RT Environmental Services, Inc.

COPRODUCT DETERMINATION
FOR
DUQUESNE SLAG SITE

4810 BUTTERMILK HOLLOW ROAD
WEST MIFFLIN, ALLEGHENY COUNTY, PENNSYLVANIA
RT PROJECT #5750-01

PREPARED FOR:

HOLCIM REDLAND QUARRIES NY, INC.
6401 GOLDEN TRIANGLE DRIVE, SUITE 400
GREENBELT, MD 20770

PREPARED BY:

RT ENVIRONMENTAL SERVICES, INC.
2001 WATERDAM PLAZA DRIVE, SUITE 205
CANONSBURG, PA 15317

NOVEMBER 2, 2023

SITE INFORMATION AND OPERATIONS

Site information and Operations

The Duquesne Slag Site consists of approximately 225 acres of land located at 4810 Buttermilk Hollow Road in West Mifflin, Allegheny County, Pennsylvania. The majority, approximately 190 acres, of the Site is currently utilized as an active slag processing plant. The remaining portions of the Site are reclaimed areas, areas reserved for future mining, and leased land. The Site is owned by Duquesne Slag Products Company (tax parcels 243-F-375, 244-D-080, and 244-E-072) and Lafarge North America Inc. (tax parcel 243-F-300). The site is located over an abandoned coal mine. Structures at the Duquesne Slag Site consist of two trailers (a weigh station office trailer and a QC office trailer), the maintenance shop building, the block building, and a building that serves as a cafeteria. Gravel and dirt access roads are located within and around the Site. A Site Location Map is provided as **Figure 1**.

Duquesne Slag Site receives air cooled blast furnace slag (ACBFS) from U.S. Steel Corporation (US Steel) in Pittsburgh, Pennsylvania as a coproduct material. The ACBFS is transported onsite by Cole & Cole Trucking via triaxles and subsequently stockpiled and processed onsite. The material is transferred in good faith as a commodity in trade, for use in lieu of an intentionally manufactured product or produced raw material, without processing that would not be required of the product or raw material, and the material is not accumulated speculatively.

Further information on the ACBFS material processing activity and end use is presented below documenting that the ACBFS qualifies as coproduct material in accordance with 25 PA Code § 287.8

Slag Processing/Facility Operations

The ACBFS is loaded onto a conveyor which processes the ACBFS material by crushing and separating the material into five different sized aggregates. The material is only crushed and sized, and no chemical processing activities are involved in the processing. The following aggregate sizes and their general designated uses are provided below:

- #1 material – aggregate in Portland cement concrete; commonly used in bedding and backfill
- #2A material – dense graded product; commonly used as a sub-base
- #8 & #57 materials – aggregate in Portland cement concrete, chip seal aggregate, asphalt pavement; commonly used in bedding and backfill
- #10 material – dense graded product; commonly used in bedding and backfill

Additional information for the applications of the ACBFS is provided in **Table 1**. The processed ACBFS is then collected and stockpiled on various exterior gravel portions of the Site in designated areas. A copy of the aggregate flow sheet is provided as **Figure 2**.

The ACBFS undergoes various laboratory testing to meet required specifications prior to being sold to various agencies including the Pennsylvania Department of Transportation (PennDOT), West Virginia DOT (WVDOT), Ohio DOT (ODOT), Pennsylvania Turnpike Commission, etc.

ACBFS MATERIAL PROPERTIES

General Properties

ACFBS is the mineral which results from the reaction of limestone (high calcium) and dolomite (high magnesium) with earth metals in iron ore in a blast furnace. It is the byproduct of iron manufactured in a blast furnace. ACFBS is the material resulting from the solidification of molten blast furnace slag under atmospheric conditions, subsequent cooling may be accelerated by the application of water to the solidified surface. ACFBS aggregate is created by crushing, screening, and washing the blast furnace slag into specification aggregate sizes. ACFBS is non-expansive as tested in accordance with the Pennsylvania Department of Transportation (PennDOT) Pennsylvania Test Methods 130 (PTM130).

ACBFS is a versatile construction aggregate that provides superior compaction and skid resistance. It can be safely used in a variety of applications including concrete, asphalt, sub-base, bedding, and backfill. ACBFS is produced to meet state specifications for gradation and other key requirements. An example of state specifications (2023 PennDOT Bulletin Chart 14) is included in **Attachment 1** indicating PennDOT approval for the ACBFS produced at Duquesne Slag Site.

American Society of Testing and Materials (ASTM C-125, Definition of Terms Relating to concrete and concrete Materials) defines blast furnace slag as “the non-metallic product consisting essentially of silicates and aluminosilicates of calcium and other bases, that is developed in a molten condition simultaneously with iron in a blast furnace.”

Chemical Properties

The ACBFS constituents consist of silica, alumina, calcia, and magnesia, which comprise 95% of the material. Minor elements include manganese, sulfur, and ferrous compounds, as well as trace quantities of several others. The compounds do not occur as oxides in the ACBFS but are combined to form various silicate and aluminosilicate minerals such as melilite, merwinite, wollastonite, etc., as found in natural geological forms. A summary of the list of constituents (oxides and carbon) that make up the ACBFS is provided in **Attachment 2**.

Features and Benefits

Weight/Volume Advantage

ACFBS has a lower weight to volume relationship than mined aggregates (stone and/or gravel). A given volume requires 10%-35% less slag than mined aggregate, which translates into significant cost savings.

Graded to Meet Specifications

ACFBS is crushed and graded to meet the grading requirements of state departments of transportation and other specifying agencies.

Beneficial Texture and Shape

ACBFS has a cubical vesicular structure with surface and interior non-connected voids. This structure and shape creates greater surface area and provides for an excellent bond with Portland cement mortar for greater compression strength and improved adhesion with asphalt for increased stability in asphalt concrete.

Superior Compaction

ACBFS compacts quickly to a more stable base than mined aggregates. In road work and backfill applications, project completion is accelerated, translating again into significant cost savings.

Resistance to Polishing

ACBFS has a rugged, vesicular surface with a high aggregate wear index. It resists polishing in surface applications as aggregate in Portland cement concrete, asphalt concrete, and chip seal applications. The surface characteristics provide for superior skid resistance and stability in asphalt pavements.

Multiple Construction Applications

As dense graded aggregate base under pavement, as bedding and backfill under and around structure, as aggregate in Portland cement concrete and asphalt concrete, as aggregate in concrete block, ACBFS is the construction material of choice.

COPRODUCT DETERMINATION EVALUATION

Coproduct Definition (25 PA Code § 287.1)

A coproduct is defined as follows:

(i) A material generated by a manufacturing or production process, or a spent material, of a physical character and chemical composition that is consistently equivalent to the physical character and chemical composition of an intentionally manufactured product or produced raw material, if the use of the material presents no greater threat of harm to human health and the environment than the use of the product or raw material. A material may not be compared, for physical character and chemical composition, to a material that is no longer determined to be waste in accordance with § 287.7 (relating to determination that a material is no longer a waste). A coproduct determination, which shall be made in accordance with § 287.8 (relating to coproduct determinations), only applies to materials that will be applied to the land or used to produce products that are applied to the land, including the placement of roadway aggregate, pipe bedding or construction materials, or that will be used for energy recovery as is with a minimum BTU value of 5,000/lb. as generated or as fired. If the proposed coproduct material is oil, a determination may only be made for oil refined from crude oil or synthetically produced oil, not contaminated by physical or chemical impurities, that will be used for energy recovery if the material has a minimum heat content (BTU value) comparable to the petroleum fuel it will

replace.

(ii) The term only applies to one of the following:

(A) If the material is to be transferred in good faith as a commodity in trade, for use in lieu of an intentionally manufactured product or produced raw material, without processing that would not be required of the product or raw material, and the material is not accumulated speculatively. Sizing, shaping, or sorting of the material will not be considered processing for the purpose of this definition.

(B) If the material is to be used by the manufacturer or producer of the material in lieu of an intentionally manufactured product or produced raw material, without processing that would not be required of the product or raw material, and the material is not accumulated speculatively. Sizing, shaping, or sorting of the material will not be considered processing for the purpose of this definition.

(iii) If no product or produced raw material exists for purposes of chemical and physical comparison, the Department will review, upon request, information provided and determine whether the material is a coproduct because it is an effective substitute for an intentionally manufactured product or produced raw material, based on the criteria in subparagraph (ii) and whether the material presents a threat of harm to human health and the environment in accordance with § 287.8.

(iv) A waste may become a coproduct after processing if it would otherwise qualify as a coproduct.

(v) Persons producing, selling, transferring, possessing, or using a material who claim that the material is a coproduct and not a waste shall demonstrate that there is a known market or disposition for the material, and that they meet the terms of this definition and § 287.8. In doing so, they shall provide appropriate documentation, such as contracts showing that a second person uses the material as an ingredient in a production process, to demonstrate that the material is not a waste.

Coproduct Determination (25 PA Code § 287.8)

A coproduct determination is defined as follows:

(a) In addition to meeting the conditions of the definition of ‘‘coproduct’’ in § 287.1 (relating to definitions), a person performing a coproduct determination shall evaluate chemical composition and threat of harm to the environment and public health in accordance with this section. A proposed coproduct may not present a greater threat of harm to human health and the environment than use of an intentionally manufactured product or produced raw material. A greater threat of harm is presented if one of the following is met:

(1) For comparison of the proposed coproduct with a product or produced raw material, hazardous or toxic constituents are present at elevated levels unless an assessment of hazardous and toxic constituents demonstrates that the constituents are not biologically available.

(2) For a proposed coproduct where no product or produced raw material will be replaced, an assessment of hazardous and toxic constituents demonstrates that the constituents are not biologically available.

(b) If the proposed coproduct is being compared to an intentionally manufactured product or produced raw material, a person performing a coproduct determination shall demonstrate that the use of a proposed coproduct does not present a greater threat of harm to human health and the environment by performing the following:

(1) An evaluation to determine which, if any, hazardous or toxic constituents are present in the proposed coproduct at levels exceeding those found in the material it is replacing.

(2) An evaluation of the total levels of hazardous or toxic constituents, including the constituents in 40 CFR Part 261, Appendix VIII (relating to hazardous constituents) as incorporated by reference in § 261a.1 (relating to incorporation by reference, purpose and scope), to determine whether the total levels of constituents contained in the proposed coproduct exceed the total levels found in the intentionally manufactured product or produced raw material it is replacing. Based on generator knowledge, if a hazardous or toxic constituent is not present evaluation of total levels is not required.

(3) An evaluation of the levels of leaching of hazardous or toxic constituents, including the constituents in 40 CFR Part 261, Appendix VIII as incorporated by reference in § 261a.1, to determine whether the levels of leaching from the proposed coproduct exceed the levels of leaching from the manufactured product or produced raw material it is replacing. A leaching procedure shall be performed that is appropriate for the intended use of the proposed product. Based on generator knowledge, if a hazardous or toxic constituent is not present evaluation of leaching levels is not required.

(4) The routes of exposure to humans and ecological receptors shall be identified. These routes of exposure shall include ingestion, inhalation, dermal contact, leaching to the groundwater, plant uptake and surface runoff potential. Mitigating circumstances, such as protective gear worn by workers to reduce exposure during processing or application of the proposed coproduct, shall be identified.

(5) The use of a 95% upper confidence interval, using the ‘‘Test Methods for Evaluating Solid Waste’’ (EPA SW-846), may be applied to the comparisons of constituent levels between the proposed coproduct and the intentionally manufactured product or produced raw material it is replacing.

(c) If the proposed coproduct is not being compared to an intentionally manufactured product or produced raw material, a person performing a coproduct determination shall demonstrate that the proposed coproduct does not present a threat of harm to human health and the environment and the hazardous or toxic constituents are not biologically available by performing the following:

(1) An evaluation of the total levels of hazardous or toxic constituents, including the constituents in 40 CFR Part 261, Appendix VIII as incorporated by reference in § 261a.1. Based on generator knowledge, if a hazardous or toxic constituent is not present evaluation of total levels is not required.

(2) An evaluation of the levels of leaching of hazardous or toxic constituents, including the constituents in 40 CFR Part 261, Appendix VIII as incorporated in § 261a.1. Based on generator knowledge, if a hazardous or toxic constituent is not present evaluation of leaching levels is not required.

(3) The routes of exposure to humans and ecological receptors shall be identified. These routes of exposure include ingestion, inhalation, dermal contact, leaching to the groundwater, plant uptake and surface runoff potential. Mitigating circumstances, such as protective gear worn by workers to reduce exposure during processing or application of the proposed coproduct, shall be identified.

(4) The use of a 95% upper confidence interval, using the ''Test Methods for Evaluating Solid Waste'' (EPA SW-846), may be applied to the analytical results of the constituents evaluated.

(d) A person who completes a coproduct determination shall maintain documentation supporting the determination. This documentation shall be available to the Department upon request.

(e) A person who completes a coproduct determination shall provide documentation supporting the determination to persons selling, transferring, possessing or using the material.

ACBFS Material Testing

Physical Testing & Laboratory Analytical Results

The ACBFS undergoes a variety of laboratory testing to ensure that the material meets required state specifics, and to show that it is consistently equivalent to the physical character of mined aggregate. Various physical testing completed for the ACBFS in 2023 is provided below:

- Gradation test
- Sheer tests
- Expansion tests

A summary of the laboratory analytical reports is provided in **Attachment 3**.

Chemical Testing & Laboratory Analytical Results

The ACBFS also undergoes various laboratory testing to ensure that the material is ecologically benign, and consistently equivalent to the chemical composition of mined aggregate prior to being sold to various agencies. Based on industry standard knowledge and given the nature of how the ACBFS material is generated at US Steel, materials were not analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, and herbicides. Various chemical testing completed for the ACBFS in 2023 is provided below:

- Sulfate and leachate tests
- pH & Synthetic Precipitation Leaching Procedure (SPLP) pH
- Reactive sulfide
- Reactive cyanide

- Resource Conservation and Recovery Act (RCRA) 8 Metals
- Total metals & SPLP metals (including antimony, arsenic, cadmium, chromium VI, copper, iron, lead, manganese, nickel, thallium, and zinc)

Laboratory analytical results indicate that all constituents of concern concentrations were non-hazardous. Additionally, all concentrations were detected below their respective, most stringent Pennsylvania Department of Environmental Protection (PADEP) Statewide Health Standards (SHS), with the exception of total manganese and total thallium.

Concentrations of total manganese were detected in four ACBFS samples (#1, #2A, #8, and #57) ranging from 3,196.5 mg/kg to 4,143.4 mg/kg. These concentrations exceed the residential and non-residential soil to groundwater SHS of 30 mg/kg. However, SPLP analysis indicates that concentrations of manganese were detected below the PADEP groundwater SHS for a used aquifer in all four ACBFS samples, indicating that manganese does not have the potential to leach into groundwater. It should also be noted that the total manganese concentrations do not exceed their respective residential and non-residential direct contact SHS of 31,000 mg/kg and 190,000 mg/kg, respectively.

One concentration of total thallium was detected in one ACBFS sample (#8) at 10.37 mg/kg. This concentration exceeded the residential direct contact SHS of 2.2 mg/kg; however, this concentration detected below the non-residential direct contact (0-2') SHS of 32 mg/kg. This concentration was also detected below the residential and non-residential soil to groundwater SHS of 14 mg/kg. Given that the ACBFS is used for non-residential purposes (i.e., sub-base for roadways, sub-base under buildings, etc.) as indicated in **Table 1**, there is no potential for residential direct contact to thallium.

Laboratory analytical results confirm that the ACBFS is non-hazardous and consistently equivalent to the physical and chemical composition of mined aggregate. A table summarizing the analytical results is provided in **Table 2**, and the laboratory analytical report is provided in **Attachment 4**.

CONCLUSIONS

Coproduct determinations are a self-certification process that allows anyone generating a waste to make a determination if that waste material has the same physical and chemical characteristics as an intentionally manufactured product or raw material. If the entity generating the waste can prove it does, and that the use of the material presents no greater threat of harm to human health and the environmental than the use of an intentionally produced product, it is no longer considered a waste and can be used in place of that product. Under the coproduct program, operators must give their coproduct documentation to anyone they give their coproduct to for use.

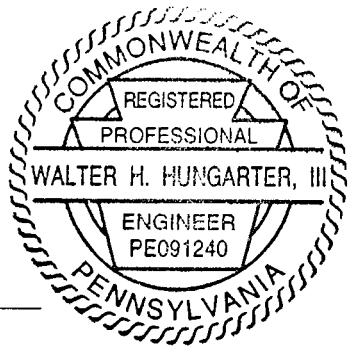
ACBFS is generated at US Steel and arrives onsite as unprocessed material. The material is only crushed and sized at the Duquesne Slag Site, and no chemical processing activities are involved in the processing. The ACBFS undergoes a variety of physical and chemical laboratory testing to ensure that the material is ecologically benign, and consistently equivalent to the physical character and chemical composition of mined aggregate prior to being sold to various

agencies. Laboratory analytical results indicate that all constituents of concern were detected below their respective PADEP SHS, with the exception of total manganese and total thallium. Total manganese was detected at concentration exceeding the PADEP residential and non-residential soil to groundwater SHS for manganese in four samples; however, SPLP results indicate that manganese does not have the potential to leach into groundwater. Total thallium was detected at a concentration exceeding the PADEP residential direct contact SHS for thallium in one sample; however, the concentration was below the PADEP non-residential direct contact SHS as well as the residential and nonresidential soil to groundwater SHS. These results indicate that thallium does not have the potential to leach into groundwater. Applications of ACBFS do not include the uses that allow for residential direct contact of the material. Both manganese and thallium are naturally occurring and can be found in mined aggregates at varying concentrations similar to ACBFS material.

This coproduct determination shows that the ACBFS material is consistently equivalent to the physical and chemical composition of mined aggregate and does not present a threat of harm to the environment or public health.

Based on this information, the ACBFS material processed at the Duquesne Slag Site meets the definition of a coproduct in accordance with 25 PA Code § 287.1 and § 287.8.

This coproduct determination was evaluated and approved by:



Walter H. Hungarter, III, P.E.
Vice President
RT Environmental Services, Inc.
Pennsylvania Registered Professional Engineer No. PE-091240

11/8/23
Date

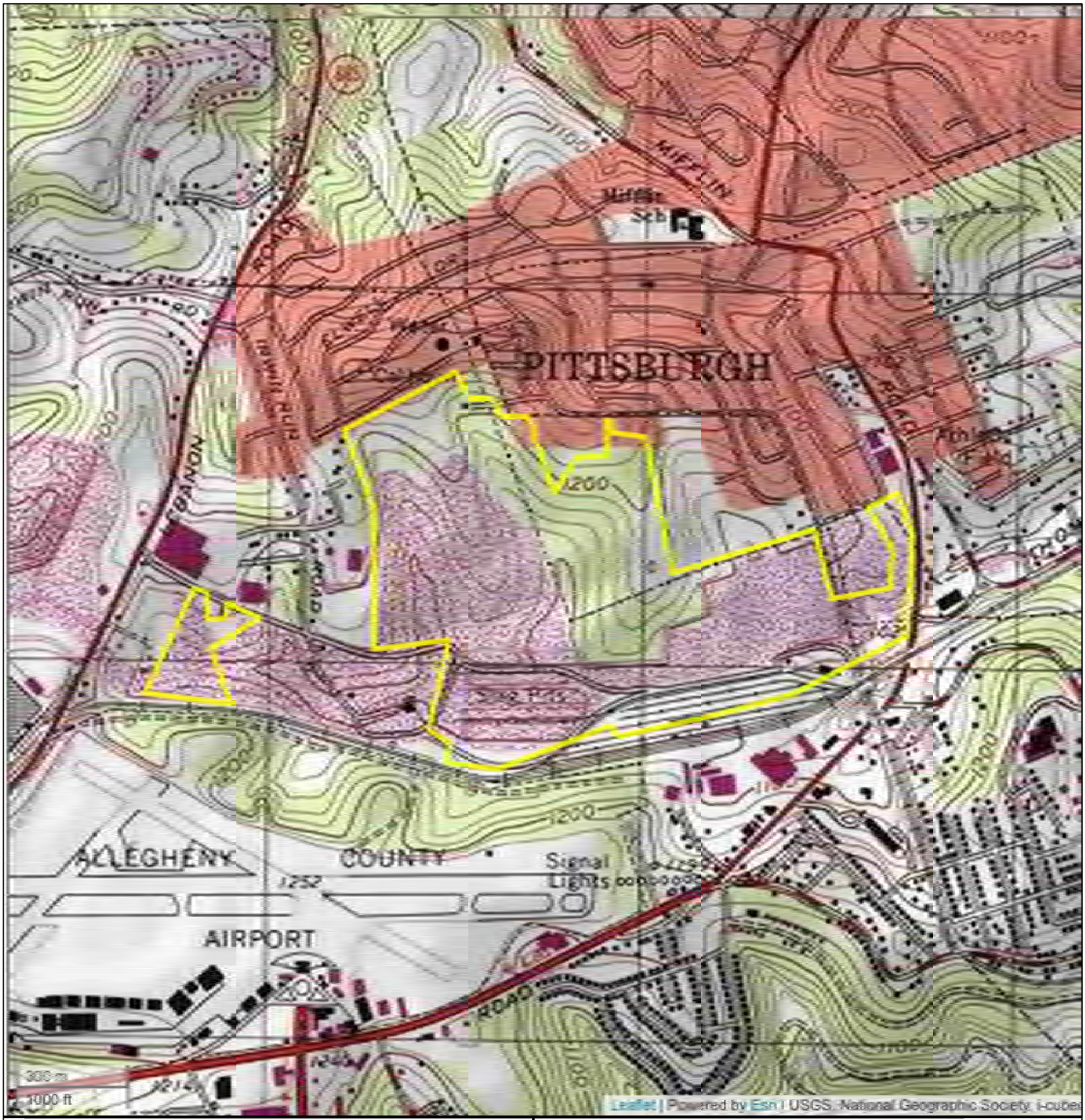
"By affixing my seal to this document, I am certifying that the information contained herein is true and correct. I further certify that I am licensed to practice engineering in the Commonwealth of Pennsylvania and that it is within my professional area of expertise to verify the correctness of this information."

FIGURES

TABLES

ATTACHMENTS

FIGURES



LEGEND

Site Boundary

0 300' 600'

RT Environmental Services, Inc.
215 West Church Road
King of Prussia, PA 19406

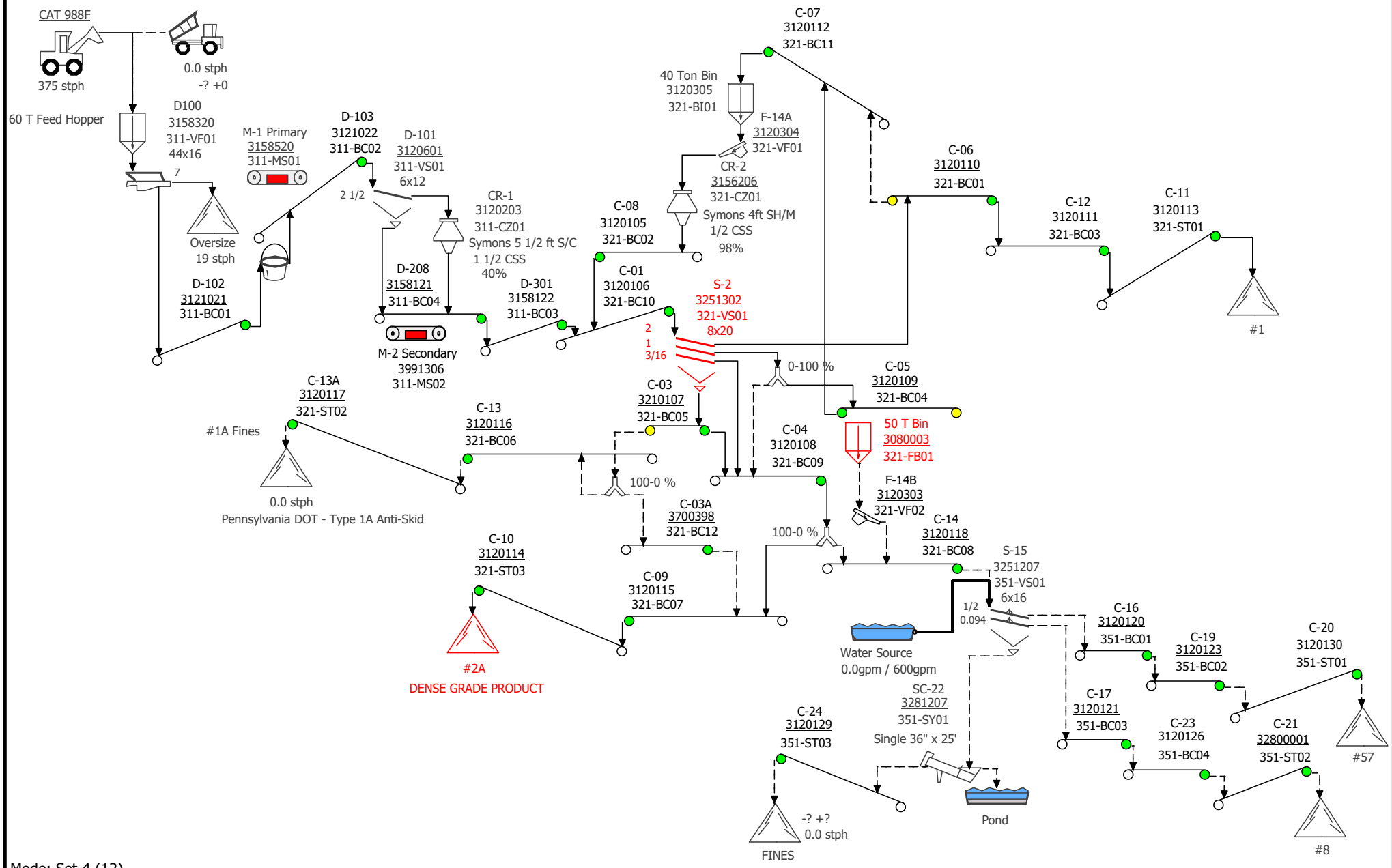
FIGURE 1
SITE LOCATION MAP

4810 BUTTERMILK HOLLOW ROAD, WEST MIFFLIN, PA

Prepared For:
Holcim Redland Quarries NY, Inc.
6401 Golden Triangle Dr., Suite 400
Greenbelt, MD 20770

CHARGE	5750-01	AUTOCAD FILE	ENGINEER	DESIGNER	DRAFTSPERSON	TS
SCALE	1:300	DRAWING NUMBER			REVISION	
DATE	11/1/2023					

Duquesne Quarry - 3305.agzx



Mode: Set 4 (12)

Calculation results may differ due to variations in operating conditions and application of crushing and screening equipment. This information does not constitute an express or implied warranty, but shows results of calculations based on information provided by customers or equipment manufacturers. Use this information for estimating purposes only.

All calculations performed by AggFlow. http://www.AggFlow.com

Lafarge

Figure 2

Duquesne Quarry - 3305.agzx

Trulane Vanatta

Plant Stage #1: Slag Processing Plant

Project #: 56272 Revision #: 222405 Date: October/20/2020

TABLES

Application	Air Cooled Blast Furnace Slag
Aggregate in Portland Cement Concrete	
Highways	ASTM / AASHTO # 1, 8, 57
Airport Runways	
Parking Lots	
Basement Floors	
Driveways	
Water and Sanitary Treatment Plants	
Buildings	
Bridge Decks	
Concrete Block	
Chip Seal Aggregate	
Highways	ASTM / AASHTO # 8, 57
Country Roads	
Private Roads	
Asphalt Pavement	
Highways	ASTM / AASHTO # 8, 57
Parking Lots	
Driveways	
Dense Graded Aggregate	
Base Under Concrete	ASTM / AASHTO # 2A, 10
Base Under all Asphalt Concrete	
Macadam Base	
Bring Building Site to Grade	
Structural Fill Base Under Concrete (inside and outside buildings)	
Base Under Runways	
Retaining Walls	
Concrete	ASTM / AASHTO # 1,57,8,10,2A
Steel Piling	
Earth Retaining Walls w/Friction Strips	
Earth Retaining Walls w/Tie back to "Deadmen"	
Decorative Paving Walls	
Conduit - Bedding and Backfill	
Sanitary	ASTM / AASHTO # 1,57,8,10,2A
Storm	
Water	
Buried Electrical & Phone Conduit	
Natural Gas Lines	
All Utility Lines	

Notes:
ACBFS = Air Cooled Blast Furnace Slag
ASTM = American Society for Testing and Materials
AASHTO = American Association of State Highway and Transportation Officials

TABLE 2
ACBFS ANALYTICAL RESULTS

Sample ID	Units	#1		#2A		#8		#57		#2A; 4-Pt Comp (1)		#2A; 4-Pt Comp (2)		Unprocessed ACBFS; 4-Pt Comp		PADEP Statewide Health Standards				
Lab ID		308262		308263		308261		308264		318375		318376		318374		Residential		Non-Residential		
Sample Date		4/19/2023		4/19/2023		4/19/2023		4/19/2023		10/11/2023		10/11/2023		10/11/2023		Direct Contact	Soil to Groundwater	Direct Contact (0-2')	Direct Contact (2'-15')	Soil to Groundwater
		Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL					
Total Metals																				
Antimony	mg/kg	<10	10	<10	10	<10	10	<10	10	NA	NA	NA	NA	NA	NA	88	27	190000	190000	27
Arsenic	mg/kg	<10	10	<10	NA	<10	NA	<10	NA	0.35	0.30	0.36	0.30	0.32	0.30	12	29	61	190000	29
Barium	mg/kg	NA	NA	NA	10	NA	10	NA	10	153	0.20	158.06	0.20	124.2	0.20	44000	8200	190000	190000	8200
Cadmium	mg/kg	<10	10	<10	NA	<10	NA	<10	NA	<0.10	0.10	<0.10	0.10	<0.10	0.10	110	38	1600	190000	38
Chromium	mg/kg	NA	NA	NA	0.8	NA	0.8	NA	0.8	57.8	0.30	57.53	0.30	53.23	0.30	NS	NS	NS	NS	NS
Chromium VI	mg/kg	<0.80	0.8	<0.81	0.81	0.8	0.8	<0.81	0.81	NA	NA	NA	NA	NA	NA	37	190	180	140000	190
Copper	mg/kg	<10	10	<10	10	<10	10	<10	10	NA	NA	NA	NA	NA	NA	7200	43000	100000	190000	43000
Iron	mg/kg	1044.4	10	1899.2	10	5928.6	10	1550.70	10	NA	NA	NA	NA	NA	NA	150000	NS	190000	190000	NS
Lead	mg/kg	<10	10	<10	10	<10	10	<10	10	0.79	0.30	1.23	0.30	0.50	0.30	500	450	1000	190000	450
Manganese	mg/kg	4143.4	10	3429.6	10	3838.9	10	3196.5	10	NA	NA	NA	NA	NA	NA	31000	30	190000	190000	30
Nickel	mg/kg	<10	10	<10	NA	<10	NA	<10	NA	NA	NA	NA	NA	NA	NA	4400	650	64000	190000	650
Selenium	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	4.61	0.30	4.45	0.30	4.14	0.30	1100	26	16000	190000	26
Silver	mg/kg	NA	NA	NA	10	NA	10	NA	10	<1.9	1.9	<1.9	1.9	<1.9	1.9	1100	84	16000	190000	84
Thallium	mg/kg	<10	10	<10	10	10.37	10	<10	10	NA	NA	NA	NA	NA	NA	2.2	14	32	190000	14
Zinc	mg/kg	<10	10	<10	NA	<10	NA	<10	NA	NA	NA	NA	NA	NA	NA	66000	12000	190000	190000	12000
Mercury	mg/kg	NA	NA	NA	NS	NA	NS	NA	NS	0.0013	0.001	0.0012	0.001	0.001	0.001	35	10	510	190000	10
Reactive Cyanide*	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	0.2	<0.2	0.2	<0.2	0.2	NS	NS	NS	NS	NS
Reactive Sulfide**	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	23.9	2.5	19.1	2.5	21.8	2.5	NS	NS	NS	NS	NS
pH	pH Unit	NA	NA	NA	NA	NA	NA	NA	NA	11.26	NS	11.10	NS	11.40	NS	NS	NS	NS	NS	NS

Notes:
ACBFS: Air Cooled Blast Furnace Slag
NA: Not Analyzed
NS: No Standard
RL: Reporting Limit
PADEP: Pennsylvania Department of Environmental Protection
SHS: Statewide Health Standards
Soil to Groundwater: Higher valu utilized when compared to the 100x gw vs generic value PADEP standards
Reactive Cyanide*: No PADEP SHS for this constituent. Waste capable of release for than 250 mg/kg of reactive cyanide is considered a hazardous waste per EPA.
Reactive Sulfide**: No PADEP SHS for this constituent. Waste capable of release for than 500 mg/kg of reactive sulfide is considered a hazardous waste per EPA.

Sample ID	Units	#1		#2A		#8		#57		#2A; 4-Pt Comp (1)		#2A; 4-Pt Comp (2)		Unprocessed ACBFS; 4-Pt Comp		PADEP Statewide Health Standards	
Lab ID		308262		308263		308261		308264		318375		318376		318374		Groundwater Used Aquifer	
Sample Date		4/19/2023		4/19/2023		4/19/2023		4/19/2023		10/11/2023		10/11/2023		10/11/2023		Residential	Non-Residential
		Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL		
SPLP Metals																	
Antimony	mg/L	<0.0010	0.001	<0.0010	0.001	<0.0010	0.001	<0.0010	0.001	NA	NA	NA	NA	NA	NA	0.006	0.006
Arsenic	mg/L	<0.0003	0.003	<0.0003	0.003	<0.0003	0.003	<0.0003	0.003	NA	NA	NA	NA	NA	NA	0.01	0.01
Cadmium	mg/L	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	NA	NA	NA	NA	NA	NA	0.005	0.005
Chromium	mg/L	0.0049	0.0003	0.0051	0.0003	0.0068	0.0003	0.0149	0.0003	NA	NA	NA	NA	NA	NA	0.1	0.1
Copper	mg/L	<0.1000	0.1000	<0.1000	0.1000	<0.1000	0.1000	<0.1000	0.1000	NA	NA	NA	NA	NA	NA	1.0	1.0
Iron	mg/L	<0.1000	0.1000	<0.1000	0.1000	<0.1000	0.1000	<0.1000	0.1000	NA	NA	NA	NA	NA	NA	NS	NS
Lead	mg/L	<0.0003	0.0003	<0.0003	0.0003	<0.0003	0.0003	0.00033	0.0003	NA	NA	NA	NA	NA	NA	0.005	0.005
Manganese	mg/L	<0.1000	0.1000	<0.1000	0.1000	<0.1000	0.1000	<0.1000	0.1000	NA	NA	NA	NA	NA	NA	0.3	0.3
Nickel	mg/L	<0.1000	0.1000	<0.1000	0.1000	<0.1000	0.1000	<0.1000	0.1000	NA	NA	NA	NA	NA	NA	0.1	0.1
Thallium	mg/L	<0.0002	0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002	0.0002	NA	NA	NA	NA	NA	NA	0.002	0.002
Zinc	mg/L	<0.1000	0.1000	<0.1000	0.1000	<0.1000	0.1000	<0.1000	0.1000	NA	NA	NA	NA	NA	NA	2.0	2.0
SPLP pH	pH Units	4.21	NS	4.23	NS	4.21	NS	4.23	NS	NA	NA	NA	NA	NA	NA	NS	NS

Notes:
ACBFS: Air Cooled Blast Furnace Slag
NA: Not Analyzed
NS: No Standard
RL: Reporting Limit
PADEP: Pennsylvania Department of Environmental Protection
SHS: Statewide Health Standards
SPLP: Synethetic Precipitation Leaching Procedure

ATTACHMENTS

ATTACHMENT 1

2023 PENNDOT BULLETIN CHART 14

HOLCIM DUQUESNE SLAG

AIR COOLED BLAST FURNACE SLAG

2023 PennDOT
Bulletin 14 Chart

Attribute	Product 1	Product 2	Product 3	Product 4	Product 5
Supplier Code	LND02A14	LND02A14	LND02A14	LND02A14	LND02A14
Material Code	203	203	203	207	203
Material Class	**A10SL**	**A57SL**	**A8SL**	**B3**	**S2ASL**
Status	Approved	Approved	Approved	Approved	Approved
Approval Date	3/7/2023	1/27/2023	1/27/2023	3/7/2023	2/2/2023
Primary Address	Holcim	Holcim	Holcim	Holcim	Holcim
Lab Number	L22036512	L22030754	L22030755	L22036513	L22030753
Bulk Specific Gravity (SSD)	2.67	2.438	2.477	2.662	2.38
Bulk Specific Gravity	2.615	2.367	2.39	2.601	2.299
Absorption	2.10	3.00	3.64	2.38	3.53
Sodium Sulfate Soundness	1%	1%	1%	1%	1%
Alkali-Silica Reactivity (ASR) ASTM C1293		0.014	0.014		
ASTM C1293 Reactivity Class		R0	R0		
Uncompacted Voids	47			48	
Sand Equivalency	98			93	
Rock Compositions & Order Of Abundance	SB (Blast Furnace Slag): 1	SB (Blast Furnace Slag): 1	SB (Blast Furnace Slag): 1	SB (Blast Furnace Slag): 1	SB (Blast Furnace Slag): 1
Skid Resistance Level Type		H	H		
Los Angeles Abrasion		44	33		39
Micro-Deval Loss		18	16		

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ATTACHMENT 2
CONSTITUENT CONCENTRATIONS

HOLCIM DUQUESNE SLAG

AIR COOLED BLAST FURNACE SLAG

Oxides and Carbon Test Data

Oxides	Dry Basis wt%
SiO2	37.10
Al2O3	8.62
Fe2O3	0.30
CaO	37.97
MgO	9.77
TiO2	0.35
SO3	3.70
Na2O	0.32
K2O	0.53
BaO	0.04
MnO2	0.49
SrO	0.06
V2O5	0.02
Cr2O3	0.01

Elements	Dry Basis wt%
Carbon	0.24

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ATTACHMENT 3

PHYSICAL TESTING LABORATORY ANALYTICAL REPORTS

HOLCIM DUQUESNE SLAG

AIR COOLED BLAST FURNACE SLAG

#1 Gradation
Test Results

Quality Statistical Summary Report - #1s		
Period	01/01/2023 - 05/08/2023	
Sieve/Test	Average	Specification
4" (100mm)	100	100-100
3 1/2" (90mm)	98	90-100
2 1/2" (63mm)	37	25-60
1 1/2" (37.5mm)	2	0-15
3/4" (19mm)	1	0-5
Pan	0.00	0.00

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AIR COOLED BLAST FURNACE SLAG

2A Gradation
Test Results

2A Quality Statistical Summary Report		
Period	01/01/2023 - 05/08/2023	
Sieve/Test	Average	Specification
2" (50mm)	100.0	100-100
1 1/2" (37.5mm)	99.5	
1" (25mm)	95.7	
3/4" (19mm)	78.4	52-100
1/2" (12.5mm)	52.8	
3/8" (9.5mm)	43.1	36-70
#4 (4.75mm)	30.5	24-50
#8 (2.36mm)	25.2	
#16 (1.18mm)	19.7	10-30
#30 (.6mm)	15.1	
#50 (.3mm)	10.2	
#100 (.15mm)	5.8	
#200 (75µm)	2.98	0-10
Pan	0.00	

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HOLCIM DUQUESNE SLAG

AIR COOLED BLAST FURNACE SLAG

#8 Gradation
Test Results

#8 Quality Statistical Summary Report		
Period	01/01/2023 - 05/08/2023	
Sieve/Test	Average	Specification
1/2" (12.5mm)	100.0	100-100
3/8" (9.5mm)	96.1	85-100
1/4" (6.3mm)	54.0	
#4 (4.75mm)	23.8	10-30
#8 (2.36mm)	3.6	0-10
#16 (1.18mm)	2.4	0-5
Pan	0.00	

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HOLCIM DUQUESNE SLAG

AIR COOLED BLAST FURNACE SLAG

#57 Gradation
Test Results

#57 Quality Statistical Summary Report		
Period	01/01/2023 - 05/08/2023	
Sieve/Test	Average	Specification
1 1/2" (37.5mm)	100.0	100-100
1" (25mm)	97.4	95-100
3/4" (19mm)	75.1	
1/2" (12.5mm)	35.1	25-60
3/8" (9.5mm)	10.9	
#4 (4.75mm)	3.3	0-10
#8 (2.36mm)	2.7	0-5
Pan	0.00	

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HOLCIM DUQUESNE SLAG

AIR COOLED BLAST FURNACE SLAG

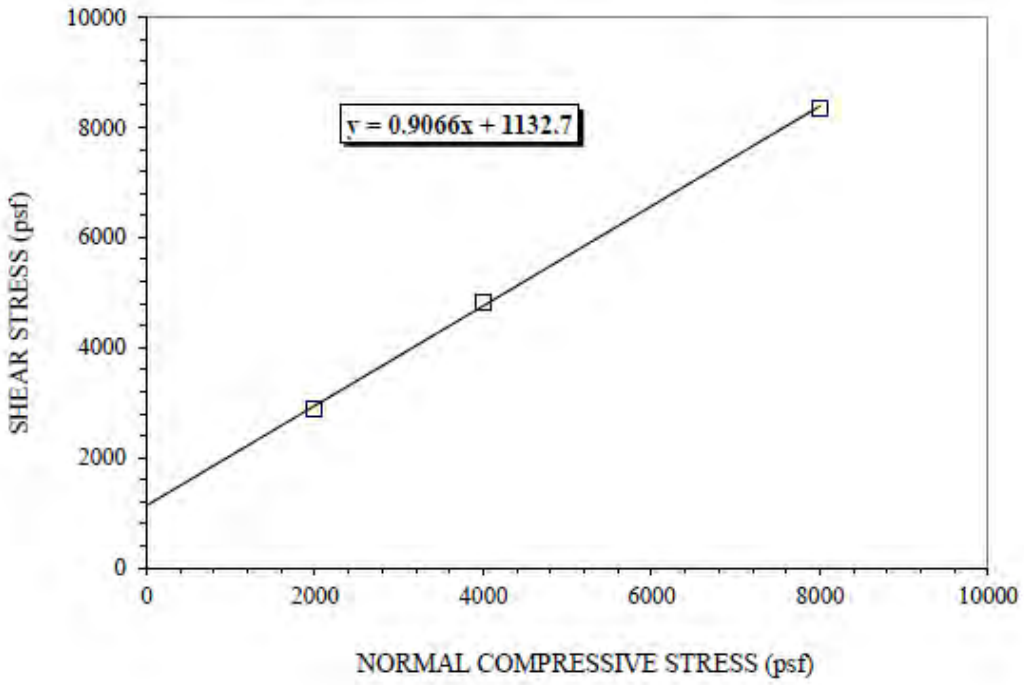
2A Sheer
Test Results

INTERFACE : **12" Direct Shear of #2A Aggregate**
@ 106.0 pcf & 7.8 % M.C.

PEAK SHEAR

FRICTION ANGLE (deg) :	Φ =	42.2
COEFFICIENT OF FRICTION :	=	0.907
COHESION [Calculated] (psf):	a =	1133

NOTES:
1.) Specimen was lightly compacted at the as-received moisture content.
2.) The specimen was loaded & seated for 1 hour prior to shearing.
3.) The peak friction angle was calculated using linear regression on the three data points.



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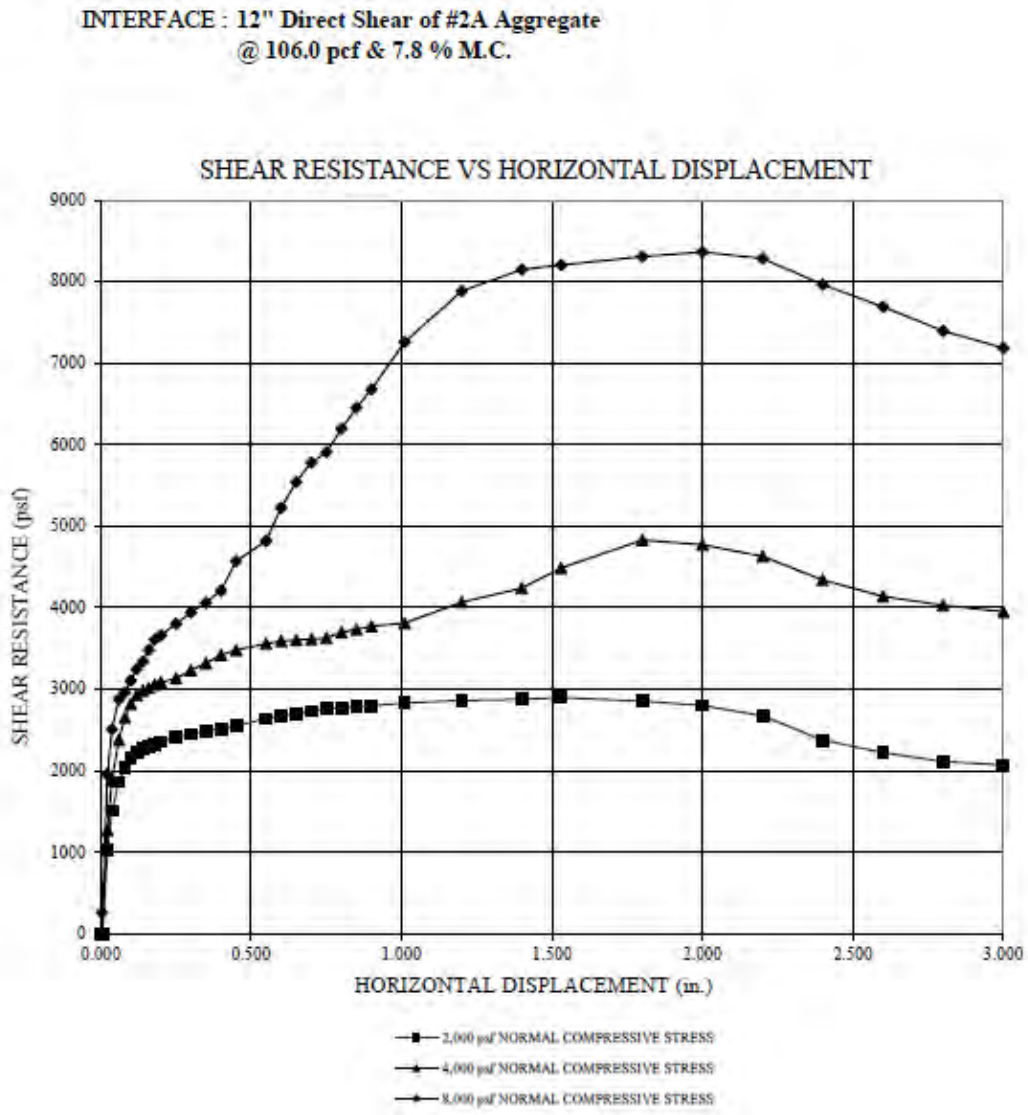
AIR COOLED BLAST FURNACE SLAG

2A Sheer Test Results



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AIR COOLED BLAST FURNACE SLAG

2A Sheer Test Results

INTERFACE: 12" Direct Shear of #2A Aggregate
@ 106.0 pcf & 7.8 % M.C.

STRAIN RATE (in / min) : 0.04
PLACEMENT CONDITION: Dry

DIRECT SHEAR UNIT: Durham Geo
NORMAL LOAD: Hydraulic Cylinder

NORMAL LOAD (psf)	2000
PEAK SHEAR STRESS (psf)	2898
PEAK SECANT ANGLE (deg)	55.4
RESIDUAL SHEAR (psf)	2071
RESID. SECANT ANGLE (deg)	46.0

NORMAL LOAD (psf)	4000
PEAK SHEAR STRESS (psf)	4830
PEAK SECANT ANGLE (deg)	50.4
RESIDUAL SHEAR (psf)	3951
RESID. SECANT ANGLE (deg)	44.6

NORMAL LOAD (psf)	8000
PEAK SHEAR STRESS (psf)	8362
PEAK SECANT ANGLE (deg)	46.3
RESIDUAL SHEAR (psf)	7186
RESID. SECANT ANGLE (deg)	41.9

HORIZONTAL			HORIZONTAL			HORIZONTAL		
DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)	DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)	DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)
0.000	0	0	0.000	0	0	0.000	0	0
0.005	2	2	0.005	3	3	0.005	263	263
0.023	1037	1037	0.023	1275	1275	0.023	1958	1958
0.038	1512	1512	0.038	1887	1887	0.038	2509	2509
0.060	1865	1865	0.060	2380	2380	0.060	2876	2876
0.080	2046	2046	0.080	2656	2656	0.080	2962	2962
0.100	2153	2153	0.100	2821	2821	0.100	3107	3107
0.120	2220	2220	0.120	2926	2926	0.120	3248	3248
0.140	2266	2266	0.140	2983	2983	0.140	3342	3342
0.160	2295	2295	0.160	3016	3016	0.160	3485	3485
0.180	2328	2328	0.180	3058	3058	0.180	3610	3610
0.200	2356	2356	0.200	3083	3083	0.200	3664	3664
0.250	2413	2413	0.250	3133	3133	0.250	3803	3803
0.300	2451	2451	0.300	3234	3234	0.300	3943	3943
0.350	2486	2486	0.350	3319	3319	0.350	4063	4063
0.400	2517	2517	0.400	3422	3422	0.400	4208	4208
0.450	2554	2554	0.450	3482	3482	0.450	4571	4571
0.550	2639	2639	0.550	3559	3559	0.550	4820	4820
0.600	2677	2677	0.600	3593	3593	0.600	5227	5227
0.650	2700	2700	0.650	3605	3605	0.650	5544	5544
0.700	2732	2732	0.700	3614	3614	0.700	5781	5781
0.750	2760	2760	0.750	3631	3631	0.750	5906	5906
0.800	2776	2776	0.800	3699	3699	0.800	6197	6197
0.850	2788	2788	0.850	3733	3733	0.850	6453	6453
0.900	2797	2797	0.900	3772	3772	0.900	6681	6681
1.010	2832	2832	1.010	3813	3813	1.010	7259	7259
1.200	2863	2863	1.200	4070	4070	1.200	7883	7883
1.400	2877	2877	1.400	4240	4240	1.400	8149	8149
1.530	2898	2898	1.530	4488	4488	1.530	8202	8202
1.800	2855	2855	1.800	4830	4830	1.800	8306	8306
2.000	2801	2801	2.000	4773	4773	2.000	8362	8362
2.200	2675	2675	2.200	4632	4632	2.200	8283	8283
2.400	2378	2378	2.400	4342	4342	2.400	7964	7964
2.600	2224	2224	2.600	4141	4141	2.600	7689	7689
2.800	2115	2115	2.800	4031	4031	2.800	7395	7395
3.000	2071	2071	3.000	3951	3951	3.000	7186	7186

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HOLCIM DUQUESNE SLAG

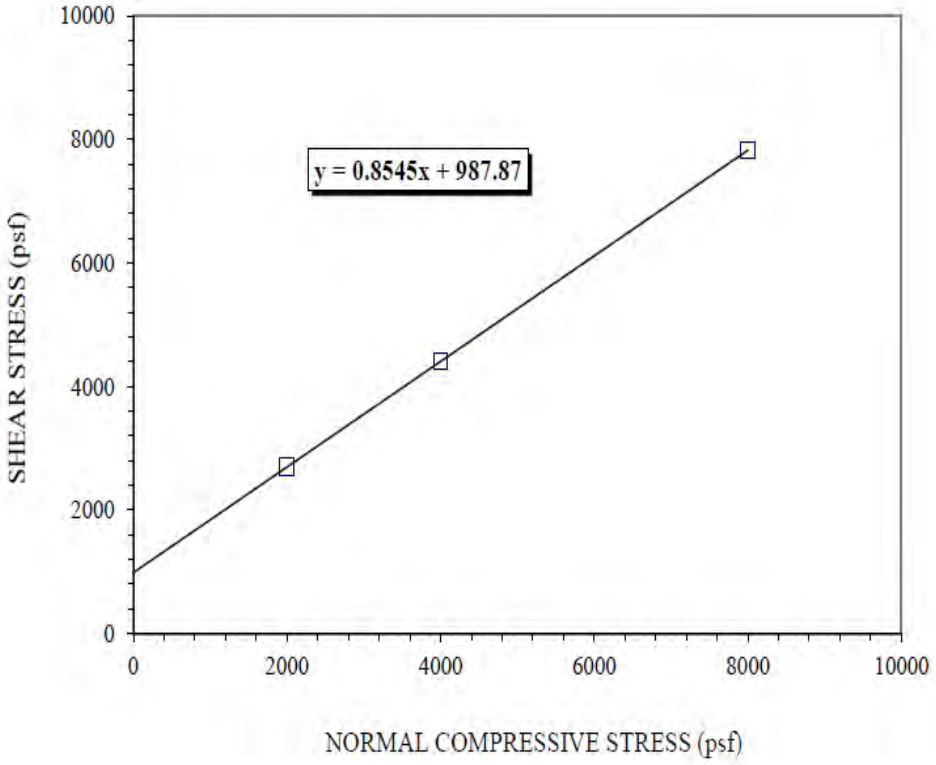
AIR COOLED BLAST FURNACE SLAG

#8 Sheer
Test Results

INTERFACE : **12" Direct Shear of #8 Aggregate**
@ 88.2 pcf & 7.1 % M.C.

		PEAK SHEAR
FRICTION ANGLE (deg) :	**Φ =**	**40.5**
COEFFICIENT OF FRICTION :	**=**	**0.855**
COHESION [Calculated] (psf):	**a =**	**988**

NOTES:
1.) Specimen was lightly compacted at the as-received moisture content.
2.) The specimen was loaded & seated for 1 hour prior to shearing.
3.) The peak friction angle was calculated using linear regression on the three data points.



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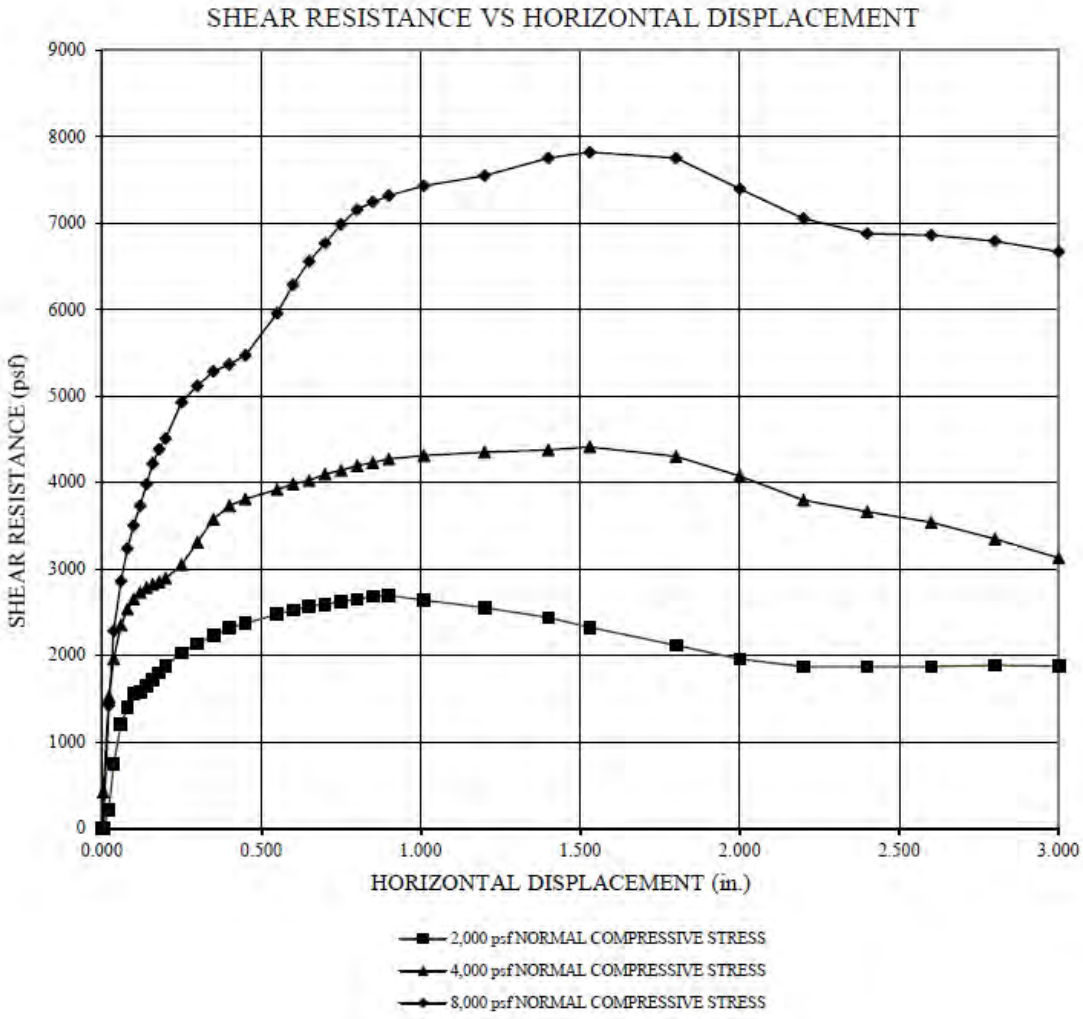

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#8 Sheer
Test Results

INTERFACE: **12" Direct Shear of #8 Aggregate @ 88.2 pcf & 7.1 % M.C.**

STRAIN RATE (in / min) : 0.04 DIRECT SHEAR UNIT: Geo Test 1

PLACEMENT CONDITION: Dry NORMAL LOAD: Hydraulic Cylinder

NORMAL LOAD (psf)	2000
PEAK SHEAR STRESS (psf)	2693
PEAK SECANT ANGLE (deg)	53.4
RESIDUAL SHEAR (psf)	1877
RESID. SECANT ANGLE (deg)	43.2

NORMAL LOAD (psf)	4000
PEAK SHEAR STRESS (psf)	4411
PEAK SECANT ANGLE (deg)	47.8
RESIDUAL SHEAR (psf)	3126
RESID. SECANT ANGLE (deg)	38.0

NORMAL LOAD (psf)	8000
PEAK SHEAR STRESS (psf)	7822
PEAK SECANT ANGLE (deg)	44.4
RESIDUAL SHEAR (psf)	6670
RESID. SECANT ANGLE (deg)	39.8

HORIZONTAL			HORIZONTAL			HORIZONTAL		
DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)	DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)	DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)
0.000	0	0	0.000	0	0	0.000	0	0
0.005	1	1	0.005	420	420	0.005	2	2
0.023	214	214	0.023	1523	1523	0.023	1423	1423
0.038	746	746	0.038	1962	1962	0.038	2282	2282
0.060	1205	1205	0.060	2351	2351	0.060	2857	2857
0.080	1399	1399	0.080	2536	2536	0.080	3237	3237
0.100	1562	1562	0.100	2653	2653	0.100	3503	3503
0.120	1572	1572	0.120	2731	2731	0.120	3732	3732
0.140	1649	1649	0.140	2781	2781	0.140	3981	3981
0.160	1721	1721	0.160	2820	2820	0.160	4222	4222
0.180	1798	1798	0.180	2850	2850	0.180	4385	4385
0.200	1879	1879	0.200	2892	2892	0.200	4511	4511
0.250	2030	2030	0.250	3048	3048	0.250	4929	4929
0.300	2133	2133	0.300	3310	3310	0.300	5122	5122
0.350	2231	2231	0.350	3575	3575	0.350	5288	5288
0.400	2313	2313	0.400	3729	3729	0.400	5369	5369
0.450	2372	2372	0.450	3809	3809	0.450	5472	5472
0.550	2475	2475	0.550	3920	3920	0.550	5958	5958
0.600	2525	2525	0.600	3983	3983	0.600	6287	6287
0.650	2569	2569	0.650	4023	4023	0.650	6560	6560
0.700	2592	2592	0.700	4096	4096	0.700	6767	6767
0.750	2621	2621	0.750	4141	4141	0.750	6988	6988
0.800	2649	2649	0.800	4196	4196	0.800	7158	7158
0.850	2681	2681	0.850	4232	4232	0.850	7245	7245
0.900	2693	2693	0.900	4273	4273	0.900	7319	7319
1.010	2640	2640	1.010	4312	4312	1.010	7433	7433
1.200	2553	2553	1.200	4353	4353	1.200	7551	7551
1.400	2438	2438	1.400	4378	4378	1.400	7755	7755
1.530	2326	2326	1.530	4411	4411	1.530	7822	7822
1.800	2116	2116	1.800	4301	4301	1.800	7754	7754
2.000	1958	1958	2.000	4076	4076	2.000	7397	7397
2.200	1872	1872	2.200	3796	3796	2.200	7054	7054
2.400	1866	1866	2.400	3663	3663	2.400	6882	6882
2.600	1871	1871	2.600	3540	3540	2.600	6860	6860
2.800	1885	1885	2.800	3348	3348	2.800	6793	6793
3.000	1877	1877	3.000	3126	3126	3.000	6670	6670

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HOLCIM DUQUESNE SLAG

AIR COOLED BLAST FURNACE SLAG

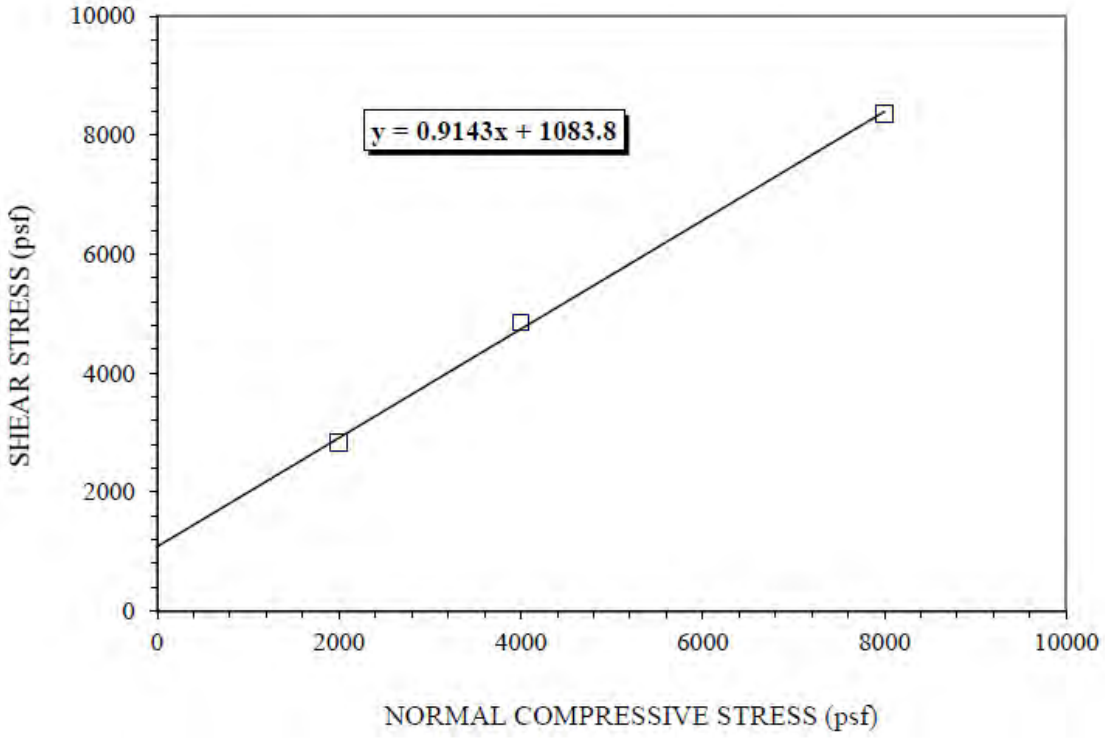
#57 Sheer
Test Results

INTERFACE : **12" Direct Shear of #57 Aggregate**
@ 86.1 pcf & 5.7 % M.C.

PEAK SHEAR

FRICTION ANGLE (deg) :	**Φ =**	**42.4**
COEFFICIENT OF FRICTION :	**=**	**0.914**
COHESION [Calculated] (psf):	**a =**	**1084**

NOTES:
1.) Specimen was lightly compacted at the as-received moisture content.
2.) The specimen was loaded & seated for 1 hour prior to shearing.
3.) The peak friction angle was calculated using linear regression on the three data points.



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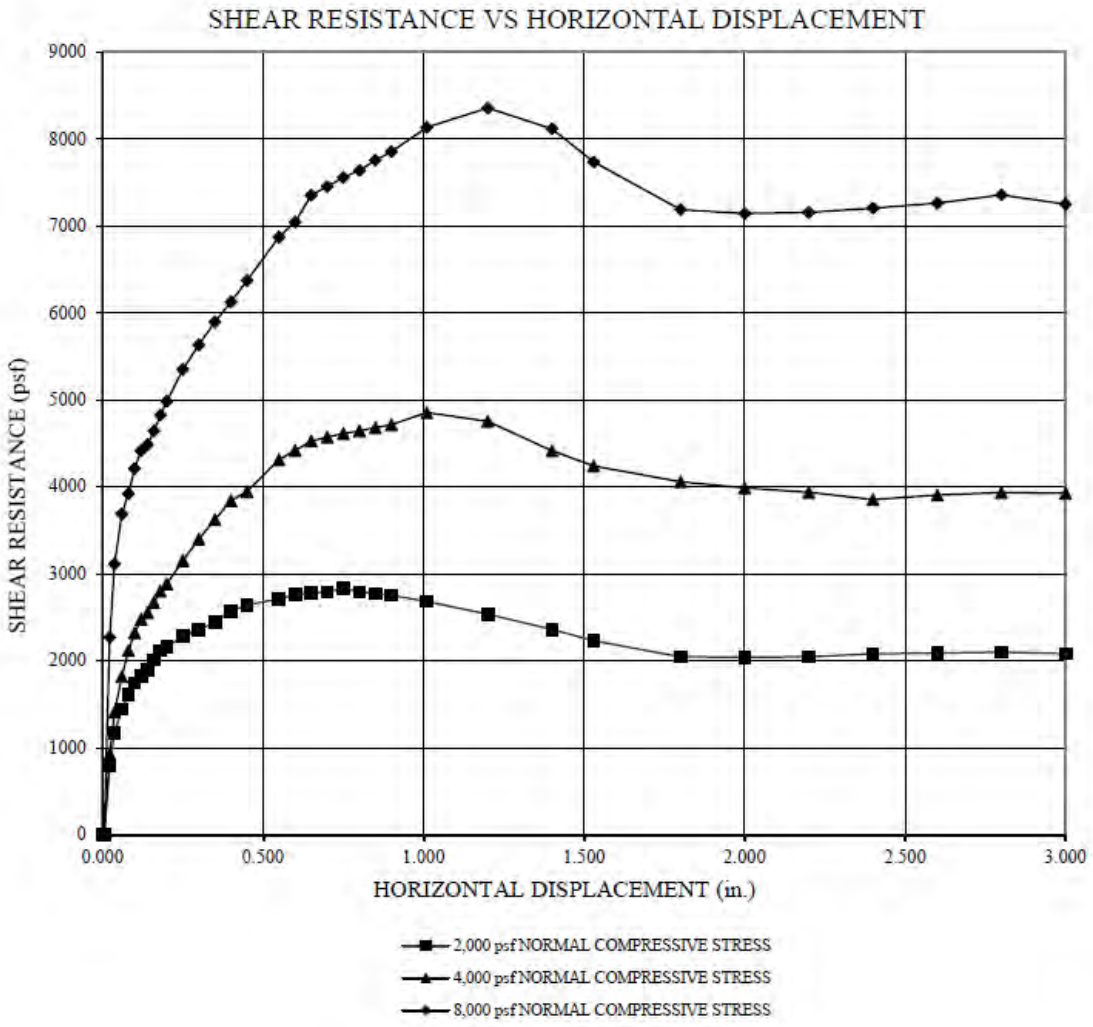
Test Results

INTERFACE : **12" Direct Shear of #57 Aggregate**
@ 86.1 pcf & 5.7 % M.C.



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AIR COOLED BLAST FURNACE SLAG

#57 Sheer
Test Results

INTERFACE: **12" Direct Shear of #57 Aggregate @ 86.1 pcf & 5.7 % M.C.**

STRAIN RATE (in / min) : 0.04
PLACEMENT CONDITION: Dry

DIRECT SHEAR UNIT: Geo Test 1
NORMAL LOAD: Hydraulic Cylinder

NORMAL LOAD (psf)	2000
PEAK SHEAR STRESS (psf)	2836
PEAK SECANT ANGLE (deg)	54.8
RESIDUAL SHEAR (psf)	2081
RESID. SECANT ANGLE (deg)	46.1

NORMAL LOAD (psf)	4000
PEAK SHEAR STRESS (psf)	4856
PEAK SECANT ANGLE (deg)	50.5
RESIDUAL SHEAR (psf)	3926
RESID. SECANT ANGLE (deg)	44.5

NORMAL LOAD (psf)	8000
PEAK SHEAR STRESS (psf)	8360
PEAK SECANT ANGLE (deg)	46.3
RESIDUAL SHEAR (psf)	7252
RESID. SECANT ANGLE (deg)	42.2

HORIZONTAL			HORIZONTAL			HORIZONTAL		
DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)	DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)	DISPLACE. (in.)	SHEAR FORCE (lbs)	STRESS (psf)
0.000	0	0	0.000	0	0	0.000	0	0
0.005	4	4	0.005	2	2	0.005	2	2
0.023	797	797	0.023	927	927	0.023	2268	2268
0.038	1174	1174	0.038	1410	1410	0.038	3115	3115
0.060	1443	1443	0.060	1819	1819	0.060	3690	3690
0.080	1613	1613	0.080	2116	2116	0.080	3922	3922
0.100	1744	1744	0.100	2321	2321	0.100	4212	4212
0.120	1825	1825	0.120	2476	2476	0.120	4417	4417
0.140	1890	1890	0.140	2551	2551	0.140	4487	4487
0.160	2011	2011	0.160	2671	2671	0.160	4644	4644
0.180	2117	2117	0.180	2801	2801	0.180	4824	4824
0.200	2161	2161	0.200	2887	2887	0.200	4983	4983
0.250	2281	2281	0.250	3153	3153	0.250	5351	5351
0.300	2355	2355	0.300	3401	3401	0.300	5634	5634
0.350	2448	2448	0.350	3625	3625	0.350	5898	5898
0.400	2575	2575	0.400	3841	3841	0.400	6129	6129
0.450	2643	2643	0.450	3945	3945	0.450	6375	6375
0.550	2711	2711	0.550	4312	4312	0.550	6875	6875
0.600	2763	2763	0.600	4418	4418	0.600	7047	7047
0.650	2777	2777	0.650	4527	4527	0.650	7356	7356
0.700	2793	2793	0.700	4573	4573	0.700	7456	7456
0.750	2836	2836	0.750	4613	4613	0.750	7561	7561
0.800	2791	2791	0.800	4642	4642	0.800	7640	7640
0.850	2774	2774	0.850	4682	4682	0.850	7757	7757
0.900	2755	2755	0.900	4714	4714	0.900	7855	7855
1.010	2681	2681	1.010	4856	4856	1.010	8134	8134
1.200	2536	2536	1.200	4755	4755	1.200	8360	8360
1.400	2361	2361	1.400	4415	4415	1.400	8118	8118
1.530	2230	2230	1.530	4239	4239	1.530	7738	7738
1.800	2045	2045	1.800	4058	4058	1.800	7190	7190
2.000	2041	2041	2.000	3987	3987	2.000	7144	7144
2.200	2046	2046	2.200	3940	3940	2.200	7156	7156
2.400	2081	2081	2.400	3853	3853	2.400	7205	7205
2.600	2086	2086	2.600	3906	3906	2.600	7264	7264
2.800	2102	2102	2.800	3936	3936	2.800	7359	7359
3.000	2081	2081	3.000	3926	3926	3.000	7252	7252

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HOLCIM

HOLCIM DUQUESNE SLAG

AIR COOLED BLAST FURNACE SLAG

PTM130 - Expansion Test Results

Commonwealth of Pennsylvania - Department of Transportation
ISSD - LTS
Laboratory Testing Section
DGS Annex Complex
81 Lab Lane
Harrisburg PA 17110-2543
Phone: (717) 787-1037 Fax: (717) 783-5955

2A Expansion Test (PTM 130) — LTS - Soils & 2A

Increment: 1

	Result	P/F
% Expansion	-0.07	P

Increment: 2

	Result	P/F
% Expansion	-0.02	P

Increment: 3

	Result	P/F
% Expansion	-0.09	P

Test Level - 2A Expansion Test (PTM 130) — LTS - Soils & 2A

	Average	Std. Dev.	PWL	Limits	
% Expansion	-0.06	0.04	100	-9999	0.49

ATTACHMENT 4

CHEMICAL TESTING LABORATORY ANALYTICAL REPORTS

Conti Testing Laboratories, Inc.
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10/31/2023

Sample ID **2A #1 Four-Point Comp 10/11/2023 11:35**

CTL ID	**318375**	Date and Time Received	10/12/2023 16:05
Date and Time Sampled	10/11/2023 11:35	Matrix	Solid-Slag
Sampled by	client	Amount received (g)	3369.8

Sample Results, As Received

Parameter	Result	unit	RL	Prep	Analyzed	Method
pH @ 22.6°C	11.26	pH unit	-	-	10/17/2023 16:55	EPA 9045D
Reactive Cyanide*	< 0.2	mg/Kg	0.2	10/24/2023 7:00	10/25/2023 18:21	EPA 7.3.3.2
Reactive Sulfide*	**23.9**	mg/Kg	2.5	10/24/2023 7:00	10/24/2023 15:47	EPA 7.3.4.2
Total Metals						
Arsenic (As)	**0.35**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Barium (Ba)	**153**	mg/Kg-Dry	0.20	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Cadmium (Cd)	< 0.10	mg/Kg-Dry	0.10	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Chromium (Cr)	**57.8**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Lead (Pb)	**0.79**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Selenium (Se)	**4.61**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Silver (Ag)	< 1.9	mg/Kg-Dry	1.9	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Mercury (Hg)	**0.0013**	mg/Kg-Dry	0.001	10/17/2023 14:10	10/17/2023 22:44	EPA 3050B/7473

Quality Control Results

Parameter	% Recovery	LCS Limit	Equipment	Analyst
Sample Receipt	-	-	-	AMD
pH	101	-	CTL-pH-2	SF
Reactive Cyanide	-	-	-	BEH
Reactive Sulfide	-	-	-	AVH
Arsenic (As)	94, 93.8, 100	80-120	CTL-ICPMS-01	CB/MB
Barium (Ba)	97.5. 97.4, 100	80-120	CTL-ICPMS-01	CB/MB
Cadmium (Cd)	100, 97.6, 100	80-120	CTL-ICPMS-01	CB/MB
Chromium (Cr)	98.5, 98.7, 100	80-120	CTL-ICPMS-01	CB/MB
Lead (Pb)`	120, 100, 100	80-120	CTL-ICPMS-01	CB/MB
Selenium (Se)	99, 99.8, 100	80-120	CTL-ICPMS-01	CB/MB
Silver (Ag)	104, 99.4, 100	80-120	CTL-ICPMS-01	CB/MB
Mercury (Hg)	94, 107	80-120	CTL-HG-02	CB/MB

Non-Accredited Methods none
Subcontracted * Reactive Cyanide and Reactive Sulfide to Geochemical Testing-56-00306

Outliers to 25 Pa. Code Chapter 252 and Code of Federal Regulations Title 40 Vol. 25 Sect. 136
None

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10/31/2023

Sample ID **2A #2 Four-Point Comp 10/11/2023 12:00**

CTL ID	**318376**	Date and Time Received	10/12/2023 16:05
Date and Time Sampled	10/11/2023 12:00	Matrix	Solid-Slag
Sampled by	client	Amount received (g)	3526.3

Sample Results, As Received

Parameter	Result	unit	RL	Prep	Analyzed	Method
pH @ 22.6°C	11.10	pH unit	-	-	10/17/2023 16:55	EPA 9045D
Reactive Cyanide*	< 0.2	mg/Kg	0.2	10/24/2023 7:00	10/25/2023 18:21	EPA 7.3.3.2
Reactive Sulfide*	**19.1**	mg/Kg	2.5	10/24/2023 7:00	10/24/2023 15:47	EPA 7.3.4.2
Total Metals						
Arsenic (As)	**0.36**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Barium (Ba)	**158.06**	mg/Kg-Dry	0.20	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Cadmium (Cd)	< 0.10	mg/Kg-Dry	0.10	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Chromium (Cr)	**57.53**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Lead (Pb)	**1.23**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Selenium (Se)	**4.45**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Silver (Ag)	< 1.9	mg/Kg-Dry	1.9	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Mercury (Hg)	**0.0012**	mg/Kg-Dry	0.001	10/17/2023 14:10	10/17/2023 22:44	EPA 3050B/7473

Quality Control Results

Parameter	% Recovery	LCS Limit	Equipment	Analyst
Sample Receipt	-	-	-	AMD
pH	101	-	CTL-pH-2	SF
Reactive Cyanide	-	-	-	BEH
Reactive Sulfide	-	-	-	AVH
Arsenic (As)	94, 93.8, 100	80-120	CTL-ICPMS-01	CB/MB
Barium (Ba)	97.5. 97.4, 100	80-120	CTL-ICPMS-01	CB/MB
Cadmium (Cd)	100, 97.6, 100	80-120	CTL-ICPMS-01	CB/MB
Chromium (Cr)	98.5, 98.7, 100	80-120	CTL-ICPMS-01	CB/MB
Lead (Pb)`	120, 100, 100	80-120	CTL-ICPMS-01	CB/MB
Selenium (Se)	99, 99.8, 100	80-120	CTL-ICPMS-01	CB/MB
Silver (Ag)	104, 99.4, 100	80-120	CTL-ICPMS-01	CB/MB
Mercury (Hg)	94, 107	80-120	CTL-HG-02	CB/MB

Non-Accredited Methods none
Subcontracted * Reactive Cyanide and Reactive Sulfide to Geochemical Testing-56-00306

Outliers to 25 Pa. Code Chapter 252 and Code of Federal Regulations Title 40 Vol. 25 Sect. 136
None

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10/31/2023

Sample ID **Unprocessed Mat 4-Pt. Comp 10/11/2023 11:15**

CTL ID	**318374**	Date and Time Received	10/12/2023 16:05
Date and Time Sampled	10/11/2023 11:15	Matrix	Solid-Slag
Sampled by	client	Amount received (g)	2582.6

Sample Results, As Received

Parameter	Result	unit	RL	Prep	Analyzed	Method
pH @ 22.6°C	11.40	pH unit	-	-	10/17/2023 16:55	EPA 9045D
Reactive Cyanide*	< 0.2	mg/Kg	0.2	10/24/2023 7:00	10/25/2023 18:21	EPA 7.3.3.2
Reactive Sulfide*	**21.8**	mg/Kg	2.5	10/24/2023 7:00	10/24/2023 15:47	EPA 7.3.4.2
Total Metals						
Arsenic (As)	**0.32**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Barium (Ba)	**124.2**	mg/Kg-Dry	0.20	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Cadmium (Cd)	< 0.10	mg/Kg-Dry	0.10	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Chromium (Cr)	**53.23**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Lead (Pb)	**0.50**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Selenium (Se)	**4.14**	mg/Kg-Dry	0.30	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Silver (Ag)	< 1.9	mg/Kg-Dry	1.9	10/17/2023 14:10	10/18/2023 22:51	EPA 3050B/6010D
Mercury (Hg)	**0.001**	mg/Kg-Dry	0.001	10/17/2023 14:10	10/17/2023 22:44	EPA 3050B/7473

Quality Control Results

Parameter	% Recovery	LCS Limit	Equipment	Analyst
Sample Receipt	-	-	-	AMD
pH	101	-	CTL-pH-2	SF
Reactive Cyanide	-	-	-	BEH
Reactive Sulfide	-	-	-	AVH
Arsenic (As)	94, 93.8, 100	80-120	CTL-ICPMS-01	CB/MB
Barium (Ba)	97.5. 97.4, 100	80-120	CTL-ICPMS-01	CB/MB
Cadmium (Cd)	100, 97.6, 100	80-120	CTL-ICPMS-01	CB/MB
Chromium (Cr)	98.5, 98.7, 100	80-120	CTL-ICPMS-01	CB/MB
Lead (Pb)`	120, 100, 100	80-120	CTL-ICPMS-01	CB/MB
Selenium (Se)	99, 99.8, 100	80-120	CTL-ICPMS-01	CB/MB
Silver (Ag)	104, 99.4, 100	80-120	CTL-ICPMS-01	CB/MB
Mercury (Hg)	94, 107	80-120	CTL-HG-02	CB/MB

Non-Accredited Methods none
Subcontracted * Reactive Cyanide and Reactive Sulfide to Geochemical Testing-56-00306

Outliers to 25 Pa. Code Chapter 252 and Code of Federal Regulations Title 40 Vol. 25 Sect. 136
None

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p.thomas@holcim.com

5/3/2023

Sample ID **#1**

CTL ID	**308262**	Date and Time Received	4/19/2023 12:00
Date and Time Sampled	4/19/2023 9:30	Matrix	Solid-Slag
Sampled by	client	Amount received (lbs)	47.1

Sample Results, As Received

Total Metals	Result	unit	RL	Prep	Analyzed	Method
Antimony (Sb)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Arsenic (As)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Cadmium (Cd)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Chromium VI (Cr VI)*	< 0.80	mg/Kg	0.80	4/26/2023 7:02	4/27/2023 11:18	EPA 3060A/7196A
Copper (Cu)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Iron (Fe)	**1044.4**	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Lead (Pb)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Manganese (Mn)	**4143.4**	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Nickel (Ni)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Thallium (Tl)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Zinc (Zn)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
SPLP pH @ 22.2°C	4.21	pH unit	---	---	4/19/2023 20:07	EPA 1312

SPLP Leachate Metals						
Antimony (Sb)*	<0.0010	mg/L	0.0010	4/24/2023 10:20	4/28/2023 8:35	EPA 1312/3010A/6020B
Arsenic (As)	< 0.0003	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Cadmium (Cd)	< 0.0001	mg/L	0.0001	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Chromium (Cr)	**0.0049**	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Copper (Cu)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Iron (Fe)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Lead (Pb)	< 0.0003	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Manganese (Mn)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Nickel (Ni)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Thallium (Tl)*	<0.0002	mg/L	0.0002	4/24/2023 10:20	4/28/2023 8:35	EPA 1312/3010A/6020B
Zinc (Zn)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D

Quality Control Results

Parameter	% Recovery	LCS	Equipment	Analyst
Sample Receipt	-	-	-	AB
Antimony (Sb)	95	99-101	CTL-ICP-02	CB
Arsenic (As)	93	85-115	CTL-ICP-02	CB
Cadmium (Cd)	95	80-120	CTL-ICP-02	CB
Chromium VI (Cr VI)*	---	---	---	CML
Copper (Cu)	97	80-120	CTL-ICP-02	CB
Iron (Fe)	97	80-120	CTL-ICP-02	CB
Lead (Pb)	96	80-120	CTL-ICP-02	CB
Manganese (Mn)	97	80-120	CTL-ICP-02	CB
Nickel (Ni)	96	80-120	CTL-ICP-02	CB
Thallium (Tl)	94	80-120	CTL-ICP-02	CB
Zinc (Zn)	94	80-120	CTL-ICP-02	CB
SPLP	---	---	CTL-ACI-01	MLL
Antimony (Sb)*	---	---	---	RLR
Arsenic (As)	99.5	90-110	CTL-ICPMS-01	MB
Cadmium (Cd)	100	90-110	CTL-ICPMS-01	MB
Chromium (Cr)	103	90-110	CTL-ICPMS-01	MB
Copper (Cu)	103	80-120	CTL-ICP-02	CB
Iron (Fe)	103	80-120	CTL-ICP-02	CB
Lead (Pb)	99	90-110	CTL-ICPMS-01	MB
Manganese (Mn)	103	80-120	CTL-ICP-02	CB
Nickel (Ni)	103	80-120	CTL-ICP-02	CB
Thallium (Tl)*	---	---	---	RLR
Zinc (Zn)	102	80-120	CTL-ICP-02	CB

Non-Accredited Methods none
Subcontracted *Chromium VI, Antimony, and Thallium to Geochemical Testing-56-00306

Outliers to 25 Pa. Code Chapter 252 and Code of Federal Regulations Title 40 Vol. 25 Sect. 136
There were no problems with the sample receipt protocols.

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5/3/2023

Sample ID **#2A**

CTL ID	**308263**	Date and Time Received	4/19/2023 12:00
Date and Time Sampled	4/19/2023 9:30	Matrix	Solid-Slag
Sampled by	client	Amount received (lbs)	55.2

Sample Results, As Received

Total Metals	Result	unit	RL	Prep	Analyzed	Method
Antimony (Sb)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Arsenic (As)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Cadmium (Cd)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Chromium VI (Cr VI)*	< 0.81	mg/Kg	0.81	4/26/2023 7:02	4/27/2023 11:18	EPA 3060A/7196A
Copper (Cu)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Iron (Fe)	1899.2	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Lead (Pb)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Manganese (Mn)	3429.6	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Nickel (Ni)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Thallium (Tl)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Zinc (Zn)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
SPLP pH @ 22.2°C	4.23	pH unit	---	---	4/19/2023 20:07	EPA 1312

SPLP Leachate Metals						
Antimony (Sb)*	<0.0010	mg/L	0.0010	4/24/2023 10:20	4/28/2023 8:35	EPA 1312/3010A/6020B
Arsenic (As)	< 0.0003	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Cadmium (Cd)	< 0.0001	mg/L	0.0001	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Chromium (Cr)	0.0051	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Copper (Cu)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Iron (Fe)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Lead (Pb)	< 0.0003	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Manganese (Mn)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Nickel (Ni)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Thallium (Tl)*	<0.0002	mg/L	0.0002	4/24/2023 10:20	4/28/2023 8:35	EPA 1312/3010A/6020B
Zinc (Zn)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D

Quality Control Results

Parameter	% Recovery	LCS	Equipment	Analyst
Sample Receipt	-	-	-	AB
Antimony (Sb)	95	99-101	CTL-ICP-02	CB
Arsenic (As)	93	85-115	CTL-ICP-02	CB
Cadmium (Cd)	95	80-120	CTL-ICP-02	CB
Chromium VI (Cr VI)*	---	---	---	CML
Copper (Cu)	97	80-120	CTL-ICP-02	CB
Iron (Fe)	97	80-120	CTL-ICP-02	CB
Lead (Pb)	96	80-120	CTL-ICP-02	CB
Manganese (Mn)	97	80-120	CTL-ICP-02	CB
Nickel (Ni)	96	80-120	CTL-ICP-02	CB
Thallium (Tl)	94	80-120	CTL-ICP-02	CB
Zinc (Zn)	94	80-120	CTL-ICP-02	CB
SPLP	---	---	CTL-ACI-01	MLL
Antimony (Sb)*	---	---	---	RLR
Arsenic (As)	99.5	90-110	CTL-ICPMS-01	MB
Cadmium (Cd)	100	90-110	CTL-ICPMS-01	MB
Chromium (Cr)	103	90-110	CTL-ICPMS-01	MB
Copper (Cu)	103	80-120	CTL-ICP-02	CB
Iron (Fe)	103	80-120	CTL-ICP-02	CB
Lead (Pb)	99	90-110	CTL-ICPMS-01	MB
Manganese (Mn)	103	80-120	CTL-ICP-02	CB
Nickel (Ni)	103	80-120	CTL-ICP-02	CB
Thallium (Tl)*	---	---	---	RLR
Zinc (Zn)	102	80-120	CTL-ICP-02	CB

Non-Accredited Methods none
Subcontracted *Chromium VI, Antimony, and Thallium to Geochemical Testing-56-00306

Outliers to 25 Pa. Code Chapter 252 and Code of Federal Regulations Title 40 Vol. 25 Sect. 136
There were no problems with the sample receipt protocols.

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Holcim
4810 Buttermilk Hollow Rd
West Mifflin, Pa 15122
Attn: Mr. Paul Thomas
p.thomas@holcim.com

5/3/2023

Sample ID **#8**

CTL ID	**308261**	Date and Time Received	4/19/2023 12:00
Date and Time Sampled	4/19/2023 9:30	Matrix	Solid-Slag
Sampled by	client	Amount received (lbs)	41.3

Sample Results, As Received

Total Metals	Result	unit	RL	Prep	Analyzed	Method
Antimony (Sb)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Arsenic (As)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Cadmium (Cd)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Chromium VI (Cr VI)* M2	< 0.80	mg/Kg	0.80	4/26/2023 7:02	4/27/2023 11:18	EPA 3060A/7196A
Copper (Cu)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Iron (Fe)	5928.6	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Lead (Pb)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Manganese (Mn)	3838.9	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Nickel (Ni)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Thallium (Tl)	10.37	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Zinc (Zn)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
SPLP pH @ 22.2°C	4.21	pH unit	---	---	4/19/2023 20:07	EPA 1312

SPLP Leachate Metals

Antimony (Sb)*	<0.0010	mg/L	0.0010	4/24/2023 10:20	4/28/2023 8:35	EPA 1312/3010A/6020B
Arsenic (As)	< 0.0003	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Cadmium (Cd)	< 0.0001	mg/L	0.0001	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Chromium (Cr)	0.0068	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Copper (Cu)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Iron (Fe)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Lead (Pb)	< 0.0003	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Manganese (Mn)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Nickel (Ni)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Thallium (Tl)*	<0.0002	mg/L	0.0002	4/24/2023 10:20	4/28/2023 8:35	EPA 1312/3010A/6020B
Zinc (Zn)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D

Quality Control Results

Parameter	% Recovery	LCS	Equipment	Analyst
Sample Receipt	-	-	-	AB
Antimony (Sb)	95	99-101	CTL-ICP-02	CB
Arsenic (As)	93	85-115	CTL-ICP-02	CB
Cadmium (Cd)	95	80-120	CTL-ICP-02	CB
Chromium VI (Cr VI)*	---	---	---	CML
Copper (Cu)	97	80-120	CTL-ICP-02	CB
Iron (Fe)	97	80-120	CTL-ICP-02	CB
Lead (Pb)	96	80-120	CTL-ICP-02	CB
Manganese (Mn)	97	80-120	CTL-ICP-02	CB
Nickel (Ni)	96	80-120	CTL-ICP-02	CB
Thallium (Tl)	94	80-120	CTL-ICP-02	CB
Zinc (Zn)	94	80-120	CTL-ICP-02	CB
SPLP	---	---	CTL-ACI-01	MLL
Antimony (Sb)*	---	---	---	RLR
Arsenic (As)	99.5	90-110	CTL-ICPMS-01	MB
Cadmium (Cd)	100	90-110	CTL-ICPMS-01	MB
Chromium (Cr)	103	90-110	CTL-ICPMS-01	MB
Copper (Cu)	103	80-120	CTL-ICP-02	CB
Iron (Fe)	103	80-120	CTL-ICP-02	CB
Lead (Pb)	99	90-110	CTL-ICPMS-01	MB
Manganese (Mn)	103	80-120	CTL-ICP-02	CB
Nickel (Ni)	103	80-120	CTL-ICP-02	CB
Thallium (Tl)*	---	---	---	RLR
Zinc (Zn)	102	80-120	CTL-ICP-02	CB

Non-Accredited Methods none
Subcontracted *Chromium VI, Antimony, and Thallium to Geochemical Testing-56-00306

Outliers to 25 Pa. Code Chapter 252 and Code of Federal Regulations Title 40 Vol. 25 Sect. 136
There were no problems with the sample receipt protocols.
M2- MS recovery below the acceptance limits for post digestion, soluble and insoluble spikes.

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Holcim
4810 Buttermilk Hollow Rd
West Mifflin, Pa 15122
Attn: Mr. Paul Thomas
p.thomas@holcim.com

5/3/2023

Sample ID **#57**

CTL ID	**308264**	Date and Time Received	4/19/2023 12:00
Date and Time Sampled	4/19/2023 9:30	Matrix	Solid-Slag
Sampled by	client	Amount received (lbs)	46.5

Sample Results, As Received

Total Metals	Result	unit	RL	Prep	Analyzed	Method
Antimony (Sb)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Arsenic (As)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Cadmium (Cd)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Chromium VI (Cr VI)*	< 0.81	mg/Kg	0.81	4/26/2023 7:02	4/27/2023 11:18	EPA 3060A/7196A
Copper (Cu)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Iron (Fe)	**1550.7**	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Lead (Pb)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Manganese (Mn)	**3196.5**	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Nickel (Ni)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Thallium (Tl)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
Zinc (Zn)	< 10	mg/Kg	10	4/21/2023 10:00	4/21/2023 16:10	EPA 3051A/6010D
SPLP pH @ 22.2°C	4.23	pH unit	---	---	4/19/2023 20:07	EPA 1312

SPLP Leachate Metals						
Antimony (Sb)*	<0.0010	mg/L	0.0010	4/24/2023 10:20	4/28/2023 8:35	EPA 1312/3010A/6020B
Arsenic (As)	< 0.0003	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Cadmium (Cd)	< 0.0001	mg/L	0.0001	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Chromium (Cr)	**0.0149**	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Copper (Cu)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Iron (Fe)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Lead (Pb)	**0.00033**	mg/L	0.0003	4/24/2023 9:32	4/27/2023 0:48	EPA 1312/3015A/6020B
Manganese (Mn)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Nickel (Ni)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D
Thallium (Tl)*	<0.0002	mg/L	0.0002	4/24/2023 10:20	4/28/2023 8:35	EPA 1312/3010A/6020B
Zinc (Zn)	< 0.1000	mg/L	0.1000	4/24/2023 9:32	4/25/2023 16:11	EPA 1312/3015A/6010D

Quality Control Results

Parameter	% Recovery	LCS	Equipment	Analyst
Sample Receipt	-	-	-	AB
Antimony (Sb)	95	99-101	CTL-ICP-02	CB
Arsenic (As)	93	85-115	CTL-ICP-02	CB
Cadmium (Cd)	95	80-120	CTL-ICP-02	CB
Chromium VI (Cr VI)*	---	---	---	CML
Copper (Cu)	97	80-120	CTL-ICP-02	CB
Iron (Fe)	97	80-120	CTL-ICP-02	CB
Lead (Pb)	96	80-120	CTL-ICP-02	CB
Manganese (Mn)	97	80-120	CTL-ICP-02	CB
Nickel (Ni)	96	80-120	CTL-ICP-02	CB
Thallium (Tl)	94	80-120	CTL-ICP-02	CB
Zinc (Zn)	94	80-120	CTL-ICP-02	CB
SPLP	---	---	CTL-ACI-01	MLL
Antimony (Sb)*	---	---	---	RLR
Arsenic (As)	99.5	90-110	CTL-ICPMS-01	MB
Cadmium (Cd)	100	90-110	CTL-ICPMS-01	MB
Chromium (Cr)	103	90-110	CTL-ICPMS-01	MB
Copper (Cu)	103	80-120	CTL-ICP-02	CB
Iron (Fe)	103	80-120	CTL-ICP-02	CB
Lead (Pb)	99	90-110	CTL-ICPMS-01	MB
Manganese (Mn)	103	80-120	CTL-ICP-02	CB
Nickel (Ni)	103	80-120	CTL-ICP-02	CB
Thallium (Tl)*	---	---	---	RLR
Zinc (Zn)	102	80-120	CTL-ICP-02	CB

Non-Accredited Methods none
Subcontracted *Chromium VI, Antimony, and Thallium to Geochemical Testing-56-00306

Outliers to 25 Pa. Code Chapter 252 and Code of Federal Regulations Title 40 Vol. 25 Sect. 136
There were no problems with the sample receipt protocols.

P.Conti Otroba
Chemist, Laboratory Director

HOLCIM DUQUESNE SLAG

AIR COOLED BLAST FURNACE SLAG

Sulfate and Leachate Test Results

Date Completed - 3/26/2023 by Conti Testing Laboratories						
Leachate Test/Color						
Sample	24 hr	24 hr	48 hr	48 hr	7 day	7 day
ID	Pass/Fail	C/H/N	Pass/Fail	C/H/N	Pass/Fail	C/H/N
#1	Pass	Colorless	Pass	Colorless	Pass	colorless
2A	Pass	Colorless	Pass	Colorless	Pass	colorless
#8	Pass	Colorless	Pass	Colorless	Pass	colorless
#57	Pass	Colorless	Pass	Colorless	Pass	colorless

Sample	pH		Conductivity		Total Dissolved Solids	
ID	Pass/Fail	std. unit	Pass/Fail	µmho/cm	Pass/Fail	mg/l
#1	Pass	7.3	Pass	328	Pass	273
2A	Pass	8.94	Pass	1093	Pass	1001
#8	Pass	8.23	Pass	592	Pass	582
#57	Pass	8.29	Pass	1013	Pass	678

Methods:	Leachate Test/Color	ODOT 1027.06
	pH	AWWA 4510
	Conductivity	AWWA 2510
	Total Dissolved Solid	AWWA 254 C

In the United States, Holcim is the leader in innovative and sustainable building solutions. Our customers rely on us to help them design and build better communities that deliver structural integrity and eco-efficiency.

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