DEQ
State of Oregon Department of Environmental Quality

Application for a Solid Waste Beneficial Use Determination

DEPT OF ENVIRONMENTAL QUALITY RECEIVED
DEC 10 2010
NORTHWEST REGION

DEQ USE ONLY – BUSINESS OFFICE
Date Received: _____
Amount Received: _____
Check No.: _____
Deposit No.: _____
Forward confirmation of fee payment for:
Eastern Region to DEQ, The Dalles
Northwestern Region to DEQ-NWR, Portland
Western Region to DEQ, Salem

A. REFERENCE INFORMATION *(Please type or print clearly.)*

COLUMBIA STEEL CASTING CO., INC
Legal name of applicant | Business name of applicant if different

PO BOX 83095 | PORTLAND | OR | 97283
Mailing address | City | State | Zip

503-286-0685 | | bruce_s@columbiasteel.com | 503-286-3028
Phone | Mobile | E-mail | Fax

SAME
Generator of solid waste (may be same as applicant)

Mailing address | City | State | Zip

Phone | Mobile | E-mail | Fax

B. TYPE OF BENEFICIAL USE DETERMINATION REQUESTED

Beneficial Use Determination applications are categorized based on the type of information and potential amount of work required by DEQ staff to review application materials and render a decision. A tiered review and fee system has been established in rule. The tiers are:

Tier 1 For a beneficial use of a solid waste that does not contain hazardous substances significantly exceeding the concentration in a comparable raw material or commercial product and that will be used in a manufactured product;

(Tier 2) For a beneficial use of a solid waste that contains hazardous substances significantly exceeding the concentration in a comparable raw material or commercial product, or involves application on the land;

Tier 3 For a beneficial use of a solid waste that requires research, such as a literature review or risk assessment, or for a demonstration project to demonstrate compliance with this rule.

I am applying for a ☐ Tier 1 ☒ Tier 2 ☐ Tier 3 determination.

C. DOES THIS PROPOSED BENEFICIAL USE INVOLVE LAND APPLICATION OF ANY MATERIAL?

☒ Yes ☐ No

D. SIGNATURE

I hereby certify by my signature below that the information contained in this application, and the documents I have attached, are true and correct to the best of my knowledge and belief.

Bruce Schacht | BRUCE SCHACHT | PLANT ENGINEER | 12/3/10
Signature of legally authorized representative | Print name | Title | Date

E. REQUIRED ATTACHMENTS TO THIS APPLICATION *(For an application to be complete, it must provide the required information for each listed item of the tier which is being applied for.)*

Tier 1

- ☑ A description of the material, manner of generation, and estimated quantity to be used each year;
- ☑ A description of the proposed use;
- ☑ A comparison of the chemical and physical characteristics of the material proposed for use with the material it will replace;
- ☑ A demonstration of compliance with the performance criteria in OAR 340-093-0280 based on knowledge of the process that generated the material, properties of the finished product, or testing; and
- ☐ Any other information that DEQ may require to evaluate the proposal.

Tier 2

- ☑ The information required for a Tier 1 application;
- ☑ Sampling and analysis that provides chemical, physical, and biological characterization of the material and that identifies potential contaminants in the material or the end product, as applicable;
- ☑ A risk screening comparing the concentration of hazardous substances in the material to existing, DEQ approved, risk-based screening level values, and demonstrating compliance with acceptable risk levels;
- ☑ Location or type of land use where the material will be applied, consistent with the risk scenarios used to evaluate risk;
- ☐ Contact information of property owner(s) if this is a site-specific land application proposal, including name, address, phone number, e-mail, site address and site coordinates (latitude and longitude); and
- ☑ A description of how the material will be managed to minimize potential adverse impacts to public health, safety, welfare, or the environment.

Tier 3

- ☐ The information required for a Tier 1 & 2 application;
- ☐ A discussion of the justification for the proposal;
- ☐ An estimate of the expected length of time that would be required to complete the project, if it is a demonstration; and
- ☐ If it is a demonstration project, the methods proposed to ensure safe and proper management of the material.

F. PERFORMANCE CRITERIA *(For all tiers - An application for a beneficial use determination must demonstrate satisfactory compliance with the following performance criteria.)*

The use is productive, including:

- There is an identified or reasonably likely use for the material that is not speculative;
- The use is a valuable part of a manufacturing process, an effective substitute for a valuable raw material or commercial product, or otherwise authorized by DEQ, and does not constitute disposal; and
- The use is in accordance with applicable engineering standards, commercial standards, and agricultural or horticultural practices.

The use will not create an adverse impact to public health, safety, welfare, or the environment, including:

- The material is not a hazardous waste under ORS 466.005;
- Until the time the material is used in accordance with a beneficial use determination, the material will be managed, including any storage, transportation, or processing, to prevent releases to the environment or nuisance conditions;
- Hazardous substances in the material do not significantly exceed the concentration in a comparable raw material or commercial product, or do not exceed naturally occurring background concentrations, or do not exceed acceptable risk levels, including evaluation of persistence and potential bioaccumulation, when the material is managed according to a beneficial use determination.

The use will not result in the increase of a hazardous substance in a sensitive environment.

The use will not create objectionable odors, dust, unsightliness, fire, or other nuisance conditions.

The use will comply with all applicable federal, state, and local regulations.

G. FEES *(Must accompany the application for it to be considered complete)*

☐	Tier 1 beneficial use determination	$1,000
☒	Tier 2 beneficial use determination	$2,000
☐	Tier 3 beneficial use determination	$5,000

Make checks out to: **Oregon DEQ**

Total fees included: 2000.00

H. APPLICATION PROCEDURE

Step 1
Contact a DEQ staff person for assistance with the preparation of the application. DEQ staff will help with: 1) Determination of the eligibility for a beneficial use determination of a particular waste or process; and, 2) If eligible, establish the tier of beneficial use determination review required and associated fee to submit with the application.

Step 2
Mail the original signed application, all attachments, including the fee payment plus one extra copy to the appropriate regional office (see listing below.) Note that DEQ review work will not begin until a complete application packet is received. Incomplete applications may be returned. DEQ recommends the applicant keep a full copy of all application materials to guard against possible loss in transit.

Step 3
DEQ will contact the applicant, acknowledging receipt of the application, and will identify the staff person assigned to carryout the review. This staff person will contact the applicant if any additional information is needed.

Region	Counties Served	Address & Phone
Eastern Region	Baker, Crook, Deschutes, Gilliam, Grant, Harney, Hood River, Jefferson, Klamath, Lake, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco, and Wheeler	Eastern Region Department of Environmental Quality 400 E Scenic Drive, Ste 2.307 The Dalles, OR 97058 (541) 298-7255 ext. 221
Northwest Region	Clatsop, Clackamas, Columbia, Multnomah, Tillamook, and Washington	Northwest Region DEQ Solid Waste Programs 2020 SW Fourth Ave. Ste 400 Portland, OR 97201 (503) 229-5353
Western Region	Benton, Coos, Curry, Douglas, Jackson, Josephine, Lane, Lincoln, Linn, Marion, Polk, and Yamhill	Western Region DEQ Solid Waste Programs 750 Front St. NE Suite 120 Salem, OR 97301 (503) 378-5047

Application for Solid Waste Beneficial Use Determination

Tier 2 Case Specific determination for Steel Foundry Slag used as non-residential construction fill, utility trench fill, roadbase and embankments.

Tier 1 requirements:

1.1 Material

The material proposed for beneficial use is slag generated in the melting of iron and steel, at the Columbia Steel Casting Co. foundry in Portland, Oregon. This is melted limestone, with occasional small amounts of fluorspar added to improve fluidity for some heats. During the metal melting process, the slag picks up small amounts of metallic elements and other impurities. When cooled and solidified, the metallics are encapsulated in the glassy matrix of the slag. The slag and melted metal are poured together out of the furnace and into waiting ladles. The slag floats to the top of the ladle, where it is manually skimmed off into slag pots. The skimming process, unintentionally but invariably, pulls small amounts of metal off with the slag. The cooled slag pots are taken to an outdoor processing area, where they are broken up to recover the metal by magnets, hand picking, and screening.

Maximum annual production is estimated at 1000 ton/yr. Current stockpiles are estimated at 40,000 tons. Estimated annual use for off site construction purposes could vary widely, depending on demand. It is conceivable that a single large job could use all that we have.

1.2 Proposed use

The proposed uses are the same as OAR340-093-0270 (5)(f), the standing beneficial use determination for foundry sand, including the types of use and the conditions of use stated therein.

1.3 Comparison with other materials

This material is recognized by contractors and engineers as a functional and cost effective substitute for crushed natural rock from quarries, gravel pits, and river beds. It is an equally suitable substitute for crushed recycled concrete. These types of uses are common practice in other states throughout the USA. Such uses are further endorsed and encouraged by the Federal Highway Administration, Dept. of Transportation, and numerous state depts. of transportation. Chemical and physical characteristics for those other materials are variable, dependant upon their specific source. The characteristics of Columbia Steel's slag are summarized in attached spreadsheets and supporting documents from laboratory analysis.

1.4 Compliance with OAR 340-093-0280

1.4.1 Characterization of material and use – see above

1.4.2 Productive use

Steel slag is widely recognized as a functional and cost effective substitute for crushed natural rock from quarries, gravel pits, and river beds. It is an equally suitable substitute for crushed recycled concrete. Such uses are common practice in other states throughout the USA. Such

uses are further endorsed and encouraged by the Federal Highway Administration, Dept. of Transportation, and numerous state depts. of transportation. The National Slag Association publishes numerous case studies of such uses in other states. Similar slag from other steel producers in Oregon has been used for years in similar applications around the Portland metro area.

1.4.3 No adverse impacts

This material is not a hazardous waste under ORS 466.005.

Established storage and handling practices, i.e. outdoor storage piles contained on site where access can be controlled, are sufficient to prevent harmful releases to the environment. Transportation, delivery, and application at the point of use can be safely accomplished using the same equipment and methods that are common to the comparable natural quarry materials.

Potentially hazardous substances in this material have been the subject of laboratory analysis. Results indicate that concentrations are within the acceptable risk levels as defined by one or more screening tables applied by DEQ, for Oregon natural background soil concentrations, DEQ Occupational Risk Based Screening Levels for Soil, EPA Regional Screening Tables, and DEQ Risk Based Concentrations for tap water.

The proposed uses will not result in the increase of a hazardous substance in a sensitive environment. The proposed uses will not include placement in waterways, wetlands, or other sensitive environments.

The proposed uses will not create odors, dust, unsightliness, fire hazards, or other nuisance conditions.

The proposed uses will comply with applicable federal, state, and local regulations, as well as standard practices in the construction industry. In most cases, the uses will be subject to inspection as part of a building permit.

Tier 2 requirements:

2.1 Sampling and analysis

The material has been sampled on multiple occasions, and analyzed by EPA certified laboratories, testing for all contaminants of potential concern that might reasonably be expected to be present. Summary spreadsheets are attached. Supporting laboratory reports, including QA/QC data, have been previously submitted to the department, but copies are also attached as part of this application.

2.2 Risk screening

Potentially hazardous substances in this material have been the subject of laboratory analysis. Results indicate that concentrations are within the acceptable risk levels as defined by one or more screening tables applied by DEQ, for Oregon natural background soil concentrations, DEQ Occupational Risk Based Screening Levels for Soil, EPA Regional Screening Tables, and DEQ Risk Based Concentrations for tap water.

2.3 Location and type of use
The proposed uses are the same as OAR340-093-0270 (5)(f), the standing beneficial use determination for foundry sand, including the types of use and the conditions of use stated therein.

2.4 Contact information
This is not a site specific proposed use. Columbia Steel Casting Co. will maintain records of approximate quantities and locations where the material is placed, according to 340-093-270 (4).

2.5 Material management
Upon removal from the foundry operations where it is created, it will be transferred to an outdoor processing and storage area at Columbia Steel Casting Co.'s plant site. It will be mechanically processed to remove metals and unwanted debris, then segregated into fractions based on size. The cleaned and sized material will be stockpiled on site until needed. Loading and hauling to destination sites will be done using conventional front end loader and trucks, same as the natural materials it replaces. Placement and use at the destination sites will be done by conventional earthmoving and construction equipment, same as the natural materials it replaces. Dust and erosion control should not require any special precautions, as the large granular nature of this material is not conducive to airborne particles or storm water erosion. Once in place at the destination site, the material will be covered with asphalt, concrete, soil, natural rock or sand, or similar materials to minimize exposure to ecological receptors.

COMPOSITION COMPARISON
COLUMBIA STEEL FURNACE SLAG

Total Metals Analysis (units = PPM)

Use Highest Value Shown per Tom Roick

	Metals of Concern	Columbia Steel Products			Oregon	DEQ RBCs - Occupational Risk Based Screening Levels for Soi				EPA Regional Screening Table	
		Dust	Sand	Slag Geo Mean (range)	Background Soil	Ingestion	Volatilization to Outdoor Air	Vapor Intrusion	Leaching to Groundwater	Industrial Soil	Soil RE: GW Protection
Sb	Antimony			NT	4	NL	NL	NL	NL	410	0.66
As	Arsenic			4.97 (ND - 7.50)	7	1.7	NV	NV	NS	1.6	0.0013
Ba	Barium			398 (30 - 1280)			NV	NV	NS	190000	300
Be	Beryllium			NT		2000	NV	NV	NS	2000	58
Cd	Cadmium			1.08 (ND - 5.37)	1	500	NV	NV	NS	800	1.4
Cr	Chromium			287 (3.87 - 1290)	42		NV	NV	NS	1500000	99000000
Cu	Copper			34.3 (15.1 - 138)	36	41000	NV	NV	NS	41000	51
Pb	Lead			3.34 (1.42 - 36.30)	17	800	NV	NV	30	800	NS
Mn	Manganese			46774 (20800 - 87800)		23000	NV	NV	NS	23000	57
Hg	Mercury			0.05 (ND - 0.115)	0.07	310	NV	NV	NS	34	0.03
NI	Nickel			233 (145 - 362)	38	20000	NV	NV	NS	NS	NS
Se	Selenium			34.4 (ND - 82)	2	NL	NL	NL	NL	5100	0.95
Ag	Silver			ND (mrl 1.02)	1	5100	NV	NV	NS	5100	1.6
Tl	Thallium			NT		NL	NL	NL	NL	NS	NS
Zn	Zinc			21.0 (13.2 - 33.1)	86	NL	NL	NL	NL	310000	680

ND = none detected
NT = not tested for

NV = non volatile
NL = not listed
NS = no standard listed

Leachable Metals Analysis (units = PPM except where noted) (ND = Non Detect)

		SPLP	SPLP	SPLP	DEQ RBCs for Tapwater			
					Residential		Occupational	
					PPB	PPM	PPB	PPM
Sb	Antimony			NT	NL	NL	NL	NL
As	Arsenic			ND (mrl 0.100)	0.038	0.000038	0.27	0.00027
Ba	Barium			0.48 (0.11 - 1.90)	7300	7.3	29000	29
Be	Beryllium			NT	73	0.073	290	0.29
Cd	Cadmium			ND (mrl 0.05)	18	0.018	73	0.073
Cr	Chromium			0.12 (ND - 0.30)	55000	55	220000	220
Cu	Copper			ND (mrl 0.25)	1500	1.5	5800	5.8
Pb	Lead			0.07 (ND - 0.07)	15	0.015	15	0.015
Mn	Manganese			ND (mrl 0.05)	880	0.88	3500	3.5
Hg	Mercury			ND (mrl 0.005)	11	0.011	44	0.044
NI	Nickel			ND (mrl 0.100)	730	0.73	2900	2.9
Se	Selenium			0.11 (ND - 0.11)	NL	NL	NL	NL
Ag	Silver			ND (mrl 0.05)	180	0.18	730	0.73
Tl	Thallium			NT	NL	NL	NL	NL
Zn	Zinc			ND (mrl 0.25)	NL	NL	NL	NL

COLUMBIA STEEL CASTING CO., INC.

FOUNDRY SLAG ANALYSIS

RCRA TOTAL METALS by EPA methods 6000/7000

units = mg/kg

	Sample ID #	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Copper	Manganese	Nickel	Zinc
COLUMBIA INSPECTION	1	ND	190	ND	145	36.30	0.0498	82	ND				
screened slag	2	ND	140	0.180	160	4.35	0.0253	43	ND				
sample date 6/22/06	3	ND	270	0.101	218	1.42	0.1150	ND	ND				
report date 8/7/06	4	ND	940	ND	669	1.88	0.1110	9	ND				
	5	ND	30	0.142	3.87	1.61	0.0180	50	ND				
APEX LABS	SLAG1	7.50	858	5.18	1290	3.36	ND	14.4	ND	138	52500	362	33.1
screened slag	SLAG2	3.60	1280	3.01	688	2.16	ND	61.2	ND	20.5	56000	145	13.2
sample date 9/14/10	SLAG3	3.94	1240	3.89	797	3.20	ND	39.4	ND	32.1	41700	223	16.2
report date 9/29/10	SLAG4	4.71	1020	5.37	580	3.23	ND	76.0	ND	15.1	20800	181	30.0
	SLAG5	6.05	356	2.24	704	3.43	ND	16.3	ND	34.6	87800	322	19.3
Geometric Mean		4.97	398	1.08	287	3.34	0.05	34.4	ND	34.3	46774	233	21.0

COLUMBIA STEEL CASTING CO., INC.

FOUNDRY SLAG ANALYSIS

RCRA LEACHABLE METALS by SPLP EPA methods 200.7/6010B/1312

units = mg/L

	Sample ID #	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Copper	Manganese	Nickel	Zinc
EPA Threshold Values for Toxicity by TCLP		**5.0**	**100.0**	**1.0**	**5.0**	**5.0**	**0.2**	**1.0**	**5.0**				
COLUMBIA INSPECTION	1	ND	0.15	ND	0.06	ND	ND	ND	ND				
screened slag	2	ND	0.11	ND	0.08	ND	ND	ND	ND				
sample date 6/22/06	3	ND	0.41	ND	0.28	ND	ND	ND	ND				
report date 8/7/06	4	ND	1.90	ND	0.14	0.07	ND	ND	ND				
	5	ND	1.30	ND	0.04	ND	ND	ND	ND				
APEX LABS	SLAG1	ND	0.54	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
screened slag	SLAG2	ND	ND	ND	ND	ND	ND	0.11	ND	ND	ND	ND	ND
sample date 9/14/10	SLAG3	ND	0.52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
report date 9/29/10	SLAG4	ND	0.58	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SLAG5	ND	ND	ND	0.30	ND	ND	ND	ND	ND	ND	ND	ND
Geometric Mean		ND	0.48	ND	0.12	0.07	ND	0.11	ND	ND	ND	ND	ND

CERTIFICATE OF ANALYSIS

CLIENT: Columbia Steel Casting Co., Inc.
ATTN: Bruce Schacht
P.O. Box 83095
Portland OR, 97283-0095

PHONE: (503) 286-0685
FAX: (503) 286-3028

PROJECT NAME: SOLID WASTE CHARACTERIZATION

SUBMITTED: 06/22/06 16:15

REPORT DATE: 08/07/06 15:10 REPORT NUMBER: 6062206

CI SAMPLE	CLIENTS ID#	DATE	TIME	MATRIX
6062206-01	1 - Screened Slag	06/22/2006	1500	Other(Sld)
6062206-02	2 - Screened Slag	06/22/2006	1500	Other(Sld)
6062206-03	3 - Screened Slag	06/22/2006	1500	Other(Sld)
6062206-04	4 - Screened Slag	06/22/2006	1500	Other(Sld)
6062206-05	5 - Screened Slag	06/22/2006	1500	Other(Sld)

SAMPLE/ ANALYSIS	METHOD	PARAMETER	RESULTS	UNITS	DETECTION LIMIT	TECH	DATE/TIME	NOTES
6062206-01	**SAMPLE ID: 1 - Screened Slag**							
Total Mercury by Cold Vapor Atomic Fluorescence								
MERCURY CV AF	EPA 245.7/1631	MERCURY	0.0498	mg/kg	0.000483	KEL	06/23/2006 13:41	
Total Metals by Inductively Coupled Plasma								
ARSENIC - ICP	EPA 200.7/6010B	ARSENIC	ND	mg/kg	32.5	KEL	06/23/2006 15:36	
BARIUM - ICP		BARIUM	190	mg/kg	0.19	KEL	06/23/2006 13:57	
CADMIUM - ICP		CADMIUM	ND	mg/kg	0.097	KEL	06/23/2006 15:36	
CHROMIUM - ICP		CHROMIUM	145	mg/kg	0.097	KEL	06/23/2006 15:36	
LEAD - ICP		LEAD	36.3	mg/kg	0.00500	KEL	06/23/2006 15:36	
SELENIUM - ICP		SELENIUM	82	mg/kg	1.3	KEL	06/23/2006 15:36	
SILVER - ICP		SILVER	ND	mg/kg	0.974	KEL	06/23/2006 13:57	
Leachate Metals Methods								
ARSENIC, SPLP - ICP	EPA 200.7/6010B	ARSENIC	ND	mg/L	0.020	KEL	06/23/2006 16:14	
BARIUM, SPLP - ICP		BARIUM	0.15	mg/L	0.020	KEL	06/23/2006 16:04	
CADMIUM, SPLP - ICP		CADMIUM	ND	mg/L	0.020	KEL	06/23/2006 16:14	
CHROMIUM, SPLP - ICP		CHROMIUM	0.060	mg/L	0.010	KEL	06/23/2006 16:14	
LEAD, SPLP - ICP		LEAD	ND	mg/L	0.040	KEL	06/23/2006 16:14	
SELENIUM, SPLP - ICP		SELENIUM	ND	mg/L	0.070	KEL	06/23/2006 16:14	
SILVER, SPLP - ICP		SILVER	ND	mg/L	0.080	KEL	06/23/2006 16:04	
Leachate Procedure -Mercury								
MERCURY, SPLP - CV AF	EPA 245.7/1631	MERCURY	ND	mg/L	0.0300	KEL	06/23/2006 16:08	
6062206-02	**SAMPLE ID: 2 - Screened Slag**							

Authorized for Release By: Richard D. Reid - Laboratory Director

CERTIFICATE OF ANALYSIS

SAMPLE/ ANALYSIS	METHOD	PARAMETER	RESULTS	UNITS	DETECTION LIMIT	TECH	DATE/TIME	NOTES
6062206-02	**SAMPLE ID: 2 - Screened Slag**							
Total Mercury by Cold Vapor Atomic Fluorescence								
MERCURY CV AF	EPA 245.7/1631	MERCURY	0.0253	mg/kg	0.000395	KEL	06/23/2006 13:41	
Total Metals by Inductively Coupled Plasma								
ARSENIC - ICP	EPA 200.7/6010B	ARSENIC	ND	mg/kg	30.1	KEL	06/23/2006 15:36	
BARIUM - ICP		BARIUM	140	mg/kg	0.18	KEL	06/23/2006 13:57	
CADMIUM - ICP		CADMIUM	0.180	mg/kg	0.090	KEL	06/23/2006 15:36	
CHROMIUM - ICP		CHROMIUM	160	mg/kg	0.090	KEL	06/23/2006 15:36	
LEAD - ICP		LEAD	4.35	mg/kg	0.00451	KEL	06/23/2006 15:36	
SELENIUM - ICP		SELENIUM	43	mg/kg	1.2	KEL	06/23/2006 15:36	
SILVER - ICP		SILVER	ND	mg/kg	0.902	KEL	06/23/2006 13:57	
Leachate Metals Methods								
ARSENIC, SPLP - ICP	EPA 200.7/6010B	ARSENIC	ND	mg/L	0.020	KEL	06/23/2006 16:14	
BARIUM, SPLP - ICP		BARIUM	0.11	mg/L	0.020	KEL	06/23/2006 16:04	
CADMIUM, SPLP - ICP		CADMIUM	ND	mg/L	0.020	KEL	06/23/2006 16:14	
CHROMIUM, SPLP - ICP		CHROMIUM	0.079	mg/L	0.010	KEL	06/23/2006 16:14	
LEAD, SPLP - ICP		LEAD	ND	mg/L	0.040	KEL	06/23/2006 16:14	
SELENIUM, SPLP - ICP		SELENIUM	ND	mg/L	0.070	KEL	06/23/2006 16:14	
SILVER, SPLP - ICP		SILVER	ND	mg/L	0.080	KEL	06/23/2006 16:04	
Leachate Procedure -Mercury								
MERCURY, SPLP - CV AF	EPA 245.7/1631	MERCURY	ND	mg/L	0.0300	KEL	06/23/2006 16:08	
6062206-03	**SAMPLE ID: 3 - Screened Slag**							
Total Mercury by Cold Vapor Atomic Fluorescence								
MERCURY CV AF	EPA 245.7/1631	MERCURY	0.115	mg/kg	0.000499	KEL	06/23/2006 13:41	
Total Metals by Inductively Coupled Plasma								
ARSENIC - ICP	EPA 200.7/6010B	ARSENIC	ND	mg/kg	30.7	KEL	06/23/2006 15:36	
BARIUM - ICP		BARIUM	270	mg/kg	0.18	KEL	06/23/2006 13:57	
CADMIUM - ICP		CADMIUM	0.101	mg/kg	0.092	KEL	06/23/2006 15:36	
CHROMIUM - ICP		CHROMIUM	218	mg/kg	0.092	KEL	06/23/2006 15:36	
LEAD - ICP		LEAD	1.42	mg/kg	0.00500	KEL	06/23/2006 15:36	
SELENIUM - ICP		SELENIUM	ND	mg/kg	1.2	KEL	06/23/2006 15:36	
SILVER - ICP		SILVER	ND	mg/kg	0.921	KEL	06/23/2006 13:57	
Leachate Metals Methods								
ARSENIC, SPLP - ICP	EPA 200.7/6010B	ARSENIC	ND	mg/L	0.020	KEL	06/23/2006 16:14	
BARIUM, SPLP - ICP		BARIUM	0.41	mg/L	0.020	KEL	06/23/2006 16:04	

Authorized for Release By:Richard D. Reid - Laboratory Director

CERTIFICATE OF ANALYSIS

SAMPLE/ ANALYSIS	METHOD	PARAMETER	RESULTS	UNITS	DETECTION LIMIT	TECH	DATE/TIME	NOTES
6062206-03	**SAMPLE ID: 3 - Screened Slag**							
Leachate Metals Methods								
CADMIUM, SPLP - ICP	EPA 200.7/6010B	CADMIUM	ND	mg/L	0.020	KEL	06/23/2006 16:14	
CHROMIUM, SPLP - ICP		CHROMIUM	0.28	mg/L	0.010	KEL	06/23/2006 16:14	
LEAD, SPLP - ICP		LEAD	ND	mg/L	0.040	KEL	06/23/2006 16:14	
SELENIUM, SPLP - ICP		SELENIUM	ND	mg/L	0.070	KEL	06/23/2006 16:14	
SILVER, SPLP - ICP		SILVER	ND	mg/L	0.080	KEL	06/23/2006 16:04	
Leachate Procedure -Mercury								
MERCURY, SPLP - CV AF	EPA 245.7/1631	MERCURY	ND	mg/L	0.0300	KEL	06/23/2006 16:08	
6062206-04	**SAMPLE ID: 4 - Screened Slag**							
Total Mercury by Cold Vapor Atomic Fluorescence								
MERCURY CV AF	EPA 245.7/1631	MERCURY	0.111	mg/kg	0.000543	KEL	06/23/2006 13:41	
Total Metals by Inductively Coupled Plasma								
ARSENIC - ICP	EPA 200.7/6010B	ARSENIC	ND	mg/kg	30.6	KEL	06/23/2006 15:36	
BARIUM - ICP		BARIUM	940	mg/kg	0.18	KEL	06/23/2006 13:57	
CADMIUM - ICP		CADMIUM	ND	mg/kg	0.092	KEL	06/23/2006 15:36	
CHROMIUM - ICP		CHROMIUM	669	mg/kg	0.092	KEL	06/23/2006 15:36	
LEAD - ICP		LEAD	1.88	mg/kg	0.00500	KEL	06/23/2006 15:36	
SELENIUM - ICP		SELENIUM	9.0	mg/kg	1.2	KEL	06/23/2006 15:36	
SILVER - ICP		SILVER	ND	mg/kg	0.919	KEL	06/23/2006 13:57	
Leachate Metals Methods								
ARSENIC, SPLP - ICP	EPA 200.7/6010B	ARSENIC	ND	mg/L	0.020	KEL	06/23/2006 16:14	
BARIUM, SPLP - ICP		BARIUM	1.9	mg/L	0.020	KEL	06/23/2006 16:04	
CADMIUM, SPLP - ICP		CADMIUM	ND	mg/L	0.020	KEL	06/23/2006 16:14	
CHROMIUM, SPLP - ICP		CHROMIUM	0.14	mg/L	0.010	KEL	06/23/2006 16:14	
LEAD, SPLP - ICP		LEAD	0.072	mg/L	0.040	KEL	06/23/2006 16:14	
SELENIUM, SPLP - ICP		SELENIUM	ND	mg/L	0.070	KEL	06/23/2006 16:14	
SILVER, SPLP - ICP		SILVER	ND	mg/L	0.080	KEL	06/23/2006 16:04	
Leachate Procedure -Mercury								
MERCURY, SPLP - CV AF	EPA 245.7/1631	MERCURY	ND	mg/L	0.0300	KEL	06/23/2006 16:08	
6062206-05	**SAMPLE ID: 5 - Screened Slag**							
Total Mercury by Cold Vapor Atomic Fluorescence								
MERCURY CV AF	EPA 245.7/1631	MERCURY	0.0180	mg/kg	0.000465	KEL	06/23/2006 13:41	
Total Metals by Inductively Coupled Plasma								

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CERTIFICATE OF ANALYSIS

SAMPLE/ ANALYSIS	METHOD	PARAMETER	RESULTS	UNITS	DETECTION LIMIT	TECH	DATE/TIME	NOTES
6062206-05	**SAMPLE ID: 5 - Screened Slag**							
Total Metals by Inductively Coupled Plasma								
ARSENIC - ICP	EPA 200.7/6010B	ARSENIC	ND	mg/kg	1.69	KEL	06/23/2006 15:36	
BARIUM - ICP		BARIUM	30	mg/kg	0.20	KEL	06/23/2006 13:57	
CADMIUM - ICP		CADMIUM	0.142	mg/kg	0.101	KEL	06/23/2006 15:36	
CHROMIUM - ICP		CHROMIUM	3.87	mg/kg	0.101	KEL	06/23/2006 15:36	
LEAD - ICP		LEAD	1.61	mg/kg	0.00500	KEL	06/23/2006 15:36	
SELENIUM - ICP		SELENIUM	50	mg/kg	1.4	KEL	06/23/2006 15:36	
SILVER - ICP		SILVER	ND	mg/kg	1.01	KEL	06/23/2006 13:57	
Leachate Metals Methods								
ARSENIC, SPLP - ICP	EPA 200.7/6010B	ARSENIC	ND	mg/L	0.020	KEL	06/23/2006 16:14	
BARIUM, SPLP - ICP		BARIUM	1.3	mg/L	0.020	KEL	06/23/2006 16:04	
CADMIUM, SPLP - ICP		CADMIUM	ND	mg/L	0.020	KEL	06/23/2006 16:14	
CHROMIUM, SPLP - ICP		CHROMIUM	0.042	mg/L	0.010	KEL	06/23/2006 16:14	
LEAD, SPLP - ICP		LEAD	ND	mg/L	0.040	KEL	06/23/2006 16:14	
SELENIUM, SPLP - ICP		SELENIUM	ND	mg/L	0.070	KEL	06/23/2006 16:14	
SILVER, SPLP - ICP		SILVER	ND	mg/L	0.080	KEL	06/23/2006 16:04	
Leachate Procedure -Mercury								
MERCURY, SPLP - CV AF	EPA 245.7/1631	MERCURY	ND	mg/L	0.0300	KEL	06/23/2006 16:08	

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Total Mercury by Cold Vapor Atomic Fluorescence - Quality Control

Batch/Sample/Analyte	Result	Detection Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
BATCH: Batch 6F23016 - ***Metals Prep*										
QC SAMPLE: Blank (6F23016-BLK1)						Prepared & Analyzed: 06/23/06				
MERCURY	0.000013	0.000002	mg/kg							
QC SAMPLE: Blank (6F23016-BLK2)						Prepared & Analyzed: 06/23/06				
MERCURY	0.000004	0.000002	mg/kg							
QC SAMPLE: Calibration Blank (6F23016-CCB1)						Prepared & Analyzed: 06/23/06				
MERCURY	ND	0.000002	mg/kg							
QC SAMPLE: Calibration Blank (6F23016-CCB2)						Prepared & Analyzed: 06/23/06				
MERCURY	ND	0.000002	mg/kg							
QC SAMPLE: Calibration Blank (6F23016-CCB3)						Prepared & Analyzed: 06/23/06				
MERCURY	ND	0.000002	mg/kg							
QC SAMPLE: Calibration Blank (6F23016-CCB4)						Prepared & Analyzed: 06/23/06				
MERCURY	ND	0.000002	mg/kg							
QC SAMPLE: Reference (6F23016-SRM1)						Prepared & Analyzed: 06/23/06				
MERCURY	0.000240	0.000002	mg/kg	0.00020		120	90-110			
QC SAMPLE: Reference (6F23016-SRM2)						Prepared & Analyzed: 06/23/06				
MERCURY	0.000262	0.000002	mg/kg	0.00020		131	90-110			
QC SAMPLE: Reference (6F23016-SRM3)						Prepared & Analyzed: 06/23/06				
MERCURY	0.000153	0.000002	mg/kg	0.00020		76.5	90-110			
QC SAMPLE: Reference (6F23016-SRM4)						Prepared & Analyzed: 06/23/06				
MERCURY	0.000115	0.000002	mg/kg	0.00010		115	90-110			

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Total Mercury by Cold Vapor Atomic Fluorescence - Quality Control

Batch/Sample/Analyte	Result	Detection Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
BATCH: Batch 6F23016 - ***Metals Prep*										
QC SAMPLE: Reference (6F23016-SRM5)					Prepared & Analyzed: 06/23/06					
MERCURY	0.000100	0.000002	mg/kg	0.00010		100	90-110			

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Total Metals by Inductively Coupled Plasma - Quality Control

Batch/Sample/Analyte	Result	Detection Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
BATCH: Batch 6F23019 - ***Metals Prep*										
QC SAMPLE: Blank (6F23019-BLK1)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.0020	mg/kg							
SILVER	ND	0.010	"							
QC SAMPLE: Blank (6F23019-BLK2)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.0020	mg/kg							
SILVER	0.0403	0.010	"							
QC SAMPLE: Calibration Blank (6F23019-CCB1)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.0020	mg/kg							
SILVER	0.101	0.010	"							
QC SAMPLE: Calibration Blank (6F23019-CCB2)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.0020	mg/kg							
SILVER	0.0816	0.010	"							
QC SAMPLE: Calibration Blank (6F23019-CCB3)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.0020	mg/kg							
SILVER	ND	0.010	"							
QC SAMPLE: Calibration Blank (6F23019-CCB4)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.0020	mg/kg							
SILVER	0.0460	0.010	"							
QC SAMPLE: Reference (6F23019-SRM1)					Prepared & Analyzed: 06/23/06					
BARIUM	0.986	0.0020	mg/kg	1.00		98.6	85-115			
SILVER	0.488	0.010	"	0.500		97.6	85-115			
QC SAMPLE: Reference (6F23019-SRM2)					Prepared & Analyzed: 06/23/06					
BARIUM	0.995	0.0020	mg/kg	1.00		99.5	85-115			
SILVER	0.511	0.010	"	0.500		102	85-115			

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Total Metals by Inductively Coupled Plasma - Quality Control

Batch/Sample/Analyte	Result	Detection Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
BATCH: Batch 6F23019 - ***Metals Prep*										
QC SAMPLE: Reference (6F23019-SRM3)					Prepared & Analyzed: 06/23/06					
BARIUM	1.01	0.0020	mg/kg	1.00		101	85-115			
SILVER	0.576	0.010	"	0.500		115	85-115			
QC SAMPLE: Reference (6F23019-SRM4)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.0020	mg/kg	1.00			85-115			
SILVER	121	0.010	"	0.500		NR	85-115			
BATCH: Batch 6F23029 - ***Metals Prep*										
QC SAMPLE: Blank (6F23029-BLK1)					Prepared & Analyzed: 06/23/06					
ARSENIC	0.00320	0.000333	mg/kg							
CADMIUM	ND	0.001	"							
CHROMIUM	0.0108	0.001	"							
LEAD	ND	0.0000500	"							
SELENIUM	ND	0.013	"							
QC SAMPLE: Calibration Blank (6F23029-CCB1)					Prepared & Analyzed: 06/23/06					
ARSENIC	0.00130	0.000333	mg/kg							
CADMIUM	0.001	0.001	"							
CHROMIUM	0.00160	0.001	"							
LEAD	0.004	0.0000500	"							
SELENIUM	ND	0.013	"							
QC SAMPLE: Calibration Blank (6F23029-CCB2)					Prepared & Analyzed: 06/23/06					
ARSENIC	0.000500	0.000333	mg/kg							
CADMIUM	0.002	0.001	"							
CHROMIUM	ND	0.001	"							
LEAD	0.003	0.0000500	"							
SELENIUM	ND	0.013	"							

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Total Metals by Inductively Coupled Plasma - Quality Control

Batch/Sample/Analyte	Result	Detection Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
BATCH: Batch 6F23029 - ***Metals Prep*										
QC SAMPLE: Calibration Blank (6F23029-CCB3)					Prepared & Analyzed: 06/23/06					
ARSENIC	0.00940	0.000333	mg/kg							
CADMIUM	0.001	0.001	"							
CHROMIUM	ND	0.001	"							
LEAD	0.005	0.0000500	"							
SELENIUM	ND	0.013	"							
QC SAMPLE: Reference (6F23029-SRM1)					Prepared & Analyzed: 06/23/06					
ARSENIC	0.970	0.000333	mg/kg	1.00		97.0	85-115			
CADMIUM	0.997	0.001	"	1.00		99.7	85-115			
CHROMIUM	1.01	0.001	"	1.00		101	85-115			
LEAD	0.996	0.0000500	"	1.00		99.6	85-115			
SELENIUM	0.859	0.013	"	1.00		85.9	85-115			
QC SAMPLE: Reference (6F23029-SRM2)					Prepared & Analyzed: 06/23/06					
ARSENIC	1.01	0.000333	mg/kg	1.00		101	85-115			
CADMIUM	1.02	0.001	"	1.00		102	85-115			
CHROMIUM	1.05	0.001	"	1.00		105	85-115			
LEAD	1.04	0.0000500	"	1.00		104	85-115			
SELENIUM	1.13	0.013	"	1.00		113	85-115			
QC SAMPLE: Reference (6F23029-SRM3)					Prepared & Analyzed: 06/23/06					
ARSENIC	1.02	0.000333	mg/kg	1.00		102	85-115			
CADMIUM	1.05	0.001	"	1.00		105	85-115			
CHROMIUM	0.984	0.001	"	1.00		98.4	85-115			
LEAD	1.05	0.0000500	"	1.00		105	85-115			
SELENIUM	1.18	0.013	"	1.00		118	85-115			

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Leachate Metals Methods - Quality Control

Batch/Sample/Analyte	Result	Detection Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
BATCH: Batch 6F23023 - ***Metals Prep*										
QC SAMPLE: Blank (6F23023-BLK1)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.018	mg/L							
SILVER	ND	0.072	"							
QC SAMPLE: Blank (6F23023-BLK2)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.018	mg/L							
SILVER	ND	0.072	"							
QC SAMPLE: Calibration Blank (6F23023-CCB1)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.018	mg/L							
SILVER	0.101	0.072	"							
QC SAMPLE: Calibration Blank (6F23023-CCB2)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.018	mg/L							
SILVER	0.0816	0.072	"							
QC SAMPLE: Calibration Blank (6F23023-CCB3)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.018	mg/L							
SILVER	ND	0.072	"							
QC SAMPLE: Calibration Blank (6F23023-CCB4)					Prepared & Analyzed: 06/23/06					
BARIUM	ND	0.018	mg/L							
SILVER	ND	0.072	"							
QC SAMPLE: Reference (6F23023-SRM1)					Prepared & Analyzed: 06/23/06					
BARIUM	0.986	0.018	mg/L	1.00		98.6	85-115			
SILVER	0.488	0.072	"	0.500		97.6	85-115			
QC SAMPLE: Reference (6F23023-SRM2)					Prepared & Analyzed: 06/23/06					
BARIUM	0.995	0.018	mg/L	1.00		99.5	85-115			
SILVER	0.511	0.072	"	0.500		102	85-115			

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Leachate Metals Methods - Quality Control

Batch/Sample/Analyte	Result	Detection Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
BATCH: Batch 6F23023 - ***Metals Prep*										
QC SAMPLE: Reference (6F23023-SRM3)						Prepared & Analyzed: 06/23/06				
BARIUM	1.01	0.018	mg/L	1.00		101	85-115			
SILVER	0.576	0.072	"	0.500		115	85-115			
QC SAMPLE: Reference (6F23023-SRM4)						Prepared & Analyzed: 06/23/06				
BARIUM	ND	0.018	mg/L	1.00			85-115			
SILVER	0.603	0.072	"	0.500		121	85-115			
BATCH: Batch 6F23030 - ***Metals Prep*										
QC SAMPLE: Blank (6F23030-BLK1)						Prepared & Analyzed: 06/23/06				
ARSENIC	ND	0.018	mg/L							
CADMIUM	ND	0.018	"							
CHROMIUM	0.0108	0.0090	"							
LEAD	ND	0.036	"							
SELENIUM	ND	0.063	"							
QC SAMPLE: Calibration Blank (6F23030-CCB1)						Prepared & Analyzed: 06/23/06				
ARSENIC	ND	0.018	mg/L							
CADMIUM	ND	0.018	"							
CHROMIUM	ND	0.0090	"							
LEAD	ND	0.036	"							
SELENIUM	ND	0.063	"							
QC SAMPLE: Calibration Blank (6F23030-CCB2)						Prepared & Analyzed: 06/23/06				
ARSENIC	ND	0.018	mg/L							
CADMIUM	ND	0.018	"							
CHROMIUM	ND	0.0090	"							
LEAD	ND	0.036	"							
SELENIUM	ND	0.063	"							

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Leachate Metals Methods - Quality Control

Batch/Sample/Analyte	Result	Detection Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
BATCH: Batch 6F23030 - ***Metals Prep*										
QC SAMPLE: Calibration Blank (6F23030-CCB3)					Prepared & Analyzed: 06/23/06					
ARSENIC	ND	0.018	mg/L							
CADMIUM	ND	0.018	"							
CHROMIUM	ND	0.0090	"							
LEAD	ND	0.036	"							
SELENIUM	ND	0.063	"							
QC SAMPLE: Reference (6F23030-SRM1)					Prepared & Analyzed: 06/23/06					
ARSENIC	0.970	0.018	mg/L	1.00		97.0	85-115			
CADMIUM	0.997	0.018	"	1.00		99.7	85-115			
CHROMIUM	1.01	0.0090	"	1.00		101	85-115			
LEAD	0.996	0.036	"	1.00		99.6	85-115			
SELENIUM	0.859	0.063	"	1.00		85.9	85-115			
QC SAMPLE: Reference (6F23030-SRM2)					Prepared & Analyzed: 06/23/06					
ARSENIC	1.01	0.018	mg/L	1.00		101	85-115			
CADMIUM	1.02	0.018	"	1.00		102	85-115			
CHROMIUM	1.05	0.0090	"	1.00		105	85-115			
LEAD	1.04	0.036	"	1.00		104	85-115			
SELENIUM	1.13	0.063	"	1.00		113	85-115			
QC SAMPLE: Reference (6F23030-SRM3)					Prepared & Analyzed: 06/23/06					
ARSENIC	1.02	0.018	mg/L	1.00		102	85-115			
CADMIUM	1.05	0.018	"	1.00		105	85-115			
CHROMIUM	0.984	0.0090	"	1.00		98.4	85-115			
LEAD	1.05	0.036	"	1.00		105	85-115			
SELENIUM	1.18	0.063	"	1.00		118	85-115			SRM-1

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Leachate Procedure -Mercury - Quality Control

Batch/Sample/Analyte	Result	Detection Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
BATCH: Batch 6F23017 - ***Metals Prep*										
QC SAMPLE: Blank (6F23017-BLK1)					Prepared & Analyzed: 06/23/06					
MERCURY	ND	0.000150	mg/L							
QC SAMPLE: Blank (6F23017-BLK2)					Prepared & Analyzed: 06/23/06					
MERCURY	ND	0.000150	mg/L							
QC SAMPLE: Calibration Blank (6F23017-CCB1)					Prepared & Analyzed: 06/23/06					
MERCURY	ND	0.000150	mg/L							
QC SAMPLE: Calibration Blank (6F23017-CCB2)					Prepared & Analyzed: 06/23/06					
MERCURY	ND	0.000150	mg/L							
QC SAMPLE: Calibration Blank (6F23017-CCB3)					Prepared & Analyzed: 06/23/06					
MERCURY	ND	0.000150	mg/L							
QC SAMPLE: Calibration Blank (6F23017-CCB4)					Prepared & Analyzed: 06/23/06					
MERCURY	ND	0.000150	mg/L							
QC SAMPLE: Reference (6F23017-SRM1)					Prepared & Analyzed: 06/23/06					
MERCURY	0.000240	0.000150	mg/L	0.00020		120	90-110			
QC SAMPLE: Reference (6F23017-SRM2)					Prepared & Analyzed: 06/23/06					
MERCURY	0.000262	0.000150	mg/L	0.00020		131	90-110			
QC SAMPLE: Reference (6F23017-SRM3)					Prepared & Analyzed: 06/23/06					
MERCURY	0.000153	0.000150	mg/L	0.00020		76.5	90-110			
QC SAMPLE: Reference (6F23017-SRM4)					Prepared & Analyzed: 06/23/06					
MERCURY	ND	0.000150	mg/L	0.00010			90-110			

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CERTIFICATE OF ANALYSIS

Leachate Procedure -Mercury - Quality Control

Batch/Sample/Analyte	Result	Detection Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
BATCH: Batch 6F23017 - ***Metals Prep*										
QC SAMPLE: Reference (6F23017-SRM5)						Prepared & Analyzed: 06/23/06				
MERCURY	ND	0.000150	mg/L	0.00010			90-110			

Data Qualifiers:

Qualifier	Notes
SRM-1	The recovery of this SRM was high. The batch was accepted on the basis of other reference materials in this batch.

Authorized for Release By:Richard D. Reid - Laboratory Director

Apex Labs

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323 Phone
503-718-0333 Fax

Wednesday, September 29, 2010

Bruce Schacht
Columbia Steel Casting Co., Inc.
PO Box 83095
Portland, OR 97283

RE: Foundry Slag / [none]

Enclosed are the results of analyses for work order A10I180, which was received by the laboratory on 9/14/2010 at 4:00:00PM.

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

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

Apex Laboratories

Allison Greiner, Project 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 Labs

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323 Phone
503-718-0333 Fax

Columbia Steel Casting Co., Inc.	Project: **Foundry Slag**	
PO Box 83095	Project Number: [none]	**Reported:**
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SLAG 1	A10I180-01	Soil	09/14/10 15:00	09/14/10 16:00
SLAG 2	A10I180-02	Soil	09/14/10 15:00	09/14/10 16:00
SLAG 3	A10I180-03	Soil	09/14/10 15:00	09/14/10 16:00
SLAG 4	A10I180-04	Soil	09/14/10 15:00	09/14/10 16:00
SLAG 5	A10I180-05	Soil	09/14/10 15:00	09/14/10 16:00

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.

Allison Greiner, Project Manager

Apex Labs

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323 Phone
503-718-0333 Fax

Columbia Steel Casting Co., Inc.	Project: **Foundry Slag**	
PO Box 83095	Project Number: [none]	**Reported:**
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
SLAG 1 (A10I180-01)			**Matrix: Soil**		**Batch: 1009380**			
Arsenic	**7.50**	---	2.04	mg/kg dry	10	09/23/10 15:10	EPA 6020	
Barium	**858**	---	10.2	"	100	09/23/10 15:42	"	
Cadmium	**5.18**	---	1.02	"	10	09/23/10 15:10	"	
Chromium	**1290**	---	20.4	"	100	09/23/10 15:42	"	
Copper	**138**	---	4.07	"	10	09/23/10 15:10	"	
Lead	**3.36**	---	1.02	"	"	"	"	
Manganese	**52500**	---	204	"	2000	09/23/10 16:17	"	
Mercury	ND	---	0.0815	"	10	09/23/10 15:10	"	
Nickel	**362**	---	2.04	"	"	"	"	
Selenium	**14.4**	---	2.04	"	"	"	"	
Silver	ND	---	1.02	"	"	"	"	
Zinc	**33.1**	---	4.07	"	"	"	"	
SLAG 2 (A10I180-02)			**Matrix: Soil**		**Batch: 1009380**			
Arsenic	**3.60**	---	2.04	mg/kg dry	10	09/23/10 15:13	EPA 6020	
Barium	**1280**	---	10.2	"	100	09/23/10 15:45	"	
Cadmium	**3.01**	---	1.02	"	10	09/23/10 15:13	"	
Chromium	**688**	---	20.4	"	100	09/23/10 15:45	"	
Copper	**20.5**	---	4.08	"	10	09/23/10 15:13	"	
Lead	**2.16**	---	1.02	"	"	"	"	
Manganese	**56000**	---	204	"	2000	09/23/10 16:20	"	
Mercury	ND	---	0.0815	"	10	09/23/10 15:13	"	
Nickel	**145**	---	2.04	"	"	"	"	
Selenium	**61.2**	---	2.04	"	"	"	"	
Silver	ND	---	1.02	"	"	"	"	
Zinc	**13.2**	---	4.08	"	"	"	"	
SLAG 3 (A10I180-03)			**Matrix: Soil**		**Batch: 1009380**			
Arsenic	**3.94**	---	2.03	mg/kg dry	10	09/23/10 15:16	EPA 6020	
Barium	**1240**	---	10.2	"	100	09/23/10 15:48	"	
Cadmium	**3.89**	---	1.02	"	10	09/23/10 15:16	"	
Chromium	**797**	---	20.3	"	100	09/23/10 15:48	"	
Copper	**32.1**	---	4.06	"	10	09/23/10 15:16	"	
Lead	**3.20**	---	1.02	"	"	"	"	
Manganese	**41700**	---	203	"	2000	09/23/10 16:23	"	
Mercury	ND	---	0.0812	"	10	09/23/10 15:16	"	
Nickel	**223**	---	2.03	"	"	"	"	

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Allison Greiner, Project Manager

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Columbia Steel Casting Co., Inc.	Project: Foundry Slag	
PO Box 83095	Project Number: [none]	Reported:
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
SLAG 3 (A10I180-03)			**Matrix: Soil**		**Batch: 1009380**			
Selenium	39.4	---	2.03	mg/kg dry	10	"	EPA 6020	
Silver	ND	---	1.02	"	"	"	"	
Zinc	16.2	---	4.06	"	"	"	"	
SLAG 4 (A10I180-04)			**Matrix: Soil**		**Batch: 1009380**			
Arsenic	4.71	---	2.00	mg/kg dry	10	09/23/10 15:19	EPA 6020	
Barium	1020	---	10.0	"	100	09/23/10 15:51	"	
Cadmium	5.37	---	1.00	"	10	09/23/10 15:19	"	
Chromium	580	---	20.0	"	100	09/23/10 15:51	"	
Copper	15.1	---	4.01	"	10	09/23/10 15:19	"	
Lead	3.23	---	1.00	"	"	"	"	
Manganese	20800	---	100	"	1000	09/23/10 16:26	"	
Mercury	ND	---	0.0802	"	10	09/23/10 15:19	"	
Nickel	181	---	2.00	"	"	"	"	
Selenium	76.0	---	2.00	"	"	"	"	
Silver	ND	---	1.00	"	"	"	"	
Zinc	30.0	---	4.01	"	"	"	"	
SLAG 5 (A10I180-05)			**Matrix: Soil**		**Batch: 1009380**			
Arsenic	6.05	---	1.97	mg/kg dry	10	09/23/10 15:22	EPA 6020	
Barium	356	---	0.986	"	"	"	"	
Cadmium	2.24	---	0.986	"	"	"	"	
Chromium	704	---	19.7	"	100	09/23/10 15:54	"	
Copper	34.6	---	3.94	"	10	09/23/10 15:22	"	
Lead	3.43	---	0.986	"	"	"	"	
Manganese	87800	---	197	"	2000	09/23/10 16:29	"	
Mercury	ND	---	0.0789	"	10	09/23/10 15:22	"	
Nickel	322	---	1.97	"	"	"	"	
Selenium	16.3	---	1.97	"	"	"	"	
Silver	ND	---	0.986	"	"	"	"	
Zinc	19.3	---	3.94	"	"	"	"	

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Allison Greiner, Project Manager

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Columbia Steel Casting Co., Inc.	Project: **Foundry Slag**	
PO Box 83095	Project Number: [none]	**Reported:**
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

ANALYTICAL SAMPLE RESULTS

SPLP Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
SLAG 1 (A10I180-01)			**Matrix: Soil**		**Batch: 1009408**			
Arsenic	ND	---	0.100	mg/L	5	09/27/10 14:55	EPA 1312/6020	
Barium	**0.543**	---	0.500	"	"	"	"	
Cadmium	ND	---	0.0500	"	"	"	"	
Chromium	ND	---	0.100	"	"	"	"	
Copper	ND	---	0.250	"	"	"	"	
Lead	ND	---	0.0500	"	"	"	"	
Manganese	ND	---	0.0500	"	"	"	"	
Mercury	ND	---	0.00500	"	"	"	"	
Nickel	ND	---	0.100	"	"	"	"	
Selenium	ND	---	0.100	"	"	"	"	
Silver	ND	---	0.0500	"	"	"	"	
Zinc	ND	---	0.250	"	"	"	"	
SLAG 2 (A10I180-02)			**Matrix: Soil**		**Batch: 1009408**			
Arsenic	ND	---	0.100	mg/L	5	09/27/10 14:58	EPA 1312/6020	
Barium	ND	---	0.500	"	"	"	"	
Cadmium	ND	---	0.0500	"	"	"	"	
Chromium	ND	---	0.100	"	"	"	"	
Copper	ND	---	0.250	"	"	"	"	
Lead	ND	---	0.0500	"	"	"	"	
Manganese	ND	---	0.0500	"	"	"	"	
Mercury	ND	---	0.00500	"	"	"	"	
Nickel	ND	---	0.100	"	"	"	"	
Selenium	**0.108**	---	0.100	"	"	"	"	
Silver	ND	---	0.0500	"	"	"	"	
Zinc	ND	---	0.250	"	"	"	"	
SLAG 3 (A10I180-03)			**Matrix: Soil**		**Batch: 1009408**			
Arsenic	ND	---	0.100	mg/L	5	09/27/10 15:01	EPA 1312/6020	
Barium	**0.522**	---	0.500	"	"	"	"	
Cadmium	ND	---	0.0500	"	"	"	"	
Chromium	ND	---	0.100	"	"	"	"	
Copper	ND	---	0.250	"	"	"	"	
Lead	ND	---	0.0500	"	"	"	"	
Manganese	ND	---	0.0500	"	"	"	"	
Mercury	ND	---	0.00500	"	"	"	"	
Nickel	ND	---	0.100	"	"	"	"	

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Columbia Steel Casting Co., Inc.	Project: **Foundry Slag**	
PO Box 83095	Project Number: [none]	**Reported:**
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

ANALYTICAL SAMPLE RESULTS

SPLP Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
SLAG 3 (A10I180-03)			**Matrix: Soil**		**Batch: 1009408**			
Selenium	ND	---	0.100	mg/L	5	"	EPA 1312/6020	
Silver	ND	---	0.0500	"	"	"	"	
Zinc	ND	---	0.250	"	"	"	"	
SLAG 4 (A10I180-04)			**Matrix: Soil**		**Batch: 1009408**			
Arsenic	ND	---	0.100	mg/L	5	09/27/10 15:04	EPA 1312/6020	
Barium	**0.576**	---	0.500	"	"	"	"	
Cadmium	ND	---	0.0500	"	"	"	"	
Chromium	ND	---	0.100	"	"	"	"	
Copper	ND	---	0.250	"	"	"	"	
Lead	ND	---	0.0500	"	"	"	"	
Manganese	ND	---	0.0500	"	"	"	"	
Mercury	ND	---	0.00500	"	"	"	"	
Nickel	ND	---	0.100	"	"	"	"	
Selenium	ND	---	0.100	"	"	"	"	
Silver	ND	---	0.0500	"	"	"	"	
Zinc	ND	---	0.250	"	"	"	"	
SLAG 5 (A10I180-05)			**Matrix: Soil**		**Batch: 1009408**			
Arsenic	ND	---	0.100	mg/L	5	09/27/10 15:07	EPA 1312/6020	
Barium	ND	---	0.500	"	"	"	"	
Cadmium	ND	---	0.0500	"	"	"	"	
Chromium	**0.300**	---	0.100	"	"	"	"	
Copper	ND	---	0.250	"	"	"	"	
Lead	ND	---	0.0500	"	"	"	"	
Manganese	ND	---	0.0500	"	"	"	"	
Mercury	ND	---	0.00500	"	"	"	"	
Nickel	ND	---	0.100	"	"	"	"	
Selenium	ND	---	0.100	"	"	"	"	
Silver	ND	---	0.0500	"	"	"	"	
Zinc	ND	---	0.250	"	"	"	"	

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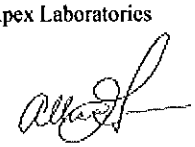

Allison Greiner, Project Manager

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Columbia Steel Casting Co., Inc.	Project: **Foundry Slag**	
PO Box 83095	Project Number: [none]	**Reported:**
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

ANALYTICAL SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
SLAG 1 (A10I180-01)			**Matrix: Soil**		**Batch: 1009393**			
% Solids	99.8	---	1.00	% by Weight	1	09/24/10 08:50	Apex SOP	
SLAG 2 (A10I180-02)			**Matrix: Soil**		**Batch: 1009393**			
% Solids	99.9	---	1.00	% by Weight	1	09/24/10 08:50	Apex SOP	
SLAG 3 (A10I180-03)			**Matrix: Soil**		**Batch: 1009393**			
% Solids	99.9	---	1.00	% by Weight	1	09/24/10 08:50	Apex SOP	
SLAG 4 (A10I180-04)			**Matrix: Soil**		**Batch: 1009393**			
% Solids	99.8	---	1.00	% by Weight	1	09/24/10 08:50	Apex SOP	
SLAG 5 (A10I180-05)			**Matrix: Soil**		**Batch: 1009393**			
% Solids	99.8	---	1.00	% by Weight	1	09/24/10 08:50	Apex SOP	

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Columbia Steel Casting Co., Inc.	Project: **Foundry Slag**	
PO Box 83095	Project Number: [none]	**Reported:**
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1009380 - EPA 3051A							**Soil**					
Blank (1009380-BLK1)					Prepared: 09/23/10 10:55 Analyzed: 09/23/10 15:04							
EPA 6020												
Arsenic	ND	---	2.00	mg/kg wet	10	---	---	---	---	---	---	
Barium	ND	---	1.00	"	"	---	---	---	---	---	---	
Cadmium	ND	---	1.00	"	"	---	---	---	---	---	---	
Chromium	ND	---	2.00	"	"	---	---	---	---	---	---	
Copper	ND	---	4.00	"	"	---	---	---	---	---	---	
Lead	ND	---	1.00	"	"	---	---	---	---	---	---	
Manganese	ND	---	1.00	"	"	---	---	---	---	---	---	
Mercury	ND	---	0.0800	"	"	---	---	---	---	---	---	
Nickel	ND	---	2.00	"	"	---	---	---	---	---	---	
Selenium	ND	---	2.00	"	"	---	---	---	---	---	---	
Silver	ND	---	1.00	"	"	---	---	---	---	---	---	
Zinc	ND	---	4.00	"	"	---	---	---	---	---	---	
LCS (1009380-BS1)					Prepared: 09/23/10 10:55 Analyzed: 09/23/10 15:07							
EPA 6020												
Arsenic	51.4	---	2.00	mg/kg wet	10	50.0	---	103	80-120%	---	---	
Barium	53.0	---	1.00	"	"	"	---	106	"	---	---	
Cadmium	49.8	---	1.00	"	"	"	---	100	"	---	---	
Chromium	49.3	---	2.00	"	"	"	---	99	"	---	---	
Copper	52.3	---	4.00	"	"	"	---	105	"	---	---	
Lead	47.0	---	1.00	"	"	"	---	94	"	---	---	
Manganese	48.6	---	1.00	"	"	"	---	97	"	---	---	
Mercury	1.98	---	0.0800	"	"	2.00	---	99	"	---	---	
Nickel	52.1	---	2.00	"	"	50.0	---	104	"	---	---	
Selenium	24.9	---	2.00	"	"	25.0	---	99	"	---	---	
Silver	25.6	---	1.00	"	"	"	---	102	"	---	---	
Zinc	51.2	---	4.00	"	"	50.0	---	102	"	---	---	
Duplicate (1009380-DUP1)					Prepared: 09/23/10 10:55 Analyzed: 09/23/10 15:25							
QC Source Sample: SLAG 5 (A10I180-05)												
EPA 6020												
Arsenic	**6.25**	---	1.97	mg/kg dry	10	---	6.05	---	---	3	40%	
Barium	**339**	---	0.984	"	"	---	356	---	---	5	40%	
Cadmium	**2.12**	---	0.984	"	"	---	2.24	---	---	6	40%	

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Columbia Steel Casting Co., Inc.	Project: Foundry Slag	
PO Box 83095	Project Number: [none]	Reported:
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1009380 - EPA 3051A							**Soil**					
Duplicate (1009380-DUP1)					Prepared: 09/23/10 10:55 Analyzed: 09/23/10 15:25							
QC Source Sample: SLAG 5 (A101180-05)												
Copper	**26.3**	---	3.94	mg/kg dry	"	---	34.6	---	---	27	40%	
Lead	**3.46**	---	0.984	"	"	---	3.43	---	---	0.9	40%	
Mercury	ND	---	0.0787	"	"	---	ND	---	---	---	40%	
Nickel	**347**	---	1.97	"	"	---	322	---	---	7	40%	
Selenium	**12.6**	---	1.97	"	"	---	16.3	---	---	25	40%	
Silver	ND	---	0.984	"	"	---	ND	---	---	---	40%	
Zinc	**21.8**	---	3.94	"	"	---	19.3	---	---	12	40%	
Duplicate (1009380-DUP2)					Prepared: 09/23/10 10:55 Analyzed: 09/23/10 16:00							
QC Source Sample: SLAG 5 (A101180-05)												
EPA 6020												
Chromium	**579**	---	19.7	mg/kg dry	100	---	704	---	---	20	40%	Q-16
Duplicate (1009380-DUP3)					Prepared: 09/23/10 10:55 Analyzed: 09/23/10 16:32							
QC Source Sample: SLAG 5 (A101180-05)												
EPA 6020												
Manganese	**87000**	---	197	mg/kg dry	2000	---	87800	---	---	0.9	40%	Q-16
Matrix Spike (1009380-MS1)					Prepared: 09/23/10 10:55 Analyzed: 09/23/10 15:30							
QC Source Sample: SLAG 5 (A101180-05)												
EPA 6020												
Arsenic	54.6	---	20.3	mg/kg dry	100	50.8	6.05	96	75-125%	---	---	
Barium	435	---	10.2	"	"	"	356	156	"	---	---	Q-03
Cadmium	51.8	---	10.2	"	"	"	2.24	98	"	---	---	
Chromium	531	---	20.3	"	"	"	704	-341	"	---	---	Q-03
Copper	72.9	---	40.6	"	"	"	34.6	75	"	---	---	
Lead	51.1	---	10.2	"	"	"	3.43	94	"	---	---	
Mercury	2.00	---	0.813	"	"	2.03	ND	99	"	---	---	
Nickel	351	---	20.3	"	"	50.8	322	57	"	---	---	Q-03
Selenium	34.0	---	20.3	"	"	25.4	16.3	70	"	---	---	Q-11
Silver	26.1	---	10.2	"	"	"	ND	103	"	---	---	
Zinc	69.1	---	40.6	"	"	50.8	19.3	98	"	---	---	
Matrix Spike (1009380-MS2)					Prepared: 09/23/10 10:55 Analyzed: 09/23/10 16:35							

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Columbia Steel Casting Co., Inc.	Project: **Foundry Slag**	
PO Box 83095	Project Number: [none]	**Reported:**
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1009360 - EPA 3051A							**Soil**					
Matrix Spike (1009380-MS2)					Prepared: 09/23/10 10:55 Analyzed: 09/23/10 16:35							
QC Source Sample: SLAG 5 (A101180-05)												
EPA 6020												
Manganese	84500	---	203	mg/kg dry	2000	50.8	87800	-6470	75-125%	---	---	)1, Q-03, Q-16
Post Spike (1009380-PS1)					Prepared: 09/23/10 16:29 Analyzed: 09/23/10 16:38							
QC Source Sample: SLAG 5 (A101180-05)												
EPA 6020												
Barium	580	---		ug/L	10	200	361	110	80-120%		---	
Chromium	918	---		"	"	"	714	102	"		---	
Nickel	543	---		"	"	"	327	108	"		---	
Selenium	111	---		"	"	100	16.5	95	"		---	

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PO Box 83095	Project Number: [none]	**Reported:**
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

QUALITY CONTROL (QC) SAMPLE RESULTS

SPLP Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1009408 - EPA 1312/3015							**Soil**					
Blank (1009408-BLK1)					Prepared: 09/27/10 08:50 Analyzed: 09/27/10 14:49							
EPA 1312/6020												
Arsenic	ND	---	0.100	mg/L	5	---	---	---	---	---	---	
Barium	ND	---	0.500	"	"	---	---	---	---	---	---	
Cadmium	ND	---	0.0500	"	"	---	---	---	---	---	---	
Chromium	ND	---	0.100	"	"	---	---	---	---	---	---	
Copper	ND	---	0.250	"	"	---	---	---	---	---	---	
Lead	ND	---	0.0500	"	"	---	---	---	---	---	---	
Manganese	ND	---	0.0500	"	"	---	---	---	---	---	---	
Mercury	ND	---	0.00500	"	"	---	---	---	---	---	---	
Nickel	ND	---	0.100	"	"	---	---	---	---	---	---	
Selenium	ND	---	0.100	"	"	---	---	---	---	---	---	
Silver	ND	---	0.0500	"	"	---	---	---	---	---	---	
Zinc	ND	---	0.250	"	"	---	---	---	---	---	---	
LCS (1009408-BS1)					Prepared: 09/27/10 08:50 Analyzed: 09/27/10 14:52							
EPA 1312/6020												
Arsenic	1.98	---	0.100	mg/L	5	2.00	---	99	80-120%	---	---	
Barium	2.07	---	0.500	"	"	"	---	103	"	---	---	
Cadmium	1.99	---	0.0500	"	"	"	---	99	"	---	---	
Chromium	1.92	---	0.100	"	"	"	---	96	"	---	---	
Copper	2.13	---	0.250	"	"	"	---	107	"	---	---	
Lead	1.93	---	0.0500	"	"	"	---	97	"	---	---	
Manganese	1.91	---	0.0500	"	"	"	---	95	"	---	---	
Mercury	0.0968	---	0.00500	"	"	0.100	---	97	"	---	---	
Nickel	2.03	---	0.100	"	"	2.00	---	102	"	---	---	
Selenium	0.968	---	0.100	"	"	1.00	---	97	"	---	---	
Silver	0.984	---	0.0500	"	"	"	---	98	"	---	---	
Zinc	2.01	---	0.250	"	"	2.00	---	101	"	---	---	
Matrix Spike (1009408-MS1)					Prepared: 09/27/10 08:50 Analyzed: 09/27/10 15:10							
QC Source Sample: SLAG 5 (A101180-05)												
EPA 1312/6020												
Arsenic	1.96	---	0.100	mg/L	5	2.00	ND	98	50-150%	---	---	
Barium	2.16	---	0.500	"	"	"	0.139	101	"	---	---	
Cadmium	1.97	---	0.0500	"	"	"	ND	98	"	---	---	

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Allison Greiner, Project Manager

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12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323 Phone
503-718-0333 Fax

Columbia Steel Casting Co., Inc.	Project: **Foundry Slag**	
PO Box 83095	Project Number: [none]	**Reported:**
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

QUALITY CONTROL (QC) SAMPLE RESULTS

SPLP Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1009408 - EPA 1312/3015							**Soil**					
Matrix Spike (1009408-MS1)					Prepared: 09/27/10 08:50 Analyzed: 09/27/10 15:10							
QC Source Sample: SLAG 5 (A10I180-05)												
Chromium	2.20	---	0.100	mg/L	"	"	0.300	95	"	---	---	
Copper	2.10	---	0.250	"	"	"	ND	105	"	---	---	
Lead	1.92	---	0.0500	"	"	"	ND	96	"	---	---	
Manganese	1.91	---	0.0500	"	"	"	ND	96	"	---	---	
Mercury	0.0965	---	0.00500	"	"	0.100	ND	96	"	---	---	
Nickel	1.99	---	0.100	"	"	2.00	ND	100	"	---	---	
Selenium	1.00	---	0.100	"	"	1.00	ND	100	"	---	---	
Silver	0.986	---	0.0500	"	"	"	ND	99	"	---	---	
Zinc	2.00	---	0.250	"	"	2.00	0.0310	98	"	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1009393 - Dry Weight							**Soil**					
Duplicate (1009393-DUP1)					Prepared: 09/23/10 16:08		Analyzed: 09/24/10 08:50					
QC Source Sample: SLAG 1 (A10I180-01)												
Apex SOP												
% Solids	99.8	---	1.00	% by Weight	1	---	99.8	---	---	0	20%	

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

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PO Box 83095	Project Number: [none]	**Reported:**
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

SAMPLE PREPARATION INFORMATION

Total Metals by EPA 6020 (ICPMS)

Prep: EPA 3051A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1009380							
A10I180-01	Soil	EPA 6020	09/14/10 15:00	09/23/10 10:55	0.492g/50mL	0.5g/50mL	1.02
A10I180-02	Soil	EPA 6020	09/14/10 15:00	09/23/10 10:55	0.491g/50mL	0.5g/50mL	1.02
A10I180-03	Soil	EPA 6020	09/14/10 15:00	09/23/10 10:55	0.493g/50mL	0.5g/50mL	1.01
A10I180-04	Soil	EPA 6020	09/14/10 15:00	09/23/10 10:55	0.5g/50mL	0.5g/50mL	1.00
A10I180-05	Soil	EPA 6020	09/14/10 15:00	09/23/10 10:55	0.508g/50mL	0.5g/50mL	0.98

SPLP Metals by EPA 6020 (ICPMS)

Prep: EPA 1312/3015

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 1009408							
A10I180-01	Soil	EPA 1312/6020	09/14/10 15:00	09/27/10 08:50	5mL/50mL	5mL/50mL	1.00
A10I180-02	Soil	EPA 1312/6020	09/14/10 15:00	09/27/10 08:50	5mL/50mL	5mL/50mL	1.00
A10I180-03	Soil	EPA 1312/6020	09/14/10 15:00	09/27/10 08:50	5mL/50mL	5mL/50mL	1.00
A10I180-04	Soil	EPA 1312/6020	09/14/10 15:00	09/27/10 08:50	5mL/50mL	5mL/50mL	1.00
A10I180-05	Soil	EPA 1312/6020	09/14/10 15:00	09/27/10 08:50	5mL/50mL	5mL/50mL	1.00

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PO Box 83095	Project Number: [none]	**Reported:**
Portland, OR 97283	Project Manager: Bruce Schacht	09/29/10 14:43

Notes and Definitions

Qualifiers:

A-01	Despite out-of-control MS recovery of this analyte, a post spike will not be performed due to the extremely high concentration of analyte in the sample.
Q-03	Percent recovery and/or RPD is outside control limits due to the high concentration of analyte present in the sample.
Q-11	Spike recovery cannot be accurately quantified due to sample dilution required for high analyte concentration and/or matrix interference.
Q-16	Reanalysis of an original Batch QC sample.

Notes and Conventions:

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. Results listed as 'wet' or without 'dry'designation are not dry weight corrected.
RPD	Relative Percent Difference
MDL	If MDL is not listed, data has been evaluated to the Method Reporting Limit only.
WMSC	Water Miscible Solvent Correction has been applied to Results and MRLs for volatiles soil samples per EPA 8000C.
Batch QC	Unless specifically requested, this report contains only results for Batch QC derived from client samples included in this report. All analyses were performed with the appropriate Batch QC (including Sample Duplicates, Matrix Spikes and/or Matrix Spike Duplicates) in order to meet or exceed method and regulatory requirements. Any exceptions to this will be qualified in this report. Complete Batch QC results are available upon request. In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) is analyzed to demonstrate accuracy and precision of the extraction and analysis.
Blank Policy	Apex assesses blank data for potential high bias down to a level equal to ½ the method reporting limit (MRL), except for conventional chemistry and HCID analyses which are assessed only to the MRL. Sample results flagged with a B or B-02 qualifier are potentially biased high if they 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. For accurate comparison of volatile results to the level found in the blank; water sample results should be divided by the dilution factor, and soil sample results should be divided by 1/50 of the sample dilution to account for the sample prep factor. Results qualified as reported below the MRL may include a potential high bias if associated with a B or B-02 qualified blank. B and B-02 qualifications are not applied to J qualified results reported below the MRL.

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PO Box 83095	Project Number: [none]	**Reported:**
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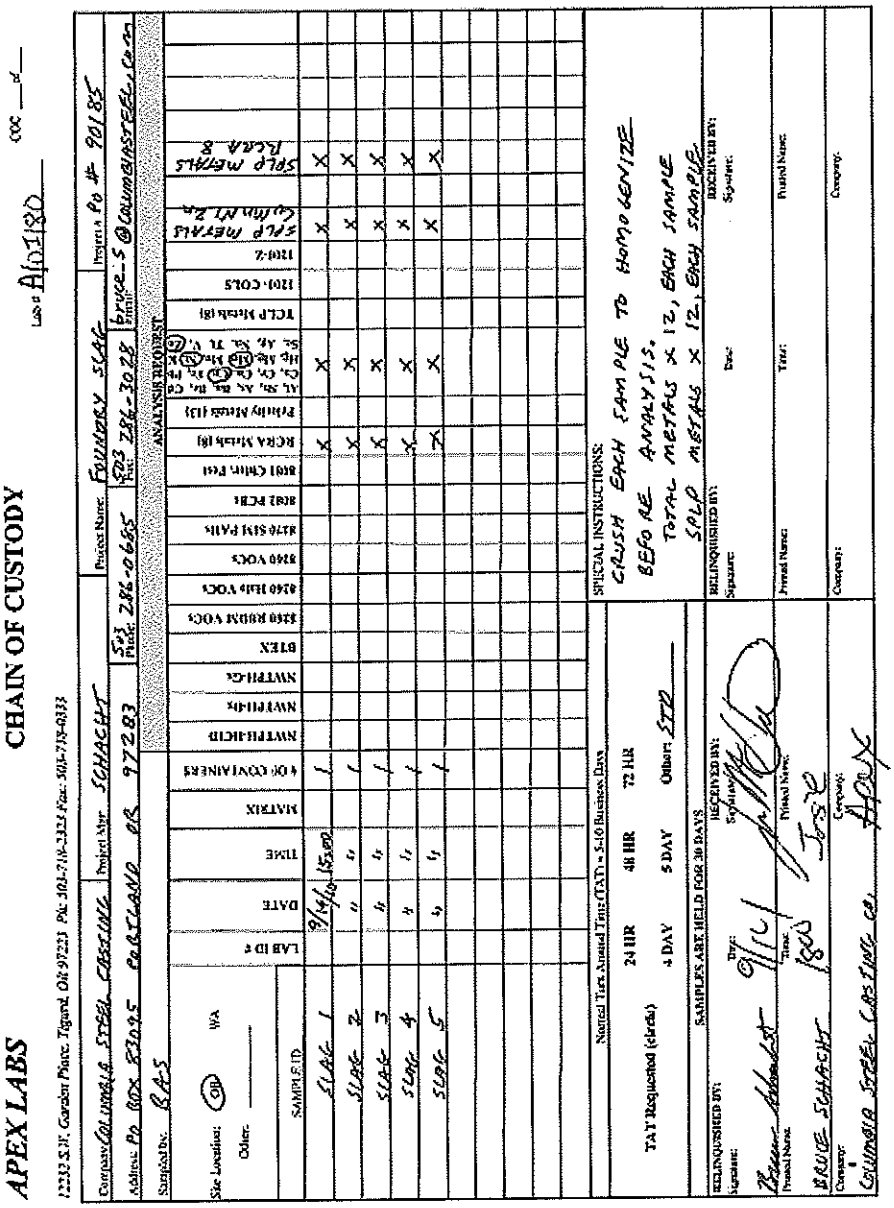

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