COLUMBIA STEEL

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August 17, 2021

Ms. Kenzie Billings
DEQ CAO Project Manager
Oregon Department of Environmental Quality
700 NE Multnomah Street, Suite 600
Portland, Oregon 97232

Re: Cleaner Air Oregon – Additional Information Regarding Air Toxics Emissions Inventory and Combined Modeling Protocol and Risk Assessment Work Plan Columbia Steel Casting Co., Inc., Portland, Oregon

Dear Ms. Billings,

As part of the ongoing efforts related to Cleaner Air Oregon, Columbia Steel Casting Co., Inc. (Columbia Steel, CSCC) submitted an Air Toxics Emissions Inventory (Form AQ520) and combined Modeling Protocol and Risk Assessment Work Plan to the Oregon Department of Environmental Quality (DEQ) on May 26, 2021. Follow-up questions and a request for additional information was provided by the DEQ on July 15, 2021 with a due date of August 17, 2021. On August 4, 2021 DEQ approved an extension of a portion of the requested additional data, which is now due by September 16, 2021.

This document and the associated attachments provide responses to certain items within the July 15, 2021 letter. Additional information and revised documents will be submitted to DEQ by September 16, 2021.

If you have any questions, please contact Bruce Schacht at (503) 286-0685, x286 or Sarah Kronholm from SLR International Corporation at (503) 709-7039.

Sincerely,
COLUMBIA STEEL CASTING CO., INC.

Bruce Schacht
Environmental Engineer

Cc: Martha Cox, Columbia Steel Casting Co., Inc.
Dave Faust, Columbia Steel Casting Co., Inc.
Sarah Kronholm, SLR International Corporation
Brien Flanagan, Schwabe, Williamson & Wyatt

Responses to DEQ's Request for Additional Information

I. Process Flow Diagram

In order to better understand all facility operations, DEQ requests that CSCC submit a detailed process flow diagram. Ensure that the process flow diagram includes all Toxic Emissions Units (TEUs) as defined in OAR 340-245-0020(60) that emit Toxic Air Contaminants (TACs) listed in OAR 340-245-8020 Table 2. Ensure that TEU designations are consistent with CSCC's Standard Air Contaminant Discharge Permit in accordance with OAR 340-245-0060(1).

> ***CSCC response:*** A detailed process flow diagram is being developed and will be provided in the response due by September 16, 2021.

II. Emissions Inventory, 1. Tab 2. Emissions Units & Activities

a. Provide a cross-reference table for DEQ's reference to clarify which TEUs identified in the Inventory correspond to Device ID and Pollution Control Device IDs listed in Section 1.0 of CSCC's Standard ACDP.

> ***CSCC response:*** A cross-reference table is provided as Table 1.

b. For any TEUs you determine to be exempt, substantiate that each TEU meets the applicable criteria as defined in OAR 340-245-0060(3). List all TEUs you have designated as exempt in accordance with OAR 340-245-0040(3)(a)(A) in CSCC's inventory.

> ***CSCC response:*** CSCC has not identified exempt TEUs at this time. If exempt TEUs are identified, they will be included in the updated inventory due by September 16, 2021, and justification that each exempt TEU meets the applicable criteria will be included.

c. Include emissions from wind erosion of the facility's outdoor material storage piles in the Inventory.

> ***CSCC response:*** An updated survey of material storage piles is being prepared by a third party and will be used in the emissions calculations. Emissions from the material storage piles are being developed and will be included in the updated inventory due by September 16, 2021.

II. Emissions Inventory, 2. Tab 3. Pollutant Emissions – EF

a. Revise emission factors for metals detected during December 2020 source testing. [remainder of request is not included in this document]

> ***CSCC response:*** An evaluation of the December 2020 source test report data has been completed. Revised emission factors will be included in the updated inventory due by September 16, 2021.

b. Classify the nickel emissions from heat treat and core ovens and ladle heaters as Insoluble nickel (CAS or DEQ ID).

CSCC response: This update has been completed and will be included in the updated inventory due by September 16, 2021.

c. Provide Safety Data Sheets (SDS) for welding materials (e.g., rod, wire, etc.) used in each welding activity performed onsite (e.g., gas metal arc welding, shielded metal arc welding, flux-cored arc welding, and submerged arc welding).

CSCC response: SDSs for welding materials are attached. A cross-reference table is provided as Table 2.

d. Provide specific references used for all emissions calculations and clearly indicate how each reference was used.

CSCC response: The inventory is in the process of being updated. More detailed references for emission factors will be provided in the updated inventory due by September 16, 2021.

e. Include emissions estimates for polycyclic aromatic hydrocarbons (PAHs), polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs), and polychlorinated biphenyls (PCBs) from the steel and manganese electric arc furnaces (EAFs) and induction furnaces in Buildings 8 and 11.

CSCC response: CSCC melting operations are unlikely to generate air emissions with concentrations of dioxins, PCBs, or PAHs. Although some ferrous metal foundries in the United States are known to have air emissions containing dioxins (EPA, 2006), PCBs (EMEP Guidebook, 2005), and PAHs (EPA, 1998), these foundries differ significantly from CSCC. Foundries with significant emissions of dioxins, PCBs, and PAHs typically melt scrap metal that contains organic matter and is contaminated with impurities such as chlorinated solvents, plastics, and cutting oils. The raw materials used by CSCC in melting operations do not have significant organic matter or chlorine contamination that are necessary precursors for the synthesis and release of PAHs or dioxins. Similarly, PCBs in foundry air emissions can be sourced to PCB contamination in raw materials used in the melt (EMEP Guidebook, 2005), and CSCC raw materials do not contain significant contamination that could possibly include PCBs. An evaluation of the likelihood that melting operations could cause air emissions with significant concentrations of dioxins, PCBs, or PAHs is given below for each of these chemical classes

Dioxins and Dioxin-Like PCBs

The formation of dioxins and dioxin-like PCBs is a complex process requiring that the following conditions be present at the same time and place (EPA, 2003):

1. Presence of chlorine
2. Presence of organic carbon
3. Temperatures between approximately 250^{o}C to 450^{o}C
4. Sufficient residence time of precursors in the above temperature window
5. Presence of a catalyst (e.g., copper)
6. Presence of oxygen

CSCC melting operations do not involve organic carbon or chlorine in the feedstocks used for the process. Because organic carbon and chlorine are essential for dioxin formation, CSCC is unlikely to produce significant quantities of these chemicals.

Dioxins and dioxin-like PCBs are found in the emissions of some ferrous metal foundries (EPA, 2006). The foundries with air emissions of dioxins differ significantly from CSCC. Foundries associated with dioxin formation typically melt large quantities of iron using coke-fired cupola furnaces. Impurities in the scrap metal such as chlorinated solvents, plastics, and cutting oils along with organic compounds in the coke provide the organic carbon and chlorine components necessary for dioxin formation.

CSCC uses electric furnaces, not cupola. Direct arc furnaces heat with an electric arc struck between graphite electrodes and the charge (e.g., scrap steel) in the bowl of the furnace. Induction furnaces heat indirectly by surrounding the furnace bowl with an electric coil. This coil creates an oscillating magnetic field that heats the scrap steel in the bowl. With both furnace types, no combustion is involved, either as a heat source, or as a result of stray organic materials that may have become mixed with raw materials such as scrap steel.

CSCC is a relatively small foundry that produces unique, high-quality machine parts, including replacement wear parts. To produce these specialty products, CSCC uses strict standards to select scrap and other raw materials for metal melting to create parts with the appropriate alloy blends. Whenever possible, CSCC buys back used casting products from their customers. These used castings are single solid pieces of alloy steel that are preferred because they already contain the metals and other elements in the appropriate ratios necessary to produce high-quality alloys that are essential for excellent replacement wear parts. When locally purchased commodity scrap is used, only top-quality scrap steel is selected as raw material to feed the melting furnaces. None of the raw materials are mixed with organic materials such as oil, grease, paints, or plastics. The primary reasons why CSCC only purchases high-quality clean scrap are that clean scrap makes it easier to maintain effective quality control for the metallurgical composition of the steel alloys. Another benefit of using high-quality clean scrap is that pollution control is more reliable if organics and other foreign matter are kept out of the furnaces. Use of clean scrap reduces or prevents emissions of volatile organic compounds and other hazardous air pollutants.

CSCC pays a premium price for top-quality steel scrap from local scrap vendors. These vendors know that CSCC will only accept clean scrap that is free of contaminants such as mercury, lead, oil, grease, auto body scrap, engine blocks, gear boxes, used oil filters, oily turnings from machine shops, plastics, free liquids, or radioactive materials. CSCC inspects each incoming load of scrap to ensure scrap quality.

Manufactured PCBs

Unlike dioxins which were never intentionally manufactured and have been mainly released to the environment from combustion processes, some PCBs have been intentionally manufactured for use as lubricating fluids, hydraulic fluids, flame retardants, and other uses. These manufactured PCBs can be contaminants in some types of scrap or additives used as a raw material in melting operations. However, CSCC's casting products require the use of clean metal as a raw material, and as a result, manufactured PCBs are unlikely to be present in scrap or air emissions from melting operations.

PAHs

As discussed above, CSCC uses clean scrap to minimize the amount of organic material (e.g., oil, grease, plastic) in the melt. Organic compounds are necessary for the creation and release of PAHs in air emissions. CSCC melting operations are unlikely to generate PAHs because organic matter is largely absent from the steel melt.

References

EPA. 2003. Exposure and human health reassessment of 2,3,7,8 tetrachlorodibenzo-p dioxin (TCDD) and related compounds [NAS review draft]. US Environmental Protection Agency, Washington DC. EPA/600/P-00/001. http://www.epa.gov/nceawww1/pdfs/dioxin/nas-review/.

EPA, 2006. An inventory of sources and environmental releases of dioxin-like compounds in the United States for the years 1987, 1995, and 2000. National Center for Environmental Assessment, U.S. Environmental Protection Agency, Washington, DC. EPA/600/P-03/002F.

EPA, 1998, Locating and Estimating Air Emissions from Sources of Polycyclic Organic Matter, US Environmental Protection Agency, EPA-454/R-98-014

EMEP, 2005, Sources of Polychlorinated Biphenyls (PCB) Emissions (Version 2.1, draft), European Monitoring and Evaluation Program.

f. Provide baghouse (BH) dust and sand system fines analytical data used as the basis for emissions estimates for BH1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17, 19, 20, 22, 24, 26, and RC18.

CSCC response: Analytical data are attached. A cross-reference table is provided as Table 3.

g. Provide the feedstock composition data referenced in BH1, BH2, and Buildings 8 and 11 roof vent emissions estimates.

CSCC response: Feedstock data is provided in Table 4.

h. For emissions estimates based on baghouse dust sample data, substantiate the use of the same hexavalent chromium percentage of total chromium for all baghouses, and provide baghouse-specific hexavalent chromium sample data where available.

> ***CSCC response:*** The emission factors for hexavalent chromium are being evaluated and a response will be provided by September 16, 2021.

II. Emissions Inventory, 3. Tab 4. Material Balance Activities
Provide Safety Data Sheets (SDS) for all materials listed.

> ***CSCC response:*** SDSs for material balance activities are attached. A cross-reference table is provided as Table 5.

II. Emissions Inventory, 4. Tab 5. Pollutant Emissions – MB
If Fiberlay Fiberfiller Structural Putty is no longer used onsite, remove it from the Inventory.

> ***CSCC response:*** It is confirmed that the material is no longer used at CSCC. This update has been completed and will be reflected in the updated inventory due by September 16, 2021.

III. Modeling Protocol and Risk Assessment Work Plan
1. DEQ's understanding is that some of CSCC operations occur only at night. Consider using a variable emission rate that may be more reflective of emission rate fluctuations during a 24-hour period or include a discussion in the modeling protocol about why a variable emission rate is not appropriate.

> ***CSCC response:*** We do not have sufficient data to allocate the subject operation emissions to specific hours of the day. CSCC conducted source testing of TEUs of greatest concern in close coordination with and approval from DEQ. Preliminary modeling of the CSCC facility indicated that emissions from the Building 11 roof vents were the largest contributors to CSCC's risk values. Emissions from the Building 11 roof vents were therefore an important focus of the source testing effort.
>
> Site-specific emission factors were developed from the source test to calculate metals emissions from the Building 11 roof vents. These site-specific emission factors were based on integrated samples taken over a daily period. As described in the source test protocol, metals emissions from the Building 11 roof vents were sampled using Air Metrics MiniVol samplers with an initial target sampling time of 24 hours for each sample. The target time was revised to 22 hours as discussed in the source test report. At that interval, results from the MiniVol filter analysis are only representative of the emissions occurring over the sample period and do not provide sufficient information to allocate the emissions to specific times of the day.
>
> Further, emissions in the DEQ-approved source test and emissions inventory for the Building 11 roof vents do not provide information for any single, discrete process. Instead, the emissions are amalgamations of different processes occurring within Building 11. Since the MiniVol results are integrated samples, capturing the contributions of all activities occurring over the 22-hour period sampled, it is not possible to determine the quantity of each metal deposited on the sample media

attributable to specific processes or at specific times of the day. Any division of emissions based on the MiniVol samples into smaller units of time or individual processes would introduce an unacceptable level of uncertainty into the risk assessment. The site-specific emission factors developed from the MiniVol sampling program are therefore representative of the integrated conditions that were present over the entire sampling period and are properly used in that context. These emission factors are therefore representative of conditions that occurred throughout the calendar day and are appropriate for calculating acute risks.

It is further noted that the facility's ACDP does not constrain the facility as to the hours of day during which specific processes occur. While, at present, certain processes at the facility are usually completed during overnight hours, other emission-producing activities also occur during the daytime. CSCC's ACDP contains no restrictions as to when during the course of the day certain emission-producing activities may occur, and it is possible that CSCC, in response to changing customer demand and business conditions, could change the times of day at which specific activities occur in the future. The risk assessment is required to be prepared using the DEQ-approved inventory which reflects the operational conditions at the time of the source tests. As described in this response, even if specific activities change in the future, allocating emissions to daytime or nighttime periods is not possible.

2. Verify baghouse stack height and diameter parameters. Some baghouses appear to have significantly higher exit velocities than others.

CSCC response: The baghouse stack parameters are being verified. This will be completed by September 16, 2021.

3. Explain why the exit gas velocities for natural gas ovens were not measurable, when exit gas temperature was measurable.

CSCC response: The stack exhaust locations for measuring exit gas velocities of the natural gas ovens are not safely accessible. The exit gas temperatures were measured using a handheld meter from the ground level and did not require access to the exhaust stacks.

4. Section 3.5.2 states that "The four exposure types are residential, non-residential adult, non-resident worker, and acute." This list has residential adult listed twice and has omitted "non-residential child". Revise this statement to list "non-residential child" rather than "non-resident adult."

CSCC response: The correction will be updated in the combined Modeling Protocol and Risk Assessment Work Plan due by September 16, 2021.

5. Areas assigned "Exclusive Farm Use" should include residential exposure, and potentially worker exposure in appropriate areas. Revise these exposure locations to assess for residential and worker risk, as appropriate. Acute exposure should also be evaluated at residential and worker exposure locations.

CSCC response: This will be updated in the combined Modeling Protocol and Risk Assessment Work Plan due by September 16, 2021.

6. The State of Washington can be categorized as "Excluded" for the purposes of Cleaner Air Oregon risk assessment.

> ***CSCC response:*** This update is being incorporated into the Modeling Protocol and Risk Assessment Work Plan due by September 16, 2021.

7. The exposure crosswalk provided does not appear to match Figure 17 of the Protocol for Southwest Portland and is missing residential assignments that are noted in Figure 17. Revise the crosswalk to match Figure 17.

> ***CSCC response:*** The exposure crosswalk will be updated in the Modeling Protocol and Risk Assessment Work Plan due by September 16, 2021.

8. Table 8 quotes OAR 340-245-8040 Table 4 (Table 4) in showing that *antimony and compounds* does not have an acute risk-based concentration (RBC). DEQ understands that this is an error in Table 4. *Antimony and compounds* has an acute toxicity reference value of 1 ug/m^3, which should be used as the acute RBC for this TAC. DEQ issued a revised spreadsheet of TRVs and RBCs with corrections in July 2020, and will be making corrections to tables in future rulemaking. Include antimony and compounds in the risk assessment.

> ***CSCC response:*** Antimony is included, and will continue to be included, in the inventory. The previous version of the Modeling Protocol and Risk Assessment included the chronic RBCs for antimony but had inadvertently omitted the acute RBC. The acute RBC will be added to the updated Modeling Protocol and Risk Assessment Work Plan due by September 16, 2021.

9. In OAR 340-245-8020 Table 2, the chemical with CAS Number 78-40-0 is incorrectly identified as triethyl phosphine. The correct chemical is triethyl phosphate. This correction is being proposed in the next CAO rulemaking. There are no RBCs for triethyl phosphate.

> ***CSCC response:*** This update is being incorporated into the Modeling Protocol and Risk Assessment Work Plan due by September 16, 2021.

10. Section 4.5 states that because there are very few HI5 chemicals, the risk assessment will be conducted assuming all chemicals are HI3 chemicals, rather than using a risk determination ratio (RDR) approach. There may be ambiguity in CAO rules regarding whether an RDR must be calculated when there are both HI3 and HI5 chemicals. However, for this facility, DEQ agrees that it is reasonable and acceptable to make the simplifying assumption that all chemicals are HI3 chemicals.

> ***CSCC response:*** No response required.

11. Include at least a preliminary uncertainty evaluation in Section 4.6 of the Work Plan. DEQ recognizes that additional uncertainties may be identified during the risk assessment.

CSCC response: The results of the risk assessment will be based on a number of assumptions, many of which are required to be used by the DEQ. With few exceptions, when substantial uncertainty is associated with a variable used in modeling or risk estimation, conservative (e.g., health-protective) assumptions will be used. This practice of bias will cause risks to be overestimated, and the degree to which risks are overestimated is unknown. Because facilities subject to the CAO program are required to make assumptions according to the same guidelines, the risk results are at best useful as a yardstick for comparing relative risk from one facility to another. Because of the great deal of uncertainty in many important assumptions, the results are not accurate for predicting actual risk in absolute numbers and should not be used as such. Risk estimates generated under the CAO program should not be interpreted as the expected rates of disease in the exposed population but rather as estimates of potential for disease, based on current scientific knowledge and assumptions incorporated into all elements of a risk assessment.

Some of the important sources of uncertainty include: 1) extrapolation of toxicity data in animals to humans, 2) uncertainty in the estimation of emissions, 3) uncertainty in the air dispersion model, and 4) uncertainty in the exposure estimates. In addition to uncertainty, there is a natural range or variability in measured parameters defining the exposure scenario.

This discussion will be included in the combined Modeling Protocol and Risk Assessment Work Plan due by September 16, 2021.

Table 1. Cross-Reference Table of TEUs

TEU Listed in Inventory	Device ID/Pollution Control Device ID from ACDP	Description
BH1	#1 / CD #1	#1 6MT Steel Electric Arc Furnace and #2 10TT Steel Electric Arc Furnace controlled by 41,000 cfm Pangborn Shaker Baghouse
BH2	#2, TC/ CD #2	#3 10TT Manganese Electric Arc Furnace and Scrap Prep & Charge Makeup – Torch Cutting controlled by 35,000 cfm National Shaker Baghouse
Vent8_1 through Vent8_5	N/A[(a)]	Building 8 roof vents (5 total vents)
Vent11_1 through Vent11_9	N/A[(b)]	Building 11 roof vents (9 total vents)
BH3	#3 / CD #3	Main Foundry Shakeout controlled by 45,000 cfm Fuller Reverse Pulse Baghouse
BH4	#4 / CD #4	National Sand Reclaimer controlled by 10,000 cfm Fuller Reverse Pulse Baghouse
BH5	#5 / CD #5	Main Foundry Sand System (Mills 1 & 3) controlled by 20,000 cfm Fuller Reverse Pulse Baghouse
BH6	#6 / CD #6	Group 8 Sand System (Mill 2) controlled by 27,000 cfm Wheelabrator Shaker Baghouse
BH7	#7 / CD #7	Joslyn Rotoblast #1 controlled by 16,000 cfm Pangborn Shaker Baghouse
BH8	#8 / CD #8	Group 3 & 6 Sand System (Mill 4) controlled by 45,000 cfm Fabric Filters NW Shaker Baghouse
BH9	#9 / CD #9	Core Room Sand System controlled by 5,000 cfm Fabric Filters NW Pulse Jet

TEU Listed in Inventory	Device ID/Pollution Control Device ID from ACDP	Description
BH10	#10 / CD #10	Joslyn Burn/Arc #1 controlled by 15,000 cfm Wheelabrator Shaker Baghouse
BH15	#15 / CD #15	South Foundry Burn/Arc controlled by 55,000 cfm Wheelabrator Shaker Baghouse
BH16	#16 / CD #16	Joslyn Turnblast controlled by 6,500 cfm US Air Pulse Jet Baghouse
BH17	#17 / CD #17	South Foundry Sand System (Mills 1 & 3) controlled by 18,000 cfm Fabric Filters NW Reverse Pulse
BH19	#19 / CD #19	Joslyn Spinblast controlled by 5,300 cfm Wheelabrator Shaker Baghouse
BH20	#20 / CD #20	Group 9 Sand Reclaim System controlled by 20,000 cfm LMC Pulse Jet Baghouse
BH22	#22 / CD #22	SMS Sand Reclaimer controlled by 4,800 cfm LMC Pulse Jet Baghouse
BH24	#24 / CD #24	Joslyn Rotoblast #2 controlled by 6,000 cfm Wheelabrator Shaker Baghouse
BH26	#26 / CD #26	Main Foundry Table Blast and Blast Room controlled by 15,000 cfm Torit Pulse Jet Baghouse
RC18	PS / CD #18	Pattern Shop controlled by 15,000 cfm Rotoclone
Fug01	--[c]	Fugitive emission sources in Building No. 1
Fug05	--[c]	Fugitive emission sources in Building No. 5
Fug15	--[c]	Fugitive emission sources in Building No. 15
OVEN102	HT102	Heat Treat Oven 102
OVEN1_A and OVEN1_B	HT1	Heat Treat Oven 1, both stacks

TEU Listed in Inventory	Device ID/Pollution Control Device ID from ACDP	Description
OVEN2_A and OVEN2_B	HT2A	Heat Treat Oven 2A, both stacks
OVEN3_A and OVEN3_B	HT3	Heat Treat Oven 3, both stacks
OVEN4_A and OVEN4_B	HT4	Heat Treat Oven 4, both stacks
OVEN5_A and OVEN5_B	HT5	Heat Treat Oven 5, both stacks
OVEN6_A and OVEN6_B	HT6	Heat Treat Oven 6, both stacks
OVEN10_A and OVEN10_B	HT10	Heat Treat Oven 10, both stacks
OVEN12_A and OVEN12_B	HT12	Heat Treat Oven 11, both stacks
OVEN13_A and OVEN13_B	HT13	Heat Treat Oven 12, both stacks
OVEN14.5[d]	HT14-1/2	Heat Treat Oven 14.5, single stack
OVEN18_A and OVEN18_B	HT18	Heat Treat Oven 18, both stacks
OVEN20_A and OVEN20_B	HT20	Heat Treat Oven 20, both stacks
OVEN21	HT21	Heat Treat Oven 21, single stack
CORE1, CORE 2, CORE3	CO1-3	Core Ovens 1-3
LADLE1-3	LH1-3	Ladle Heaters 1-3
N/A[e]	#11, #12, #13	American Sheet Metal Baffle Chambers
N/A[f]	#23 / CD #23	Sand Dryer at Landfill controlled by 6,000 cfm Torit Reverse Pulse Baghouse
N/A[g]	FP&C	Floor Pouring & Cooling
N/A[g]	CP	Casting Painting
N/A[g]	MW	Mold Wash

(a) This TEU is not listed in ACDP, but includes Inductotherm Steel Induction Furnace, Bldg. #8 (two crucibles w/one power supply).
(b) Not listed in ACDP, but includes Inductotherm Induction Furnace, Bldg. #11 (two crucibles w/one power supply).
(c) Not included in the ACDP.
(d) OVEN14.5 was previously listed as OVEN14 in the inventory. This will be updated in the revised inventory due by September 16, 2021.
(e) Device ID Nos. 11, 12, and 13 do not currently control operations. Emissions from this area are currently vented through the Building No. 11 roof vents.
(f) This emission unit is not in operation.
(g) Emissions from these TEUs are presented in the Building No. 8 and 11 roof vents emissions and/or the material balance calculations.

Table 2. Safety Data Sheets for Welding Materials

Welding Material	Type of Welding	Attachment Name
312 SS SOLID WIRE 1/16" 3	GMAW - ER316	SDS01_Lincoln 312 SS welding wire 1-16.pdf
LINCORE 15CRMN LI15CM-25#	SMAW - 14Mn-4Cr	SDS02_Lincore15CrMg.pdf
5/32 STAINLESS WELD ROD #	SMAW - E316	SDS03_Arcaloy 300 Series.pdf
STICK ELECTRODE E310 1/8X	SMAW - E310	SDS04_Radnor Products.pdf
1/16-71 ELITE	FCAW-G - E71T	SDS05_Lincoln Outershield 71 Elite.pdf
5/64"L-60 LINCOLN WELD WI	SAW and SMAW – E308	SDS06_Lincoln Wearshield 60.pdf
LINCOLN H560 FLUX 3840#	SAW	SDS07_Lincoln Weld H-560.pdf
BLUE MAX FC 309L	GMAW - ER316	SDS04_Radnor Products.pdf

Table 3. Analytical Data for Baghouse Dust and Sand System Fines

TEU	Data Source	Attachment Name
BH1	2016 Arc Furnace Dust analytical (Hg only)	Att 1 – Arc fce dust 2016 by Apex.pdf
BH2	2016 Arc Furnace Dust analytical (Hg only)	Att 1 – Arc fce dust 2016 by Apex.pdf
BH3	2012 Sand System Fines analytical	Att 2 – Fines Chem by Apex 6-12-12.pdf
BH4	2012 Sand System Fines analytical	Att 2 – Fines Chem by Apex 6-12-12.pdf
BH5	2012 Sand System Fines analytical	Att 2 – Fines Chem by Apex 6-12-12.pdf
BH6	2012 Sand System Fines analytical	Att 2 – Fines Chem by Apex 6-12-12.pdf
BH7	2016 Rotoblast Composite Dust analytical	Att 3 – Rotoblast & welding dust by Apex 2016.pdf
BH8	2012 Sand System Fines analytical	Att 2 – Fines Chem by Apex 6-12-12.pdf
BH9	2012 Sand System Fines analytical	Att 2 – Fines Chem by Apex 6-12-12.pdf
BH10	2016 Rotoblast Composite Dust analytical	Att 3 – Rotoblast & welding dust by Apex 2016.pdf
BH15	2016 Rotoblast Composite Dust analytical	Att 3 – Rotoblast & welding dust by Apex 2016.pdf
BH16	2016 Rotoblast Composite Dust analytical	Att 3 – Rotoblast & welding dust by Apex 2016.pdf
BH17	2012 Sand System Fines analytical	Att 2 – Fines Chem by Apex 6-12-12.pdf
BH19	2016 Rotoblast Composite Dust analytical	Att 3 – Rotoblast & welding dust by Apex 2016.pdf
BH20	2012 Sand System Fines analytical	Att 2 – Fines Chem by Apex 6-12-12.pdf
BH22	2012 Sand System Fines analytical	Att 2 – Fines Chem by Apex 6-12-12.pdf
BH24	2016 Rotoblast Composite Dust analytical	Att 3 – Rotoblast & welding dust by Apex 2016.pdf
BH26	2021 Baghouse 26 Dust Sampling Summary Report	Att 4 – BH26 Summary Report.pdf
RC18	2016 Rotoblast Composite Dust analytical	Att 3 – Rotoblast & welding dust by Apex 2016.pdf

Table 4. Feedstock Composition Data

Toxic Air Contaminant	Electric Arc Furnaces (% of Total Melt)	Induction Furnaces (% of Total Melt)
Carbon	0.29	0.52
Manganese	2.64	1.83
Silicon	0.52	0.89
Phosphorous	0.00	0.01
Chromium	0.62	5.45
Nickel	0.17	1.64
Molybdenum	0.07	0.51
Aluminum	0.12	0.01
Sulfur	0.00	0.00
Vanadium	0.00	0.06

Table 5. Safety Data Sheets for Material Balance Activities

Material Name	Manufacturer	Attachment Name
Moldcote 34	Foseco	SDS08_Foseco_Moldcote 34.pdf
Isomol 780	Foseco	SDS09_Foseco_Isomol 780.pdf
Isopropanol 99%	Ashland	SDS10_Ashland_Isopropanol.pdf
Fiberlay P-18 Waxed Surfboard/Greenhouse Resin	Fiberlay Inc.	SDS11_Fiberlay_P-18.pdf
P-16 Resin Polyester Resin	Fiberlay Inc.	SDS12_Fiberlay_P-19.pdf
TC-816 Part B	BJB Enterprises, Inc.	SDS13_BJB_TC-816 Part B.pdf
TC-816 Part A	BJB Enterprises, Inc.	SDS14_BJB_TC-816 Part A.pdf
Master Kincote Pattern Coating - Black	Freeman Manufacturing and Supply Company	SDS15_Freeman_Master Kincote Black.pdf
Loctite Stycast PC 18M	Henkel Corporation	SDS16_Henkel_Loctite Stycast.pdf
RENCAST 6400-1 US	Huntsman Advanced Materials Americas LLC	SDS17_Huntsman_RenCast 6400-1.pdf
Master Kincote Pattern Coating - Vermillion	Freeman Manufacturing and Supply Company	SDS18_Freeman_Master Kincote Vermillion.pdf
Master Kincote Pattern Coating - Yellow	Freeman Manufacturing and Supply Company	SDS19_Freeman_Master Kincote Yellow.pdf
PARTALL Film #10	REXCO	SDS20_Rexco_Partall Film #10.pdf
Developer D-100	Sherwin Incorporated	SDS21_Sherwin_Developer D-100.pdf
Luster LAC WW LAC Sand Seal	The Valspar Corporation	SDS22_Valspar_Luster LAC.pdf
Lacquer Thinner	The Nelson Paint Company	SDS23_Nelson_Lacquer Thinner.pdf
Black - Gloss W/R Alkyd Enamel	FORREST Technical Coatings	SDS24_Forrest_Black Gloss.pdf
CSC Green Satin Gloss W/R Alkyd	FORREST Technical Coatings	SDS25_Forrest_Green Satin.pdf
NCF Quick	Satellite City, Inc.	SDS26_Satellite City_NCF Quick

Material Name	Manufacturer	Attachment Name
Fiberlay Methyl Ethyl Ketone Peroxide	Fiberlay Inc.	SDS27_Fiberlay_MEK Peroxide.pdf
Forrest Green Jones Green Enamel 380	FORREST Technical Coatings	SDS28_Forrest_Green Enamel 380.pdf
3M Platinum Plus Filler	3M	SDS29_3M_Platinum Plus Filler.pdf