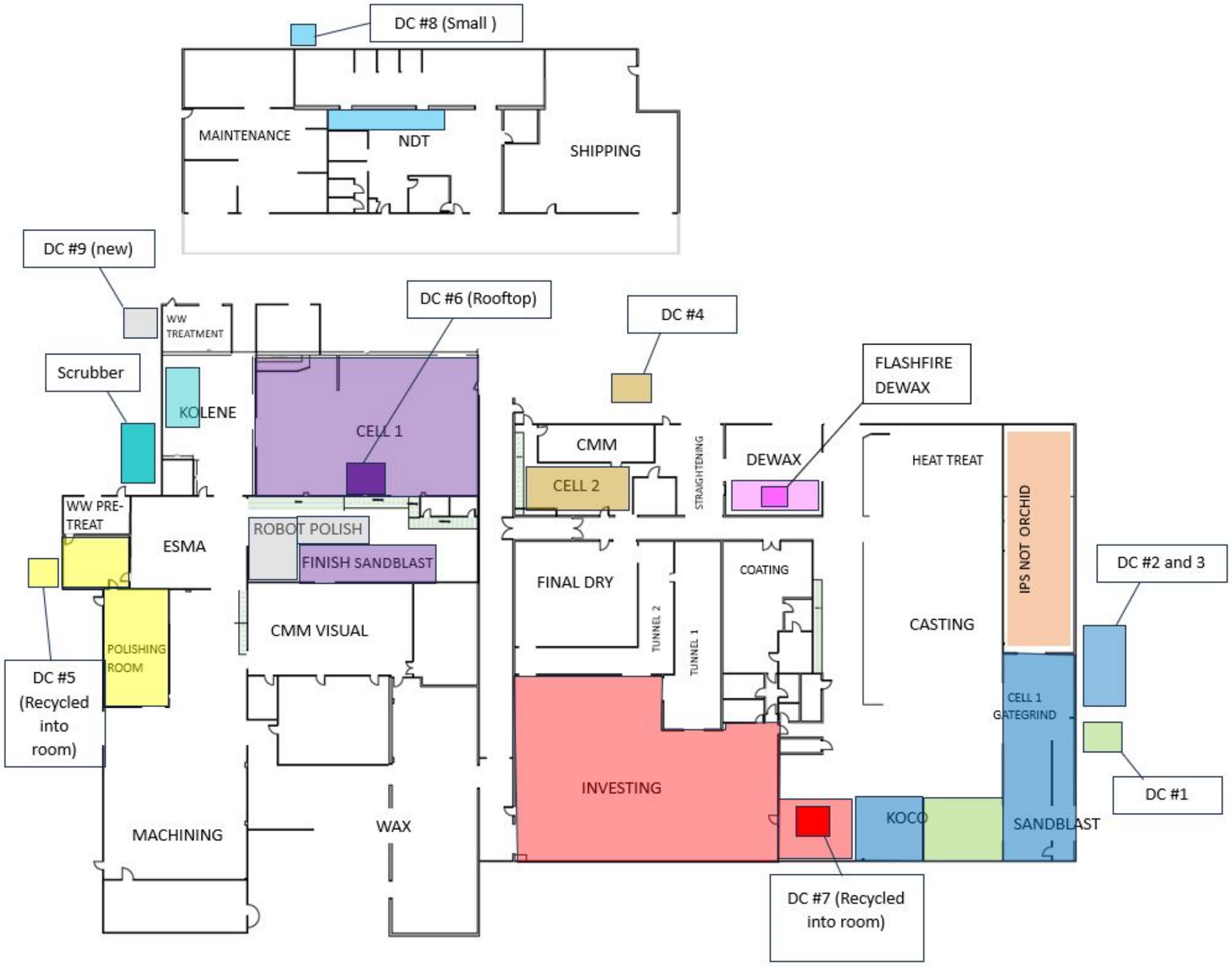
N

FIGURE 2

SITE PLAN

ORCHID ORTHOPEDIC
13963 FIR STREET
OREGON CITY, OREGON

DRAWN BY	M. FERRY	11/19/2024
CHECKED BY	L. SIMMONS	11/19/2024
APPROVED BY	L. GREEN	11/19/2024
DRAWING NUMBER	1827-23001(V01)	



LEGEND:

NOTES:

1. SITE DRAWING PROVIDED BY ORCHID ORTHOPEDIC

2. SYMBOLS AND SHADING REPRESENT LOCATION BUT DO NOT ALWAYS REPRESENT EXACT SHAPE, SIZE, OR ORIENTATION

3. AREAS OF EMISSION CONTROLS ARE COLOR-CODED TO MATCH THEIR CONTROL DEVICE

0 55 110 220

Feet

N

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FIGURE 3

PROCESS AND EMISSION CONTROL AREAS

ORCHID ORTHOPEDIC
13963 FIR STREET
OREGON CITY, OREGON

ODEQ AIR QUALITY FORMS

- AQ520 CAO Emissions Inventory (excel file)
- AQ523 Categorically Exempt Toxics Emissions Units

Form AQ523

CATEGORICALLY EXEMPT TOXICS EMISSIONS UNITS **ANSWER SHEET**

Facility name: Orchid Orthopedic Solutions Oregon, Inc. Permit Number: 03-2505-SI-01

Indicate which of the following categorically exempt activities occur at this facility by checking the appropriate columns below. Submit this form electronically with your Cleaner Air Oregon (CAO) Emissions Inventory AQ520 form to meet the reporting requirements in OAR 340-245-0040(4)(a)(A) for categorically exempt Toxics Emissions Units (TEUs). This form is the complete list of categorically exempt TEUs, which can be found in the division 245 rules under OAR 340-245-0060(3)(b).

Yes	No	Categorically Exempt TEU Activities
✔		Evaporative and tail pipe emissions from on-site motor vehicle operation.
✔		Distillate oil, kerosene, gasoline, natural gas or propane burning equipment, provided the aggregate expected actual emissions of the equipment identified does not exceed the de minimis level for any regulated pollutant, based on the expected maximum annual operation of the equipment. If a source's expected emissions from all such equipment exceed the de minimis levels, then the source may identify a subgroup of such equipment as categorically exempt with the remainder not designated as an exempt TEU. The following equipment may never be included as part of the exempt TEU: A. Any individual distillate oil, kerosene or gasoline burning equipment with a rating greater than 0.4 million Btu/hour; and B. Any individual natural gas or propane burning equipment with a rating greater than 2.0 million Btu/hour.
	✔	Distillate oil, kerosene, gasoline, natural gas or propane burning equipment brought on site for six months or less for maintenance, construction or similar purposes, such as but not limited to generators, pumps, hot water pressure washers and space heaters, provided that any such equipment that performs the same function as the permanent equipment, must be operated within the source's existing PSEL.
✔		Office activities.
	✔	Food service activities.
✔		Janitorial activities.
✔		Personal care activities.
✔		Grounds keeping activities, including, but not limited to building painting and road and parking lot maintenance.
	✔	On-site laundry activities.
	✔	On-site recreation facilities.
✔		Instrument calibration.
	✔	Automotive storage garages.

✔		Refrigeration systems with less than 50 pounds of charge of ozone depleting substances regulated under Title VI, including pressure tanks used in refrigeration systems but excluding any combustion equipment associated with such systems.
✔		Temporary construction activities.
✔		Warehouse activities.
✔		Accidental fires and fire suppression.
✔		Air vents from compressors.
✔		Air purification systems.
	✔	Continuous emissions monitoring lines.
	✔	Demineralized water tanks.
✔		Pre-treatment of municipal water, including use of deionized water purification systems.
✔		Electrical charging stations.
	✔	Fire brigade training.
✔		Instrument air dryers and distribution.
	✔	Fully enclosed process raw water filtration systems.
✔		Electric motors.
✔		Pressurized tanks containing gaseous compounds that do not contain toxic air contaminants.
	✔	Vacuum sheet stacker vents.
	✔	Emissions from wastewater discharges to publicly owned treatment works (POTW) provided the source is authorized to discharge to the POTW, not including on-site wastewater treatment and/or holding facilities.
	✔	Log ponds.
✔		Stormwater settling basins.
✔		Paved roads and paved parking lots within an urban growth boundary.
✔		Hazardous air pollutant emissions in fugitive dust from paved and unpaved roads except for those sources that have processes or activities that contribute to the deposition and entrainment of hazardous air pollutants from surface soils.
✔		Health, safety, and emergency response activities.
	✔	Non-diesel, compression ignition emergency generators* and pumps used only during loss of primary equipment or utility service due to circumstances beyond the

		reasonable control of the owner or operator, or to address a power emergency, provided that the aggregate horsepower rating of all stationary emergency generator and pump engines is not more than 3,000 horsepower. If the aggregate horsepower rating of all the stationary emergency generator and pump engines is more than 3,000 horsepower, then no emergency generators and pumps at the source may be considered categorically exempt. ***All spark ignition engines remain exempt.**
☐	☑	Non-contact steam vents and leaks and safety and relief valves for boiler steam distribution systems.
☐	☑	Non-contact steam condensate flash tanks.
☐	☑	Non-contact steam vents on condensate receivers, deaerators and similar equipment.
☐	☑	Boiler blowdown tanks.
☐	☑	Ash piles maintained in a wetted condition and associated handling systems and activities.

SUPPORTING INFORMATION

- Orchid Ortho CAO - Process Flows
- Orchid Ortho CAO - TEU Summary
- Orchid Ortho CAO - Product List & SDS Review (excel file)
- Orchid Ortho CAO - Supporting Calcs for Emissions (excel file)
- 210720 Orchid HI Report

ORCHID ORTHOPEDICS – PROCESS FLOWS

Following are all primary process flows conducted at Orchid Orthopedics. Each step is briefly explained, followed by an assessment of the potential to emit constituents on the ODEQ Pollutant List (PTE), toxic emission unit (TEU) identifier (if applicable), and any further explanatory notes.

WAX Process Flow

**This is the only process that includes waxes and is the 'start' of product formation.*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
1) Wax Molding. Injection wax machines inject pattern wax into pattern tools. Gate wax is heated to 120°F and pattern wax is heated to 148°F for molding. The unique pattern tools are then combined into a mold assembly, called a 'gate'. Excess wax on molds is cut off, collected and combined with cooled wax from Step #4 and sent back to the manufacturer for re-use.	Wax	NO – *see notes*	NA PARTS CLEANING	The wax molding room has been identified as having no to negligible PTE. Logic: • Physical. This room is in the building interior and has no vents, windows or doors to the exterior. • Non-wax products. An SDS review of non-wax products in this room did not identify any ODEQ Pollutants with potential to emit. • Wax products: A review of emission reference documents did not identify any discussion or reference to emissions from low-temperature wax melt and injection into a pattern. This includes AP-42 (Section 13, Steel Foundries), or the RTI International *Emission Estimate Protocol for Iron and Steel Foundries* (RTI). Therefore, there are no identified stack or fugitive emissions. *Note that any general cleaning activities with acetone or isopropyl alcohol (IPA) in this room is still conservatively included as fugitive emissions in the material balance (MB) portion of AQ520 as their use was considered facility wide.*
2) Investing. Wax molds go through a repeated dipping in wet slurry, then sand application and then drying process to create ceramic forms around the assembled wax molds. Sub-processes: a. Slurry mixtures are created in large containers by pouring dry and wet products together to create slurry. b. After being dipped in a slurry, sand is applied either through a "Rainfall sander" that drizzles sand on the slurry-dipped mold, or in a "Sand bed" which blows compressed air up through the bed. c. The mold with the slurry and sand coating dries on an open rack prior to repeating the process as many times as is needed.	Investing	NO – *see notes*	NA	The investing room has been identified as having no PTE. Logic: • Physical. This room is climate controlled to specific temperatures and humidity, with no exterior vents. • Internal Dust Control: Ducting to the mixing and sand coating processes collects dust using a large blower motor (vacuum). The system sends the collected dust/air through a large array of 40 pleated filter cartridges in parallel (99.9% mass efficiency).* Filtered air is returned to the investing room through a large 'sock' to soften air flow and distribution. Therefore, there are no identified stack or fugitive emissions. *Dust Collector (DC) #7 (see Figure 3).

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
3) Drying Tunnels (2, 3 & Final Dry). A series of controlled environment curing rooms kept around 70 degrees. Recirculated air goes through a dehumidifier to lower humidity and dry molds.	Drying Tunnels 1, 2 & Final Dry	NO – *see notes*	NA	The drying tunnels have been identified as having no PTE. Logic: • Physical. These rooms are climate controlled to specific temperatures and humidity, with no exterior vents.
4) De-wax. Dried molds are placed in a furnace powered by natural gas. The furnace operates at 1,500F (main burner) and 1,600°F (afterburner). Wax melts out of the molds and the drippage is collected, cooled and sent back to the manufacturer for re-use. Air emissions are controlled with an afterburner on the furnace stack.	Dewax	YES – Fugitive (natural gas) & Point (flashfire dewax afterburner)	NATURAL GAS & FLASHFIRE DEWAX	Pacific Kiln FlashFire Dewax system is fueled by Natural Gas (NG). According to manufacturer: • Approx. 10 - 20% wax is burned off as smoke during the process. The average of 15% is used for emission calculations. This is considered conservative since wax purchase amount is being used and does not account for wax that is cut off during the process, collected and sent for recycling. • Afterburner has a minimum 99% efficiency rate for VOCs and PM. Wax Products with PTE ODEQ Pollutants: Emissions from wax with ODEQ pollutants are calculated using MB (15% of wax purchased) and a 99% control efficiency (afterburner).

CASTING Process Flow

**In this process the ceramic molds are used to create metal castings.*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
5) Pre-Heating. Ceramic molds are wrapped in fiberglass insulation and pre heated in open ovens (fueled by natural gas) to prepare for receiving metal (casting). Batches are heated to 1600-1900°F depending on part design.	Foundry (Casting)	YES – Fugitive (natural gas)	NATURAL GAS	The only PTE identified are fugitive natural gas emissions. Heat from the ovens is collected and vented. Fiberglass insulation is used to protect the ceramic molds (reduces cracking). A review of the SDS (M-414 Inswool Moldable) did not identify any ODEQ Pollutants in the fiberglass binder.
6) Casting. Metal is heated to 2,900°F in electric induction furnaces (EIFs). Molten metal is then manually poured into the pre-heated ceramic molds. Freshly cast molds are placed on pallets and allowed to cool for 45-60 mins. Sub-processes: a. F75 alloy is melted and argon gas (used as shielding gas to prevent rust by blocking oxygen) is dripped into the crucible. b. 17-4 alloy is melted with argon (gas) and hexamethylenetetramine (powder) placed on top of mold to create a reaction for an oxygen free environment (drum placed over mold to preserve the environment).	Casting	YES-Fugitive	F-75 CAST & 17-4 CAST	Casting emissions are fugitive. Orchid's engineering department reviewed the RTI document and identified the following (uncontrolled) alloy Emission Factors (EF) are used: *Melting*: - AP-42 (Table 12.13-2): 0.1 lb. PM / ton metal poured *Pouring and Casting:* - RTI (Table 5-4): 0.087 lb. PM / ton metal poured *Cooling*: - RTI (Table 5-4): 0.29 lb. PM / ton metal poured **Alloy Casting EF** (uncontrolled) combines above EFs: 0.1 + 0.087 + 0.29 = 0.477 lb. PM / ton metal poured This process occurs early in the morning in a large, enclosed, unvented room. This space is under negative pressure. Process instructions require all doors to be closed during casting to prevent a draft which could introduce dust or debris to the alloy. Any PM emissions would settle on surfaces. A building control efficiency of 99% has been applied.

KNOCK OUT AND CUTOFF Process Flow

**In this process the ceramic molds are removed from the castings, which are then cut into individual parts.*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
7) Knock out. After cooling, molds are placed one by one into a pneumatic jack hammer tool "knockout booth" to break and crack shell off the casting.	Knock Out and Cutoff (KOCO)	YES- Point	KNOCKOUT	Control Device: The knockout booth is connected to Dust Collector #2 (DC2). **Ceramic Knockout EF** (uncontrolled): - RTI (Table 5-4): 79.3 lb. PM / ton metal poured - described as "shakeout" in RTI, aka "knockoff" The PM is generated from breaking the ceramic molds. The estimated percentage of each ODEQ pollutant present in one pound of ceramic material is calculated in the excel file *Supporting Calcs for Emissions*.
8) Cutting. Two AW Bell power saws are used to cut off individual parts from the gate assemblies.	KOCO	YES - Point	F-75 CUT & 17-4 CUT	Control Device: Dust Collector #1 (DC1) collects dust from both saws. **Alloy Cutting EF** (uncontrolled): - RTI (Table 6-2): 6 lb. PM / ton metal produced

CELL 1 and CELL 2 Process Flow

**In this process the rough parts are taken through an initial series of steps to take any remaining ceramic mold off the part, grind down the gate connection point, inspection for flaws, and rework of fixable defects.*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
9) Sandblast. Parts are sandblasted to remove residual amounts of remaining ceramic shell.	Cell 1 Sandblast	YES - Point	CELL 1 SANDBLAST	Control Device: Dust Collector #3 (DC3) collects the air from the sand blast operations. PM generated is predominantly sand, with small amounts of alloy and residual ceramic mold. **PM Emissions** from sandblast are calculated using Material Balance. Sandblast also occurs in Cell 2 using two Goff tumble blasters using the same grit material. Estimates assume 75% of material is used in Cell 1 Sandblast and 25% in Cell 2 Sandblast.
10) Gate Grind. The remaining gates on each part are ground down to prepare for machining in CNC machine cells. Predominantly this is an auto gate grind, but some hand grinding on a belt is also done.	Cell 1 Gate Grind	YES - Point	CELL 1 GATE GRIND	Control Device: DC3 collects the air from the alloy grinding operations. The emissions from this and rework grinding operations are calculated using the following EF: **Alloy Grinding EF** (uncontrolled): - RTI (Table 6-2): 16 lb. PM / ton metal produced Estimate assumes 95% of Alloy Grinding emissions go to DC3. Hand grind activities described in the Steps #12 (Hand Grind) and #14 (Rework) are each assumed to have 2.5% of total alloy grinding emissions.

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
11) Tumble Blasters. Parts are sandblast using two Goff tumble blasters.	Cell 2	YES - Point	CELL 2 SANDBLAST	Control Device: Dust Collector #4 (DC4) collects emissions from the tumble blasters and the downdraft tables. **PM Emissions** from sandblast are calculated using Material Balance. Sandblast also occurs in Cell 1 using the same material (method of estimation is described in Step #9, above).
12) Hand Grind. As needed, druml-sized dies are used to hand grind parts at four down draft tables.	Cell 2	YES - Point	CELL 2 HAND GRIND	Control Device: DC4 collects emissions from the tumble blasters and the downdraft tables. Alloy hand grinding emissions are assumed to be 2.5% of total (using EF described above in Step #10).
13) Straightening. Parts are inspected using Go/NoGo gauges and manually straightening with hammers and presses.	Cell 2	NO	NA	
14) Rework. Parts are manually inspected, and small defects are ground out using small die grinders.	Cell 1	YES - Point	REWORK GRIND	Control Device: Dust Collector #6 (DC6) is a roof top collection unit that collects emissions from each booth's down draft table. Alloy hand grind emissions are assumed to be 2.5% of total (using EF described above in Step #10).
15) Penetrant inspection. Parts are soaked in fluorescent penetrant fluid. The parts are then inspected under a blacklight to identify any flaws, cracks or defects	Cell 1	YES - Fugitive	PARTS CLEANING	The penetrant inspection has been identified as having no PTE. Logic: • An SDS review of the penetrant and developer used did not identify any ODEQ Pollutants with potential to emit. *Note that parts cleaning with acetone (sharpie marks, degrease, etc.) is included as fugitive emissions in the material balance portion of AQ520 as their use was considered facility wide.*
16) Rework welding. Parts that are found to have fixable defects are repaired by welding in a weld booth. Welding is TIG welding.	Cell 1	Yes- POINT (Welding) & YES - Fugitive	WELD (F-75), WELD (17-4) & PARTS CLEANING	Control Device: DC6 collects welding emissions from each booth's down draft table. *Note that parts cleaning by hand with isopropyl alcohol is included as fugitive emissions in the material balance portion of AQ520 as their use was considered facility wide.*

Heat Treat

**All products go through a heat treatment (including products shipped unfinished).*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
17) Heat Treat. Castings are placed in heat treat and heated up under vacuum to enhance metallurgical properties.	Heat Treat	YES - Fugitive	NATURAL GAS	Natural gas is used for heating. The process might produce minimal emissions of Argon gas (not an ODEQ pollutant).

**** At this point over 90% of the castings are sent off site for finishing. In 2023, 6.5% of castings were finished at the Oregon City facility (16,599 pounds of finished products produced).****

Kolene

**This is a specialty cleaning process conducted for one client. Frequency of use is approximately 2x per month, but the system is always kept heated and ready.*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
18) Kolene. Parts are cleaned in a Kolene process tank. This step is to remove small amounts of residual ceramic shell that are lodged in hard-to-reach nooks and crannies of parts. The process takes parts through a series of baths: a Sodium hydroxide bath heated to 1,000°F, a water bath, and then a hydrochloric acid bath to neutralize.	Kolene	YES - Point	KOLENE	Control Device: Viron Horizontal Scrubber The Kolene system emits a sodium hydroxide (NaOH) mist that is captured by the Viron scrubber. According to Viron's industry knowledge we can expect ~10% of NaOH to be 'spent' during etching, leaving ~90% emitted as mist. According to Viron, when operating as designed the scrubber will have a 98.5% to 99.5% control efficiency. This information also presented in the excel file *Supporting Calcs for Emissions*.

Machining

**In this step parts are milled closer to finished dimensions and then cleaned.*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
19) Machining. Parts are placed into a CNC machine and milled to bring it much closer to finished dimensions. Each mill is equipped with a mist buster to eliminate aerosolized coolant escaping the machines. There is no direct dust collection.	Machining	YES-Fugitive	MACHINING OIL	This process is not anticipated to produce PM emissions. Fugitive emissions from one product with ODEQ Pollutants are estimated based on Material Balance.
20) Auto Chlor. Parts are cleaned after machining to remove any coolant and machine oil. An industrial dish-washer style machine is used to clean the parts.	Machining	NO – *see notes*	NA	SDS review of the cleaning product Mach Endurance identified sodium hydroxide (CAS 1310-73-2) as the only ODEQ pollutant. Sodium hydroxide (also known as caustic soda) is highly soluble in water and will discharge with wastewater. Therefore, there is no PTE for the Auto Chlor process.

Finishing / Polishing

**In this step parts are polished in a variety of ways.*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
21) Belting/ Polishing. Parts are manually belted and polished on buffing wheels and polishing belts. Polishing compounds are used in three different varieties.	Finishing/polishing	NO – *see notes*	NA	Control Device: Dust Collector #5 (DC5) is currently collected at machine sources, filtered and recycled back into the controlled environment room. No emissions from the room.
22) Robot polish. Same as manual polish only these parts are supported by an automated robot that completes the same belting and polishing task with a preprogramed robot arm. Work is conducted in an enclosed booth.	Robot Polish	YES – Point	ROBOT POLISH	Control Device: Dust Collector #9 (DC9) collects emissions from the robot polish booth. **PM emissions** from the polishing compound used in this room are estimated based on Material Balance.
23) Drag finish. Parts are fixed to a rotating arbor that drags them through a trough of media that creates a highly polished surface	Drag	NO – *see notes*	NA	Wet process (no PM emissions).
24) Vibratory mill. Parts are placed in a large container of media and vibrated to achieve a high polish finish.	Drag			
25) Sandblast. Parts are sandblasted manually in sandblast cabinets. Using a finer media than previous sandblast treatments	Finish Sandblast Room	YES – Point	FINISHING SANDBLAST	Control Device: Dust Collector #6 (DC6) collects PM from the sandblast cabinets. **PM emissions** from sand included under Material Balance.
26) Polishing water treatment. Water used in polishing processes is treated to remove polishing compound in preparation for water treatment disposal.	WW Pre-Treat	NO – *see notes*	NA	A review of products used in water treatment shows that they either don't contain ODEQ pollutants or don't have PTE (coagulants and pH balancers).

Cleaning/ESMA

**In this step parts are cleaned and a protectant sealant applied.*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
27) Parts Cleaning. Parts are placed in a dishwasher style machine to clean and disinfect the parts. Each machine is equipped to plumb in and out each liquid component.	ESMA	NO – *see notes*	NA	Emissions vent out of the room unfiltered through ducting. The equipment uses MC 518 Solution, RO water and Citric Acid. Products used in this step do not contain ODEQ pollutants.
28) Dip Seal. Parts are dipped into a dip seal solution that quickly hardens to protect the parts surface during additional process.	ESMA	NO – *see notes*	NA	Dip seal (M-2175 Evans Stripcoat Type II) does not contain any hazardous ingredients per SDS. Dip seal media is kept heated and ready at roughly 180°F. (Crockpot sized.). Lid kept on when not in use. Wax consistency.
29) Final Clean. Hand inspecting and cleaning parts and then packaged in protective packaging.	ESMA	YES-Fugitive	PARTS CLEANING	*Note that parts cleaning by hand with isopropyl alcohol is included as fugitive emissions in the material balance portion of AQ520 as their use was considered facility wide.*

NDT

**In this step parts undergo non-destructive testing (NDT).*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
30) Digital X-ray. Parts are inspected using digital x-rays.	NDT	NO	NA	
31) Fluorescent penetrant. A second location for penetrant inspection. Same process in a second location	NDT	NO	NA	
32) Manual Inspection. Personnel use black lights and minimal touch up grinding on parts using die grinders in a booth setting (for using the black lights).	NDT	Yes - POINT	NA (de minimis)	Control Device: The small filter behind the building (DC8) collects emissions from booths. *PM emissions at this location are assumed to be <1% of the emissions from all grinding activities are therefore not shown on AQ520. Note that grind emissions in Steps 10 -12 are included on AQ520 assuming 100%.*

Coating

**In this step specialty parts metal beads applied.*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
33) Coating. Specialty parts have metal beads manually applied and glued into place. Parts are subsequently cured in an electric oven.	Coating Room	NO – *see notes*	NA	None. Heat (and emissions) from the electric oven vent to the roof. No ODEQ pollutants in adhesives. *Note that parts cleaning by hand with isopropyl alcohol is included as fugitive emissions in the material balance portion of AQ520 as their use was considered facility wide, however the air in this room is recirculated.*

Waste Water Treatment

**Parts are not involved in this step.*

Step # & Activity	*Room or Area*	*PTE*	*TEU*	*Notes & Methodology*
34) Water Treatment. Plant process water is collected in tanks and processed in 1,000-gallon batches. The solids are removed, and the water is measured for pH before discharge to sewer line.	Waste Water Treatment Room	None (see Notes)	NA	A review of products used in water treatment shows that they either don't contain ODEQ pollutants or don't have PTE (coagulants and pH balancers).

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ORCHID ORTHOPEDICS – TEU SUMMARY

Following is a summary of toxic emission units (TEUs) at the Facility. Items shown in blue use material balance to estimate emissions; all other items use an emission factor.

Point Emissions

TEU	Description	Stack ID	Control Device
FLASHFIRE DEWAX	Emissions from the Pacific Kiln Flashfire Dewax furnace	FLASHFIRE DEWAX	FLASHFIRE DEWAX (afterburner)
KOLENE	Emissions from Kolene system	SCRUBBER	Viron Horizontal Scrubber
F-75 CUT	Emissions from cutting individual F-75 alloy parts from gate assemblies	DC1	Dust Collector DC1
17-4 CUT	Emissions from cutting individual 17-4 alloy parts from gate assemblies	DC1	
KNOCKOUT	Emissions from the pneumatic jack hammer tool "knockout booth" where the ceramic mold is cracked and broken off the casting	DC2	Dust Collector DC2
CELL 1 SANDBLAST	Emissions from sandblast activities in Cell 1	DC3	Dust Collector DC3
CELL 1 GATE GRIND	Emissions from manual and auto grinding activities in Cell 1	DC3	
CELL 2 SANDBLAST	Emissions from tumble blasters in Cell 2	DC4	Dust Collector DC4
CELL 2 HAND GRIND	Emissions from hand grinding parts	DC4	
REWORK GRIND	Emissions using small hand die grinders during inspection and rework	DC6	Dust Collector DC6, a roof top unit that collects from each booth's downdraft table
WELD (F-75)	Emissions from rework welding of F-75 alloy parts	DC6	
WELD (17-4)	Emissions from rework welding of 17-4 alloy parts	DC6	
FINISHING SANDBLAST	Emissions parts sandblasted manually using a fine grit	DC6	Dust Collector DC6
ROBOT POLISH	Emissions from robot polish booth	DC9	Dust Collector DC9

Fugitive Emissions *(no control devices)*

TEU	Description	Fugitive ID
PARTS CLEANING	Fugitive emissions from hand cleaning of parts	F-AGGREGATE
MACHINING OIL	Fugitive emissions from machining oil	
NATURAL GAS	Fugitive emissions from natural gas use at the facility (i.e., flashfire dewax furnace, preheat ovens, heat treatment, building heating)	
F-75 CAST	Emissions related to F-75 alloy melting, charging/tapping, pouring/casting and cooling	
17-4 CAST	Emissions related to 17-4 alloy melting, charging/tapping, pouring/casting and cooling	
WELD (MIG)	Emissions from MIG welding during occasional facility equipment maintenance activities	

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INDUSTRIAL HYGIENE SAMPLING REPORT

FINDINGS OF EXPOSURE ASSESSMENT FOR HEXAVALENT CHROMIUM

ORCHID (OREGON)
WELDING, CASTING, CUTOFF, AND BARREL CHANGE
13963 S FIR STREET
OREGON CITY, OREGON 97045

Report date: August 9, 2021

Prepared by:
Robin Sharpe-Yablonka, CIH
Sharpe Industrial Hygiene Solutions, LLC
Owner and Certified Industrial Hygienist
sharpeihs@gmail.com

Executive Summary

On July 20, 2021, Sharpe Industrial Hygiene Solutions, LLC (SIHS), at the direction of Orchid (Oregon), conducted an occupational exposure assessment during typical work-day operations in the Cell 1 Welding, Casting, Cutoff departments and during a barrel change task at the Oregon (Oregon) facility located at 13963 S Fir Street in Oregon City, Oregon. The assessment included personal breathing zone air sampling for hexavalent chromium [Cr(VI)] during one 8-hr day shift. Monitored operations within the departments included welding, casting, gate removal, and a dust collector barrel change.

The personal breathing zone air sample results for the employees performing welding, casting, cutoff, and the barrel change were all below the occupational exposure limits (OELs) established by OR-OSHA, ACGIH, and NIOSH for Cr(VI). Additionally, each of the sample results were below the laboratory reporting limit (non-detect).

A more detailed discussion of assessment findings, conclusions, and recommendations is provided below.

Process Characterization

The Orchid (Oregon) facility manufactures orthopedic products primarily made of F75 alloy metal, which is composed of cobalt, chromium, and molybdenum. Infrequently (approximately two times per month), parts are made from 17-4 alloy, which has a higher percentage of chromium. The cutoff department is located at the southeast corner of the facility, with knockout in the same room. There are two AW Bell saws, a table saw, shotblast tumbler, and a vibratory table located in the area. Cutoff employees use an AW Bell saw to cut the F75 parts from the gating tree. The table saw is used to cut parts made of 17-4. Cutoff employees wear full-face or half-face air purifying respirators (APRs) with P100 particulate filters during cutting. Local exhaust ventilation (LEV) is located at the back of the saws and exhausts through a dust collection system and to the outdoors.

Cell 1 welding is located at the northeast side of the facility. One welding booth is located at the south side of the room. LEV is located at the back of the welding table that exhausts to the outdoors. Employees do not wear respiratory protection.

Finishing is located at the west side of the facility. There are eight Hammond grinders with two polishing wheels on each grinder that are used to polish parts. Six pedestal belt grinders are located along the west wall and use a very fine grit belt for a “belting” process. Each of the Hammond grinders and pedestal grinders are connected to LEV at the belts that exhausts to the outdoors. The dust collector is located outside the west exterior door of the department. A 55-gallon drum is used to collect particulate generated from these processes.

Findings

Observations

During the monitored shift, the following observations were made:

Cell 1 Welding

- There was one welder who spent the duration of the shift in the welding booth.
- For the purposes of the assessment, he welded on 17-4 parts for approximately two hours of the shift. This is reportedly the maximum amount of time he could work on this alloy during any typical day. Although 17-4 parts are not a regular product. The remainder of the shift he worked on F75 parts.
- The employee was observed wearing the following PPE: safety glasses, ear plugs or muffs, safety shoes, leather gloves welding, work jacket, and welding helmet.

Casting

- There were three employees working in the department throughout the shift. Casting was performed for the first five hours of the shift.
- The employees rotated responsibilities. The monitored employee removed the molds from the oven and then helped lift the pot for pouring for the first two hours and then switched to checking chemistry and pouring for the remainder of the time.
- Significant smoke was observed during pouring.
- The employees wore the following PPE: safety glasses, ear plugs, and safety shoes. During pouring, they additionally wore flame resistant (aluminized) leg coverings and jackets, heat resistant gloves, and heat reflective face shields.

Cutoff

- There was one employee working in the area during the monitored period of the shift. The employee worked on 17-4 alloy at the table saw for approximately 100 minutes, which would be typical durations during a shift when this alloy is available for work. He then worked at the AW Bell saw on F75 parts for the remainder of the shift.
- A strong metal odor and significant airborne particulate was observed during cutting.
- Settled particulate (metal and shell material) was observed on surfaces throughout the department.
- The employee wore the following PPE: safety glasses, earmuffs, safety shoes, cut resistant gloves, and a half-face APR with P100 filters.

Barrel Change

- A swing shift finishing employee performed a barrel change for the finishing dust collector at the beginning of his shift. This is reportedly done as needed (every one to two weeks).
- He used a hammer on the outside of the funnel leading to the barrel to knock down any settled particulate. He then removed the lid and capped it. Another employee removes the barrel using a forklift. An empty barrel is then secured.
- Significant, very fine particulate was observed throughout the area throughout the process and remained airborne for several minutes after completion.
- The employee wore the following PPE: safety glasses, ear plugs, safety shoes, and a half-face APR with P100 filters.

Sample Results

The personal breathing zone air sample results are presented in Table 1. Sample collection methodologies are provided in appendix A and laboratory reports are attached in appendix B.

The time-weighted averages (TWAs) were calculated for three employees during one 8-hour day shift and assuming the concentration of Cr(VI) in the breathing zones of the employees would be similar during the sampled and non-sampled time should the employees continue to perform their specific tasks for the duration of their shifts. Additionally, a short-term sample was collected during the barrel change task. Based on information provided by the employees, the

workload on the day of monitoring would be considered typical in terms of the type and amount of work performed during the monitored shift while air samples were collected. Additionally, the cutoff and welding employees simulated work in 17-4 alloy parts as these are only worked on periodically. One 17-4 part was poured in casting which is also typical when these parts are needed. Therefore, the overall results could be considered representative of typical exposures during the monitored operations during a shift with work on 17-4 and F75 alloy parts.

Results were compared to applicable exposure limits and guidelines including Oregon OSHA (OR-OSHA) regulatory limits and exposure guidelines published by the American Conference of Governmental Industrial Hygienists (ACGIH) and the National Institute for Occupational Safety & Health (NIOSH).

Results of the air samples collected from the breathing zones of the welding, casting, cutoff, and barrel change employee were all below the established OELs for Cr(VI). Additionally, the results were all below the laboratory reporting limit (non-detect) for Cr(VI).

Table 1: Orchid – Welding, Casting, Cutoff, and Barrel Change
Personal Breathing Zone Sampling for Cr(VI)
Sample Date: July 20, 2021

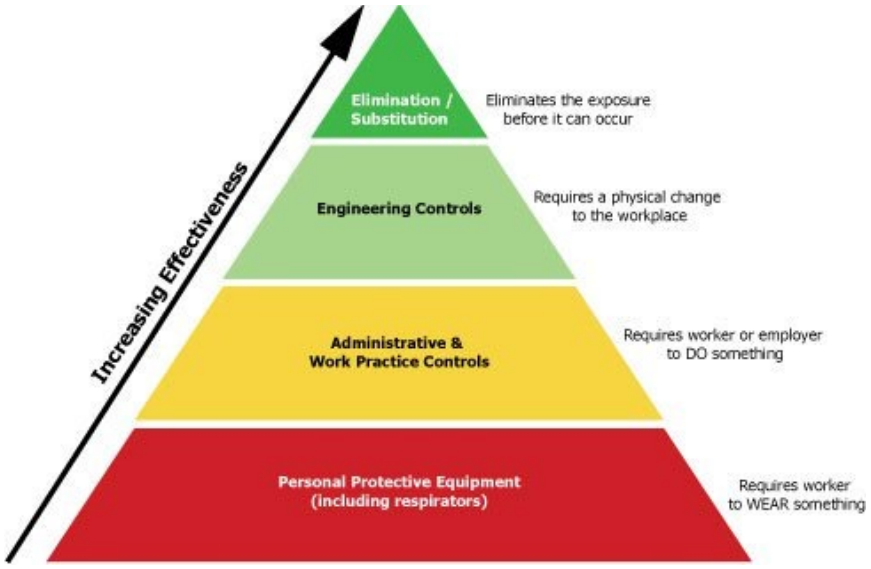
Sample Number	Sample Details	Duration (minutes)	Cr(VI) (µg/m^3)
72021-1	Cell 1, Welder (Ed Eaton): Repair welding (2 hours 17-4, 6 hours F75)	400	ND
72021-2	Casting, Foundry Operator (Troy Hill): Pouring F75 (27 parts), 17-4 (1 part)	270	ND
72021-3	Cutoff, Cutoff Operator (Eric Mecum): Gate removal of 40 F75 molds, 100 minutes cutting 17-4	376	ND
72021-4	Finishing, Barrel Change (Frank Kelley): Dust collector barrel change	30	ND
OR-OSHA PEL (Permissible Exposure Limit)			**5**
OR-OSHA AL (Action Level)			**2.5**
NIOSH REL (Recommended Exposure Limit)			**NA**
2020 ACGIH TLV® (Threshold Limit Value)			**[1]0.2, [1,2]0.5**

Notes:
Time weighted averages were calculated using the actual sample time and assuming continuous, representative exposure throughout the work shift. Exposures limits are based on an 8-hour workday (except for NIOSH REL which is for a 10-hour workday).
µg/m^3 = milligrams per cubic meter
ND = results were below the laboratory reporting limit (non-detected). See the laboratory report for the numerical value.
[1]Inhalable fraction
[2]STEL (short-term exposure limit)
RED = Exceeds OSHA PEL, ORANGE = Exceeds OSHA AL, YELLOW = Exceeds NIOSH REL or ACGIH TLV

Conclusions and Recommendations

Based on the July 20, 2021 assessment findings, including visual observations and sample results, current engineering controls appear to be sufficient to reduce potential exposures to Cr(VI) to below the applicable OELs. Additionally, Cr(VI) was not detected on the samples (air sample results were below the laboratory reporting limit).

Per OSHA, and industry best practice, when a hazard is identified, controls are implemented using the hierarchy of controls. If the hazard cannot be eliminated or removed, then engineering controls and/or administrative controls and work practices must be implemented whenever feasible. Only when such controls are not feasible to achieve full compliance, or in the interim while controls are being implemented, then personal protective equipment can be used to reduce employee exposures. Respiratory protection should not be selected as the control of choice until and unless other controls are determined to be ineffective or infeasible.



Based on these conclusions, the following recommendations are provided:

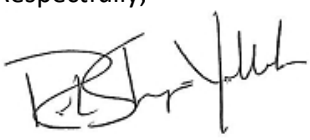
- Periodically, and/or if conditions, workloads, equipment, or tasks change such that higher exposures could be anticipated, additional exposure monitoring should be repeated at that time.
- The employees whose exposures are represented by the results of this survey (all cutoff, cell 1 welders, casting employees and employees who perform barrel changes) should be informed of the results of this assessment in accordance with OSHA standards (29 CFR 1910.1026) and industry best practice.

Limitations

This assessment is limited to the conditions and work practices observed and information provided to SIHS. The methods, conclusions, and recommendations provided are based on SIHS' judgment, expertise, and the standard of practice for professional service. They are subject to the limitations and variability inherent in the methodology employed. This industrial hygiene assessment is limited to the defined scope and does not purport to set forth all hazards, nor indicate that other hazards do not exist.

Thank you for the opportunity to assist Orchid (Oregon) in promoting a safer and healthier workplace. Please do not hesitate to contact me with any questions.

Respectfully,



Robin Sharpe-Yablonka, CIH
Sharpe Industrial Hygiene Solutions, LLC

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Appendix A:

Sampling Methods

For Cr(VI) sample collection, air was drawn through 37mm 5µm polyvinyl chloride (PVC) filters in two-piece cassettes. The sampling train was calibrated to operate at an average flow rate of 2 liters per minute (LPM). Samples were analyzed per modified OSHA ID 215 using ion chromatography.

An appropriate field blank was also obtained on site for quality assurance/quality control purposes. Samples were shipped to Galson Laboratories, Inc., following appropriate chain of custody procedures. The laboratory is accredited by the American Industrial Hygiene Association (AIHA) Laboratory Accreditation Programs (AIHA-LAP), LLC in the Industrial Hygiene LAP (IHLAP).

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Appendix B:

Laboratory Reports

Terms and Conditions & General Disclaimers

- This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.
- Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Analytical Disclaimers

- Unless otherwise noted within the report, all quality control results associated with the samples were within established control limits or did not impact reported results.
- Note: The findings recorded within this report were drawn from analysis of the sample(s) provided to the laboratory by the Client (or a third party acting at the Client's direction). The laboratory does not have control over the sampling process, including but not limited to the use of field equipment and collection media, as well as the sampling duration, collection volume or any other collection parameter used by the Client. The findings herein constitute no warranty of the sample's representativeness of any sampled environment, and strictly relate to the samples as they were presented to the laboratory. For recommended sampling collection parameters, please refer to the Sampling and Analysis Guide at www.sgsgalson.com.
- Unrounded results are carried through the calculations that yield the final result and the final result is rounded to the number of significant figures appropriate to the accuracy of the analytical method. Please note that results appearing in the columns preceding the final result column may have been rounded and therefore, if carried through the calculations, may not yield an identical final result to the one reported.
- The stated LOQs for each analyte represent the demonstrated LOQ concentrations prior to correction for desorption efficiency (if applicable).
- Unless otherwise noted within the report, results have not been blank corrected for any field blank or method blank data.

Accreditations SGS Galson holds a variety of accreditations and recognitions. Our quality management system conforms with the requirements of ISO/IEC 17025. Where applicable, samples may also be analyzed in accordance with the requirements of ELAP, NELAC, or LELAP under one of the state accrediting bodies listed below. Current Scopes of Accreditation can be viewed at http://www.sgsgalson.com in the accreditations section of the "About" page. To determine if the analyte tested falls under our scope of accreditation, please visit our website or call Client Services at (888) 432-5227.

National/International	Accreditation/Recognition	Lab ID#	Program/Sector
AIHA-LAP, LLC - IHLAP, ELLAP, EMLAP	ISO/IEC 17025 and USEPA NLLAP	Lab ID 100324	Industrial Hygiene, Environmental Lead, Environmental Microbiology

State	Accreditation/Recognition	Lab ID#	Program/Sector
New York (NYSDOH)	ELAP and NELAC (TNI)	Lab ID: 11626	Air Analysis, Solid and Hazardous Waste
New Jersey (NJDEP)	NELAC (TNI)	Lab ID: NY024	Air Analysis
Louisiana (LDEQ)	LELAP	Lab ID: 04083	Air Analysis, Solid Chemical Materials
Texas	Texas Dept. of Licensing and Regulation	Lab ID: 1042	Mold Analysis Laboratory license

Legend

< - Less than	mg - Milligrams	MDL - Method Detection Limit	ppb - Parts per Billion
> - Greater than	ug - Micrograms	NA - Not Applicable	ppm - Parts per Million
l - Liters	m3 - Cubic Meters	NS - Not Specified	ppbv - ppb Volume
LOQ - Limit of Quantitation	kg - Kilograms	ND - Not Detected	ppmv - ppm Volume
ft2 - Square Feet	cm2 - Square Centimeters	in2 - Square Inches	ng - Nanograms

SGS GALSON

6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.sgsgalson.com

LABORATORY ANALYSIS REPORT

Client : Sharpe Industrial Hygiene Solu
Site : ORCHID
Project No. : CR6
Date Sampled : 20-JUL-21
Date Received : 21-JUL-21

Account No.: 37681
Login No. : L541978
Date Analyzed : 21-JUL-21
Report ID : 1256274

Hexavalent Chromium (Welding)

Sample ID	Lab ID	Air Vol liter	Total ug	Conc ug/m3
72021-1	L541978-1	800	<0.030	<0.038
72021-2	L541978-2	540	<0.030	<0.056
72021-3	L541978-3	752	<0.030	<0.040
72021-4	L541978-4	60	<0.030	<0.50
72021-5	L541978-5	NA	<0.030	NA

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Level of Quantitation: 0.030 ug
Analytical Method : mod. OSHA ID-215 (version 2); IC/UV
Collection Media : PVC UW 37mm

Submitted by: KLS
Date : 22-JUL-21
Supervisor : MWJ

Approved by: NKP

SGS GALSON

6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.sgsgalson.com

LABORATORY FOOTNOTE REPORT

Client Name : Sharpe Industrial Hygiene Solutions
Site : ORCHID
Project No. : CR6

Date Sampled : 20-JUL-21 Account No.: 37681
Date Received: 21-JUL-21 Login No. : L541978
Date Analyzed: 21-JUL-21

L541978 (Report ID: 1256274):
HEXAVALENT CHROMIUM results have been corrected for the average background found on the media:
0.0143 ug for lot #23135 (samples 1-5).
SOPs: IC-SOP-15(25)
Total ug corrected for a desorption efficiency of 100%.
SGS Galson Laboratories pretests all media lots distributed for Hexavalent Chromium analysis and can provide data confirming that no significant background is present. We may not be able to verify lot background levels for media obtained through alternate vendors.
Samples were prepared and analyzed within method-specified hold times.

L541978 (Report ID: 1256274):
Accuracy and mean recovery data presented below is based on a 95% confidence interval (k=2). The estimated accuracy applies to the media, technology, and SOP referenced in this report and does not account for the uncertainty associated with the sampling process. The accuracy is based solely on spike recovery data from internal quality control samples. Where N/A appears below, insufficient data is available to provide statistical accuracy and mean recovery values for the associated analyte.

Parameter	Accuracy	Mean Recovery
Hexavalent Chromium (Welding)	+/-14%	98.1%

SHARPE Industrial Hygiene Solutions

L541978

R29

Bill to: Sharpe Industrial Hygiene Solutions, LLC **PO #:** NA **Account #:** [redacted]37681	**Date:** 7-20-21	**Sampled by:** RASY	**Page:** 1 of 1
	Turnaround Time:	**Standard (5 day)**	**Rush:** Next day by 6pm: ICMO **Results Due by:** 7/22/21 by 6 pm
Report to: Robin Sharpe-Yablonka **Phone:** 971-409-6302 sharpeihs@gmail.com	**Analysis:** Cr6 (welding)		
Site: Orchid **Project:** Cr6	**Additional Comments:**		

Sample Number	Name /Emp. #	Location/Activity	Flow Start / Flow End	Flow Ave (LPM)	Sample Time On / Sample Time Off	Total Sample Time (min)	Total Sample Vol (L)	Analysis
7201-1	Ed Eaton	Cell 1 - Welding	2.0 / 2.0	2.0	5:15 / 11:55	400	800	2PC UMPIC
2	Troy Hill	Casting - foundry operator	2.0 / 2.0	2.0	5:22 / 9:52	270	540	
3	Eric Mecum	Cutoff	2.0 / 2.0	2.0	7:09 / 1:25	376	752	
4	Frank Kelley	Barrel change	2.0 / 2.0	2.0	1:30 / 2:00	30	60	
5	Field blank	—	— / —	—	— / —	—	—	SKY 7/21/21

774311191909
Date:07/21/21
Shipper:FEDEX
Initials:MAK
Prep:UNKNOWN

Relinquished by: Signature	**Date:** 7-20-21	**Received by:** Signature: Michelle Krause Michelle Krause	**Date:** 7/21/21

0926