APPENDIX I-9

Hazards and Hazardous Materials Report

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HAZARDS AND HAZARDOUS MATERIALS REPORT FOR ORCEM CALIFORNIA PROPOSED GROUND GRANULATED BLAST FURNACE SLAG MANUFACTURING PLANT, 800 DERR STREET, VALLEJO, CALIFORNIA

Technical Report Prepared For

ORCEM

Technical Report Prepared By

Dr Fergal Callaghan BSc(Chem) PhD(ChemEng) MRSC AMIChemE

Our Reference

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1.0 INTRODUCTION

This report is an assessment of the Orcem Vallejo Project with regard to hazards and hazardous materials.

(Orcem) has filed an application with the City of Vallejo to approve a Major Use Permit and Site Development Plan to construct and operate a processing plant for the manufacture of ground granulated blast furnace slag (hereafter referred to as "GGBFS") and other cement products from GBFS (granulated blast furnace slag) and other products.

The Orcem Project would occupy a portion of the former General Mills plant site located at 800 Derr Street.

Sometimes referred to as "environmentally friendly cement", Orcem's primary finished product, GGBFS, will be produced on site, via the following major steps:

1. Receive via several alternative transport modes, various raw materials, including, Granulated Blast Furnace Slag (GBFS), clinker, Portland cement clinker, pozzolan, gypsum and limestone.
2. Store the GBFS, clinker, Portland cement clinker, pozzolan, gypsum and limestone on the site.
3. Process, by milling within a closed system, the GBFS granulate and gypsum into GGBFS powder, and all the materials into a variety of hydraulic cements.
4. Store the GGBFS and cement products within enclosed storage facilities on the site.
5. Distribute the GGBFS and cement from the enclosed storage facilities on the site for use in construction projects throughout California and Nevada.

2.0 GBFS – THE PRINCIPAL MATERIAL TO BE STORED AND USED ON-SITE

GBFS, the raw material used in the process, is the principal material which will be stored, used and processed on site.

It is an inorganic, vitreous material, with a glass content around 95 - 100%, the minor impurities being minerals formed by the calcium, silicon, aluminium etc., because they were not cooled fast enough in the granulation process.

GBFS has a low solubility in water, and in fact has an inherent free moisture content, from 8% to 12%.

The glassy nature of the granules and the moisture of the GBFS minimize the dust created in either handling or storage. It is non-flammable, non-toxic and non-explosive. The bulk density is 70-80 pounds per cubic foot, depending on moisture content.

GBFS has the following typical chemical composition:

Calcium, expressed as	CaO	41 ± 3%
Silicon, expressed as	SiO_2	35.5 ± 2.5%
Aluminium, expressed as	$Al2O_3$	10.5 ± 2%
Magnesium, expressed as	MgO	7.5 ± 1.5%
Titanium, expressed as	TiO_2	< 1%
Sulphur, expressed as	SO_3	<<1%

Laboratory analysis of a GBFS sample, undertaken by Weck Laboratories, California, (California State Environmental Laboratory Accreditation Program Branch – NELAP Accreditation Certificate 04229CA, expiry 10/31/2014) is provided as Attachment A of this report.

The other materials which may be used on site, by adding to the GBFS in small quantities during the crushing process to manufacture different types of final GGBFS based product are listed as follows (The full Laboratory Analysis Report for each of these materials is provided as Attachment B of this Report).

Natural quarried materials which may be added to the GBFS during the grinding process include:

- Limestone
- Pozzolan Rock
- Gypsum

GBFS granulate is similar to the particle size of a coarse sand, with 95% of the material between approximately 5,000 micron and 125 micron in size.

The finished product GGBFS is finely ground GBFS, sometimes with minor additions to enhance performance. It has similar physical characteristics to ordinary Portland cement.

GGBFS has the following properties:

Particle Size	5-40 micron
pH (wet)	9-11
Solubility in Water	very low
Color	off white
Humidity	<0.2%

GGBFS, as a finely ground powder, is capable of emitting fugitive dust particles if not properly contained within closed processing, storage and loading facilities (as proposed).

As an alternative, the production plant may also process clinker only, depending on market and economic conditions, although this is not the main purpose of the facility, the main purpose is the manufacture of GGBFS. If the facility is used from time to time, as may be required, for the processing of Portland cement clinker, the facility will still use the same processes, all materials are handled under enclosed conditions, with air emissions discharged through bag filtration systems to ensure no environmental impacts occur.

An analysis of Portland Cement is also included in Attachment B.

Therefore the milling process, whether undertaken using GBFS or Portland Cement Clinker, is carried out in a closed circuit system under negative pressure (no outlet to the exterior, except through high performance filters). Likewise fully sealed finished product storage in silos is provided, for either operational mode.

The Orcem Plant production process involves seven key elements:

(1) Transport of raw materials to the Site, including GBFS, Portland cement clinker and other additives as described above;

(2) Storage of raw materials in sufficient quantities to support continuous production (stockpile storage externally or internally in clinker building,);

(3) Transport of raw material from storage to the Process Plant (via mobile hydraulic machinery);

(4) Drying, grinding and blending GBFS granulate and other raw material. ;

(5) Storage of finished GGBFS and cement products in sealed storage units;

(6) Loading of the finished products into tanker trucks or rail cars; and

(7) Transport of finished GGBFS and cements to markets

An assessment has been made of the analysis data by reference to:

Guidance for Hazard Determination for Compliance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

U.S. Department of Labor, Occupational Safety and Health Administration (OSHA)

GBFS is classified as non-hazardous, with the following components and comparison with 29 CFR 1910.1200, as shown in Table 2.1:

	%	% Threshold	Conclusion
Antimony	0.00061	1	Non-Hazardous
Arsenic	ND	0.1	Non-Hazardous
Barium	0.043	1	Non-Hazardous
Beryllium	0.00069	1	Non-Hazardous
Cadmium	ND	1	Non-Hazardous
Chromium	0.0017	1	Non-Hazardous
Chromium VI	ND	0.1	Non-Hazardous
cobalt	ND	1	Non-Hazardous
Copper	ND	1	Non-Hazardous
Lead	ND	1	Non-Hazardous
Manganese	0.12	1	Non-Hazardous
Mercury	ND	1	Non-hazardous
Nickel	ND	0.1	Non-Hazardous
Selenium	0.00026	1	Non-Hazardous
Thallium	ND	1	Non-Hazardous
Vanadium	0.0029	1	Non-Hazardous

Table 2.1 GBFS Comparison with Hazardous Material Thresholds (ND is Non-Detect)

It can be stated, with reference to Proposition 65 of the State of California that the substance does contain traces of some heavy metals but at concentrations well below those which would render it hazardous.

The other materials which may be added, in small quantities, to the process are described in more detail in the following Section.

3.0 OTHER MATERIALS WHICH MAY BE USED IN THE MANUFACTURING PROCESS

- Limestone – a natural rock (composed mainly of calcium carbonate) which is mined and crushed for use as an aggregate in the construction industry, maybe be used on-site in small quantities – MSDS provided as Attachment C;

- Gypsum – a natural material (composed of calcium sulphate) which is mined and processed for use in the construction industry (MSDS provided as Attachment D);

- Pozzolan Rock – naturally occurring material derived from volcanic rock and ash deposits, used as an additive in small quantities to improve the performance of cement (MSDS provided as Attachment E);

- Portland cement clinker – common construction material manufactured by blending materials including limestone, shale and clay in a kiln and processing at temperatures in excess of 1800 degrees F, may be processed on-site depending on market conditions (MSDS provided as Attachment F)

All MSDS are from the Chicago based MSDS Online Database, one of the leading sources of MSDS for the USA.

Limestone is classified as non-hazardous substance, the MSDS (see Attachment C) for limestone notes that it may produce a nuisance dust, which does not have health impacts for workers provided it is kept below occupational exposure limits.

It can be stated, with reference to Proposition 65 of the State of California that the substance does contain traces of some heavy metals but at concentrations well below those which would render it hazardous.

A review of the laboratory analysis data (see Attachment B) for limestone, against hazardous criteria, is show in Table 3.1 below.

	%	% Threshold	Conclusion
Antimony	ND	1	Non-Hazardous
Arsenic	0.000013	0.1	Non-Hazardous
Barium	0.0014	1	Non-Hazardous
Beryllium	ND	1	Non-Hazardous
Cadmium	0.000095	1	Non-Hazardous
Chromium	0.000019	1	Non-Hazardous
Chromium VI	ND	0.1	Non-Hazardous
cobalt	ND	1	Non-Hazardous
Copper	ND	1	Non-Hazardous
Lead	ND	1	Non-Hazardous
Manganese	0.0015	1	Non-Hazardous
Mercury	ND	1	Non-hazardous
Nickel	0.0002	0.1	Non-Hazardous
Selenium	0.00025	1	Non-Hazardous
Thallium	ND	1	Non-Hazardous
Vanadium	0.00017	1	Non-Hazardous

Table 3.1 Limestone comparison with hazardous material thresholds

Gypsum is classified as non-hazardous substance, the MSDS (see Attachment D) for gypsum notes that it may produce a nuisance dust, which does not have health impacts for workers provided it is kept below occupational exposure limits.

It can be stated, with reference to Proposition 65 of the State of California that the substance does contain traces of some heavy metals but at concentrations well below those which would render it hazardous.

A review of the laboratory analysis data (see Attachment B) for gypsum, against hazardous criteria, is show in Table 3.2 below.

	%	% Threshold	Conclusion
Antimony	ND	1	Non-Hazardous
Arsenic	ND	0.1	Non-Hazardous
Barium	0.00023	1	Non-Hazardous
Beryllium	ND	1	Non-Hazardous
Cadmium	ND	1	Non-Hazardous
Chromium	ND	1	Non-Hazardous
Chromium VI	ND	0.1	Non-Hazardous
cobalt	ND	1	Non-Hazardous
Copper	ND	1	Non-Hazardous
Lead	ND	1	Non-Hazardous
Manganese	0.001	1	Non-Hazardous
Mercury	ND	1	Non-hazardous
Nickel	ND	0.1	Non-Hazardous
Selenium	0.00013	1	Non-Hazardous
Thallium	ND	1	Non-Hazardous
Vanadium	ND	1	Non-Hazardous

Table 3.2 Gypsum comparison with hazardous material thresholds

Pozzolan is classified as non-hazardous substance, the MSDS (see Attachment E) for pozzolan notes that it contains crystalline silica, which may produce silicosis in susceptible persons. It also notes that pozzolan is not listed as a carcinogen by the IARC but that crystalline silica is listed as a human carcinogen.

With reference to Proposition 65 of the State of California, crystalline silica is listed as a substance which is known to the State of California to cause cancer.

It can also be stated, with reference to Proposition 65 of the State of California that the substance does contain traces of some heavy metals but at concentrations well below those which would render it hazardous.

A review of the laboratory analysis data (see Attachment B) for pozzolan, against hazardous criteria, is show in Table 2.4 below.

	%	% Threshold	Conclusion
Antimony	ND	1	Non-Hazardous
Arsenic	ND	0.1	Non-Hazardous
Barium	0.00043	1	Non-Hazardous
Beryllium	ND	1	Non-Hazardous
Cadmium	ND	1	Non-Hazardous
Chromium	ND	1	Non-Hazardous
Chromium VI	ND	0.1	Non-Hazardous
cobalt	ND	1	Non-Hazardous
Copper	ND	1	Non-Hazardous
Lead	ND	1	Non-Hazardous
Manganese	0.0085	1	Non-Hazardous
Mercury	ND	1	Non-hazardous
Nickel	ND	0.1	Non-Hazardous
Selenium	ND	1	Non-Hazardous
Thallium	ND	1	Non-Hazardous
Vanadium	ND	1	Non-Hazardous

Table 3.3 Pozzolan comparison with hazardous material thresholds

Portland cement clinker is classified as hazardous substance, the MSDS (see Attachment F) for Portland cement clinker notes that it contains crystalline silica, which may produce silicosis in susceptible persons. It also notes that Portland cement is not listed as a carcinogen by the IARC but that crystalline silica is listed as a human carcinogen.

With reference to Proposition 65 of the State of California, crystalline silica is listed as a substance which is known to the State of California to cause cancer.

It can also be stated, with reference to Proposition 65 of the State of California that the substance does contain traces of some heavy metals but at concentrations well below those which would render it hazardous.

A review of the laboratory analysis data (see Attachment B) for pozzolan, against hazardous criteria, is show in Table 3.4 below.

	%	% Threshold	Conclusion
Antimony	0.0002	1	Non-Hazardous
Arsenic	0.0004	0.1	Non-Hazardous
Barium	0.026	1	Non-Hazardous
Beryllium	0.00006	1	Non-Hazardous
Cadmium	0.00005	1	Non-Hazardous
Chromium	0.0046	1	Non-Hazardous
Chromium VI	0.0016	0.1	Non-Hazardous
cobalt	0.00028	1	Non-Hazardous
Copper	0.001	1	Non-Hazardous
Lead	0.0022	1	Non-Hazardous
Manganese	0.064	1	Non-Hazardous
Mercury	ND	1	Non-hazardous
Nickel	0.0013	0.1	Non-Hazardous
Selenium	ND	1	Non-Hazardous
Thallium	ND	1	Non-Hazardous
Vanadium	0.0046	1	Non-Hazardous

Table 3.4 Portland cement clinker comparison with hazardous material thresholds

4.0 OTHER MATERIALS STORED ON SITE

The other materials stored on-site are oils, greases and lubricant, which have a hazardous classification due to their hydrocarbon content but these materials are stored in very small quantities on-site, in individual packaged containers received from suppliers.

The expected quantities and likely material types are listed in Table 4.1 on the following page.

Product	Name	Number of Unit containers	Capacity of one Unit Container	Location on-site
Oil	mobil gear oil XMP 220	1	55 gallons	Workshop
Oil	Mobil gear oil 600XP320	2	55 gallons	Workshop
Oil	Mobil gear oil DTE 26	3.5	55 gallons	Workshop
Oil	Mobil oil 460	0	55 gallons	Workshop
Oil	Oil	1.5	55 gallons	Workshop
Oil	Mobile gear oil	4	21 gallons	Workshop
Oil	Oil	5	26 gallons	Workshop
Oil	Mobil gear oil	1	5 gallons	Workshop
Oil	Mobil oil SHC 632	1	5 gallons	Workshop
Oil	Mobile Oil SHC 630	2	7 gallons	Workshop
Oil	Mobil oil DTC 24	1	3 gallons	Workshop
Grease	Molykote	1	55 lb	Workshop
Grease	Mobilux 2	2	55 lb	Workshop
Grease	Mobilith SHC 100	12	9 lb	Workshop
Grease	Mouwar	2	44 lb	Workshop
Grease	SFK LGMT 3/1	4	15 lb	Workshop
Grease	Mobilux EP 3	1	40 ib	Workshop
Grease	Mobitemp 78 NLGI 1	1	40 lb	Workshop
Oil	Atlas Copco Rotoinject fluid	2	11 gallons	Air Compressor
Lubricant	Permopro Bio 2 D	1	45 lb	Air Compressor
Lubricant	Permo AD NS	1	55 lb	Air Compressor
Lubricant	Permo BE 02	1	65 lb	Air Compressor
Lubricant	Permo BERL	1	55 lb	Air Compressor
Lubricant	Permo BE NET	1	45 lb	Air Compressor
Oil	Oil	2	100 gallons	Intermediate Hopper
Oil	Total Azolla ZS 68	7	375 gallons	Intermediate Hopper
Oil	Total Carter EP 320	5	250 gallons	Intermediate Hopper
Oil	Total Carter SY 460	1	55 gallons	Intermediate Hopper
Oil	Total Carter SH 220	4	20 gallons	Intermediate Hopper
Oil	Total Carter EP 320	1	5 gallons	Intermediate Hopper
Oil	Total Carter SY 460	2	11 gallons	Intermediate Hopper

Table 4.1 Small quantities of oils, greases and lubricants

5.0 REVIEW OF MATERIALS, HAZARDOUS MATERIALS AND CEQA

In summary it can be stated:

- The only hazardous raw material handled in any size above small individual packaged amounts is Portland cement clinker
- Other hazardous materials, which consist of small individual packaged units of oils, greases and lubricants, are stored on site for use to maintain equipment.

With reference to CEQA, the following can be concluded.

Question
Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Response
No, the main material used on-site (GBFS) is non-hazardous as are most of the other ingredients used on-site.

Portland cement clinker may be processed at the facility ,if market conditions require, but will be handled in an enclosed environment, with the only emissions being through specialised bag filtration equipment. Portland cement is widely used for construction in domestic and commercial environments and does not pose a hazard if handled correctly.

Lubricants, oils and greases, common in any manufacturing or industrial facility, will be stored and used on-site in small unit quantities and pose no hazard of significance. All liquids of this nature will be stored on spill pallets and will have associated drip trays to catch and retain any drips during use.

Therefore it can be concluded that the project will not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

Question
Could the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Response
No, the only material which is hazardous that is handled in unit quantities of anything more than small packaged units is Portland cement clinker, which is present in the form of uncrushed clinker and which may be ground into powder form on-site and even if it were to leak or spill during handling, would form a mound in the location it leaks within and would be readily cleaned up by the site operations team.

Therefore it can be concluded that the project will not create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

Question
Could the project Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Response
No, the project is not located within ¼ mile of a school.

It can also be confirmed that the site and proposed development:

- Is not on a list of hazardous materials sites
- Is not located in or within 2 miles of, a public use airport
- Is not located close to a public air strip
- Will not impair implementation or physically interfere with any emergency plan
- Expose people or structures to wildland fire risk

ATTACHMENT A

LABORATORY ANALYSIS GBFS

3J02078-07 **Granulated Blast Furnace Slag**

Sampled: 09/12/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Anions in solids by EPA 9056/300.0

Method: EPA 9056A | Batch: W3J0646 | Prepared: 10/11/13 11:00 | Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chloride, Water Leachable	ND	5.0	mg/kg	1	10/12/13 12:55	
Fluoride, Water Leachable	**3.0**	1.0	mg/kg	1	10/12/13 12:55	
Sulfate as S, Water Leachable	**52**	5.0	mg/kg	1	10/12/13 12:55	

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D2862 | Batch: W3K0786 | Prepared: 11/18/13 15:08 | Analyst: gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Passes through last sieve	**0.00**		% by Weight	1	11/20/13 14:00	
Sieve #200 (0.075 mm Opening)	**0.0340**		% by Weight	1	11/20/13 14:00	
Sieve #230 (0.063mm Opening)	**0.00**		% by Weight	1	11/20/13 14:00	
Sieve #270 (0.053mm Opening)	**0.00**		% by Weight	1	11/20/13 14:00	
Sieve #325 (0.045 mm Opening)	**0.00**		% by Weight	1	11/20/13 14:00	
Sieve 0.100 mm Opening	**99.6**		% by Weight	1	11/20/13 14:00	

Method: EPA 9045C | Batch: W3J0423 | Prepared: 10/08/13 15:53 | Analyst: ajp

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
pH	**11.3**		Units	1	10/09/13 14:14	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B | Batch: W3J0418 | Prepared: 10/08/13 14:43 | Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Total	**68000**	500	mg/kg	100	10/10/13 14:05	
Antimony, Total	**6.1**	2.0	mg/kg	1	10/10/13 13:49	
Arsenic, Total	ND	1.0	mg/kg	1	10/10/13 13:49	
Barium, Total	**430**	2.0	mg/kg	1	10/10/13 13:49	
Beryllium, Total	**6.9**	0.50	mg/kg	1	10/10/13 13:49	
Cadmium, Total	ND	0.50	mg/kg	1	10/10/13 13:49	
Chromium, Total	**17**	1.0	mg/kg	1	10/10/13 13:49	
Cobalt, Total	ND	1.0	mg/kg	1	10/10/13 13:49	
Copper, Total	ND	5.0	mg/kg	1	10/10/13 13:49	
Iron, Total	**1900**	5.0	mg/kg	1	10/10/13 13:49	
Lead, Total	ND	1.0	mg/kg	1	10/10/13 13:49	
Manganese, Total	**1200**	1.0	mg/kg	1	10/10/13 13:49	
Nickel, Total	ND	2.0	mg/kg	1	10/10/13 13:49	
Phosphorus, Total	**94**	2.5	mg/kg	1	10/10/13 13:49	
Selenium, Total	**2.6**	1.0	mg/kg	1	10/10/13 13:49	
Thallium, Total	ND	3.0	mg/kg	1	10/10/13 13:49	
Titanium, Total	**2400**	100	mg/kg	100	10/10/13 14:05	
Vanadium, Total	**29**	1.0	mg/kg	1	10/10/13 13:49	
Zinc, Total	ND	5.0	mg/kg	1	10/10/13 13:49	

3J02078-07 **Granulated Blast Furnace Slag**

Sampled: 09/12/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 7196A | Batch: W3J0613 | Prepared: 10/14/13 10:53 | Analyst: ajw

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+	ND	1.0	mg/kg	1	10/22/13 15:47	O-14

Method: EPA 7471A | Batch: W3J0355 | Prepared: 10/07/13 13:41 | Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Total	ND	10	ug/kg	1	10/10/13 15:24	

Arsenic, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:28	
Barium, Soluble on DI Extract	**82**	0.50	ug/l	1	10/15/13 00:28	
Beryllium, Soluble on DI Extract	ND	0.60	ug/l	2	10/16/13 16:34	M-04
Cadmium, Soluble on DI Extract	ND	0.50	ug/l	1	10/15/13 00:28	
Chromium, Soluble on DI Extract	ND	4.0	ug/l	1	10/15/13 00:28	
Cobalt, Soluble on DI Extract	ND	0.20	ug/l	1	10/16/13 16:24	
Copper, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:28	
Lead, Soluble on DI Extract	ND	1.0	ug/l	1	10/15/13 00:28	
Molybdenum, Soluble on DI Extract	ND	1.0	ug/l	1	10/16/13 16:24	
Nickel, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:28	
Selenium, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:28	
Silver, Soluble on DI Extract	ND	0.50	ug/l	1	10/16/13 16:24	
Thallium, Soluble on DI Extract	ND	0.50	ug/l	1	10/15/13 00:28	
Vanadium, Soluble on DI Extract	**7.9**	5.0	ug/l	1	10/15/13 00:28	
Zinc, Soluble on DI Extract	ND	10	ug/l	1	10/15/13 00:28	

Method: EPA 7470A | Batch: W3J0426 | Prepared: 10/08/13 17:26 | Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Soluble on DI Extract	ND	0.10	ug/l	1	10/16/13 15:53	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 7196A | Batch: W3J0884 | Prepared: 10/14/13 11:15 | Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+, Soluble on DI Extract	ND	0.010	mg/l	1	10/16/13 18:08	O-04

ATTACHMENT B

LABORATORY ANALYSIS DATA

ATTACHMENT C

LIMESTONE MSDS

ATTACHMENT D

GYPSUM MSDS

ATTACHMENT E

POZZOLAN ROCK MSDS

ATTACHMENT F

PORTLAND CEMENT MSDS

END OF REPORT

CERTIFICATE OF ANALYSIS

Client:	AWN Consulting Ltd The Tecpro Building, Clonshaugh Business & Technolo Dublin IRELAND, 17	**Report Date:**	11/21/13 09:34
		Received Date:	10/02/13 09:00
		Turn Around:	Normal
Attention:	Fergal Callaghan	**Client Project:**	Project Green
Phone:	3(531) 847-4220		
Fax:	3(531) 847-4257		
Work Order(s):	3J02078		

NELAP #04229CA ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.

Dear Fergal Callaghan :

Enclosed are the results of analyses for samples received 10/02/13 09:00 with the Chain of Custody document. The samples were received in good condition, at 23.8 °C. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:

Reviewed by:

Brandon Gee
Project Manager

AWN Consulting Ltd
The Tecpro Building, Clonshaugh Business & Technolog
Dublin IRELAND, 17

Date Received: 10/02/13 09:00
Date Reported: 11/21/13 09:34

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Sample Comments	Lab ID	Matrix	Date Sampled
Limestone	Steve Bryan		3J02078-01	Solid	09/18/13 00:00
Limestone	Steve Bryan		3J02078-02	DI Extract	09/18/13 00:00
Gypsum	Steve Bryan		3J02078-03	Solid	09/18/13 00:00
Gypsum	Steve Bryan		3J02078-04	DI Extract	09/18/13 00:00
Pozzolan Rock Fine	Steve Bryan		3J02078-05	Solid	09/12/13 00:00
Pozzolan Rock Fine	Steve Bryan		3J02078-06	DI Extract	09/12/13 00:00
Granulated Blast Furnace Slag	Steve Bryan		3J02078-07	Solid	09/12/13 00:00
Granulated Blast Furnace Slag	Steve Bryan		3J02078-08	DI Extract	09/12/13 00:00
Pozzolan Rock Coarse	Steve Bryan		3J02078-09	Solid	09/12/13 00:00
Pozzolan Rock Coarse	Steve Bryan		3J02078-10	DI Extract	09/12/13 00:00
Portland Cement type II/V	lab		3J02078-11	Solid	10/11/13 00:00
Portland Cement Type II/V	Steve Bryan		3J02078-12	DI Extract	10/11/13 00:00

ANALYSES

Anions in solids by EPA 9056/300.0

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Metals - Soluble on STLC by EPA 6000/7000 Methods

Metals (Aqueous) by EPA 6000/7000 Series Methods

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

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Date Received: 10/02/13 09:00
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3J02078-01 Limestone

Sampled: 09/18/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Anions in solids by EPA 9056/300.0

Method: EPA 9056A | Batch: W3J0646 | Prepared: 10/11/13 11:00 | Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chloride, Water Leachable	ND	5.0	mg/kg	1	10/12/13 12:55	
Fluoride, Water Leachable	ND	1.0	mg/kg	1	10/12/13 12:55	
Sulfate as S, Water Leachable	**8.4**	5.0	mg/kg	1	10/12/13 12:55	

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D2862 | Batch: W3K0786 | Prepared: 11/18/13 15:08 | Analyst: gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Passes through last sieve	**5.00**		% by Weight	1	11/20/13 14:00	
Sieve #200 (0.075 mm Opening)	**1.87**		% by Weight	1	11/20/13 14:00	
Sieve #230 (0.063mm Opening)	**1.14**		% by Weight	1	11/20/13 14:00	
Sieve #270 (0.053mm Opening)	**1.56**		% by Weight	1	11/20/13 14:00	
Sieve #325 (0.045 mm Opening)	**1.59**		% by Weight	1	11/20/13 14:00	
Sieve #400 (0.037mm Opening)	**1.24**		% by Weight	1	11/20/13 14:00	
Sieve 0.100 mm Opening	**87.3**		% by Weight	1	11/20/13 14:00	

Method: EPA 9045C | Batch: W3J0423 | Prepared: 10/08/13 15:53 | Analyst: ajp

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
pH	**8.6**		Units	1	10/09/13 14:14	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B | Batch: W3J0418 | Prepared: 10/08/13 14:43 | Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Total	**75**	5.0	mg/kg	1	10/10/13 13:43	
Antimony, Total	ND	2.0	mg/kg	1	10/10/13 13:43	
Arsenic, Total	**1.3**	1.0	mg/kg	1	10/10/13 13:43	
Barium, Total	**14**	2.0	mg/kg	1	10/10/13 13:43	
Beryllium, Total	ND	0.50	mg/kg	1	10/10/13 13:43	
Cadmium, Total	**0.95**	0.50	mg/kg	1	10/10/13 13:43	
Chromium, Total	**1.9**	1.0	mg/kg	1	10/10/13 13:43	
Cobalt, Total	ND	1.0	mg/kg	1	10/10/13 13:43	
Copper, Total	ND	5.0	mg/kg	1	10/10/13 13:43	
Iron, Total	**340**	5.0	mg/kg	1	10/10/13 13:43	
Lead, Total	ND	1.0	mg/kg	1	10/10/13 13:43	
Manganese, Total	**15**	1.0	mg/kg	1	10/10/13 13:43	
Nickel, Total	**2.0**	2.0	mg/kg	1	10/10/13 13:43	
Phosphorus, Total	**610**	2.4	mg/kg	1	10/10/13 13:43	
Selenium, Total	**2.5**	1.0	mg/kg	1	10/10/13 13:43	
Thallium, Total	ND	3.0	mg/kg	1	10/10/13 13:43	
Titanium, Total	ND	1.0	mg/kg	1	10/10/13 13:43	
Vanadium, Total	**1.7**	1.0	mg/kg	1	10/10/13 13:43	

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3J02078-01 Limestone

Sampled: 09/18/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B Batch: W3J0418 Prepared: 10/08/13 14:43 Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Total	**19**	5.0	mg/kg	1	10/10/13 13:43	

Method: EPA 7196A Batch: W3J0613 Prepared: 10/14/13 10:53 Analyst: ajw

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+	ND	1.0	mg/kg	1	10/22/13 15:47	O-14

Method: EPA 7471A Batch: W3J0355 Prepared: 10/07/13 13:41 Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Total	**21**	10	ug/kg	1	10/10/13 15:24	

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Date Received: 10/02/13 09:00
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3J02078-02 Limestone

Sampled: 09/18/13 00:00 **Sampled By:** Steve Bryan **Matrix:** DI Extract

Metals - Soluble on STLC by EPA 6000/7000 Methods

Method: EPA 6020A | Batch: W3J0429 | Prepared: 10/08/13 17:19 | Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Manganese, Soluble on DI Extract	ND	0.0010	mg/l	1	10/16/13 16:17	

Metals (Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B | Batch: W3J0427 | Prepared: 10/08/13 16:59 | Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Soluble on DI extract	**0.14**	0.050	mg/l	1	10/11/13 15:44	
Iron, Soluble on DI Extract	ND	0.020	mg/l	1	10/11/13 15:44	

Method: EPA 6020A | Batch: W3J0429 | Prepared: 10/08/13 17:19 | Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Antimony, Soluble on DI Extract	ND	5.0	ug/l	1	10/14/13 23:17	
Arsenic, Soluble on DI Extract	ND	2.0	ug/l	1	10/14/13 23:17	
Barium, Soluble on DI Extract	**16**	0.50	ug/l	1	10/14/13 23:17	
Beryllium, Soluble on DI Extract	ND	0.30	ug/l	1	10/16/13 16:17	
Cadmium, Soluble on DI Extract	ND	0.50	ug/l	1	10/14/13 23:17	
Chromium, Soluble on DI Extract	ND	4.0	ug/l	1	10/14/13 23:17	
Cobalt, Soluble on DI Extract	ND	0.20	ug/l	1	10/16/13 16:17	
Copper, Soluble on DI Extract	ND	2.0	ug/l	1	10/14/13 23:17	
Lead, Soluble on DI Extract	ND	1.0	ug/l	1	10/14/13 23:17	
Molybdenum, Soluble on DI Extract	**2.8**	1.0	ug/l	1	10/16/13 16:17	
Nickel, Soluble on DI Extract	ND	2.0	ug/l	1	10/14/13 23:17	
Selenium, Soluble on DI Extract	ND	2.0	ug/l	1	10/14/13 23:17	
Silver, Soluble on DI Extract	ND	0.50	ug/l	1	10/16/13 16:17	
Thallium, Soluble on DI Extract	ND	0.50	ug/l	1	10/14/13 23:17	
Vanadium, Soluble on DI Extract	ND	5.0	ug/l	1	10/14/13 23:17	
Zinc, Soluble on DI Extract	ND	10	ug/l	1	10/14/13 23:17	

Method: EPA 7470A | Batch: W3J0426 | Prepared: 10/08/13 17:26 | Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Soluble on DI Extract	ND	0.10	ug/l	1	10/16/13 15:53	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 7196A | Batch: W3J0884 | Prepared: 10/14/13 11:15 | Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+, Soluble on DI Extract	ND	0.010	mg/l	1	10/16/13 18:08	O-04

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3J02078-03 Gypsum

Sampled: 09/18/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Anions in solids by EPA 9056/300.0

Method: EPA 9056A | Batch: W3J0646 | Prepared: 10/11/13 11:00 | Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chloride, Water Leachable	ND	5.0	mg/kg	1	10/12/13 12:55	
Fluoride, Water Leachable	ND	1.0	mg/kg	1	10/12/13 12:55	
Sulfate as S, Water Leachable	**15000**	120	mg/kg	25	10/12/13 12:55	

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D2862 | Batch: W3K0786 | Prepared: 11/18/13 15:08 | Analyst: gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Passes through last sieve	**5.22**		% by Weight	1	11/20/13 14:00	
Sieve #200 (0.075 mm Opening)	**6.27**		% by Weight	1	11/20/13 14:00	
Sieve #230 (0.063mm Opening)	**2.43**		% by Weight	1	11/20/13 14:00	
Sieve #270 (0.053mm Opening)	**1.89**		% by Weight	1	11/20/13 14:00	
Sieve #325 (0.045 mm Opening)	**2.17**		% by Weight	1	11/20/13 14:00	
Sieve #400 (0.037mm Opening)	**1.11**		% by Weight	1	11/20/13 14:00	
Sieve 0.100 mm Opening	**80.2**		% by Weight	1	11/20/13 14:00	

Method: EPA 9045C | Batch: W3J0423 | Prepared: 10/08/13 15:53 | Analyst: ajp

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
pH	**8.5**		Units	1	10/09/13 14:14	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B | Batch: W3J0418 | Prepared: 10/08/13 14:43 | Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Total	**140**	5.0	mg/kg	1	10/10/13 13:45	
Antimony, Total	ND	2.0	mg/kg	1	10/10/13 13:45	
Arsenic, Total	ND	1.0	mg/kg	1	10/10/13 13:45	
Barium, Total	**2.3**	2.0	mg/kg	1	10/10/13 13:45	
Beryllium, Total	ND	0.50	mg/kg	1	10/10/13 13:45	
Cadmium, Total	ND	0.50	mg/kg	1	10/10/13 13:45	
Chromium, Total	ND	1.0	mg/kg	1	10/10/13 13:45	
Cobalt, Total	ND	1.0	mg/kg	1	10/10/13 13:45	
Copper, Total	ND	5.0	mg/kg	1	10/10/13 13:45	
Iron, Total	**530**	5.0	mg/kg	1	10/10/13 13:45	
Lead, Total	ND	1.0	mg/kg	1	10/10/13 13:45	
Manganese, Total	**10**	1.0	mg/kg	1	10/10/13 13:45	
Nickel, Total	ND	2.0	mg/kg	1	10/10/13 13:45	
Phosphorus, Total	**17**	2.5	mg/kg	1	10/10/13 13:45	
Selenium, Total	**1.3**	1.0	mg/kg	1	10/10/13 13:45	
Thallium, Total	ND	3.0	mg/kg	1	10/10/13 13:45	
Titanium, Total	**2.7**	1.0	mg/kg	1	10/10/13 13:45	
Vanadium, Total	ND	1.0	mg/kg	1	10/10/13 13:45	

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3J02078-03 **Gypsum**

Sampled: 09/18/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B | Batch: W3J0418 | Prepared: 10/08/13 14:43 | Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Total	ND	5.0	mg/kg	1	10/10/13 13:45	

Method: EPA 7196A | Batch: W3J0613 | Prepared: 10/14/13 10:53 | Analyst: ajw

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+	ND	1.0	mg/kg	1	10/22/13 15:47	O-14

Method: EPA 7471A | Batch: W3J0355 | Prepared: 10/07/13 13:41 | Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Total	ND	10	ug/kg	1	10/10/13 15:24	

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Date Received: 10/02/13 09:00
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3J02078-04 Gypsum

Sampled: 09/18/13 00:00 **Sampled By:** Steve Bryan **Matrix:** DI Extract

Metals - Soluble on STLC by EPA 6000/7000 Methods

Method: EPA 6020A Batch: W3J0429 Prepared: 10/08/13 17:19 Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Manganese, Soluble on DI Extract	**0.0066**	0.0010	mg/l	1	10/16/13 16:19	

Metals (Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B Batch: W3J0427 Prepared: 10/08/13 16:59 Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Soluble on DI extract	**0.092**	0.050	mg/l	1	10/11/13 15:47	
Iron, Soluble on DI Extract	ND	0.020	mg/l	1	10/11/13 15:47	

Method: EPA 6020A Batch: W3J0429 Prepared: 10/08/13 17:19 Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Antimony, Soluble on DI Extract	ND	5.0	ug/l	1	10/14/13 23:25	
Arsenic, Soluble on DI Extract	**6.2**	2.0	ug/l	1	10/14/13 23:25	
Barium, Soluble on DI Extract	**14**	0.50	ug/l	1	10/14/13 23:25	
Beryllium, Soluble on DI Extract	ND	0.30	ug/l	1	10/16/13 16:19	
Cadmium, Soluble on DI Extract	ND	0.50	ug/l	1	10/14/13 23:25	
Chromium, Soluble on DI Extract	ND	4.0	ug/l	1	10/14/13 23:25	
Cobalt, Soluble on DI Extract	**1.2**	0.20	ug/l	1	10/16/13 16:19	
Copper, Soluble on DI Extract	ND	2.0	ug/l	1	10/14/13 23:25	
Lead, Soluble on DI Extract	ND	1.0	ug/l	1	10/14/13 23:25	
Molybdenum, Soluble on DI Extract	ND	1.0	ug/l	1	10/16/13 16:19	
Nickel, Soluble on DI Extract	**6.3**	2.0	ug/l	1	10/14/13 23:25	
Selenium, Soluble on DI Extract	ND	2.0	ug/l	1	10/14/13 23:25	
Silver, Soluble on DI Extract	ND	0.50	ug/l	1	10/16/13 16:19	
Thallium, Soluble on DI Extract	ND	0.50	ug/l	1	10/14/13 23:25	
Vanadium, Soluble on DI Extract	ND	5.0	ug/l	1	10/14/13 23:25	
Zinc, Soluble on DI Extract	ND	10	ug/l	1	10/14/13 23:25	

Method: EPA 7470A Batch: W3J0426 Prepared: 10/08/13 17:26 Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Soluble on DI Extract	ND	0.10	ug/l	1	10/16/13 15:53	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 7196A Batch: W3J0884 Prepared: 10/14/13 11:15 Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+, Soluble on DI Extract	ND	0.010	mg/l	1	10/16/13 18:08	O-04

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3J02078-05 Pozzolan Rock Fine

Sampled: 09/12/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Anions in solids by EPA 9056/300.0

Method: EPA 9056A Batch: W3J0646 Prepared: 10/11/13 11:00 Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chloride, Water Leachable	ND	5.0	mg/kg	1	10/12/13 12:55	
Fluoride, Water Leachable	ND	1.0	mg/kg	1	10/12/13 12:55	
Sulfate as S, Water Leachable	**28**	5.0	mg/kg	1	10/12/13 12:55	

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D2862 Batch: W3K0786 Prepared: 11/18/13 15:08 Analyst: gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Passes through last sieve	**0.605**		% by Weight	1	11/20/13 14:00	
Sieve #200 (0.075 mm Opening)	**5.22**		% by Weight	1	11/20/13 14:00	
Sieve #230 (0.063mm Opening)	**0.962**		% by Weight	1	11/20/13 14:00	
Sieve #270 (0.053mm Opening)	**0.0648**		% by Weight	1	11/20/13 14:00	
Sieve #325 (0.045 mm Opening)	**0.0898**		% by Weight	1	11/20/13 14:00	
Sieve 0.100 mm Opening	**92.3**		% by Weight	1	11/20/13 14:00	

Method: EPA 9045C Batch: W3J0423 Prepared: 10/08/13 15:53 Analyst: ajp

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
pH	**8.8**		Units	1	10/09/13 14:14	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B Batch: W3J0418 Prepared: 10/08/13 14:43 Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Total	**530**	5.0	mg/kg	1	10/10/13 13:47	
Antimony, Total	ND	2.0	mg/kg	1	10/10/13 13:47	
Arsenic, Total	ND	1.0	mg/kg	1	10/10/13 13:47	
Barium, Total	**4.3**	2.0	mg/kg	1	10/10/13 13:47	
Beryllium, Total	ND	0.50	mg/kg	1	10/10/13 13:47	
Cadmium, Total	ND	0.50	mg/kg	1	10/10/13 13:47	
Chromium, Total	ND	1.0	mg/kg	1	10/10/13 13:47	
Cobalt, Total	ND	1.0	mg/kg	1	10/10/13 13:47	
Copper, Total	ND	5.0	mg/kg	1	10/10/13 13:47	
Iron, Total	**920**	5.0	mg/kg	1	10/10/13 13:47	
Lead, Total	ND	1.0	mg/kg	1	10/10/13 13:47	
Manganese, Total	**85**	1.0	mg/kg	1	10/10/13 13:47	
Nickel, Total	ND	2.0	mg/kg	1	10/10/13 13:47	
Phosphorus, Total	**5.0**	2.4	mg/kg	1	10/10/13 13:47	
Selenium, Total	ND	1.0	mg/kg	1	10/10/13 13:47	
Thallium, Total	ND	3.0	mg/kg	1	10/10/13 13:47	
Titanium, Total	**25**	1.0	mg/kg	1	10/10/13 13:47	
Vanadium, Total	ND	1.0	mg/kg	1	10/10/13 13:47	
Zinc, Total	**5.4**	5.0	mg/kg	1	10/10/13 13:47	

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3J02078-05 Pozzolan Rock Fine

Sampled: 09/12/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 7196A Batch: W3J0613 Prepared: 10/14/13 10:53 Analyst: ajw

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+	ND	1.0	mg/kg	1	10/22/13 15:47	O-14

Method: EPA 7471A Batch: W3J0355 Prepared: 10/07/13 13:41 Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Total	ND	10	ug/kg	1	10/10/13 15:24	

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Date Received: 10/02/13 09:00
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3J02078-06 Pozzolan Rock Fine

Sampled: 09/12/13 00:00 **Sampled By:** Steve Bryan **Matrix:** DI Extract

Metals - Soluble on STLC by EPA 6000/7000 Methods

Method: EPA 6020A Batch: W3J0429 Prepared: 10/08/13 17:19 Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Manganese, Soluble on DI Extract	ND	0.0020	mg/l	2	10/16/13 16:32	M-04

Metals (Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B Batch: W3J0427 Prepared: 10/08/13 16:59 Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Soluble on DI extract	**0.14**	0.050	mg/l	1	10/11/13 15:49	
Iron, Soluble on DI Extract	ND	0.020	mg/l	1	10/11/13 15:49	

Method: EPA 6020A Batch: W3J0429 Prepared: 10/08/13 17:19 Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Antimony, Soluble on DI Extract	ND	5.0	ug/l	1	10/14/13 23:33	
Arsenic, Soluble on DI Extract	ND	2.0	ug/l	1	10/14/13 23:33	
Barium, Soluble on DI Extract	**0.81**	0.50	ug/l	1	10/14/13 23:33	
Beryllium, Soluble on DI Extract	ND	0.60	ug/l	2	10/16/13 16:32	M-04
Cadmium, Soluble on DI Extract	ND	0.50	ug/l	1	10/14/13 23:33	
Chromium, Soluble on DI Extract	ND	4.0	ug/l	1	10/14/13 23:33	
Cobalt, Soluble on DI Extract	ND	0.20	ug/l	1	10/16/13 16:22	
Copper, Soluble on DI Extract	ND	2.0	ug/l	1	10/14/13 23:33	
Lead, Soluble on DI Extract	ND	1.0	ug/l	1	10/14/13 23:33	
Molybdenum, Soluble on DI Extract	ND	1.0	ug/l	1	10/16/13 16:22	
Nickel, Soluble on DI Extract	ND	2.0	ug/l	1	10/14/13 23:33	
Selenium, Soluble on DI Extract	ND	2.0	ug/l	1	10/14/13 23:33	
Silver, Soluble on DI Extract	ND	0.50	ug/l	1	10/16/13 16:22	
Thallium, Soluble on DI Extract	ND	0.50	ug/l	1	10/14/13 23:33	
Vanadium, Soluble on DI Extract	ND	5.0	ug/l	1	10/14/13 23:33	
Zinc, Soluble on DI Extract	ND	10	ug/l	1	10/14/13 23:33	

Method: EPA 7470A Batch: W3J0426 Prepared: 10/08/13 17:26 Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Soluble on DI Extract	ND	0.10	ug/l	1	10/16/13 15:53	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 7196A Batch: W3J0884 Prepared: 10/14/13 11:15 Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+, Soluble on DI Extract	ND	0.010	mg/l	1	10/16/13 18:08	O-04

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3J02078-07 **Granulated Blast Furnace Slag**

Sampled: 09/12/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Anions in solids by EPA 9056/300.0

Method: EPA 9056A | Batch: W3J0646 | Prepared: 10/11/13 11:00 | Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chloride, Water Leachable	ND	5.0	mg/kg	1	10/12/13 12:55	
Fluoride, Water Leachable	**3.0**	1.0	mg/kg	1	10/12/13 12:55	
Sulfate as S, Water Leachable	**52**	5.0	mg/kg	1	10/12/13 12:55	

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D2862 | Batch: W3K0786 | Prepared: 11/18/13 15:08 | Analyst: gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Passes through last sieve	**0.00**		% by Weight	1	11/20/13 14:00	
Sieve #200 (0.075 mm Opening)	**0.0340**		% by Weight	1	11/20/13 14:00	
Sieve #230 (0.063mm Opening)	**0.00**		% by Weight	1	11/20/13 14:00	
Sieve #270 (0.053mm Opening)	**0.00**		% by Weight	1	11/20/13 14:00	
Sieve #325 (0.045 mm Opening)	**0.00**		% by Weight	1	11/20/13 14:00	
Sieve 0.100 mm Opening	**99.6**		% by Weight	1	11/20/13 14:00	

Method: EPA 9045C | Batch: W3J0423 | Prepared: 10/08/13 15:53 | Analyst: ajp

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
pH	**11.3**		Units	1	10/09/13 14:14	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B | Batch: W3J0418 | Prepared: 10/08/13 14:43 | Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Total	**68000**	500	mg/kg	100	10/10/13 14:05	
Antimony, Total	**6.1**	2.0	mg/kg	1	10/10/13 13:49	
Arsenic, Total	ND	1.0	mg/kg	1	10/10/13 13:49	
Barium, Total	**430**	2.0	mg/kg	1	10/10/13 13:49	
Beryllium, Total	**6.9**	0.50	mg/kg	1	10/10/13 13:49	
Cadmium, Total	ND	0.50	mg/kg	1	10/10/13 13:49	
Chromium, Total	**17**	1.0	mg/kg	1	10/10/13 13:49	
Cobalt, Total	ND	1.0	mg/kg	1	10/10/13 13:49	
Copper, Total	ND	5.0	mg/kg	1	10/10/13 13:49	
Iron, Total	**1900**	5.0	mg/kg	1	10/10/13 13:49	
Lead, Total	ND	1.0	mg/kg	1	10/10/13 13:49	
Manganese, Total	**1200**	1.0	mg/kg	1	10/10/13 13:49	
Nickel, Total	ND	2.0	mg/kg	1	10/10/13 13:49	
Phosphorus, Total	**94**	2.5	mg/kg	1	10/10/13 13:49	
Selenium, Total	**2.6**	1.0	mg/kg	1	10/10/13 13:49	
Thallium, Total	ND	3.0	mg/kg	1	10/10/13 13:49	
Titanium, Total	**2400**	100	mg/kg	100	10/10/13 14:05	
Vanadium, Total	**29**	1.0	mg/kg	1	10/10/13 13:49	
Zinc, Total	ND	5.0	mg/kg	1	10/10/13 13:49	

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3J02078-07 **Granulated Blast Furnace Slag**

Sampled: 09/12/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 7196A Batch: W3J0613 Prepared: 10/14/13 10:53 Analyst: ajw

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+	ND	1.0	mg/kg	1	10/22/13 15:47	O-14

Method: EPA 7471A Batch: W3J0355 Prepared: 10/07/13 13:41 Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Total	ND	10	ug/kg	1	10/10/13 15:24	

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3J02078-08 **Granulated Blast Furnace Slag**

Sampled: 09/12/13 00:00 **Sampled By:** Steve Bryan **Matrix:** DI Extract

Metals - Soluble on STLC by EPA 6000/7000 Methods

Method: EPA 6020A | Batch: W3J0429 | Prepared: 10/08/13 17:19 | Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Manganese, Soluble on DI Extract	ND	0.0020	mg/l	2	10/16/13 16:34	M-04

Metals (Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B | Batch: W3J0427 | Prepared: 10/08/13 16:59 | Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Soluble on DI extract	**4.0**	0.050	mg/l	1	10/11/13 15:51	
Iron, Soluble on DI Extract	ND	0.020	mg/l	1	10/11/13 15:51	

Method: EPA 6020A | Batch: W3J0429 | Prepared: 10/08/13 17:19 | Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Antimony, Soluble on DI Extract	ND	5.0	ug/l	1	10/15/13 00:28	
Arsenic, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:28	
Barium, Soluble on DI Extract	**82**	0.50	ug/l	1	10/15/13 00:28	
Beryllium, Soluble on DI Extract	ND	0.60	ug/l	2	10/16/13 16:34	M-04
Cadmium, Soluble on DI Extract	ND	0.50	ug/l	1	10/15/13 00:28	
Chromium, Soluble on DI Extract	ND	4.0	ug/l	1	10/15/13 00:28	
Cobalt, Soluble on DI Extract	ND	0.20	ug/l	1	10/16/13 16:24	
Copper, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:28	
Lead, Soluble on DI Extract	ND	1.0	ug/l	1	10/15/13 00:28	
Molybdenum, Soluble on DI Extract	ND	1.0	ug/l	1	10/16/13 16:24	
Nickel, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:28	
Selenium, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:28	
Silver, Soluble on DI Extract	ND	0.50	ug/l	1	10/16/13 16:24	
Thallium, Soluble on DI Extract	ND	0.50	ug/l	1	10/15/13 00:28	
Vanadium, Soluble on DI Extract	**7.9**	5.0	ug/l	1	10/15/13 00:28	
Zinc, Soluble on DI Extract	ND	10	ug/l	1	10/15/13 00:28	

Method: EPA 7470A | Batch: W3J0426 | Prepared: 10/08/13 17:26 | Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Soluble on DI Extract	ND	0.10	ug/l	1	10/16/13 15:53	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 7196A | Batch: W3J0884 | Prepared: 10/14/13 11:15 | Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+, Soluble on DI Extract	ND	0.010	mg/l	1	10/16/13 18:08	O-04

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Date Received: 10/02/13 09:00
Date Reported: 11/21/13 09:34

3J02078-09 Pozzolan Rock Coarse

Sampled: 09/12/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Anions in solids by EPA 9056/300.0

Method: EPA 9056A Batch: W3J0646 Prepared: 10/11/13 11:00 Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chloride, Water Leachable	ND	5.0	mg/kg	1	10/12/13 12:55	
Fluoride, Water Leachable	ND	1.0	mg/kg	1	10/12/13 12:55	
Sulfate as S, Water Leachable	**6.3**	5.0	mg/kg	1	10/12/13 12:55	

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D2862 Batch: W3K0786 Prepared: 11/18/13 15:08 Analyst: gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Passes through last sieve	**0.751**		% by Weight	1	11/20/13 14:00	
Sieve #200 (0.075 mm Opening)	**4.38**		% by Weight	1	11/20/13 14:00	
Sieve #230 (0.063mm Opening)	**2.01**		% by Weight	1	11/20/13 14:00	
Sieve #270 (0.053mm Opening)	**0.0888**		% by Weight	1	11/20/13 14:00	
Sieve #325 (0.045 mm Opening)	**0.202**		% by Weight	1	11/20/13 14:00	
Sieve 0.100 mm Opening	**91.9**		% by Weight	1	11/20/13 14:00	

Method: EPA 9045C Batch: W3J0423 Prepared: 10/08/13 15:53 Analyst: ajp

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
pH	**8.9**		Units	1	10/09/13 14:14	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B Batch: W3J0418 Prepared: 10/08/13 14:43 Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Total	**270**	5.0	mg/kg	1	10/10/13 13:52	
Antimony, Total	ND	2.0	mg/kg	1	10/10/13 13:52	
Arsenic, Total	ND	1.0	mg/kg	1	10/10/13 13:52	
Barium, Total	**3.1**	2.0	mg/kg	1	10/10/13 13:52	
Beryllium, Total	ND	0.50	mg/kg	1	10/10/13 13:52	
Cadmium, Total	ND	0.50	mg/kg	1	10/10/13 13:52	
Chromium, Total	ND	1.0	mg/kg	1	10/10/13 13:52	
Cobalt, Total	ND	1.0	mg/kg	1	10/10/13 13:52	
Copper, Total	ND	5.0	mg/kg	1	10/10/13 13:52	
Iron, Total	**820**	5.0	mg/kg	1	10/10/13 13:52	
Lead, Total	ND	1.0	mg/kg	1	10/10/13 13:52	
Manganese, Total	**71**	1.0	mg/kg	1	10/10/13 13:52	
Nickel, Total	ND	2.0	mg/kg	1	10/10/13 13:52	
Phosphorus, Total	ND	2.4	mg/kg	1	10/10/13 13:52	
Selenium, Total	ND	1.0	mg/kg	1	10/10/13 13:52	
Thallium, Total	ND	3.0	mg/kg	1	10/10/13 13:52	
Titanium, Total	**23**	1.0	mg/kg	1	10/10/13 13:52	
Vanadium, Total	ND	1.0	mg/kg	1	10/10/13 13:52	
Zinc, Total	ND	5.0	mg/kg	1	10/10/13 13:52	

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Date Received: 10/02/13 09:00
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3J02078-09 Pozzolan Rock Coarse

Sampled: 09/12/13 00:00 **Sampled By:** Steve Bryan **Matrix:** Solid

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 7196A Batch: W3J0613 Prepared: 10/14/13 10:53 Analyst: ajw

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+	ND	1.0	mg/kg	1	10/22/13 15:47	O-14

Method: EPA 7471A Batch: W3J0355 Prepared: 10/07/13 13:41 Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Total	ND	10	ug/kg	1	10/10/13 15:24	

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Date Received: 10/02/13 09:00
Date Reported: 11/21/13 09:34

3J02078-10 Pozzolan Rock Coarse

Sampled: 09/12/13 00:00 **Sampled By:** Steve Bryan **Matrix:** DI Extract

Metals - Soluble on STLC by EPA 6000/7000 Methods

Method: EPA 6020A | Batch: W3J0429 | Prepared: 10/08/13 17:19 | Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Manganese, Soluble on DI Extract	**0.0016**	0.0010	mg/l	1	10/16/13 16:26	

Metals (Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B | Batch: W3J0427 | Prepared: 10/08/13 16:59 | Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Soluble on DI extract	**0.37**	0.050	mg/l	1	10/11/13 15:54	
Iron, Soluble on DI Extract	**0.021**	0.020	mg/l	1	10/11/13 15:54	

Method: EPA 6020A | Batch: W3J0429 | Prepared: 10/08/13 17:19 | Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Antimony, Soluble on DI Extract	ND	5.0	ug/l	1	10/15/13 00:36	
Arsenic, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:36	
Barium, Soluble on DI Extract	**0.76**	0.50	ug/l	1	10/15/13 00:36	
Beryllium, Soluble on DI Extract	ND	0.30	ug/l	1	10/16/13 16:26	
Cadmium, Soluble on DI Extract	ND	0.50	ug/l	1	10/15/13 00:36	
Chromium, Soluble on DI Extract	ND	4.0	ug/l	1	10/15/13 00:36	
Cobalt, Soluble on DI Extract	ND	0.20	ug/l	1	10/16/13 16:26	
Copper, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:36	
Lead, Soluble on DI Extract	ND	1.0	ug/l	1	10/15/13 00:36	
Molybdenum, Soluble on DI Extract	ND	1.0	ug/l	1	10/16/13 16:26	
Nickel, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:36	
Selenium, Soluble on DI Extract	ND	2.0	ug/l	1	10/15/13 00:36	
Silver, Soluble on DI Extract	ND	0.50	ug/l	1	10/16/13 16:26	
Thallium, Soluble on DI Extract	ND	0.50	ug/l	1	10/15/13 00:36	
Vanadium, Soluble on DI Extract	ND	5.0	ug/l	1	10/15/13 00:36	
Zinc, Soluble on DI Extract	ND	10	ug/l	1	10/15/13 00:36	

Method: EPA 7470A | Batch: W3J0426 | Prepared: 10/08/13 17:26 | Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Soluble on DI Extract	ND	0.10	ug/l	1	10/16/13 15:53	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 7196A | Batch: W3J0884 | Prepared: 10/14/13 11:15 | Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+, Soluble on DI Extract	ND	0.010	mg/l	1	10/16/13 18:08	O-04

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Date Received: 10/02/13 09:00
Date Reported: 11/21/13 09:34

3J02078-11 **Portland Cement type II/V**

Sampled: 10/11/13 00:00 **Sampled By:** lab **Matrix:** Solid

Anions in solids by EPA 9056/300.0

Method: EPA 9056A | Batch: W3J0646 | Prepared: 10/11/13 11:00 | Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chloride, Water Leachable	**40**	5.0	mg/kg	1	10/12/13 12:55	
Fluoride, Water Leachable	ND	1.0	mg/kg	1	10/12/13 12:55	
Sulfate as S, Water Leachable	**9000**	120	mg/kg	25	10/12/13 12:55	

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods

Method: ASTM D2862 | Batch: W3K0786 | Prepared: 11/18/13 15:08 | Analyst: gza

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Passes through last sieve	**24.0**		% by Weight	1	11/20/13 14:00	
Sieve #200 (0.075 mm Opening)	**13.2**		% by Weight	1	11/20/13 14:00	
Sieve #230 (0.063mm Opening)	**5.49**		% by Weight	1	11/20/13 14:00	
Sieve #270 (0.053mm Opening)	**8.27**		% by Weight	1	11/20/13 14:00	
Sieve #325 (0.045 mm Opening)	**10.1**		% by Weight	1	11/20/13 14:00	
Sieve #400 (0.037mm Opening)	**4.34**		% by Weight	1	11/20/13 14:00	
Sieve 0.100 mm Opening	**34.5**		% by Weight	1	11/20/13 14:00	

Method: EPA 9045C | Batch: W3J0699 | Prepared: 10/14/13 11:20 | Analyst: ajp

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
pH	**10.0**		Units	1	10/14/13 13:51	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B | Batch: W3J0903 | Prepared: 10/17/13 09:14 | Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Total	**17000**	5.0	mg/kg	1	10/17/13 15:02	
Antimony, Total	**2.0**	2.0	mg/kg	1	10/17/13 15:02	
Arsenic, Total	**4.4**	1.0	mg/kg	1	10/17/13 15:02	
Barium, Total	**260**	2.0	mg/kg	1	10/17/13 15:02	
Beryllium, Total	**0.63**	0.50	mg/kg	1	10/17/13 15:02	
Cadmium, Total	**0.52**	0.50	mg/kg	1	10/17/13 15:02	
Chromium, Total	**46**	1.0	mg/kg	1	10/17/13 15:02	
Cobalt, Total	**2.8**	1.0	mg/kg	1	10/17/13 15:02	
Copper, Total	**10**	5.0	mg/kg	1	10/17/13 15:02	
Iron, Total	**19000**	25	mg/kg	5	10/17/13 15:02	
Lead, Total	**22**	1.0	mg/kg	1	10/17/13 15:02	
Manganese, Total	**640**	1.0	mg/kg	1	10/17/13 15:02	
Nickel, Total	**13**	2.0	mg/kg	1	10/17/13 15:02	
Phosphorus, Total	**450**	2.3	mg/kg	1	10/17/13 15:02	
Selenium, Total	ND	1.0	mg/kg	1	10/17/13 15:02	
Thallium, Total	ND	3.0	mg/kg	1	10/17/13 15:02	
Titanium, Total	**900**	1.0	mg/kg	1	10/17/13 15:02	
Vanadium, Total	**46**	1.0	mg/kg	1	10/17/13 15:02	

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Date Reported: 11/21/13 09:34

3J02078-11 **Portland Cement type II/V**

Sampled: 10/11/13 00:00 **Sampled By:** lab **Matrix:** Solid

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B Batch: W3J0903 Prepared: 10/17/13 09:14 Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Total	**60**	5.0	mg/kg	1	10/17/13 15:02	

Method: EPA 7196A Batch: W3J0613 Prepared: 10/14/13 10:53 Analyst: ajw

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+	**16**	1.0	mg/kg	1	10/22/13 15:47	O-14

Method: EPA 7471A Batch: W3J0679 Prepared: 10/14/13 08:59 Analyst: apa

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Total	ND	10	ug/kg	1	10/14/13 16:00	

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Date Received: 10/02/13 09:00
Date Reported: 11/21/13 09:34

3J02078-12 Portland Cement Type II/V

Sampled: 10/11/13 00:00 **Sampled By:** Steve Bryan **Matrix:** DI Extract

Metals - Soluble on STLC by EPA 6000/7000 Methods

Method: EPA 6020A Batch: W3J0869 Prepared: 10/16/13 14:09 Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Manganese, Soluble on DI Extract	**0.0076**	0.0010	mg/l	1	10/24/13 11:45	

Metals (Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 6010B Batch: W3J0868 Prepared: 10/16/13 14:05 Analyst: jck

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Aluminum, Soluble on DI extract	**0.47**	0.050	mg/l	1	10/17/13 11:48	
Iron, Soluble on DI Extract	**0.044**	0.020	mg/l	1	10/17/13 11:48	

Method: EPA 6020A Batch: W3J0869 Prepared: 10/16/13 14:09 Analyst: APA

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Antimony, Soluble on DI Extract	ND	5.0	ug/l	1	10/23/13 19:41	
Arsenic, Soluble on DI Extract	**4.4**	2.0	ug/l	1	10/23/13 19:41	
Barium, Soluble on DI Extract	**4700**	0.50	ug/l	1	10/23/13 19:41	
Beryllium, Soluble on DI Extract	ND	0.30	ug/l	1	10/23/13 19:41	
Cadmium, Soluble on DI Extract	ND	0.50	ug/l	1	10/23/13 19:41	
Chromium, Soluble on DI Extract	**25**	4.0	ug/l	1	10/24/13 11:45	
Cobalt, Soluble on DI Extract	**2.4**	0.20	ug/l	1	10/23/13 19:41	
Copper, Soluble on DI Extract	**4.4**	2.0	ug/l	1	10/24/13 11:45	
Lead, Soluble on DI Extract	**3.0**	1.0	ug/l	1	10/23/13 19:41	
Molybdenum, Soluble on DI Extract	**3.6**	1.0	ug/l	1	10/24/13 11:45	
Nickel, Soluble on DI Extract	**13**	2.0	ug/l	1	10/24/13 11:45	
Selenium, Soluble on DI Extract	ND	2.0	ug/l	1	10/24/13 11:45	
Silver, Soluble on DI Extract	ND	0.50	ug/l	1	10/23/13 19:41	
Thallium, Soluble on DI Extract	ND	0.50	ug/l	1	10/23/13 19:41	
Vanadium, Soluble on DI Extract	ND	5.0	ug/l	1	10/24/13 11:45	
Zinc, Soluble on DI Extract	ND	10	ug/l	1	10/24/13 11:45	

Method: EPA 7470A Batch: W3J0870 Prepared: 10/16/13 14:12 Analyst: svm

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Mercury, Soluble on DI Extract	ND	0.10	ug/l	1	10/17/13 16:09	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods

Method: EPA 7196A Batch: W3J0884 Prepared: 10/14/13 11:15 Analyst: atl

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Chromium 6+, Soluble on DI Extract	**0.060**	0.010	mg/l	1	10/16/13 18:08	O-04

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QUALITY CONTROL SECTION

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Anions in solids by EPA 9056/300.0 - Quality Control

Batch W3J0646 - EPA 9056A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0646-BLK1)				Analyzed: 10/12/13 12:55						
Chloride, Water Leachable	ND	5.0	mg/kg							
Fluoride, Water Leachable	ND	1.0	mg/kg							
Sulfate as S, Water Leachable	ND	5.0	mg/kg							
LCS (W3J0646-BS1)				Analyzed: 10/12/13 12:55						
Chloride, Water Leachable	37.7	5.0	mg/kg	39.9		95	90-110			
Fluoride, Water Leachable	20.7	1.0	mg/kg	20.0		104	90-110			
Sulfate as S, Water Leachable	78.9	5.0	mg/kg	79.8		99	90-110			
Matrix Spike (W3J0646-MS1)	**Source: 3J02078-01**			Analyzed: 10/12/13 12:55						
Chloride, Water Leachable	37.3	5.0	mg/kg	39.6	ND	94	31-160			
Fluoride, Water Leachable	18.9	1.0	mg/kg	19.8	0.842	91	0.1-134			
Sulfate as S, Water Leachable	87.1	5.0	mg/kg	79.2	8.45	99	5-159			
Matrix Spike Dup (W3J0646-MSD1)	**Source: 3J02078-01**			Analyzed: 10/12/13 12:55						
Chloride, Water Leachable	37.5	5.0	mg/kg	39.7	ND	94	31-160	0.4	20	
Fluoride, Water Leachable	18.9	1.0	mg/kg	19.8	0.842	91	0.1-134	0.3	20	
Sulfate as S, Water Leachable	87.1	5.0	mg/kg	79.3	8.45	99	5-159	0.02	20	

Conventional Chemistry/Physical Parameters by APHA/EPA/ASTM Methods - Quality Control

Batch W3J0423 - EPA 9045C

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
LCS (W3J0423-BS1)				Analyzed: 10/09/13 14:14						
pH	6.86		Units	6.86		100	95-105			
Duplicate (W3J0423-DUP1)	**Source: 3J02078-07**			Analyzed: 10/09/13 14:14						
pH	11.4		Units		11.3			0.4	15	

Batch W3J0699 - EPA 9045C

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
LCS (W3J0699-BS1)				Analyzed: 10/14/13 13:51						
pH	6.88		Units	6.86		100	95-105			
Duplicate (W3J0699-DUP1)	**Source: 3J02078-11**			Analyzed: 10/14/13 13:51						
pH	10.0		Units		9.98			0.2	15	

Metals (Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0426 - EPA 7470A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0426-BLK1)				Analyzed: 10/16/13 15:53						
Mercury, Soluble on DI Extract	ND	0.10	ug/l							
LCS (W3J0426-BS1)				Analyzed: 10/16/13 15:53						

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Metals (Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0426 - EPA 7470A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Mercury, Soluble on DI Extract	1.07	0.10	ug/l	1.00		107	80-120			
Matrix Spike (W3J0426-MS1)	**Source: 3J02078-02**			Analyzed: 10/16/13 15:53						
Mercury, Soluble on DI Extract	1.06	0.10	ug/l	1.00	ND	106	70-127			
Matrix Spike Dup (W3J0426-MSD1)	**Source: 3J02078-02**			Analyzed: 10/16/13 15:53						
Mercury, Soluble on DI Extract	1.08	0.10	ug/l	1.00	ND	108	70-127	2	20	

Batch W3J0427 - EPA 6010B

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0427-BLK1)				Analyzed: 10/11/13 15:37						
Aluminum, Soluble on DI extract	ND	0.050	mg/l							
Iron, Soluble on DI Extract	ND	0.020	mg/l							
LCS (W3J0427-BS1)				Analyzed: 10/11/13 15:40						
Aluminum, Soluble on DI extract	0.997	0.050	mg/l	1.00		100	80-120			
Iron, Soluble on DI Extract	1.00	0.020	mg/l	1.00		100	80-120			
Matrix Spike (W3J0427-MS1)	**Source: 3J02078-08**			Analyzed: 10/11/13 15:58						
Aluminum, Soluble on DI extract	4.83	0.050	mg/l	1.00	3.95	88	75-125			
Iron, Soluble on DI Extract	0.999	0.020	mg/l	1.00	ND	100	75-125			
Matrix Spike Dup (W3J0427-MSD1)	**Source: 3J02078-08**			Analyzed: 10/11/13 16:01						
Aluminum, Soluble on DI extract	4.86	0.050	mg/l	1.00	3.95	90	75-125	0.5	20	
Iron, Soluble on DI Extract	0.999	0.020	mg/l	1.00	ND	100	75-125	0.01	20	

Batch W3J0429 - EPA 6020A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0429-BLK1)				Analyzed: 10/14/13 22:46						
Antimony, Soluble on DI Extract	ND	5.0	ug/l							
Arsenic, Soluble on DI Extract	ND	2.0	ug/l							
Barium, Soluble on DI Extract	ND	0.50	ug/l							
Beryllium, Soluble on DI Extract	ND	0.30	ug/l							
Cadmium, Soluble on DI Extract	ND	0.50	ug/l							
Chromium, Soluble on DI Extract	ND	4.0	ug/l							
Cobalt, Soluble on DI Extract	ND	0.20	ug/l							
Copper, Soluble on DI Extract	ND	2.0	ug/l							
Lead, Soluble on DI Extract	ND	1.0	ug/l							
Molybdenum, Soluble on DI Extract	ND	1.0	ug/l							
Nickel, Soluble on DI Extract	ND	2.0	ug/l							
Selenium, Soluble on DI Extract	ND	2.0	ug/l							
Silver, Soluble on DI Extract	ND	0.50	ug/l							
Thallium, Soluble on DI Extract	ND	0.50	ug/l							
Vanadium, Soluble on DI Extract	ND	5.0	ug/l							
Zinc, Soluble on DI Extract	ND	10	ug/l							
LCS (W3J0429-BS1)				Analyzed: 10/14/13 22:53						
Antimony, Soluble on DI Extract	47.2	5.0	ug/l	50.0		94	80-120			
Arsenic, Soluble on DI Extract	46.0	2.0	ug/l	50.0		92	80-120			

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Metals (Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0429 - EPA 6020A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
LCS (W3J0429-BS1)				Analyzed: 10/14/13 22:53						
Barium, Soluble on DI Extract	48.2	0.50	ug/l	50.0		96	80-120			
Beryllium, Soluble on DI Extract	56.4	0.30	ug/l	50.0		113	80-120			
Cadmium, Soluble on DI Extract	47.2	0.50	ug/l	50.0		94	80-120			
Chromium, Soluble on DI Extract	46.3	4.0	ug/l	50.0		93	80-120			
Cobalt, Soluble on DI Extract	47.8	0.20	ug/l	50.0		96	80-120			
Copper, Soluble on DI Extract	48.6	2.0	ug/l	50.0		97	80-120			
Lead, Soluble on DI Extract	48.0	1.0	ug/l	50.0		96	80-120			
Molybdenum, Soluble on DI Extract	47.4	1.0	ug/l	50.0		95	80-120			
Nickel, Soluble on DI Extract	46.2	2.0	ug/l	50.0		92	80-120			
Selenium, Soluble on DI Extract	43.6	2.0	ug/l	50.0		87	80-120			
Silver, Soluble on DI Extract	48.5	0.50	ug/l	50.0		97	80-120			
Thallium, Soluble on DI Extract	47.5	0.50	ug/l	50.0		95	80-120			
Vanadium, Soluble on DI Extract	46.2	5.0	ug/l	50.0		92	80-120			
Zinc, Soluble on DI Extract	44.5	10	ug/l	50.0		89	80-120			
Matrix Spike (W3J0429-MS1)	**Source: 3J02078-04**			Analyzed: 10/14/13 23:01						
Antimony, Soluble on DI Extract	46.9	5.0	ug/l	50.0	ND	94	75-125			
Arsenic, Soluble on DI Extract	38.7	2.0	ug/l	50.0	6.20	65	75-125			MS-01
Barium, Soluble on DI Extract	63.7	0.50	ug/l	50.0	14.4	99	75-125			
Beryllium, Soluble on DI Extract	44.8	0.30	ug/l	50.0	ND	90	75-125			
Cadmium, Soluble on DI Extract	44.5	0.50	ug/l	50.0	ND	89	75-125			
Chromium, Soluble on DI Extract	49.4	4.0	ug/l	50.0	0.0945	99	75-125			
Cobalt, Soluble on DI Extract	45.9	0.20	ug/l	50.0	1.17	90	75-125			
Copper, Soluble on DI Extract	42.2	2.0	ug/l	50.0	1.66	81	75-125			
Lead, Soluble on DI Extract	43.5	1.0	ug/l	50.0	ND	87	75-125			
Molybdenum, Soluble on DI Extract	54.5	1.0	ug/l	50.0	0.825	107	75-125			
Nickel, Soluble on DI Extract	49.4	2.0	ug/l	50.0	6.29	86	75-125			
Selenium, Soluble on DI Extract	55.2	2.0	ug/l	50.0	1.52	107	75-125			
Silver, Soluble on DI Extract	46.1	0.50	ug/l	50.0	ND	92	75-125			
Thallium, Soluble on DI Extract	44.5	0.50	ug/l	50.0	ND	89	75-125			
Vanadium, Soluble on DI Extract	50.8	5.0	ug/l	50.0	ND	102	75-125			
Zinc, Soluble on DI Extract	37.1	10	ug/l	50.0	ND	74	75-125			MS-01
Matrix Spike Dup (W3J0429-MSD1)	**Source: 3J02078-04**			Analyzed: 10/14/13 23:09						
Antimony, Soluble on DI Extract	45.3	5.0	ug/l	50.0	ND	91	75-125	3	20	
Arsenic, Soluble on DI Extract	40.1	2.0	ug/l	50.0	6.20	68	75-125	4	20	MS-01
Barium, Soluble on DI Extract	61.3	0.50	ug/l	50.0	14.4	94	75-125	4	20	
Beryllium, Soluble on DI Extract	48.4	0.30	ug/l	50.0	ND	97	75-125	8	20	
Cadmium, Soluble on DI Extract	43.4	0.50	ug/l	50.0	ND	87	75-125	2	20	
Chromium, Soluble on DI Extract	49.1	4.0	ug/l	50.0	0.0945	98	75-125	0.5	20	
Cobalt, Soluble on DI Extract	46.8	0.20	ug/l	50.0	1.17	91	75-125	2	20	
Copper, Soluble on DI Extract	42.1	2.0	ug/l	50.0	1.66	81	75-125	0.09	20	
Lead, Soluble on DI Extract	42.8	1.0	ug/l	50.0	ND	86	75-125	2	20	
Molybdenum, Soluble on DI Extract	54.7	1.0	ug/l	50.0	0.825	108	75-125	0.3	20	
Nickel, Soluble on DI Extract	49.8	2.0	ug/l	50.0	6.29	87	75-125	0.8	20	
Selenium, Soluble on DI Extract	51.1	2.0	ug/l	50.0	1.52	99	75-125	8	20	

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Metals (Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0429 - EPA 6020A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Matrix Spike Dup (W3J0429-MSD1)	**Source: 3J02078-04**			Analyzed: 10/16/13 16:15						
Silver, Soluble on DI Extract	47.3	0.50	ug/l	50.0	ND	95	75-125	3	20	
Thallium, Soluble on DI Extract	43.9	0.50	ug/l	50.0	ND	88	75-125	1	20	
Vanadium, Soluble on DI Extract	50.7	5.0	ug/l	50.0	ND	101	75-125	0.3	20	
Zinc, Soluble on DI Extract	36.9	10	ug/l	50.0	ND	74	75-125	0.5	20	MS-01
Post Spike (W3J0429-PS1)	**Source: 3J02078-04**			Analyzed: 10/15/13 15:05						
Arsenic, Soluble on DI Extract	40.1		ug/l	50.0	1.24	78	80-120			MS-01
Zinc, Soluble on DI Extract	42.7		ug/l	50.0	0.0174	85	80-120			
Post Spike (W3J0429-PS2)	**Source: 3J02078-04**			Analyzed: 10/15/13 15:13						
Arsenic, Soluble on DI Extract	43.2		ug/l	50.0	1.24	84	80-120			
Zinc, Soluble on DI Extract	42.8		ug/l	50.0	0.0174	86	80-120			

Batch W3J0868 - EPA 6010B

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0868-BLK1)				Analyzed: 10/17/13 11:41						
Aluminum, Soluble on DI extract	ND	0.050	mg/l							
Iron, Soluble on DI Extract	ND	0.020	mg/l							
LCS (W3J0868-BS1)				Analyzed: 10/17/13 11:43						
Aluminum, Soluble on DI extract	0.954	0.050	mg/l	1.00		95	80-120			
Iron, Soluble on DI Extract	1.02	0.020	mg/l	1.00		102	80-120			
Matrix Spike (W3J0868-MS1)	**Source: 3J02078-12**			Analyzed: 10/17/13 11:50						
Aluminum, Soluble on DI extract	2.68	0.050	mg/l	2.00	0.471	110	75-125			
Iron, Soluble on DI Extract	2.12	0.020	mg/l	2.00	0.0444	104	75-125			
Matrix Spike Dup (W3J0868-MSD1)	**Source: 3J02078-12**			Analyzed: 10/17/13 11:52						
Aluminum, Soluble on DI extract	2.63	0.050	mg/l	2.00	0.471	108	75-125	2	20	
Iron, Soluble on DI Extract	2.11	0.020	mg/l	2.00	0.0444	103	75-125	0.8	20	

Batch W3J0869 - EPA 6020A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0869-BLK1)				Analyzed: 10/23/13 18:54						
Antimony, Soluble on DI Extract	ND	5.0	ug/l							
Arsenic, Soluble on DI Extract	ND	2.0	ug/l							
Barium, Soluble on DI Extract	ND	0.50	ug/l							
Beryllium, Soluble on DI Extract	ND	0.30	ug/l							
Cadmium, Soluble on DI Extract	ND	0.50	ug/l							
Chromium, Soluble on DI Extract	ND	4.0	ug/l							
Cobalt, Soluble on DI Extract	ND	0.20	ug/l							
Copper, Soluble on DI Extract	ND	2.0	ug/l							
Lead, Soluble on DI Extract	ND	1.0	ug/l							
Molybdenum, Soluble on DI Extract	ND	1.0	ug/l							
Nickel, Soluble on DI Extract	ND	2.0	ug/l							
Selenium, Soluble on DI Extract	ND	2.0	ug/l							
Silver, Soluble on DI Extract	ND	0.50	ug/l							

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Metals (Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0869 - EPA 6020A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0869-BLK1)				Analyzed: 10/23/13 18:54						
Thallium, Soluble on DI Extract	ND	0.50	ug/l							
Vanadium, Soluble on DI Extract	ND	5.0	ug/l							
Zinc, Soluble on DI Extract	ND	10	ug/l							
LCS (W3J0869-BS1)				Analyzed: 10/23/13 19:02						
Antimony, Soluble on DI Extract	48.5	5.0	ug/l	50.0		97	80-120			
Arsenic, Soluble on DI Extract	41.3	2.0	ug/l	50.0		83	80-120			
Barium, Soluble on DI Extract	51.2	0.50	ug/l	50.0		102	80-120			
Beryllium, Soluble on DI Extract	53.4	0.30	ug/l	50.0		107	80-120			
Cadmium, Soluble on DI Extract	49.1	0.50	ug/l	50.0		98	80-120			
Chromium, Soluble on DI Extract	47.2	4.0	ug/l	50.0		94	80-120			
Cobalt, Soluble on DI Extract	51.0	0.20	ug/l	50.0		102	80-120			
Copper, Soluble on DI Extract	54.7	2.0	ug/l	50.0		109	80-120			
Lead, Soluble on DI Extract	50.1	1.0	ug/l	50.0		100	80-120			
Molybdenum, Soluble on DI Extract	51.8	1.0	ug/l	50.0		104	80-120			
Nickel, Soluble on DI Extract	53.0	2.0	ug/l	50.0		106	80-120			
Selenium, Soluble on DI Extract	50.7	2.0	ug/l	50.0		101	80-120			
Silver, Soluble on DI Extract	54.5	0.50	ug/l	50.0		109	80-120			
Thallium, Soluble on DI Extract	49.0	0.50	ug/l	50.0		98	80-120			
Vanadium, Soluble on DI Extract	49.3	5.0	ug/l	50.0		99	80-120			
Zinc, Soluble on DI Extract	47.7	10	ug/l	50.0		95	80-120			
Matrix Spike (W3J0869-MS1)	**Source: 3J02078-12**			Analyzed: 10/23/13 19:10						
Antimony, Soluble on DI Extract	46.0	25	ug/l	50.0	ND	92	75-125			
Arsenic, Soluble on DI Extract	40.9	10	ug/l	50.0	4.42	73	75-125			MS-01
Barium, Soluble on DI Extract	4770	2.5	ug/l	50.0	4680	191	75-125			MS-02
Beryllium, Soluble on DI Extract	43.1	1.5	ug/l	50.0	ND	86	75-125			
Cadmium, Soluble on DI Extract	46.6	2.5	ug/l	50.0	0.119	93	75-125			
Chromium, Soluble on DI Extract	70.6	20	ug/l	50.0	25.3	91	75-125			
Cobalt, Soluble on DI Extract	51.1	1.0	ug/l	50.0	2.41	97	75-125			
Copper, Soluble on DI Extract	52.8	10	ug/l	50.0	4.37	97	75-125			
Lead, Soluble on DI Extract	49.3	5.0	ug/l	50.0	2.97	93	75-125			
Molybdenum, Soluble on DI Extract	56.3	5.0	ug/l	50.0	3.65	105	75-125			
Nickel, Soluble on DI Extract	59.2	10	ug/l	50.0	13.0	92	75-125			
Selenium, Soluble on DI Extract	42.7	10	ug/l	50.0	1.65	82	75-125			
Silver, Soluble on DI Extract	47.6	2.5	ug/l	50.0	ND	95	75-125			
Thallium, Soluble on DI Extract	46.0	2.5	ug/l	50.0	ND	92	75-125			
Vanadium, Soluble on DI Extract	47.8	25	ug/l	50.0	ND	96	75-125			
Zinc, Soluble on DI Extract	42.9	50	ug/l	50.0	1.73	82	75-125			
Matrix Spike Dup (W3J0869-MSD1)	**Source: 3J02078-12**			Analyzed: 10/23/13 19:18						
Antimony, Soluble on DI Extract	47.6	25	ug/l	50.0	ND	95	75-125	3	20	
Arsenic, Soluble on DI Extract	40.2	10	ug/l	50.0	4.42	72	75-125	2	20	MS-01
Barium, Soluble on DI Extract	4950	2.5	ug/l	50.0	4680	542	75-125	4	20	MS-02
Beryllium, Soluble on DI Extract	44.2	1.5	ug/l	50.0	ND	88	75-125	2	20	
Cadmium, Soluble on DI Extract	47.9	2.5	ug/l	50.0	0.119	96	75-125	3	20	
Chromium, Soluble on DI Extract	72.9	20	ug/l	50.0	25.3	95	75-125	3	20	

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Metals (Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0869 - EPA 6020A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Matrix Spike Dup (W3J0869-MSD1)	**Source: 3J02078-12**			Analyzed: 10/23/13 19:18						
Cobalt, Soluble on DI Extract	52.4	1.0	ug/l	50.0	2.41	100	75-125	3	20	
Copper, Soluble on DI Extract	53.9	10	ug/l	50.0	4.37	99	75-125	2	20	
Lead, Soluble on DI Extract	50.4	5.0	ug/l	50.0	2.97	95	75-125	2	20	
Molybdenum, Soluble on DI Extract	57.3	5.0	ug/l	50.0	3.65	107	75-125	2	20	
Nickel, Soluble on DI Extract	61.7	10	ug/l	50.0	13.0	97	75-125	4	20	
Selenium, Soluble on DI Extract	50.5	10	ug/l	50.0	1.65	98	75-125	17	20	
Silver, Soluble on DI Extract	47.8	2.5	ug/l	50.0	ND	96	75-125	0.4	20	
Thallium, Soluble on DI Extract	46.8	2.5	ug/l	50.0	ND	94	75-125	2	20	
Vanadium, Soluble on DI Extract	50.8	25	ug/l	50.0	ND	102	75-125	6	20	
Zinc, Soluble on DI Extract	47.6	50	ug/l	50.0	1.73	92	75-125	11	20	
Post Spike (W3J0869-PS1)	**Source: 3J02078-12**			Analyzed: 10/23/13 19:26						
Arsenic, Soluble on DI Extract	38.5		ug/l	50.0	0.884	75	80-120			MS-01
Post Spike (W3J0869-PS2)	**Source: 3J02078-12**			Analyzed: 10/23/13 19:33						
Arsenic, Soluble on DI Extract	38.2		ug/l	50.0	0.884	75	80-120			MS-01

Batch W3J0870 - EPA 7470A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0870-BLK1)				Analyzed: 10/17/13 16:09						
Mercury, Soluble on DI Extract	ND	0.10	ug/l							
LCS (W3J0870-BS1)				Analyzed: 10/17/13 16:09						
Mercury, Soluble on DI Extract	1.06	0.10	ug/l	1.00		106	80-120			
Matrix Spike (W3J0870-MS1)	**Source: 3J02078-12**			Analyzed: 10/17/13 16:09						
Mercury, Soluble on DI Extract	1.83	0.10	ug/l	2.00	ND	92	70-127			
Matrix Spike Dup (W3J0870-MSD1)	**Source: 3J02078-12**			Analyzed: 10/17/13 16:09						
Mercury, Soluble on DI Extract	1.78	0.10	ug/l	2.00	ND	89	70-127	3	20	

Metals (Non-Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0355 - EPA 7471A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0355-BLK1)				Analyzed: 10/10/13 15:24						
Mercury, Total	ND	10	ug/kg							
LCS (W3J0355-BS1)				Analyzed: 10/10/13 15:24						
Mercury, Total	90.0	10	ug/kg	83.3		108	80-120			
Matrix Spike (W3J0355-MS1)	**Source: 3J02078-07**			Analyzed: 10/10/13 15:24						
Mercury, Total	57.6	10	ug/kg	76.3	ND	75	47-138			
Matrix Spike Dup (W3J0355-MSD1)	**Source: 3J02078-07**			Analyzed: 10/10/13 15:24						
Mercury, Total	59.9	10	ug/kg	78.5	ND	76	47-138	4	20	

Batch W3J0418 - EPA 6010B

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Metals (Non-Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0418 - EPA 6010B

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0418-BLK1)				Analyzed: 10/10/13 13:36						
Aluminum, Total	ND	5.0	mg/kg							
Antimony, Total	ND	2.0	mg/kg							
Arsenic, Total	ND	1.0	mg/kg							
Barium, Total	ND	2.0	mg/kg							
Beryllium, Total	ND	0.50	mg/kg							
Cadmium, Total	ND	0.50	mg/kg							
Chromium, Total	ND	1.0	mg/kg							
Cobalt, Total	ND	1.0	mg/kg							
Copper, Total	ND	5.0	mg/kg							
Iron, Total	ND	5.0	mg/kg							
Lead, Total	ND	1.0	mg/kg							
Manganese, Total	ND	1.0	mg/kg							
Nickel, Total	ND	2.0	mg/kg							
Phosphorus, Total	ND	2.5	mg/kg							
Selenium, Total	ND	1.0	mg/kg							
Thallium, Total	ND	3.0	mg/kg							
Titanium, Total	ND	1.0	mg/kg							
Vanadium, Total	ND	1.0	mg/kg							
Zinc, Total	ND	5.0	mg/kg							
LCS (W3J0418-BS1)				Analyzed: 10/10/13 13:39						
Aluminum, Total	48.8	5.0	mg/kg	50.0		98	80-120			
Antimony, Total	50.5	2.0	mg/kg	50.0		101	80-120			
Arsenic, Total	51.7	1.0	mg/kg	50.0		103	80-120			
Barium, Total	51.7	2.0	mg/kg	50.0		103	80-120			
Beryllium, Total	48.5	0.50	mg/kg	50.0		97	80-120			
Cadmium, Total	49.8	0.50	mg/kg	50.0		100	80-120			
Chromium, Total	52.5	1.0	mg/kg	50.0		105	80-120			
Cobalt, Total	49.6	1.0	mg/kg	50.0		99	80-120			
Copper, Total	49.8	5.0	mg/kg	50.0		100	80-120			
Iron, Total	52.6	5.0	mg/kg	50.0		105	80-120			
Lead, Total	50.1	1.0	mg/kg	50.0		100	80-120			
Manganese, Total	52.4	1.0	mg/kg	50.0		105	80-120			
Nickel, Total	51.7	2.0	mg/kg	50.0		103	80-120			
Phosphorus, Total	48.3	2.5	mg/kg	50.0		97	80-120			
Selenium, Total	48.6	1.0	mg/kg	50.0		97	80-120			
Thallium, Total	47.5	3.0	mg/kg	50.0		95	80-120			
Titanium, Total	52.7	1.0	mg/kg	50.0		105	80-120			
Vanadium, Total	53.9	1.0	mg/kg	50.0		108	80-120			
Zinc, Total	48.5	5.0	mg/kg	50.0		97	80-120			
Matrix Spike (W3J0418-MS1)	**Source: 3J02096-01**			Analyzed: 10/10/13 13:56						
Aluminum, Total	19700	5.0	mg/kg	46.0	20100	NR	75-125			MS-02
Antimony, Total	21.2	2.0	mg/kg	46.0	1.87	42	75-125			MS-01
Arsenic, Total	79.0	1.0	mg/kg	46.0	26.2	115	75-125			
Barium, Total	124	2.0	mg/kg	46.0	86.3	83	75-125			

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Metals (Non-Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0418 - EPA 6010B

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Matrix Spike (W3J0418-MS1)	**Source: 3J02096-01**			Analyzed: 10/10/13 13:56						
Beryllium, Total	43.6	0.50	mg/kg	46.0	0.340	94	75-125			
Cadmium, Total	38.5	0.50	mg/kg	46.0	1.09	81	75-125			
Chromium, Total	190	1.0	mg/kg	46.0	152	83	75-125			
Cobalt, Total	39.1	1.0	mg/kg	46.0	4.31	76	75-125			
Copper, Total	80.5	5.0	mg/kg	46.0	33.5	102	75-125			
Iron, Total	17000	5.0	mg/kg	46.0	28400	NR	75-125			MS-02
Lead, Total	71.0	1.0	mg/kg	46.0	35.5	77	75-125			
Manganese, Total	914	1.0	mg/kg	46.0	903	24	75-125			MS-02
Nickel, Total	49.0	2.0	mg/kg	46.0	12.1	80	75-125			
Phosphorus, Total	924	2.3	mg/kg	46.0	896	62	75-125			MS-02
Selenium, Total	47.5	1.0	mg/kg	46.0	ND	103	75-125			
Thallium, Total	2.19	3.0	mg/kg	46.0	ND	5	75-125			MS-01
Titanium, Total	983	1.0	mg/kg	46.0	1110	NR	75-125			MS-02
Vanadium, Total	95.6	1.0	mg/kg	46.0	52.3	94	75-125			
Zinc, Total	111	5.0	mg/kg	46.0	76.9	74	75-125			MS-02
Matrix Spike Dup (W3J0418-MSD1)	**Source: 3J02096-01**			Analyzed: 10/10/13 13:59						
Aluminum, Total	19600	5.0	mg/kg	49.5	20100	NR	75-125	0.9	20	MS-02
Antimony, Total	23.7	2.0	mg/kg	49.5	1.87	44	75-125	11	20	MS-01
Arsenic, Total	83.2	1.0	mg/kg	49.5	26.2	115	75-125	5	20	
Barium, Total	127	2.0	mg/kg	49.5	86.3	82	75-125	2	20	
Beryllium, Total	47.1	0.50	mg/kg	49.5	0.340	94	75-125	8	20	
Cadmium, Total	42.1	0.50	mg/kg	49.5	1.09	83	75-125	9	20	
Chromium, Total	192	1.0	mg/kg	49.5	152	81	75-125	1	20	
Cobalt, Total	42.2	1.0	mg/kg	49.5	4.31	76	75-125	7	20	
Copper, Total	83.0	5.0	mg/kg	49.5	33.5	100	75-125	3	20	
Iron, Total	17400	5.0	mg/kg	49.5	28400	NR	75-125	2	20	MS-02
Lead, Total	74.1	1.0	mg/kg	49.5	35.5	78	75-125	4	20	
Manganese, Total	921	1.0	mg/kg	49.5	903	36	75-125	0.7	20	MS-02
Nickel, Total	52.3	2.0	mg/kg	49.5	12.1	81	75-125	7	20	
Phosphorus, Total	922	2.5	mg/kg	49.5	896	52	75-125	0.3	20	MS-02
Selenium, Total	53.0	1.0	mg/kg	49.5	ND	107	75-125	11	20	
Thallium, Total	2.77	3.0	mg/kg	49.5	ND	6	75-125	24	20	MS-01
Titanium, Total	1040	1.0	mg/kg	49.5	1110	NR	75-125	6	20	MS-02
Vanadium, Total	98.7	1.0	mg/kg	49.5	52.3	94	75-125	3	20	
Zinc, Total	115	5.0	mg/kg	49.5	76.9	76	75-125	3	20	
Post Spike (W3J0418-PS1)	**Source: 3J02096-01**			Analyzed: 10/10/13 14:01						
Antimony, Total	1.01		mg/l	1.00	0.00382	101	80-125			
Thallium, Total	0.789		mg/l	1.00	-0.0670	86	80-125			
Post Spike (W3J0418-PS2)	**Source: 3J02096-01**			Analyzed: 10/10/13 14:03						
Antimony, Total	0.993		mg/l	1.00	0.00382	99	80-125			
Thallium, Total	0.772		mg/l	1.00	-0.0670	84	80-125			

Batch W3J0613 - EPA 7196A

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Metals (Non-Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0613 - EPA 7196A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0613-BLK1)				Analyzed: 10/22/13 15:47						
Chromium 6+	ND	1.0	mg/kg							
LCS (W3J0613-BS1)				Analyzed: 10/22/13 15:47						
Chromium 6+	6.83	1.0	mg/kg	8.00		85	80-120			
Matrix Spike (W3J0613-MS1)	**Source: 3J02096-01**			Analyzed: 10/22/13 15:47						
Chromium 6+	56.9	2.0	mg/kg	7.96	35.6	268	75-125			MS-02
Matrix Spike Dup (W3J0613-MSD1)	**Source: 3J02096-01**			Analyzed: 10/22/13 15:47						
Chromium 6+	57.5	2.0	mg/kg	7.93	35.6	277	75-125	1	20	MS-02

Batch W3J0679 - EPA 7471A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0679-BLK1)				Analyzed: 10/14/13 16:00						
Mercury, Total	ND	10	ug/kg							
LCS (W3J0679-BS1)				Analyzed: 10/14/13 16:00						
Mercury, Total	90.8	10	ug/kg	83.3		109	80-120			
Matrix Spike (W3J0679-MS1)	**Source: 3J04005-03**			Analyzed: 10/14/13 16:00						
Mercury, Total	78.1	10	ug/kg	77.3	4.73	95	47-138			
Matrix Spike Dup (W3J0679-MSD1)	**Source: 3J04005-03**			Analyzed: 10/14/13 16:00						
Mercury, Total	78.3	10	ug/kg	78.7	4.73	93	47-138	0.3	20	

Batch W3J0884 - EPA 7196A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0884-BLK1)				Analyzed: 10/16/13 18:08						
Chromium 6+, Soluble on DI Extract	ND	0.010	mg/l							
LCS (W3J0884-BS1)				Analyzed: 10/16/13 18:08						
Chromium 6+, Soluble on DI Extract	0.208	0.010	mg/l	0.200		104	89-110			
Matrix Spike (W3J0884-MS1)	**Source: 3J02078-02**			Analyzed: 10/16/13 18:08						
Chromium 6+, Soluble on DI Extract	0.196	0.010	mg/l	0.200	ND	98	70-130			
Matrix Spike Dup (W3J0884-MSD1)	**Source: 3J02078-02**			Analyzed: 10/16/13 18:08						
Chromium 6+, Soluble on DI Extract	0.196	0.010	mg/l	0.200	ND	98	70-130	0.1	15	

Batch W3J0903 - EPA 6010B

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0903-BLK1)				Analyzed: 10/17/13 14:55						
Aluminum, Total	ND	5.0	mg/kg							
Antimony, Total	ND	2.0	mg/kg							
Arsenic, Total	ND	1.0	mg/kg							
Barium, Total	ND	2.0	mg/kg							
Beryllium, Total	ND	0.50	mg/kg							
Cadmium, Total	ND	0.50	mg/kg							
Chromium, Total	ND	1.0	mg/kg							

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Metals (Non-Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0903 - EPA 6010B

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0903-BLK1)				Analyzed: 10/17/13 14:55						
Cobalt, Total	ND	1.0	mg/kg							
Copper, Total	ND	5.0	mg/kg							
Iron, Total	ND	5.0	mg/kg							
Lead, Total	ND	1.0	mg/kg							
Manganese, Total	ND	1.0	mg/kg							
Nickel, Total	ND	2.0	mg/kg							
Phosphorus, Total	ND	2.5	mg/kg							
Selenium, Total	ND	1.0	mg/kg							
Thallium, Total	ND	3.0	mg/kg							
Titanium, Total	ND	1.0	mg/kg							
Vanadium, Total	ND	1.0	mg/kg							
Zinc, Total	ND	5.0	mg/kg							
LCS (W3J0903-BS1)				Analyzed: 10/17/13 14:57						
Aluminum, Total	49.3	5.0	mg/kg	50.0		99	80-120			
Antimony, Total	48.1	2.0	mg/kg	50.0		96	80-120			
Arsenic, Total	50.1	1.0	mg/kg	50.0		100	80-120			
Barium, Total	49.1	2.0	mg/kg	50.0		98	80-120			
Beryllium, Total	47.8	0.50	mg/kg	50.0		96	80-120			
Cadmium, Total	47.3	0.50	mg/kg	50.0		95	80-120			
Chromium, Total	48.0	1.0	mg/kg	50.0		96	80-120			
Cobalt, Total	44.6	1.0	mg/kg	50.0		89	80-120			
Copper, Total	48.2	5.0	mg/kg	50.0		96	80-120			
Iron, Total	51.2	5.0	mg/kg	50.0		102	80-120			
Lead, Total	48.0	1.0	mg/kg	50.0		96	80-120			
Manganese, Total	49.2	1.0	mg/kg	50.0		98	80-120			
Nickel, Total	47.7	2.0	mg/kg	50.0		96	80-120			
Phosphorus, Total	49.3	2.5	mg/kg	50.0		99	80-120			
Selenium, Total	46.0	1.0	mg/kg	50.0		92	80-120			
Thallium, Total	46.4	3.0	mg/kg	50.0		93	80-120			
Titanium, Total	52.2	1.0	mg/kg	50.0		104	80-120			
Vanadium, Total	52.7	1.0	mg/kg	50.0		106	80-120			
Zinc, Total	44.3	5.0	mg/kg	50.0		89	80-120			
Matrix Spike (W3J0903-MS1)	**Source: 3J02078-11**			Analyzed: 10/17/13 15:11						
Aluminum, Total	18200	5.0	mg/kg	46.5	16900	NR	75-125			MS-02
Antimony, Total	13.9	2.0	mg/kg	46.5	2.00	26	75-125			MS-01
Arsenic, Total	55.1	1.0	mg/kg	46.5	4.40	109	75-125			
Barium, Total	310	2.0	mg/kg	46.5	257	112	75-125			
Beryllium, Total	42.2	0.50	mg/kg	46.5	0.635	89	75-125			
Cadmium, Total	36.2	0.50	mg/kg	46.5	0.521	77	75-125			
Chromium, Total	85.2	1.0	mg/kg	46.5	46.1	84	75-125			
Cobalt, Total	36.5	1.0	mg/kg	46.5	2.81	72	75-125			MS-01
Copper, Total	57.3	5.0	mg/kg	46.5	10.3	101	75-125			
Iron, Total	15100	5.0	mg/kg	46.5	19000	NR	75-125			MS-02
Lead, Total	58.3	1.0	mg/kg	46.5	21.7	79	75-125			

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Metals (Non-Aqueous) by EPA 6000/7000 Series Methods - Quality Control

Batch W3J0903 - EPA 6010B

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Matrix Spike (W3J0903-MS1)	**Source: 3J02078-11**			Analyzed: 10/17/13 15:11						
Manganese, Total	706	1.0	mg/kg	46.5	637	150	75-125			MS-02
Nickel, Total	49.4	2.0	mg/kg	46.5	13.5	77	75-125			
Phosphorus, Total	528	2.3	mg/kg	46.5	450	169	75-125			MS-02
Selenium, Total	45.0	1.0	mg/kg	46.5	ND	97	75-125			
Thallium, Total	ND	3.0	mg/kg	46.5	ND	NR	75-125			MS-01
Titanium, Total	975	1.0	mg/kg	46.5	903	154	75-125			MS-02
Vanadium, Total	91.2	1.0	mg/kg	46.5	46.3	97	75-125			
Zinc, Total	94.1	5.0	mg/kg	46.5	60.0	73	75-125			MS-02
Matrix Spike Dup (W3J0903-MSD1)	**Source: 3J02078-11**			Analyzed: 10/17/13 15:13						
Aluminum, Total	18000	5.0	mg/kg	47.2	16900	NR	75-125	1	20	MS-02
Antimony, Total	13.8	2.0	mg/kg	47.2	2.00	25	75-125	1	20	MS-01
Arsenic, Total	54.5	1.0	mg/kg	47.2	4.40	106	75-125	1	20	
Barium, Total	306	2.0	mg/kg	47.2	257	103	75-125	1	20	
Beryllium, Total	42.0	0.50	mg/kg	47.2	0.635	88	75-125	0.5	20	
Cadmium, Total	36.5	0.50	mg/kg	47.2	0.521	76	75-125	0.9	20	
Chromium, Total	84.2	1.0	mg/kg	47.2	46.1	81	75-125	1	20	
Cobalt, Total	36.3	1.0	mg/kg	47.2	2.81	71	75-125	0.4	20	MS-01
Copper, Total	57.0	5.0	mg/kg	47.2	10.3	99	75-125	0.5	20	
Iron, Total	15000	5.0	mg/kg	47.2	19000	NR	75-125	0.3	20	MS-02
Lead, Total	58.6	1.0	mg/kg	47.2	21.7	78	75-125	0.6	20	
Manganese, Total	684	1.0	mg/kg	47.2	637	101	75-125	3	20	
Nickel, Total	49.2	2.0	mg/kg	47.2	13.5	76	75-125	0.6	20	
Phosphorus, Total	523	2.4	mg/kg	47.2	450	156	75-125	1	20	MS-02
Selenium, Total	45.3	1.0	mg/kg	47.2	ND	96	75-125	0.6	20	
Thallium, Total	ND	3.0	mg/kg	47.2	ND	NR	75-125			MS-01
Titanium, Total	968	1.0	mg/kg	47.2	903	137	75-125	0.7	20	MS-02
Vanadium, Total	90.7	1.0	mg/kg	47.2	46.3	94	75-125	0.6	20	
Zinc, Total	94.2	5.0	mg/kg	47.2	60.0	72	75-125	0.1	20	MS-02
Post Spike (W3J0903-PS1)	**Source: 3J02078-11**			Analyzed: 10/17/13 15:15						
Antimony, Total	0.966		mg/l	1.00	0.00437	96	80-125			
Cobalt, Total	0.855		mg/l	1.00	0.00614	85	80-125			
Thallium, Total	0.805		mg/l	1.00	-0.0833	89	80-125			
Post Spike (W3J0903-PS2)	**Source: 3J02078-11**			Analyzed: 10/17/13 15:17						
Antimony, Total	1.01		mg/l	1.00	0.00437	101	80-125			
Cobalt, Total	0.881		mg/l	1.00	0.00614	87	80-125			
Thallium, Total	0.827		mg/l	1.00	-0.0833	91	80-125			

Metals - Soluble on STLC by EPA 6000/7000 Methods - Quality Control

Batch W3J0429 - EPA 6020A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0429-BLK1)				Analyzed: 10/16/13 16:08						

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Dublin IRELAND, 17

Date Received: 10/02/13 09:00
Date Reported: 11/21/13 09:34

Metals - Soluble on STLC by EPA 6000/7000 Methods - Quality Control

Batch W3J0429 - EPA 6020A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0429-BLK1)				Analyzed: 10/16/13 16:08						
Manganese, Soluble on DI Extract	ND	0.0010	mg/l							
LCS (W3J0429-BS1)				Analyzed: 10/16/13 16:10						
Manganese, Soluble on DI Extract	0.0436	0.0010	mg/l				80-120			
Matrix Spike (W3J0429-MS1)	**Source: 3J02078-04**			Analyzed: 10/16/13 16:12						
Manganese, Soluble on DI Extract	0.0520	0.0010	mg/l		0.00664		75-125			
Matrix Spike Dup (W3J0429-MSD1)	**Source: 3J02078-04**			Analyzed: 10/16/13 16:15						
Manganese, Soluble on DI Extract	0.0583	0.0010	mg/l		0.00664		75-125	11	20	

Batch W3J0869 - EPA 6020A

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W3J0869-BLK1)				Analyzed: 10/24/13 11:29						
Manganese, Soluble on DI Extract	ND	0.0010	mg/l							
LCS (W3J0869-BS1)				Analyzed: 10/24/13 11:33						
Manganese, Soluble on DI Extract	0.0552	0.0010	mg/l				80-120			
Matrix Spike (W3J0869-MS1)	**Source: 3J02078-12**			Analyzed: 10/24/13 11:37						
Manganese, Soluble on DI Extract	0.0588	0.0050	mg/l		0.00762		75-125			
Matrix Spike Dup (W3J0869-MSD1)	**Source: 3J02078-12**			Analyzed: 10/24/13 11:41						
Manganese, Soluble on DI Extract	0.103	0.0050	mg/l		0.00762		75-125	55	20	MS-01

AWN Consulting Ltd
The Tecpro Building, Clonshaugh Business & Technolog
Dublin IRELAND, 17

Date Received: 10/02/13 09:00
Date Reported: 11/21/13 09:34

Notes and Definitions

O-14	This analysis was requested by the client after the holding time was exceeded.
O-04	This analysis was performed outside the EPA recommended holding time.
MS-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
M-04	Due to the nature of matrix interferences, sample extract was diluted prior to analysis. The MDL and MRL were raised due to the dilution.
ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

Franklin Industrial Minerals
Material Safety Data Sheet

I - IDENTIFICATION

CHEMICAL NAME	CHEMICAL FORMULA	MOLECULAR WEIGHT
Limestone	$CaCO_3$	Not Applicable

TRADE NAME/SYNONYMS
Calcium Carbonate, Pulverized Limestone, Ground Limestone, Ground Calcium Carbonate, GCC

DOT IDENTIFICATION NO.
Not Restricted

II - PRODUCT AND COMPONENT DATA

COMPONENT(S) CHEMICAL NAME	CAS REGISTRY NO.
Calcium Carbonate	1317-65-3
Silica *(concentrations of less than 1.5%)*	14808-60-7

% APPROXIMATE	ACGIH TLV-TLW	OSHA PEL
CaCO3 95-100	See Section VI	
Silica less than 1.5%		

III - PHYSICAL DATA

APPEARANCE & ODOR	SPECIFIC GRAVITY
White, Odorless Grains	2.71

BOILING POINT	VAPOR DENSITY (AIR=1)
N/A	N/A

VAPOR PRESSURE	% VOLATILE, By Volume
N/A	N/A

EVAPORATION RATE	SOLUBILITY IN WATER
N/A	Insoluble

IV - REACTIVE DATA

STABILITY	CONDITIONS TO AVOID
Stable	None Known

INCOMPATIBILITY (Materials to Avoid)
None Known

HAZARDOUS DECOMPOSITION PRODUCTS
Respirable Dust May Be Generated by Handling and May Contain a Small Amount of Silica

HAZARDOUS POLYMERIZATION
Will Not Occur

V - FIRE AND EXPLOSION DATA

FLASHPOINT (Method Used)	FLAMMABLE LIMITS IN AIR
Not Flammable	Not Flammable

EXTINGUISHING AGENTS	UNUSUAL FIRE & EXPLOSION HAZARDS
None Required	None Known

VI - TOXICITY AND FIRST AID

EXPOSURE LIMITS *(When exposure to this and other chemicals is concurrent, the exposure limit must be defined in the workplace.)*

Unless Specified Otherwise, Limits Are Expressed as Milligrams of Substance per Cubic Meter of Air.

	ACGIH-TLV	OSHA CFR 1910.1000 TWA
CaCO3	10.0 mg/m3	15.0 For Total Dust / 5.0 For Respirable Dust
Silica	0.05 mg/m3 TWA	0.05 mg/m3 TWA For Respirable Dust

TLV=Threshold Limit Value
TWA=Time Weighted Average

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Nuisance Dusts have little adverse effect on lungs and do not produce significant organic disease or toxic effects when exposures are kept below occupational exposure limits.

PRIMARY ROUTES OF EXPOSURE: INHALATION [x] SKIN [ ]

ACUTE TOXICITY

Exposure to dust may irritate respiratory system, eyes and skin

Contact.....No Adverse Effects Skin Absorption.....No Adverse Effects
Eye Contact.....May Cause Irritation If Exposed to Large Amounts of Dust
Injestion.....Non-Hazardous

FIRST AID

Dust In Eyes- Flush with water. Contact a Physician if irritation persists or later develops.
Dust On Previously Irritated Skin- Wash with soap and water. Contact a Physician if irritation is aggravated.
Dust Inhalation- Remove to fresh air. Dust in throat and nasal passages should clear spontaneously. Contact a Physician if irritation persists or later develops.

CHRONIC TOXICITY

Effect and hazards of chronic exposure:

There are no reported health effects associated with repeated or prolonged exposure to pure calcium carbonate. Overexposure to calcium carbonate dust may increase the risk of developing pneumoconiosis (lung disease). Being a naturally occurring mineral, these products contain minimal amounts of crystalline silica as an impurity. Prolonged exposure to respirable crystalline silica at levels above the occupational exposure limits may increase the risk of developing silicosis. IARC has classified crystalline silica as a Class 1 human carcinogen.

VII - PERSONAL PROTECTION AND CONTROLS

RESPIRATORY PROTECTION

NIOSH-MSHA approved dust respirators for conditions where dust levels exceed or are likely to exceed appropriate exposure limits. Respirator use must comply with applicable MSHA or OSHA standards, which include provisions for a user training program, respirator fit testing, and other requirements.

VENTILATION

Local exhaust or general ventilation adequate to maintain exposures below appropriate exposure limits.

SKIN PROTECTION

See HYGIENE section below.

EYE PROTECTION

Safety glasses with side shields should be worn as minimum protection. Dust goggles should be worn when excessively (visible) dusty conditions are present or anticipated.

HYGIENE

Wash dust exposed skin with soap and water. Wash work clothes after each use. Sweep up spills and keep work area clean.

HMIS RATING SYSTEM	
C.A.S No. 1317-65-3	
HEALTH HAZARD	0* NO ACUTE EFFECTS
FLAMMABILITY HAZARD	0
REACTIVITY HAZARD	0
MAXIMUM PERSONAL PROTECTION	A

OTHER CONTROL MEASURES

Respirable dust levels should be monitored regularly when appropriate exposure limits are likely to be exceeded.

VIII - STORAGE AND HANDLING PRECAUTIONS

Respirable Dust may be generated during processing, handling and storage. The controls identified in Section VII of this MSDS should be applied as appropriate. Suggest storage or warehousing in a dry area.

IX - SPILL, LEAK AND DISPOSAL PRACTICES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

The controls identified in Section VII of this MSDS should be applied as appropriate. Spilled materials, where dust can be generated, may over expose cleanup personnel to respirable dust. Wetting of spilled materials and/or use of respiratory protective equipment (dust masks) may be necessary. None of the components in this product are subject to the reporting requirements of *Title III of SARA 1986* and *40 CFR 261.*

WASTE DISPOSAL METHOD

Dispose of this material only in accordance with applicable Federal, State and Local laws and regulations. Pickup and reuse clean materials. Limestone makes an excellent neutralizer for spilled acids. Material may be spread on lawns or fields to promote plant growth.

X - TRANSPORTATION

DOT HAZARD CLASSIFICATION

None

PLACARD REQUIRED

None

LABEL REQUIRED

Label is required by the OSHA Hazard Communications Standard (29 CFR 1910.1200[F], and applicable State and Local regulations.

FOR FURTHER INFORMATION CONTACT:

Technical Department
FRANKLIN INDUSTRIAL MINERALS
821 Tilton Bridge Rd., S.E.
Dalton, Georgia 30721-5499
(706)277-3740

Harrison Gypsum Company
ALLIED CUSTOM GYPSUM

Material Safety Data Sheet

Harrison Gypsum Co.
Allied Custom Gypsum
708 24th Ave., NW
Norman, OK 73069-6232

Phone Number: (405) 366-9500
Preparation Date: 10/10/2005

Section I - Product Identification

Products	Gypsum Rock, Anhydrite Rock
Common Names	Gypsum & Anhydrite
Chemical Names & Formulas	Calcium Sulfate Dihydrate ($CaSO_4 \cdot 2H_2O$) Calcium Sulfate ($CaSO_4$)

Section II - Ingredients

Ingredients	CAS Number	OSHA PEL* (mg/m3)	ACGIH TLV* (mg/m3)	Concentration (%)
Calcium Sulfate Dihydrate	13397-24-5	5/15	10	
Calcium Sulfate	7778-18-9	5/15	10	
Calcium Carbonate	471-34-1	5/15	10	<5
Crystalline Silica	14808-60-7	0.1/ -	0.1/ -	<1

* Respirable dust/total dust. PEL and TLV limits are based on an 8 hour TWA.

Note: Ground calcium sulfate dihydrate, calcium sulfate and calcium carbonate are classified as nuisance dusts. OSHA believes that nuisance dust may cause safety problems among exposed workers because it can be a source of distraction and physical irritation which can cause accidents or safety mishaps in the workplace.

Section III - Physical/Chemical Characteristics

Appearance Whitish rose or buff colored rock or granular fines Odor None Solubility (in water) Slight Specific Gravity 2.32 to 2.96

Section IV - Fire and Explosion Hazard Data

Flash Point Flammable Limits Fire Extinguishing Media Special Fire-Fighting Procedures Toxic Gases Produced Not Combustible N/A Not Combustible None Decomposes to Sulfur dioxide @1450°C

Section V - Health Hazard Data

Effects of Overexposure

Acute: Persons exposed to large amounts of dust may be forced to leave the area because of nuisance conditions, including coughing, sneezing, and nasal irritation. Other temporary effects may include drying of the skin and eye irritation. Gypsum is considered non-toxic.

Chronic: None known for gypsum. Prolonged and repeated exposure to crystalline silica by inhalation may cause silicosis and lung cancer.

Medical Conditions Generally Aggravated by Exposure: Bronchitis, Emphysema and Asthma
Target Organs: Lungs, eyes
Routes of Entry: Inhalation

Carcinogenicity:	IARC	NTP
Crystalline silica	Carcinogen (Group 1)	Anticipated Carcinogen

In 1997, IARC classified inhaled crystalline silica as carcinogenic to humans categorizing it as a Group 1 agent. In this evaluation, IARC noted that carcinogenicity was not detected in all industrial circumstances studied, and may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs. In 1992, NTP listed respirable crystalline silica among the substances "reasonably anticipated to be carcinogens".

Emergency and First-Aid Procedures:

Effects of Overexposure

Acute: Persons exposed to large amounts of dust may be forced to leave the area because of nuisance conditions, including coughing, sneezing, and nasal irritation. Other temporary effects may include drying of the skin and eye irritation. Gypsum is considered non-toxic.

Chronic: None known for gypsum. Prolonged and repeated exposure to crystalline silica by
inhalation may cause silicosis and lung cancer.

Medical Conditions Generally Aggravated by Exposure: Bronchitis, Emphysema and Asthma Target Organs: Lungs, eyes Routes of Entry: Inhalation

Carcinogenicity: IARC NTP Crystalline silica Carcinogen (Group 1)
Anticipated Carcinogen

In 1997, IARC classified inhaled crystalline silica as carcinogenic to humans categorizing it as a Group 1 agent. In this evaluation, IARC noted that carcinogenicity was not detected in all industrial circumstances studied, and may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs. In 1992, NTP listed respirable crystalline silica among the substances "reasonably anticipated to be carcinogens".

Ingestion:	If swallowed and the person is conscious, immediately give large amounts of water. Get medical attention.
Inhalation:	If person breathes in large amounts, move the exposed person to fresh air. Get medical attention if irritation persists.
Eye Contact:	Remove contact lenses and immediately flush with water for at least 15 minutes, including under eyelids. Seek medical advice if irritation persists.
Skin Contact:	Wash with soap and water. If irritation occurs, contact physician.

Precautionary Labeling:

	HMIS	NFPA
Health	0	0
Flammability	0	0
Reactivity	0	0
Other	-	N/A

Rating Scale: 0 = Minimal Hazard, 1 = Slight Hazard, 3 = Serious Hazard, 4 = Extreme Hazard

Precautionary Label Statements:
Caution, may cause irritation during use. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. When not in uses keep in tightly closed container.

Section VI - Reactivity Data

Stability:	Stable
Hazardous Polymerization:	Will not occur
Conditions to Avoid:	None
Incompatibles:	Aluminum, Strong Acids
Decomposition Products:	Oxides of Sulfur

Section VII - Spill and Disposal Procedures

Stability: Stable Hazardous Polymerization: Will not occur Conditions to Avoid: None Incompatibles: Aluminum, Strong Acids Decomposition Products: Oxides of Sulfur

Steps to be taken in the event of a spill or discharge: Remove by dry-sweeping or vacuum. Avoid creating excessive dust. Wear approved respirators if necessary. Do not wash down drains since it could plug drains.

Disposal Procedure: For disposal of this material as a waste, act in accordance with all applicable federal, state and local environmental regulations.

Section VIII – Special Protection Information

Ventilation:	Use adequate general or local exhaust ventilation to keep dust levels as low as possible.
Respiratory Protection:	None required where adequate ventilation conditions exist. A dust mask can be used for nuisance dust. If airborne concentrations of any hazardous ingredients exceed the TLV or PEL, use a NIOSH approved respirator.
Eye Protection:	Safety glasses or goggles, as needed.
Skin Protection:	Gloves are not required, but may be desirable under certain working conditions or to protect against drying of hands.

Section IX – Special Precautions

Ventilation: Respiratory Protection:

Eye Protection: Skin Protection: Use adequate general or local exhaust ventilation to keep dust levels as low as possible. None required where adequate ventilation conditions exist. A dust mask can be used for nuisance dust. If airborne concentrations of any hazardous ingredients exceed the TLV or PEL, use a NIOSH approved respirator. Safety glasses or goggles, as needed. Gloves are not required, but may be desirable under certain working conditions or to protect against drying of hands.

Section IX – Special Precautions

Precautions to be taken in handling and storage:

Wear appropriate protective equipment during handling and store in a dry area to minimize potential for clumping due to moisture absorption. Dew point conditions or other conditions causing presence of moisture will harden gypsum during storage.

information is not intended as a license to operate under or a recommendation to practice or infringe any patent of this Company or others covering any process, composition of matter or use. Since the Company shall have no control of the use of the product described herein, the Company assumes no liability for loss or damage incurred from the proper or improper use of such product.

MATERIAL SAFETY DATA SHEET

March 14, 2011

SECTION 1	CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: **Phoenix Natural Pozzolan / ASTM Class N**

Manufacturer's Name and Address:

Salt River Materials Group
Phoenix Cement Company
8800 E. Chaparral Rd. Suite 155
Scottsdale, AZ 85250-2606

24-Hour Emergency Telephone: CHEMTREC: 1-800-424-9300

Customer Service: Phone: (480) 850-5757 Fax: (480) 850-4333

Chemical Name: Mixture

Chemical Formula: Complex mixture of inorganic materials including metals and silica

SECTION 2	COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients: Pozzolan Type N – SiO_2, AlO_3, Fe_2O_3
Chemical Additives – N/A

SECTION 3	HAZARD IDENTIFICATION

POTENTIAL HEALTH EFFECTS

Relevant Routes of Exposure:
Eye contact, skin contact, inhalation, ingestion

Inhalation:
Can irritate respiratory tract; long term exposure to respirable silica above the Occupational Exposure Limit (OEL) may produce silicosis in susceptible persons. See below.

Hazardous Component (*Specific chemical Identity, Common Name(s)*)	**OSHA PEL**	**ACGIH TLV**	**Other Limits Recommended**
Silica, Amorphous (SiO_2) CAS 7631-86-9	80 mg/m^3 / %SiO_2 (total dust)	10 mg/m^3 (total dust)	NIOSH: 6 mg/m^3
Silica, Crystalline (SiO_2) CAS 148-086-97	30 mg/m^3 / (%SiO_2) +2 (total dust) 10 mg/m^3 /(%SiO_2)+2(resp. dust)	0.1 mg/m^3 (resp. dust)	0.05 mg/m^3

Ingestion:
Possible, but very unlikely to occur in sufficient quantities

Eyes:
Can irritate eyes

Skin:
Can dry and irritate skin; is not absorbed by skin

Signs and symptoms of exposure:
Irritation of eyes, skin, and respiratory system

Acute:
May cause irritation to the respiratory tract, eyes, or skin; alkaline material – irritation may be aggravated by the addition of moisture (sweat)

Chronic:
Prolonged inhalation exposure may cause pulmonary fibrosis or chronic bronchitis

Carcinogenic potential:
Natural Pozzolan is not a listed carcinogen. Respirable crystalline silica from occupational sources is listed as carcinogenic to human by IARC. NTP listed silica, crystalline (respirable) as a compound that

may reasonably be anticipated to be a carcinogen. Presence of crystalline silica in respirable dust has not been established in this source.

Medical conditions which may be aggravated by exposure:
May aggravate existing pulmonary condition if high dust situation is created; dusting conditions should not occur under normal use.

SECTION 4 FIRST AID MEASURES

Eyes:
Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eyes and lid tissue. Washing eyes within several seconds is essential to achieve maximum effectiveness. If symptoms persist, get medical attention.

Skin:
Immediately flush contaminated areas with water. Remove contaminated clothing and footwear. Wash contaminated areas with plenty of soap and water. Wash clothing before reuse. Discard footwear that cannot be decontaminated. If irritation or rash persist or worsens seek medical attention.

Inhalation:
Remove to fresh air if safe to transport. Otherwise, attempt to provide fresh air by ventilation. If breathing is difficult, have trained person administer oxygen. If respiration or pulse has stopped, have a trained person administer basic life support (cardio-pulmonary resuscitation/automatic external defibrillator) and call for emergency services immediately.

Ingestion:
Never give anything by mouth to an unconscious person. If swallowed, do not induce vomiting. Give large quantities of water. If vomiting occurs spontaneously, keep airway clear and give more water. If symptoms persist get medical attention.

SECTION 5 FIRE FIGHTING MEASURES

Flash point [*provided method used*]:
None

Upper Explosion Limit: N/A
Lower Explosion Limit: N/A

Auto ignition temperature: N/A

Extinguishing media:
No special Media

Fire fighting procedures:
Evacuate all unnecessary personnel. Shut down motors, pumps, electrical service and eliminate all sources of ignition. Use water spray if appropriate or appropriate extinguishing media for fires where water is not appropriate. Wear NIOSH/MSHA approved positive pressure self-contained breathing apparatus and full protective clothing.

Special fire fighting procedures:
No special procedures

Water reactive: N/A

Unusual fire and explosion hazards: None. This material is considered non-flammable and non-combustible. Use fire extinguishing agent suitable for surrounding media.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal Precautions:
People performing the cleanup should have personal protective equipment sufficient to keep material away from skin and to prevent inhalation.

Environmental Precautions and Methods for Clean Up:
Clean up material for use or disposal. Dampen with water mist to control dust (airborne dust) before removal. Do not use compressed air to move material. If loaded on trucks, wet down ash to prevent dusting during transport. Avoid discharge into storm waters, sewer drains, and other waterways.

SECTION 7 HANDLING AND STORAGE

Handling:
Avoid breathing dust, use with adequate ventilation. In dusty environments (greater than the PEL/TLV) wear NIOSH/MSHA approved respiratory protection and tight fitting goggles. Local exhaust can be used, if necessary, to control airborne dust levels. Avoid actions that may generate dust. Do not get into eyes, on skin or clothing. Wash thoroughly after handling material. When handling moist or wet product skin protection is required. Impervious boots or shoes covering should be used if material is anticipated to contact feet.

Storage:
Store in cool, dry, ventilated area away from ignition sources (sparks and flame)

SECTION 8	EXPOSURE CONTROL / PERSONAL PROTECTION

Engineering Controls:
Use general local exhaust ventilation and dust collection systems to keep dust level within acceptable limits.

PERSONAL PROTECTION

Respiratory:
If airborne levels are expected to exceed the PEL/TLV use a NIOSH/MSHA approved respirator.

Eye/Face:
Use safety goggles for face shield in dusty operations. Avoid contact lenses

Skin:
Normal work gloves to prevent excessive contact with skin. On regular basis, wash work clothes.

Other:
Recommend coveralls in high concentrated conditions. Wet-wash areas periodically to minimize dust.

SECTION 9	PHYSICAL AND CHEMICAL PROPERTIES

Appearance:
Light to dark gray, tan or charcoal colored

Odor:
No distinctive odor

Physical State:
Powder of varying textures

Specific Gravity (H_2O = 1.0):
1.8 to 2.7

Vapor Density:
Not applicable

Vapor Pressure:
Not applicable

Evaporating Rate:
Not applicable

Boiling Point:
>2000°F

Melting Point:
>1400°F

Solubility in Water (% by weight):
0.5%

pH (in water):
9 - 11

SECTION 10	STABILITY AND REACTIVITY

Stability:
Stable

Incompatibility:
None known

Hazardous Polymeration:
Not known to occur

Hazardous Decomposition:
Not known to occur and not suspected under normal conditions

Conditions to Avoid:
Any condition that may generate excessive dust

HMIS Hazard Ratings:
Health Hazard: 1 Fire Hazard: 0 Reactivity: 0

SECTION 11	TOXICOLOGICAL INFORMATION

Acute or short-term:
This product is expected to cause irritation of the eyes, skin and mucous membranes. Product may cause sneezing and coughing if inhaled. Swallowing this product may produce gastrointestinal discomfort. Inhalation of this product may produce irritation of the upper respiratory tract and asthma-like responses in some individuals.

Chronic or long-term:
This product contains crystalline silica, which upon long-term exposure to levels above the PEL/TLV may produce bronchitis, silicosis, a fibrotic (scarring) disease of the lungs and potentially lung cancer. Studies have shown that smoking increases the risk of these diseases. This product may also increase the risk of scleroderma for which the causes are unknown, but some reports link over exposure to silica in combination with other chemicals to this disease.

SECTION 12	ECOLOGICAL INFORMATION

Ecotoxicity:
No data available. This material is believed to be non-toxic to aquatic life.

Persistence:
No data available. This material is believed to be unlikely to persist in the environment.

Bioaccumulation:
No data available. This material is believed unlikely to bioaccumulate.

SECTION 13	DISPOSAL CONSIDERATIONS

This product is not classified as a hazardous waste under RCRA or CERCLA. The material may be land filled; however, material should be covered to minimize generation of airborne dust. Ensure that all federal, state and local regulations are followed.

DISCLAIMER: Users are advised to make their own determinations as to the suitability of the information in this data sheet in relation to their particular purposes and specific circumstances. Each user should read the data sheet and consider the information in the context of how the product will be handled and used in the workplace and in conjunction with other substances or products. Individual responsibility must be taken as to proper use and handling of the product. The manufacturer makes no warranty expressed or implied regarding the accuracy of the information in this data sheet or the results to be obtained in the use of the product.

This MSDS has been prepared in accordance with the Hazard Communication Rule 29 CFR 1910.1200. Information herein is based on data considered to be accurate as of the date prepared. No warranty or representation, expressed or implied, is made as to the accuracy or completeness of this data and safety information. No responsibility can be assumed by Salt River Materials Group, or its partners and vendors for any damage or injury resulting from abnormal use, failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.

LEHIGH CEMENT COMPANY
MATERIAL SAFETY DATA SHEET
FOR
PORTLAND CEMENT

REVISED DATE: OCTOBER, 2002

1. PRODUCT/COMPANY IDENTIFICATION

Supplier:
Lehigh Cement Company
7660 Imperial Way
Allentown, PA 18195
610 / 366 - 4600
Contact Number: 1-800-462-9071

Chemical Family: Calcium Compounds

Chemical Name and Synonyms:
Portland Cement (CAS # 65997-15-1), Hydraulic Cement Types I, II, III, V
Trade Name and Synonyms:
Lehigh Portland Cement

2. EMERGENCY AND FIRST AID

EMERGENCY INFORMATION:
Portland cement is a light gray or white powder. When in contact with moisture in eyes or on skin, or when mixed with water, portland cement becomes highly caustic (pH > 12) and will damage or burn (as severely as third-degree) the eyes or skin. Inhalation may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system or may cause or may aggravate certain lung diseases or conditions. Use exposure controls or personal protection methods described in Section 10.

EYES:
Immediately flush eye thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

SKIN:
Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment if irritation or inflammation develops or persists. Seek immediate medical treatment in the event of burns.

INHALATION:
Remove person to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical help if coughing and other symptoms do not subside. Inhalation of large amounts of portland cement require immediate medical attention.

INGESTION:
Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

ACCIDENTIAL RELEASE MEASURES
Clean up spilled material without causing it to become airborne or mixed with water to limit potential harm. Wear appropriate personal protective equipment. Dispose of waste material according to local, state or federal regulations.

3. COMPOSITION INFORMATION

DESCRIPTION:

This product consists of finely ground portland cement clinker mixed with a small amount of gypsum (calcium sulfate dihydrate). The portland cement clinker is made by heating to a high temperature a mixture of substances such as limestone, sand, clay and shale. Portland cement is essentially hydraulic calcium silicates contained in a crystalline mass, not separable into individual components. Major compounds are:

$3CaO•SiO_2$	Tricalcium Silicate	CAS #12168-85-3
$2CaO•SiO_2$	Dicalcium Silicate	CAS #10034-77-2
$3CaO•Al_2O_3$	Tricalcium Aluminate	CAS #12042-78-3
$4CaO•Al_2O_3•Fe_2O_3$	Tetracalcium aluminoferrite	CAS #12068-35-8
$CaSO_4•2H_2O$	Calcium Sulfate dihydrate (Gypsum)	CAS #7778-18-9 (CAS #13397-24-5)

4. HAZARDOUS INGREDIENTS

COMPONENT	OSHA PEL (8-Hour TWA)	ACGIH TLV-TWA (1995-1996)	NIOSH REL (8-Hour TWA)
Portland Cement (CAS #65997-15-1) 50 to 95% by weight	5 mg respirable dust/m^3 15 mg total dust/m^3	10 mg total dust/m^3	
Calcium sulfate (CAS #7778-18-9) [Gypsum (CAS #13397-24-5)] 0 to 10% by weight	5 mg respirable dust/m^3 15 mg total dust/m^3	10 mg total dust/m^3	
Iron oxide (CAS #1309-37-1) 0 to 15% by weight	10 mg/m^3	5 mg/m^3	
Calcium carbonate (CAS #1317-65-3) 0 to 5% by weight	5 mg respirable dust/m^3 15 mg total dust/m^3	10 mg total dust/m^3	
Magnesium oxide (CAS #1309-48-4) 0 to 5% by weight	15 mg total dust/m^3	10 mg total dust/m^3	
Calcium oxide (CAS #1305-78-8) 0 to 5%[1] by weight	5 mg/m^3	2 mg/m^3	
Crystalline silica (CAS #14808-60-7) 0 to 5% by weight	$\frac{\text{10 mg of respirable dust/m}^3}{\%\ SiO_2 + 2}$ $\frac{\text{30 mg of total dust/m}^3}{\%\ SiO_2 + 2}$ $\frac{\text{250 million particles/ft}^3}{\%\ SiO_2 + 5}$	0.05 mg respirable quartz/m^3	0.05 mg respirable quartz dust/m^3

TRACE INGREDIENTS:

Due to the use of substances mined from the earth's crust, trace amounts of naturally occurring, potentially harmful constituents may be detected during chemical analysis. Portland cement may contain up to 0.75% insoluble residue. A small amount of this residue includes free crystalline silica. Portland cement also may contain trace (<0.05%) amounts of chromium salts or compounds (including hexavalent chromium) or other metals (including nickel compounds) found to be hazardous or toxic in some chemical forms. These metals are present mostly as trace substitutions within the principal minerals. Other trace constituents may include potassium and sodium sulfate compounds.

[1] If Portland/Lime blended product "0 to 25%" values.

5. HAZARD IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

NOTE: Potential health effects may vary depending upon the duration and degree of exposure. To reduce or eliminate health hazards associated with this product, use exposure controls or personal protection methods as described in Section 10.

EYE CONTACT:

(Acute/Chronic) Exposure to airborne dust may cause immediate or delayed irritation or inflammation of the cornea. Eye contact by larger amounts of dry powder or splashes of wet portland cement may cause effects ranging from moderate eye irritation to chemical burns and blindness.

SKIN CONTACT:

(Acute) Exposure to dry portland cement may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation of other conditions. Discomfort or pain cannot be relied upon to alert a person to a hazardous skin exposure.

(Chronic) Dry portland cement coming in contact with wet skin or exposure to wet portland cement may cause more severe skin effects, including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of chemical (caustic) burns.

(Acute/Chronic) Some individuals may exhibit an allergic response upon exposure to portland cement. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers.

INHALATION:

(Acute) Exposure to portland cement may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system. Pre-existing upper respiratory and lung diseases may be aggravated by inhalation of portland cement.

(Chronic) Inhalation exposure to free crystalline silica may cause delayed lung injury including silicosis, a disabling and potentially fatal lung disease, and/or cause or aggravate other lung diseases or conditions.

INGESTION:

(Acute/Chronic) Internal discomfort or ill effects are possible if large quantities are swallowed.

CARCINOGENIC POTENTIAL:

Portland cement is not recognized as a carcinogen by NTP, OSHA, or IARC. However, it may contain trace amounts of heavy metals recognized as carcinogens by these organizations. In addition, IARC classifies crystalline silica, a trace constituent, as a known human carcinogen (Group I). NTP has characterized respirable silica as "reasonably anticipated to be a carcinogen." (See also Section 13.)

6. PHYSICAL/CHEMICAL DATA

APPEARANCE/ODOR:	Gray, white or colored powder, odorless	PHYSICAL STATE:	Solid (Powder)
BOILING POINT:	> 1000°C	MELTING POINT:	Not applicable
VAPOR PRESSURE:	Not applicable	VAPOR DENSITY:	Not applicable
pH (IN WATER) (ASTM D 1293-95)	12 to 13	SOLUBILITY IN WATER:	Slightly soluble (0.1% to 1.0%)
SPECIFIC GRAVITY (H_2O = 1.0):	3.15	EVAPORATION RATE:	Not applicable

7. FIRE AND EXPLOSION

FLASH POINT:	None	LOWER EXPLOSIVE LIMIT:	None
AUTO IGNITION TEMPERATURE:	Not combustible	UPPER EXPLOSIVE LIMIT:	None
FLAMMABLE LIMITS	Not applicable	SPECIAL FIRE FIGHTING PROCEDURES:	None
EXTINGUISHING MEDIA:	Not combustible	UNUSUAL FIRE AND EXPLOSION HAZARDS:	None
HAZARDOUS COMBUSTION PRODUCTS:	None		

8. STABILITY AND REACTIVITY DATA

STABILITY: Product is stable. Keep dry until used.

CONDITIONS TO AVOID: Unintentional contact with water. Contact with water will result in hydration and produces (caustic) calcium hydroxide.

INCOMPATIBILITY: Wet portland cement is alkaline. As such, it is incompatible with acids, ammonium salts and aluminum metal.

HAZARDOUS DECOMPOSITION: Will not occur.

HAZARDOUS POLYMERIZATION: Will not occur.

9. PRECAUTIONS FOR HANDLING, STORAGE AND DISPOSAL

HANDLING AND STORAGE Keep dry until used. Handle and store in a manner so that airborne dust does not exceed applicable exposure limits. Use adequate ventilation and dust collection. Use exposure control and personal protection methods as described in Section 10.

SPILL: Use dry clean-up methods that do not disperse dust into the air or entry into surface water. Material can be used if not contaminated. Place in an appropriate container for disposal or use. Avoid inhalation of dust and contact with skin and eyes. Use exposure control and personal protection methods as described in Section 10.

DISPOSAL: Comply with all applicable local, state and federal regulations for disposal of unusable or contaminated materials. Dispose of packaging/containers according to local, state and federal regulations.

10. EXPOSURE CONTROLS/PERSONAL PROTECTION

RESPIRATORY PROTECTION:	Use local exhaust or general dilution ventilation to control dust levels below applicable exposure limits. Minimize dispersal of dust into the air. If local or general ventilation is not adequate to control dust levels below applicable exposure limits or when dust causes irritation or discomfort, use MSHA/NIOSH approved respirators.
EYE PROTECTION:	Wear safety glasses with side shields or goggles to avoid contact with the eyes. In extremely dusty environments and unpredictable environments, wear tight-fitting unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when handling cement or cement containing products.
SKIN PROTECTION:	Wear impervious abrasion- and alkali-resistant gloves, boots, long-sleeved shirt, long pants or other protective clothing to prevent skin contact. Promptly remove clothing dusty with dry portland cement or clothing dampened with moisture mixed with portland cement, and launder before re-use. If contact occurs, wash areas contacted by material with pH neutral soap and water.

11. TRANSPORTATION DATA

Portland cement is not hazardous under U.S. DOT regulations.

12. TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For a description of available, more detailed toxicological and ecological information, contact Lehigh Cement Company.

13. OTHER REGULATORY INFORMATION

Status under US OSHA Hazard Communication Rule 29 CFR 1910.1200:	Portland cement is considered a hazardous chemical under this regulation and should be included in the employer's hazard communication program.
Status under CERCLA/Superfund, 40 CFR 117 and 302:	Not listed.
Hazard Category under SARA (Title III), Sections 311 and 312:	Portland cement qualifies as a hazardous substance with delayed health effects.
Status under SARA (Title III), Section 313:	Maybe subject to reporting requirements under Section 313. Contact sales office for further information.
Status under TSCA (as of May 1997):	Some substances in portland cement are on the TSCA inventory list.
Status under the Federal Hazardous Substances Act:	Portland cement is a hazardous substance subject to statutes promulgated under the subject act.

Status under California Proposition 65:	This product contains crystalline silica, a substance known to the State of California to cause cancer. This product also may contain trace amounts of heavy metals known to the State of California to cause cancer, birth defects or other reproductive harm.

14. OTHER INFORMATION

This MSDS provides information on various types of portland cement products. A particular product's composition may vary from sample to sample. The information provided herein is believed by Lehigh Cement Company to be accurate at the time of preparation or prepared from sources believed to be reliable. Health and safety precautions in this data sheet may not be adequate for all individuals or situations. Users have the responsibility to comply with all laws and procedures applicable to the safe handling and use of the product, to determine the suitability of the product for its intended use, and to understand possible hazards associated with mixing portland cement with other materials. This product neither contains nor is directly manufactured with any controlled ozone depleting substances, Class I and II. SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY LEHIGH CEMENT COMPANY.

ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ASTM	American Society for Testing and Materials
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
ft^3	Cubic foot
IARC	International Agency for Research on Cancer
m^3	Cubic meter
mg	Milligram
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
REL	Recommended Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
TLV	Threshold Limit Value
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average