

**From:** [Paul Mellon](#)  
**To:** [Shallal, Suhair](#)  
**Subject:** Regulations.gov - Environmental Justice  
**Date:** Wednesday, February 05, 2014 2:27:25 PM  
**Attachments:**

All seven (7) attachments have been appended below for your convenience

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Dr Shallal,

Good morning. I am resending the email with the Disclaimer removed and attachments so that this information can be shared with the SAB Committee and posted in Regulations.gov. Please advise if you have any questions or need additional revisions. I hope the Committee finds this information helpful.

Thank you.

*Paul J. Mellon Jr.*

**Novetas Solutions,LLC**

Phone: ( 215 ) 551 - 3070

Cell: [REDACTED]

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**From:** Paul Mellon [mailto:pmell@comcast.net]  
**Sent:** Friday, January 31, 2014 2:50 PM  
**To:** 'shallal.suhair@epa.gov'  
**Subject:** Regulations.gov - Environmental Justice

Dr Shallal,

Good afternoon. I regret that while I was able to briefly attend the hearing yesterday of the EPA's SAB in Arlington VA I was not able to speak due formally to the Committee to changes in my schedule due to business matters. I would like to submit to you and the SAB my recent comments that I sent to the EPA concerning their **NESHAP for Beryllium Rule**. As you can see below it is very apparent that some of the slag companies that are manufacturing coal and copper slag are purposely locating their sites in poor, minority neighborhoods. Many of the coal and copper slag abrasives companies produce their products on the site of the coal or smelting plant so that would not necessarily be an **Environmental Justice** issue for the EPA unless there was an issue with the existing coal/copper plant being located in that area. However, if you look at the below two sites that store thousands of tons of coal slag in open air locations that are literally a mile or two away from local schools and residents.

You can see that these locations are not next to coal or copper plants. Instead they are at rail locations that are conveniently located in poor minority neighborhoods. These coal waste products contain numerous contaminants already identified by OSHA, EPA and NIOSH from decades of studies. Recently, the issue of beryllium exposure in slags has become a significant public issue with both the EPA and OSHA. None of the local residents or schools located within a mile of these coal slag mountains have any idea that they are being exposed everyday to the beryllium in the dust and run off from these open air piles. I would state that this is a text book case on companies doing Environmental In Justice to communities that have no idea what they are being exposed to from these locations.

Below you can see the locations of 3 sites located in **Norfolk, VA, Baltimore , MD and Gary, IN**. The piles sitting the open outside are so large they can be easily seen on Google Maps. If you review the

US Census files on the excel form you will see all three sites are located in minority, low income neighborhoods.

In 2012, the state of Maryland took action with a coal slag plant located in downtown Balt Inner Harbor which is located in the middle a poor, minority neighborhood. The Baltimore Sun did a front page story on the issue and it is attached. It is interesting to note however that while the Maryland Environmental Board forced the company Opta Minerals to remove their coal slag pile ( which they admitted they then dumped in Norfolk VA ) the MDE however took no further action on the thousands of tons of copper slag which actually has more known toxins than the coal slag. Take a look at both up the company's MSDS's which are attached.

I have submitted numerous comments to both the EPA and OSHA on this issue. Perhaps the SAB can review this information and advise the EPA that they should simply not be in the business of supporting and promoting coal or copper slag abrasives and the companies that produce these products. The EPA's OIG already told the EPA this back in 2011 in a report showing the EPA failed to properly test all coal waste products for human health issues. The EPA should be taking more precautions to help educate and protect the local poor minority communities that are being exposed on a daily basis to the toxins in the dust from these products. The EPA is supposed to be coming releasing their new guidelines for Beneficial Use of Coal Waste Products this summer ( see attached IG response to EPA ) . Now would a be a good time for the SAB to weigh in on the [importance of factoring in on Environmental Justice of the locations to the EPA Office of Air](#) concerning their Beryllium NESHAP Rule and decision to add coal and copper slag plant locations to monitor the air emissions. The comment close out period is in March 2014, I also attached a link below.

Please advise if you have any questions.

Regards

Paul Mellon  
Novetas Solutions LLC  
1517 Packer Ave  
Philadelphia PA 19130

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<http://www.regulations.gov/index.jsp#!documentDetail;D=EPA-HQ-OECA-2013-0301-0004>

**Comment on: NESHAP for Beryllium (40 CFR Part 61, Subpart C) (Renewal)**

My name is Paul Mellon, President of Novetas Solutions LLC. I would like to comment on the NESHAP for Beryllium Rule in regards to the listed sources that are subject to the Rule. In the EPA's Supporting Document for the Rule the following statement concerning the types of sources governed by the Beryllium Rule from 1(b) Short Characterization/Abstract states

“ All sources known to have caused, or to have the potential to cause, dangerous levels of beryllium in the ambient air are covered by the standard.”

Since the original NESHAP for Beryllium Rule was promulgated several years there has been a recent major change in the MSDS's of companies that manufacture coal and copper slag abrasives. In 2012, OSHA issued letters to all the Manufacturers of Coal and Copper slag abrasives requesting they add Beryllium and other toxins to their MSDS' due to the fact there is overwhelming scientific evidence that the dust emitted contains Beryllium that exceeds the OSHA Personal Exposure Limit ( PEL ) of 2 micrograms. This is a significant level because OSHA is now in the process of lowering their Beryllium PEL because it is widely acknowledged that this level is too high for human health. This means that the levels of beryllium in the dust of coal and copper slag abrasives are at very dangerous levels for human health. I have attached the letter from Thomas Galassi, Director of Enforcement for OSHA from January 2012 that lists the names of all the coal and copper slag companies identified by OSHA as having plants that manufacture slag abrasives. This is the letter that notified the companies to add beryllium to their MSDS and the rationale for the change. Example coal slag MSDS' with the beryllium change are attached as well.

Last December, OSHA issued a presentation to their Construction Advisory Committee in which they discussed how high the levels of beryllium were in coal and copper slag abrasives. I have attached the presentation to this letter.

The EPA itself has also identified that the dust emitted from coal and copper slags can emit Hazardous Airborne Pollutants into the air. Here is a direct quote by the EPA in their 1997 Report on Abrasive Blasting Emission Factor Documentation for AP-42 :

“Coal and smelter slags are commonly used for abrasive blasting at shipyards. Black Beauty TM, which consists of crushed slag from coal-fired utility boilers, is a commonly used slag. Slags have the advantage of low silica content, but have been documented to release other contaminants, including hazardous air pollutants (HAP), into the air”.

The report is attached.

Many of the coal and copper slag plants are located in densely populated areas of the country and in particular some are located in poor minority areas with many schools located with 1 to 2 miles of the plant locations ( see below addresses ) When these plants manufacture the coal and copper slag there is a significant amount of dust that is generated which then blows into the communities located nearby. In addition the workers at these sites are also exposed to dangerous levels of beryllium in the dust on a weekly basis. The local communities deserve to know if the levels of beryllium in the dust emitted from these facilities could be affecting the health and welfare of the residents and in particular the children who attend schools with very close proximity to these plant sites:

Example of Plant Locations of Coal Slag Plants located within 2 miles of local Schools:

### **Harsco Minerals**

**7100 West 9th Avenue**

**Gary, IN 46406 ( % Population African American 84% )**

**Closest Schools:**

**Morton Senior High School**  
Hammond, IN 0.9 mi SW  
(219) 989-7316

**West Side High School**  
Gary, IN 1.0 mi E  
(219) 977-2100

+++++

**Virginia Materials**  
3306 Peterson Street  
Norfolk, VA 23509 ( % Population African American 37% )

**Closest Schools:**

**Coleman Place Elementary School**  
Norfolk, VA 0.5 mi E  
(757) 852-4641

•

**Lafayette-Winona Middle School**  
1701 Alsace Ave, Norfolk, VA 1.1 mi NW  
(757) 628-2477

**Booker T Washington High School**  
1111 Park Ave, Norfolk, VA 1.6 mi SW  
(757) 628-3575

+++++

**Virginia Materials**

**4500 East Fayette Street,**

**Baltimore, MD 21224**

**Highlandtown Elementary School**  
3223 E Pratt St, Baltimore, MD 0.7 mi SW  
(410) 396-9381 .

**Claremont School**  
Baltimore, MD 0.6 mi NE

**(410) 545-3380 .**

.

**Highlandtown Elementary School  
231 S Eaton St, Baltimore, MD 0.5 mi SW  
(443) 642-2792 .**

**Armistead Gardens Elementary School  
5001 E Eager St, Baltimore, MD 0.7 mi NE  
(410) 396-9090 .  
7th grade . 8th grade .**

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I believe based on the known facts about beryllium dust exposure from coal and copper slag plants, these companies and their individual plants locations should be added to the list of companies that emit dangerous levels beryllium into the air and should subject to the new NESHAP for Beryllium Rule.

Regards

Paul Mellon  
Novetas Solutions LLC  
1517 Packer Ave  
Philadelphia PA 19130

# Opta Minerals (USA) Inc.

3306 Peterson Street, Norfolk, Virginia 23509-2415  
 Tel: (757) 855-0155 Toll Free: (800) 743-0094 Fax: (757) 857-5631  
 Email: www.optaminerals.com

## MATERIAL SAFETY DATA SHEET

### SECTION 1 - PRODUCT IDENTIFICATION AND USE

**PRODUCT NAME:** Black Blast **MSDS #:** 413-1

**CHEMICAL NAME AND SYNONYMS:** Crushed Coal Slag

**MATERIAL IDENTIFICATION AND USE:** *This material is a shiny, black, granular aggregate for use as a blasting media. This product contains **no** free crystalline silica. **Note:** This MSDS covers many products and individual physical and chemical properties will vary. Consult individual Technical Data Sheet's for specifics.*

**MANUFACTURER AND SUPPLIER:**

Virginia Materials Inc.  
 3306 Peterson Street  
 Norfolk, Virginia  
 23509-2415  
**Telephone:** 800-743-0094  
**Emergency:** 905-689-6661, Ext. 222

### SECTION 2 – HAZARDOUS INGREDIENTS

The approximate element composition of this material is as follows:

INGREDIENT	%	CAS #	LD <sub>50</sub>	LC <sub>50</sub>
Silica Amorphous SiO <sub>2</sub>	~46.5	61790-53-2	3160 mg/kg – Oral Rat	N/A
Aluminium Oxide AL <sub>2</sub> O <sub>3</sub>	~22.5	1344-28-1	>5000 mg/kg - Oral Rat	N/A
Iron Oxide Fe <sub>2</sub> O <sub>3</sub>	~19	1309-37-1	>10000 mg/kg - Oral Rat	N/A
Calcium Oxide CaO	~5.5	1305-78-8	500 mg/kg - Oral Rat	N/A
Magnesium Oxide MgO	~1.0	1309-48-4	N/A	N/A
Titanium Dioxide TiO <sub>2</sub>	~1.0	13463-67-7	>10000 mg/kg - Oral Rat	N/A
Silica, crystalline quartz SiO <sub>2</sub>	<0.1	14808-60-7	500 mg/kg – Oral Rat	N/A
Beryllium Be	<0.001	7440-41-7	N/A	N/A
Cadmium Cd	<0.001	7440-43-9	890 mg/kg Oral Mouse	229.9 mg/m <sup>3</sup> / 4 hour(s) Rat

### SECTION 3 – PHYSICAL DATA

**PHYSICAL STATE:** Solid  
**APPEARANCE:** Angular granules. Shiny black colour.  
**ODOR:** No appreciable odour  
**ODOR THRESHOLD (ppm):** Not applicable  
**SPECIFIC GRAVITY:** Not applicable  
**SOLUBILITY IN WATER (%):** Insoluble  
**VAPOUR PRESSURE:** Not applicable

VAPOUR DENSITY (AIR = 1):	Not applicable
BOILING POINT:	Not applicable
FREEZING POINT:	Not applicable
MELTING POINT:	Not applicable
pH:	Not available

#### SECTION 4 – FIRE AND EXPLOSION DATA

FLAMABILITY:	No
EXTINGUISHING MEDIA:	Not applicable
SPECIAL FIRE FIGHTING PROCEDURES:	Not applicable
UNUSUAL FIRE/EXPLOSION HAZARDS:	Not applicable
HAZARDOUS COMBUSTION PRODUCTS:	Not applicable
AUTO-IGNITION TEMPERATURE:	Not applicable
FLASH POINT:	Not applicable

The product will not burn or explode.

#### SECTION 5 - REACTIVITY DATA

PRODUCT STABILITY:	Stable.
HAZARDOUS POLYMERIZATION:	Will not occur.
CONDITIONS TO AVOID:	Not applicable.
INCOMPATIBILITY:	Not applicable
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS:	Not applicable.

#### SECTION 6 - TOXICOLOGICAL PROPERTIES

EYE CONTACT:	May cause irritation due to presence of "foreign object".	
SKIN CONTACT:	Possible skin irritation.	
INHALATION:	<b>EFFECTS OF ACUTE EXPOSURE:</b>	Exposure may cause irritation to nose, throat and lungs.
	<b>EFFECTS OF CHONIC EXPOSURE:</b>	Exposure may cause irritation to nose, throat and lungs.
INGESTION:	May cause irritation.	
OCCUPATIONAL EXPOSURE LIMITS:	The following Threshold Limit Values (TLV's) refer to airborne concentrations of substances. The potential hazard of solid particles depends on particle size, which is expressed in three forms:	

Inhalable (< 100 µm) – when deposited anywhere in the respiratory tract

Thoracic (< 25 µm) – when deposited anywhere within the lung airways and the gas-exchange region

Respirable (< 10 µm) – when deposited in the gas-exchange region

<u>Substance</u>	<u>C.A.S. No.</u>	<u>PEL</u>	<u>TWA</u>	<u>STEL/C</u>	<u>Critical Effect(s)</u>
PNOC <sup>1</sup> Inhalable		15	10	-	Lung
Respirable		5	3	-	Lung
Fe <sub>2</sub> O <sub>3</sub> (Iron Oxide)	1309-37-1	10	5	-	Pneumoconiosis
AL <sub>2</sub> O <sub>3</sub> (Aluminum Oxide)	1344-28-1	15	10	-	Lung; irritation
CaO (Calcium Oxide)	1305-78-8	5	2	-	Irritation
MgO (Magnesium Oxide)	1309-48-4	15	10	-	Irritation; metal fume fever
TiO <sub>2</sub> (Titanium Dioxide)	13463-67-7	15	10	-	Lung

<sup>1</sup> Particulates (Insoluble) Not Otherwise Classified

OSHA PEL – Permissible Exposure Limit (mg/m<sup>3</sup>)

ACGIH TWA – Time Weighted Average (mg/m<sup>3</sup>)  
STEL/C – Short-term Exposure Limit / Ceiling (mg/m<sup>3</sup>)

In other jurisdiction, please consult appropriate occupational exposure regulations.

Reference: 1999 TLV's and BEI's Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposure Indices

## SECTION 7 - PREVENTATIVE MEASURES

**EYE PROTECTION:** Safety goggles or glasses, as required by nature of task(s) being performed.

**SKIN PROTECTION:** Impervious gloves recommended and other clothing as required by nature of work being done.

**VENTILATION:** Use adequate ventilation and dust collection.

**RESPIRATORY PROTECTION:** The following chart specifies the types of respirators to be used based on airborne concentrations of respirable crystalline silica. This chart has been provided as a guide for protection of personnel that may be exposed to airborne concentrations of any particulate matter.

**Airborne Concentration**  
(Respirable Free Silica)

**Type of Respirator Required**

< or equal to 10 X TWAEV

*Half-mask particulate respirator with N-, R-, or P- series filter and 95, 99, or 100% efficiency.*

< or equal to 25 X TWAEV

*Powered air purifying respirator equipped with a hood or helmet, and any type of particulate filter; or supplied air respirator equipped with a hood or helmet and operated in a continuous flow mode.*

TWAEV – time-weighted average exposure value

*Where applicable, respirators should be fitted, maintained, and cleaned in accordance with the regulations made under the Occupational Health and Safety Act.*

**OTHER PROTECTIVE EQUIPMENT:** As required by nature of work being done.

**LEAKS AND SPILLS:** Avoid breakage of bagged material or spills of bulk material. Do not dry sweep, use a dustless system (vacuum) for clean up so that airborne dust does not exceed the permissible exposure limit.

**WASTE DISPOSAL INFORMATION:** Dispose in accordance with federal, state or local regulations. Material contaminated in use may have special disposal requirements. Dispose in accordance with federal, state or local regulations

**HANDLING PROCEDURES AND EQUIPMENT:** Use adequate ventilation and dust collection. Do not permit dust to collect on walls, floors, ledges, machinery, or equipment. Use dustless system (vacuum) for handling, storage and clean up so that airborne dust does not exceed the permissible exposure limit.

**STORAGE REQUIREMENTS:** No special storage procedures required. Avoid dust generation when handling.

## SECTION 8 – FIRST AID MEASURES

**SKIN CONTACT:** Wash with soap and water.

**EYE EXPOSURE:** Flush with water and seek medical advice if irritation persists.

**INGESTION:** Seek immediate medical aid.

**INHALATION:** Remove to fresh air. If breathing difficulty is encountered, seek medical aid.

**SECTION 9 - PREPARATION DATE OF MSDS**

The MSDS was prepared from information provided by raw material suppliers to Opta Minerals.

**DATE ISSUED:** April 9, 2012

**CONTACT:** Operations Supervisor  
Quality Control Coordinator

For non-emergency questions, please contact your sales person.  
General inquiries may be directed to 800-743-0094.

# Opta Minerals (USA) Inc.

3306 Peterson Street, Norfolk, Virginia 23509-2415  
 Tel: (757) 855-0155 Toll Free: (800) 743-0094 Fax: (757) 857-5631  
 Email: www.optaminerals.com

## MATERIAL SAFETY DATA SHEET

### SECTION 1 - PRODUCT IDENTIFICATION AND USE

**PRODUCT NAME:** Ebony Grit USA **MSDS #:** 398-4

**CHEMICAL NAME AND SYNONYMS:** Granulated Industrial Slag

**MATERIAL IDENTIFICATION AND USE:** This material is a shiny, black, granular aggregate.

**MANUFACTURER AND/OR SUPPLIER:**

Opta Minerals USA  
 3306 Peterson Street  
 Norfolk, Virginia  
 23509-2415  
**Telephone:** (757) 855-0155  
**Emergency:** (905) 689-6661, Ext. 222

### SECTION 2 - INFORMATION ON COMPONENTS

Primarily composed of ferrosilicate material (Fayalite -  $\text{Fe}_2\text{SiO}_4$ ) and metal oxides such as magnetite ( $\text{Fe}_2\text{O}_3$ ), with other metals substituting for iron in the magnetite structure. The approximate element composition of this material is as follows:

Ingredients	Chemical formula by weight	Typical %	CAS #
Iron Oxide	$\text{Fe}_2\text{O}_3$	54 - 60	1309-37-1
Amorphous Silica	$\text{SiO}_2$ (total)	32 - 35	61790-53-2
Aluminum Oxide	$\text{Al}_2\text{O}_3$	4 - 6	1344-28-1
Calcium Oxide	$\text{CaO}$	1 - 3	1305-78-8
Magnesium Oxide	$\text{MgO}$	1 - 2	1309-48-4
Zinc	Zn	<1	1314-13-2
Arsenic	As	<0.1	7440-38-2
Beryllium	Be	<0.001	7440-41-7
Cadmium	Cd	<0.001	7440-43-9
Lead	Pb	<0.05	7439-92-1

### SECTION 3 - HAZARD IDENTIFICATION

#### Emergency Overview

#### POTENTIAL HEALTH EFFECTS:

**INHALATION:** This material does not normally present an inhalation hazard due to the large particle size and physical properties.

**EYE CONTACT:** High levels of dust are not likely to occur from use and handling this material. May cause eye irritation. Direct contact may cause irritation, redness, tearing, and blurred vision. Prolonged contact may cause irritation and conjunctivitis.

**TOXICITY:** Non Toxic

#### **SECTION 4 – FIRE AND EXPLOSION HAZARD DATA**

**EYE CONTACT:** Flush the eye(s) with lukewarm water until the particles have been removed. If irritation persists, obtain medical attention.

**SKIN CONTACT:** Wash with soap and water.

**INHALATION:** Acute exposure: Remove to fresh air. If not breathing, give artificial respiration Administer oxygen if breathing is difficult. Get medical attention.

**INGESTION:** Rare in industry. Induce vomiting. IF UNCONSCIOUS, DO NOT INDUCE VOMITING OR GIVE ANY LIQUID. Seek medical attention.

#### **SECTION 5 – FIREFIGHTING METHODS**

**Flashpoint and Method :** Non-Flammable

**Flammable Limits :** Non-Flammable

**Autoignition Temperature :** N/A

**Firefighting Instructions :** Use any means suitable for extinguishing surrounding fire.

#### **SECTION 6 – ACCIDENTAL RELEASE MEASURES**

**SPILL OR RELEASE TO THE ENVIRONMENT:** In case of leak in powdery form, collect quickly with care.

#### **SECTION 7 - HANDLING AND STORAGE**

This material can be stored in piles exposed to the outside environment.

#### **SECTION 8 - EXPOSURE CONTROL & PERSONAL PROTECTION**

**HAND PROTECTION:** Protective Gloves

**EYE PROTECTION:** Protective glasses of goggle type

**SKIN PROTECTION:** Protective wear

#### **SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES**

**Appearance/Odor:** Black Crystal Grain

**Specific Gravity:** Approx. 3.5

**Solubility in Water:** Not Soluble

**Solubility in Others:** Soluble in Acid

**Boiling Point:** N/A

**Melting Point:** Approx. 1150 °C

#### **SECTION 10 – STABILITY AND REACTIVITY**

**Self Reactivity/Explosion Properties:** N/A

**Dust Explosion Properties:** N/A

**Stability/Reactivity:** Oxidized Material

### SECTION 11 – MSDS PREPARATION AND TOXICOLOGICAL INFORMATION

Acute Toxicity: N/A  
Subacute Toxicity: N/A  
Chronic Toxicity: N/A  
Carcinogenicity: N/A  
Variability: N/A  
Reproduction Toxicity: N/A  
Mutagenicity: N/A  
Others: N/A  
Skin Corrosiveness: N/A  
Irritability: N/A  
Sensitization: N/A

### SECTION 12 – ECOLOGICAL INFORMATION

Decomposibility: Will not decompose  
Bioaccumulation: N/A

### SECTION 13 – REQUIRED TRANSPORT INFORMATION

Suitable for all modes of transportation

### SECTION 14 – OTHER INFORMATION

The above information is believed to be accurate and represents the best information currently available to us. The matters to be attended to are intended for normal handling. In case of special handling, applicable safety measure for the application and usage should be done and use it. However, we make no warranty expressed or implied with respect to such information and we assume no liability resulting from its use.

The MSDS was prepared from information provided by raw material suppliers to Opta Minerals.

**DATE ISSUED:** April 9, 2012

**CONTACT:** Operations Supervisor  
Quality Control Coordinator

For non-emergency questions, please contact your sales person.  
General inquiries may be directed to 905-689-6661.



U.S. ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF INSPECTOR GENERAL

*Catalyst for Improving the Environment*

## Evaluation Report

# EPA Promoted the Use of Coal Ash Products With Incomplete Risk Information

Report No. 11-P-0173

March 23, 2011



**Report Contributors:**

Carolyn Copper  
Steve Hanna  
Tapati Bhattacharyya  
Anne Declerck  
Richard Jones  
Chad Kincheloe  
Brooke Shull

**Abbreviations**

C <sup>2</sup> P <sup>2</sup>	Coal Combustion Products Partnership
CCR	Coal combustion residual
EPA	U.S. Environmental Protection Agency
FBC	Fluidized bed combustion
GAO	U.S. Government Accountability Office
IWEM	Industrial Waste Evaluation Model
OIG	Office of Inspector General
ORCR	Office of Resource Conservation and Recovery
OSWER	Office of Solid Waste and Emergency Response
RCC	Resource Conservation Challenge
TCLP	Toxicity characteristic leaching procedure

**Cover photo:** Spreading and compacting fly ash structural fill. (EPA photo)



# At a Glance

*Catalyst for Improving the Environment*

## Why We Did This Review

We initiated this review to determine whether the U.S. Environmental Protection Agency (EPA) followed accepted and standard practices in determining that coal combustion residuals (CCRs) are safe for the beneficial uses it had promoted on its Coal Combustion Products Partnership (C<sup>2</sup>P<sup>2</sup>) program website.

## Background

CCRs are generated from burning coal. More than 136 million tons of CCRs were generated in 2008. EPA defines beneficial use of CCRs as one that provides a functional benefit, replaces the use of an alternative material, conserves natural resources, and meets relevant product specifications and regulatory standards. Beneficial uses of CCRs include concrete manufacture or soil enhancement, among others.

For further information, contact our Office of Congressional, Public Affairs and Management at (202) 566-2391.

The full report is at:  
[www.epa.gov/oig/reports/2011/20110323-11-P-0173.pdf](http://www.epa.gov/oig/reports/2011/20110323-11-P-0173.pdf)

## ***EPA Promoted the Use of Coal Ash Products With Incomplete Risk Information***

### **What We Found**

EPA did not follow accepted and standard practices in determining the safety of the 15 categories of CCR beneficial uses it promoted through the C<sup>2</sup>P<sup>2</sup> program. EPA's application of risk assessment, risk screening, and leachate testing and modeling was significantly limited in scope and applicability. Without proper protections, CCR contaminants can leach into ground water and migrate to drinking water sources, posing significant public health concerns.

EPA officials told us they relied on individual state beneficial use programs to review and approve specific CCR beneficial uses, and to manage associated risks. EPA established, but did not implement, plans in 2005 to identify environmentally safe and beneficial use practices. Had EPA implemented its plans, it may have known earlier about risks from large-scale disposal of CCRs described as beneficial use.

EPA documented these risks in damage cases presented in its June 2010 proposed rule to regulate certain CCRs. EPA stated in the proposed rule that certain uses of CCRs, in sand and gravel pits as well as large-scale fill operations, represent disposal rather than beneficial use. After release of its proposed rule, EPA stopped promoting beneficial uses of CCRs through the C<sup>2</sup>P<sup>2</sup> program. Further, in response to a recommendation from the OIG, EPA removed access to the C<sup>2</sup>P<sup>2</sup> website.

In the proposed rule, EPA sought public comment on approaches for regulating CCRs, to include information and data on beneficial uses, particularly unencapsulated uses that may present a risk to human health and the environment. Such information will help EPA make informed decisions about safe beneficial use of CCRs. EPA should also have a sound process for evaluating and analyzing risk information that forms the basis of Agency promotions on safe beneficial use of CCRs.

### **What We Recommend**

We recommend that EPA define and implement risk evaluation practices for beneficial uses of CCRs, and that it determine if further action is warranted to address historical CCR structural fill applications. EPA agreed with these recommendations, which were revised in response to EPA suggestions. In its final response to this report, EPA should describe its specific corrective actions to address the recommendations and provide estimated completion dates for these actions.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

THE INSPECTOR GENERAL

March 23, 2011

**MEMORANDUM**

**SUBJECT:** EPA Promoted the Use of Coal Ash Products  
With Incomplete Risk Information  
Report No. 11-P-0173

**FROM:** Arthur A. Elkins, Jr.  
Inspector General

A handwritten signature in black ink, appearing to read "Arthur A. Elkins, Jr.", is written over the printed name.

**TO:** Mathy Stanislaus  
Assistant Administrator for Solid Waste and Emergency Response

This is our report on the subject evaluation conducted by the Office of Inspector General (OIG) of the U.S. Environmental Protection Agency (EPA). This report contains findings that describe the problems the OIG has identified and corrective actions the OIG recommends. This report represents the opinion of the OIG and does not necessarily represent the final EPA position. Final determinations on matters in this report will be made by EPA managers in accordance with established resolution procedures.

The estimated direct labor and travel costs for this report are \$759,649.

**Action Required**

In accordance with EPA Manual 2750, you are required to provide a written response to this report within 90 calendar days. Your response should include a corrective action plan for agreed-upon actions, including actual or estimated milestone completion dates. Your response will be posted on the OIG's public website, along with our comments on your response. Your response should be provided in an Adobe PDF file that complies with the accessibility requirements of section 508 of the Rehabilitation Act of 1973, as amended. Please e-mail your response to Carolyn Copper at [copper.carolyn@epa.gov](mailto:copper.carolyn@epa.gov). If your response contains data that you do not want to be released to the public, you should identify the data for redaction. We have no objections to the further release of this report to the public.

If you or your staff have any questions regarding this report, please contact Wade Najjum at (202) 566-0832 or [najjum.wade@epa.gov](mailto:najjum.wade@epa.gov), or Carolyn Copper at (202) 566-0829 or [copper.carolyn@epa.gov](mailto:copper.carolyn@epa.gov).

# Table of Contents

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# Chapter 1

## Introduction

### Purpose

The purpose of this review was to evaluate whether the U.S. Environmental Protection Agency (EPA) followed accepted and standard practices in determining that coal combustion residuals (CCRs) are safe for the beneficial uses it had promoted.<sup>1</sup>

### Background

CCRs are the residuals produced from burning coal for the generation of electricity. CCRs represent one of the largest waste streams in the United States. EPA records as of 2008 show that approximately 136 million tons are produced each year. In 2001, the EPA Office of Resource Conservation and Recovery (ORCR<sup>2</sup>) started the Coal Combustion Products Partnership (C<sup>2</sup>P<sup>2</sup>), a cooperative effort among EPA and more than 170 public and private partners to promote the beneficial use of CCRs. The goal of the program was, “By 2011, [to] increase the use of coal combustion ash to 50 percent from 32 percent in 2001.”

According to EPA, CCRs contain a range of metals such as arsenic, selenium, cadmium, lead, and mercury, in low concentrations. Without proper protections, these contaminants can leach into ground water and migrate to drinking water sources, posing significant public health concerns. Other concerns associated with CCRs include the exposure of vegetation to airborne dust and contamination, and resulting impacts on the food chain. Beneficial use of CCRs includes both encapsulated and unencapsulated uses. Encapsulated uses are bound in products such as concrete or bricks. Examples of unencapsulated uses are land applications in agriculture and road embankments.

The Bevill amendment of the Solid Waste Disposal Act Amendments of 1980 included CCRs as a “special waste” considered temporarily exempt from regulation as hazardous waste under Resource Conservation and Recovery Act

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<sup>1</sup> In the 2010 proposed rule, EPA listed the following criteria to appropriately define legitimate beneficial use: (1) the material used must provide a functional benefit; (2) the material substitutes for a virgin material, conserving natural resources that would otherwise need to be obtained through practices such as extraction; (3) where relevant product specifications or regulatory standards are available, the materials meet those specifications, and where such specifications or standards have not been established, they are not being used in excess quantities; and (4) in the case of agricultural uses, CCRs would be expected to meet appropriate standards, constituent levels, prescribed total loads, application rates, etc.

<sup>2</sup> ORCR was formerly known as the Office of Solid Waste.

(RCRA) subtitle C, until further study was completed. A 2000 EPA regulatory determination stated that:

- Fossil fuel combustion wastes [CCRs] do not warrant regulation as hazardous waste and the exemption for these wastes is retained.
- Regulation under RCRA subtitle D for nonhazardous wastes is needed for CCRs disposed in surface impoundments and landfills.
- Beneficial uses of CCRs, other than minefills, pose no significant risk and no additional national regulations are needed.

On December 22, 2008, an estimated 5.4 million cubic yards of coal ash sludge were accidentally released from a disposal containment dike at a Kingston, Tennessee, power plant. The ash extended over approximately 300 acres of land. An estimated 3 million cubic yards of the coal ash entered the Emory River in Tennessee and adjacent tributaries. In the aftermath of this catastrophe, EPA initiated a review to determine the need to regulate coal ash waste disposal. On May 4, 2010, EPA for the first time released a prepublication version of a proposed rule to regulate CCR disposal. The proposed rule was published in the Federal Register on June 21, 2010.

During the course of this review, we determined that risk information on EPA's C<sup>2</sup>P<sup>2</sup> website was incomplete, and that information on the website appeared to inappropriately endorse commercial products. After we informed EPA of these findings in an early warning report,<sup>3</sup> EPA removed the website. In addition, following release of its May 2010 proposal to regulate CCRs, EPA stopped promoting beneficial uses of CCRs through the C<sup>2</sup>P<sup>2</sup> program.

## Noteworthy Achievements

- Following the December 2008 catastrophe in Kingston, Tennessee, EPA took steps to identify and assess the structural integrity of impoundments, dams, or other management units within the electric power generating industry that hold wet-handled CCRs. This effort led to reports on the structural stability of these units, and recommendations for actions. EPA is monitoring the implementation of these actions. EPA has made all of the information on these assessments available to the public on its website. EPA is continuing its assessment activities on units holding “wet” CCRs.
- In June 2010, EPA proposed a rule to regulate coal ash under RCRA for the first time, to address the risks from the disposal of the wastes generated by electric utilities and independent power producers.

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<sup>3</sup> EPA OIG, *Website for Coal Combustion Products Partnership Conflicts with Agency Policies*, Report No. 11-P-0002, October 13, 2010.

- EPA has held eight public meetings across the nation to provide the public an opportunity to hear the contents of the proposed rule and offer comments. These public meetings are in addition to existing opportunities to provide written comments on the proposed rule.
- EPA has held three webinars on the proposed rule. The webinars include an explanation of the proposal by EPA staff, guidance on how to give official public comment, and an opportunity to address questions from participants.
- EPA stopped its participation in the C<sup>2</sup>P<sup>2</sup> program and removed access to incomplete C<sup>2</sup>P<sup>2</sup> website content while it is taking and assessing comment on the beneficial use of CCRs through the CCR proposed rulemaking. EPA continues to support safe and protective beneficial reuse of CCRs.
- EPA and the U.S. Department of Agriculture are conducting a multiyear study on the use of flue gas desulfurization gypsum in agriculture. The results of that study should be available in late 2012.

## Scope and Methodology

We conducted our work from March to December 2010 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the evaluation to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our objectives. We assessed whether EPA followed accepted and standard practices in determining that CCRs are safe for the beneficial uses it has promoted. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based upon our objectives.

We interviewed staff from ORCR and the EPA Office of Research and Development. We reviewed ORCR documents to identify existing accepted and standard practices that could be used to determine the safety of beneficial uses of CCRs. We also reviewed:

- Existing guidance, policies, and procedures governing EPA's industry partnership programs and promotion of beneficial use materials
- Regulatory documents related to the management and use of CCRs
- Prior EPA risk assessments of CCRs, as well as other materials developed by EPA to assist with beneficial use decisions
- C<sup>2</sup>P<sup>2</sup> website materials, including the types of beneficial uses of CCRs promoted and the information provided about safety concerns
- Beneficial use data from the American Coal Ash Association, which EPA uses to track progress toward its goal of recycling 50 percent of CCRs by 2011
- Information from EPA evaluations of other industrial materials, such as foundry sand and cement kiln dust

## Prior Evaluation Coverage

The following recent EPA Office of Inspector General (OIG) and U.S. Government Accountability Office (GAO) reports addressed issues related to the scope of our review:

- EPA OIG, *Website for Coal Combustion Products Partnership Conflicts with Agency Policies*, Report No. 11-P-0002, October 13, 2010
- EPA OIG, *Response to EPA Administrator's Request for Investigation into Allegations of a Cover-up in the Risk Assessment for the Coal Ash Rulemaking*, Report No. 10-N-0019, November 2, 2009
- GAO, *Coal Combustion Residue: Status of EPA's Efforts to Regulate Disposal*, GAO-10-85R, October 30, 2009
- EPA OIG, *Voluntary Greenhouse Gas Reduction Programs Report*, Report No. 08-P-0206, July 23, 2008
- EPA OIG, *Voluntary Programs Could Benefit from Internal Policy Controls and a Systematic Management Approach*, Report No. 2007-P-00041, September 25, 2007

## Chapter 2

# EPA Did Not Follow Accepted and Standard Practices in Determining the Safe Beneficial Uses of Coal Ash

EPA did not follow accepted and standard practices in determining that the 15 categories of CCR beneficial uses it promoted through the C<sup>2</sup>P<sup>2</sup> program were safe for those uses. According to EPA, CCRs contain a range of metals, such as arsenic, selenium, cadmium, lead, and mercury, in low concentrations. Without proper protections, these contaminants can leach into ground water and migrate to drinking water sources, posing significant public health concerns. EPA's application of risk assessment, risk screening, and leachate testing and modeling was significantly limited in scope and applicability. EPA has not defined procedures for applying such practices to CCR beneficial use analyses and believed it could rely on state programs to manage risks associated with CCR beneficial use. As a result, EPA promoted beneficial uses of CCRs based on incomplete information, without knowing the risks associated with each type of beneficial use.

### EPA Had Incomplete Risk Information on Coal Ash

EPA did not take sufficient action to ensure that its promotion of CCR beneficial use would not result in unacceptable risk to human health or the environment. EPA initiated a risk assessment for the residuals of one specific coal combustion process,<sup>4</sup> but the risk assessment was never finalized and remains a draft document. EPA did not finalize the risk assessment or take other actions to determine the risks of CCR beneficial uses. EPA could have completed additional risk assessments, evaluated whether reliance on state actions sufficiently addressed risks associated with beneficial uses of CCRs, gathered additional leachate data, and developed additional modeling procedures to determine the risks of CCR beneficial uses.

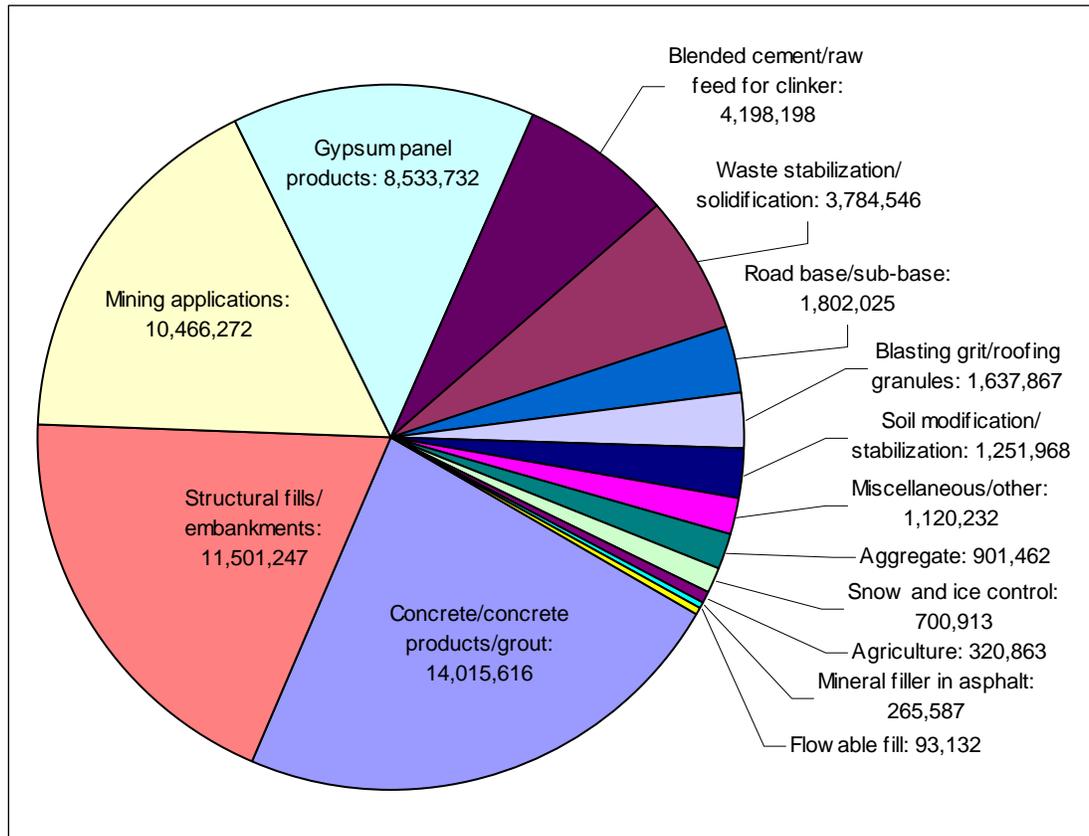
#### ***Risk Assessment***

EPA only initiated a risk assessment for one beneficial use of CCRs from one specific combustion process, and the results were never finalized or peer reviewed. The draft assessment is not representative of the 15 categories of CCR beneficial uses promoted by EPA through the C<sup>2</sup>P<sup>2</sup> program (figure 1).

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<sup>4</sup> The risk assessment addressed CCRs (fly and bottom ashes) from the fluidized bed combustion process. Fly and bottom ashes from other combustion processes, as well as boiler slag and flue gas desulfurization gypsum, were not studied in this risk assessment.

**Figure 1: Beneficial uses of coal ash in 2008**



Source: OIG analysis of EPA C<sup>2</sup>P<sup>2</sup> data.

Note: Numbers indicate total tons for each type of beneficial use.

In 1998, EPA issued a draft final risk assessment for fluidized bed combustion (FBC) waste in a specific agricultural (land) application.<sup>5</sup> EPA stated in the proposed rule that agriculture was selected as the beneficial use for study because “use of CCRs in this manner is likely to raise concerns from an environmental point of view.” The draft risk assessment concluded that there were no unacceptable human health risks associated with use of FBC waste as an agricultural soil amendment, and that ecological risks were unlikely. However, this draft risk assessment is limited by the following:

- The draft risk assessment was not finalized and remains identified as a draft final not to be cited or quoted. The document states it did not undergo a thorough external or internal review and does not represent Agency policy.

<sup>5</sup> This assessment looked at land application of FBC waste as a liming agent for soils. We use the term “assessment” instead of “analysis” in this report, consistent with EPA’s terminology in the proposed rule.

- The draft risk assessment was not peer reviewed. EPA policy states, “Peer review of all scientific and technical information that is intended to inform or support Agency decisions is encouraged and expected.”
- The draft risk assessment for FBC waste (fly and bottom ashes) does not represent all CCRs. In 2008, FBC waste represented only about 7 percent of all CCRs, and was mostly used in minefilling. Although EPA has promoted the beneficial use of other fly and bottom ashes and flue gas desulfurization gypsum for agricultural purposes, these CCRs were not included in the risk assessment.

### ***Risk Screening***

EPA initiated, but never finished, two risk screening practices to evaluate risks of CCR beneficial uses—the draft risk compendium and the never-completed risk information assessment. EPA could have finalized and used either as an accepted practice for evaluating risks of CCR beneficial uses, but did not.

**Risk Compendium**—The purpose of EPA’s draft risk compendium, *Evaluating Risk of Industrial Materials Recycling: A Compendium of Information and Tools*, is to provide information to states, users of industrial materials, and the general public on how to evaluate such materials to ensure that the materials are recycled and reused in an environmentally sound manner. The compendium is designed to provide a flexible approach, highlighting current best practices for evaluating potential risks associated with industrial materials recycling, including CCRs.

The draft compendium describes a three-tiered approach to be used depending on the significance of the risk scenario and the amount of time, resources, and data that are available. According to the draft compendium, the three approaches may be used independently or together. The first two “are applicable to a variety of scenarios and will lead to a streamlined, defensible, risk-informed decision.” The third is intended to provide “the tools needed to evaluate a detailed risk assessment conducted by a risk assessment professional.” The tiers are:

1. Lines of Evidence Approach—This approach uses relevant, existing information to make a risk-informed decision about the safety of a nonhazardous, industrial material proposed for reuse. Information may include prior beneficial use decisions or case studies published in peer-reviewed journals. The results may establish a defensible decision about the appropriateness of the beneficial use, or may identify questions or data gaps to be answered using another approach.
2. Screening Approach—This approach is designed to quickly, yet conservatively, estimate risks. Screening approaches do not provide definitive estimates of risk. They may look at possible worst-case

scenarios, or they may screen out a list of chemicals to identify those that require additional research.

3. Risk Assessment Modeling Approach—This approach uses computer models to evaluate human or ecological impacts at a specific site, and is the most data intensive of the three approaches. Risk assessment models often improve the accuracy and precision of the risk estimates, but require more time and resources.

EPA began developing the risk compendium in 2006 to assist state and local programs in evaluating the potential human and ecological health risks of recycling nonhazardous industrial materials, including CCRs. EPA staff stated that EPA could have developed a screening approach (i.e., a “fast analysis”) to determine safe beneficial uses, but did not.

**Risk Information Assessment**—In preparation for a 2006 beneficial use conference, EPA initiated the risk information assessment. The assessment was a risk screening template structured to collect information on CCR beneficial uses from all offices within ORCR. The template requested the following information:

1. Whether adequate data existed to characterize the material and the potential risks for all beneficial uses of CCRs
2. Whether each ORCR division agreed with each type of beneficial use
3. Existing EPA documents or past analyses addressing beneficial use
4. Risk assessment tools available to address concerns about beneficial use
5. Additional data sources, such as research studies and scientific journal articles
6. Relevant regulations and data from state programs

According to an ORCR division director, the compilation of risk information was stopped in favor of developing the draft compendium, which has never been finalized and distributed. Therefore, the risk information assessment was not used by EPA to assess risks associated with CCR beneficial uses.

### ***Leachate Testing and Modeling***

EPA’s promotion of CCR beneficial uses to date has been based, in part, on limited leachate testing data that may not be applicable to beneficial use scenarios. In 1999, EPA used the toxicity characteristic leaching procedure (TCLP) to assess the mobility of CCR constituents, such as metals, and in 2000 determined that CCRs are not hazardous wastes. Recent research by the EPA Office of Research and Development shows that TCLP may not be the most accurate predictor of the mobility of metals under some beneficial use conditions. Therefore, use of the TCLP test may be limited for understanding risks of beneficial use of CCRs. TCLP attempts to mimic landfill conditions by measuring

leaching at a single pH point. However, actual CCR beneficial use applications may differ from a landfill scenario and require testing at different pH values. EPA has acknowledged in its 2010 proposed rule that TCLP alone is not a good predictor of the mobility of metals from CCRs under a variety of conditions. The Agency has, therefore, also gathered data using the synthetic precipitation leaching procedure, as well as the multiple pH Kosson approach, to evaluate leaching of CCR constituents.

EPA's Industrial Waste Evaluation Model (IWEM) assists in determining the most appropriate waste management process to minimize ground water contamination. This model was initially developed by EPA to help states determine the type of disposal liner necessary to minimize adverse ground water impacts caused by leachate from recycled industrial materials, such as CCRs. IWEM can now be used to model the use of industrial materials in roadway construction, a common beneficial use of CCRs. Although EPA could use IWEM to evaluate risks of CCR beneficial uses, it has not expanded IWEM to model other beneficial uses of CCRs. While there are some limitations of IWEM, we learned that ORCR management has discouraged further expansion of IWEM because CCR beneficial uses are not regulated by EPA.

## **EPA Has Not Defined Accepted and Standard Practices for Assessing Risks of CCR Beneficial Uses**

EPA did not apply accepted and standard practices to analyze the beneficial uses of CCRs. Further, EPA has not defined a process for identifying and utilizing appropriate risk analysis tools that could be established as accepted and standard practices. As a result, significantly limited risk evaluations have taken place for an unrepresentative set of CCR beneficial uses.

EPA has relied on individual state beneficial use programs to review and approve specific CCR beneficial uses, and to manage associated risks. The ORCR director in place when EPA instituted CCR beneficial use promotion, as well as other managers, stated that the burden to determine the safety of CCR beneficial uses was on the states and the end users of CCR products. However, only 34 states currently have beneficial use programs for recycled industrial materials, and beneficial use requirements vary in scope and rigor from state to state. States may rely on EPA for technical guidance and assistance because many do not have sufficient resources. In addition, EPA did not conduct oversight of states' beneficial use determinations. EPA believes it has communicated CCR beneficial use precautions to states and industry in three published documents.<sup>6</sup>

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<sup>6</sup> *Using Coal Ash in Highway Construction: A Guide to Benefits and Impacts*, April 2005; *Agricultural Uses for Flue Gas Desulfurization (FGD) Gypsum*, March 2008; and *User Guidelines for Byproducts and Secondary Use Materials in Pavement Construction*, July 28, 2008.

In its 2005 Resource Conservation Challenge (RCC) Action Plan, EPA stated that sound technical assessments of the safety of the materials is a strategic component central to EPA's role in increasing appropriate beneficial use practices. The RCC's overall objective related to industrial materials recycling is to increase the amounts of three industrial nonhazardous wastes, including CCRs, that are beneficially used in an environmentally sound manner. To achieve this objective, EPA's RCC Action Plan included two strategies: (1) analyze and characterize the target materials, and (2) identify environmentally safe and beneficial practices. The first strategy states, "We need these data to . . . provide a repository of information about these materials for use by the public, including States conducting beneficial use determinations." The second strategy states, "While other federal agencies such as DOE [U.S. Department of Energy] and DOT [U.S. Department of Transportation] play important roles in fostering beneficial use (e.g., demonstrating the efficacy of fly ash as a supplemental cementitious material in road construction), EPA's core mission is to protect human health and the environment. As a result, the public looks to us to assess and explain the safety of beneficial use practices." EPA could not provide evidence that it implemented these two strategies.

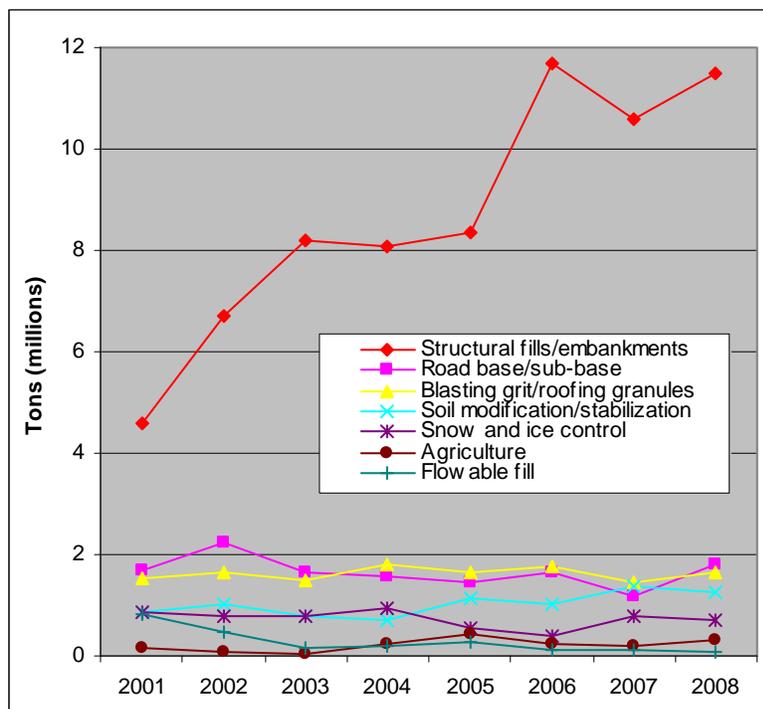
Had EPA acted on its 2005 RCC Action Plan to identify environmentally safe and beneficial uses, it may have recognized potential risks from large-scale application of unencapsulated coal ash used for structural fill. EPA's current position on the proposed rule is that the use of coal ash in large-scale structural fill applications, including sand and gravel pits, constitutes disposal, not beneficial use. Problems with large-scale structural fill applications, such as ground water contamination, have been documented in damage cases EPA presented in the proposed rule. The large volumes of unencapsulated coal ash reportedly used for structural fill beneficial use applications may represent a large universe of inappropriate disposal applications with unknown potential for adverse environmental and human health impacts.

From 2001 through 2008, information from the American Coal Ash Association<sup>7</sup> shows a total of 70 million tons of coal ash used in structural fill applications. This type of application increased more than any other reported beneficial use of unencapsulated coal ash (figure 2).

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<sup>7</sup> EPA has relied on American Coal Ash Association data to determine the volumes of coal ash used in beneficial use applications.

**Figure 2: Beneficial uses of unencapsulated CCRs**



Source: OIG analysis of American Coal Ash Association data.

## Conclusions

EPA efforts to seek reuse opportunities and establish reuse goals for a very large waste stream such as CCRs are an important and necessary part of its environmental protection mission. However, innovative but untested approaches to resource conservation and environmental protection should consider best management practices and sound scientific principles. EPA's work to develop regulations for the management of CCRs has resulted in several key improvements in the promotion and characterization of CCR beneficial uses. EPA will evaluate additional information on beneficial uses that present a risk to human health and the environment during the ongoing rulemaking. This additional information may help EPA to complete its risk information and lead to a stronger scientific foundation for EPA's promotion of CCRs. New information and disclosures that come from the rulemaking activities may include new definitions of beneficial use (versus disposal) and information on potential risk areas. EPA has an opportunity to evaluate this new information to identify new or previously unknown potential risks to human health and the environment. In our opinion, the good intentions underlying beneficial use activities do not supersede EPA's mission to protect human health and the environment. EPA should define and implement the accepted practices it will use for assessing the risks and safety of the CCR beneficial uses it promotes.

## Recommendations

We recommend the Assistant Administrator for Solid Waste and Emergency Response:

1. Define and implement risk evaluation practices to determine the safety of the CCR beneficial uses EPA promotes.
2. Determine if further EPA action is warranted to address historical CCR structural fill applications, based on comments on the proposed rule and other information available to EPA.

## Agency Response and OIG Evaluation

The Office of Solid Waste and Emergency Response (OSWER) provided Agency comments. We reviewed OSWER's comments, met with OSWER officials to discuss the comments, and made changes to the report, as appropriate. Appendix A provides the full text of OSWER's response and the OIG's comments.

In its response, EPA emphasized, "while the Agency recognizes the need for regulations for the management of CCRs in landfills and surface impoundments, EPA strongly supports the legitimate, beneficial use of CCRs in a protective, environmentally sound manner because of the significant environmental benefits that accrue both locally and globally."

The Agency agreed with recommendation 1, with a modification. EPA agreed to reexamine the range of risk evaluation practices that may be appropriate and determine how to proceed after evaluating the comments received on the CCR proposal, particularly for unencapsulated uses. We modified the recommendation as suggested, replacing "risk assessment" with "risk evaluation." In its 90-day response to this report, EPA should include a detailed corrective action plan with estimated milestone dates for defining and implementing these practices. This recommendation is open with agreed-to actions pending.

The Agency agreed with recommendation 2, with a modification. EPA agreed to determine if further action is warranted to address historical CCR structural fill applications based on comments on the proposed rule and other available information. We modified the recommendation as suggested. In its 90-day response to this report, EPA should include a detailed corrective action plan with estimated milestone completion dates for recommendation 2. This recommendation is open with agreed-to actions pending.

## **Status of Recommendations and Potential Monetary Benefits**

RECOMMENDATIONS						POTENTIAL MONETARY BENEFITS (in \$000s)	
Rec. No.	Page No.	Subject	Status <sup>1</sup>	Action Official	Planned Completion Date	Claimed Amount	Agreed-To Amount
1	12	Define and implement risk evaluation practices to determine the safety of the CCR beneficial uses EPA promotes.	O	Assistant Administrator for Solid Waste and Emergency Response			
2	12	Determine if further EPA action is warranted to address historical CCR structural fill applications, based on comments on the proposed rule and other information available to EPA.	O	Assistant Administrator for Solid Waste and Emergency Response			

<sup>1</sup> O = recommendation is open with agreed-to corrective actions pending  
 C = recommendation is closed with all agreed-to actions completed  
 U = recommendation is undecided with resolution efforts in progress

## **Agency Response to Draft Report and OIG Comment**

(Received February 4, 2011)

### **MEMORANDUM**

**Subject:** Response to the Draft OIG Report: EPA Promoted the Use of Coal Ash Products With Incomplete Risk Information: Project No. OPE-FY10-007

**From:** Mathy Stanislaus  
Assistant Administrator

**To:** Arthur A. Elkins, Jr.  
Inspector General

The Office of Solid Waste and Emergency Response (OSWER) appreciates the opportunity to review the Office of Inspector General's (OIGs) subject draft report and its recommendations. The purpose of this memorandum is to transmit our response to the OIG draft report and its recommendations. Our response addresses four main concerns with the draft report:

- EPA's technical work related to beneficial use of coal ash is much more extensive than recognized in the draft report.
- Proven damage cases associated with sand and gravel pits (which have always been considered disposal, not beneficial use) should not be used to draw conclusions regarding beneficial use.
- Important distinctions need to be recognized between encapsulated and unencapsulated beneficial uses, as well as the different manner in which EPA addressed those uses.
- Since EPA is still in the process of assessing the comments received on the proposed rule, the OIG draft report should be very cautious in treating the proposal as a final statement.

With regard to the two recommendations, OSWER suggests some clarification for the first recommendation, and cannot agree with the second recommendation as currently written.

### **EPA's Technical Work**

*EPA's technical work related to the beneficial use of coal ash is much more extensive than recognized in the draft report.*

Specifically, for the majority of beneficial uses covered by the Coal Combustion Product Partnership (C2P2) program, EPA was relying on the assessments conducted to support the May

2000 Regulatory Determination (65 FR 322214, <http://www.epa.gov/fedrgstr/EPA-WASTE/2000/May/Day-22/f11138.htm>). As part of that Regulatory Determination, EPA concluded that the beneficial uses identified were not likely to present risks to human health or the environment. EPA's conclusion was based on a detailed Report to Congress (RTC),<sup>8</sup> and was reached only after a robust public process that included both notice and comment and public hearings. Specific findings in the May 2000 Regulatory Determination that support this conclusion are attached. (See Attachment A)

**OIG Response:** The only risk assessment EPA performed in the 2000 regulatory determination was a draft risk assessment for a portion of CCRs. This risk assessment does not cover a “majority of beneficial uses,” as implied in EPA’s response. Rather, as the OIG reports on pages 6–7, the risk assessment used for the 2000 regulatory determination (1) was not finalized and is identified as a draft document not to be cited or quoted, (2) did not go through external or internal review and does not represent Agency policy, (3) was not peer reviewed, and (4) used FBC fly and bottom ashes that do not represent all CCRs. In its response to this report, OSWER did not disagree with the above OIG findings.

Further, in the proposed rule for coal ash (page 35160) EPA states, “EPA did not conduct specific risk assessments for the beneficial use of these materials, except as noted below and elsewhere in this preamble. Instead, it generally described the uses and benefits of CCRs, and cited the importance of beneficially using secondary materials and of resource conservation, as an alternative to disposal.” The risk assessment “except as noted below” is the same risk assessment mentioned in points 1–4 above. The risk assessments “elsewhere in this preamble” include one looking at flue gas desulfurization gypsum in agriculture (the OIG mentions this in the Noteworthy Achievements section) and other references that are not risk assessments performed by EPA.

Thus, EPA’s position on the beneficial use of coal combustion residuals (CCRs) was built upon the 1988<sup>9</sup> and 1999 Reports to Congress on fossil fuel combustion wastes and the May 2000 Regulatory Determination. Subsequent reports, public comments, and related studies (for example, the development of the Guide for Industrial Waste Management, February 2003, which included the Industrial Waste Evaluation Model (IWEM) and further materials applicable to beneficial use concerns; the Land Disposal Restrictions program which helped form our understanding of metal stabilization; the Chat Rule, 72 Fed Reg 393331-39353, which demonstrates the effectiveness of asphalt in encapsulating metals; and numerous literature articles that EPA directly referenced or provided links to other sites, such as the Recycled Materials Resource Center, a federal-university partnership) also supported the Agency’s position on the beneficial use of CCRs<sup>10</sup>.

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<sup>8</sup> In the March 1999 Report to Congress: Wastes from the Combustion of Fossil Fuels, page 3-6, EPA explained that the reason for maintaining the Bevill exemption for beneficial uses “...is based on one or more of the following reasons for each use or resulting product: absence of identifiable damage cases, fixation of the waste in finished products which immobilizes the material, and/or low probability of human exposure to the material.”

<sup>9</sup> Report to Congress on Wastes from the Combustion of Coal by Electric Utility Power Plants, February 1988.

<sup>10</sup> In the June 21, 2010 Federal Register notice, EPA proposed to regulate the disposal of CCRs in landfills and surface impoundments, while at the same time proposed to retain the Bevill exclusion for the beneficial use of CCRs. However, the Agency did seek comment on the beneficial use of CCRs, particularly the unencapsulated uses of CCRs because of its potential to create risks and need more site-specific review.

While the OIG draft report does reference EPA's efforts to address highway applications by providing a module to address roadway construction, it also criticizes EPA for failing to expand IWEM for other beneficial uses of CCRs. The OIG draft report needs to acknowledge the broader applicability of IWEM, as well as available non-EPA risk assessment tools. Specifically, EPA encouraged the use of the IWEM model (in particular the land application portion) for agricultural use, and prior to the development of the highway module, EPA recognized the use of IWEM (the landfill component) as appropriate for fill applications. In addition, there are non-EPA models (such as WiscLEACH, MODFLOW, etc.) that are also available to states and industry to address beneficial uses, and references to such models were cited in publicly available EPA reports.

**OIG Response:** The 1988 and 1999 Reports to Congress do not provide evidence that EPA applied standard and accepted risk assessment or evaluation practices to reach decisions about the risks of beneficial uses of CCRs. In addition, as we have stated previously, the risk assessment that formed the basis for the 2000 regulatory determination is silent on most forms of the CCR beneficial uses that EPA has promoted.

Our report does acknowledge the development of IWEM and its expansion to highway construction. However, we also note that IWEM could have been expanded for other CCR beneficial uses but, according to EPA staff, this expansion was discouraged by ORCR management.

As a further example, EPA and USDA have been engaged in an extensive agricultural use study that is not mentioned in the OIG draft report, but which should provide further support for the Regulatory Determination position that national regulation is not warranted. Through conferences, newsletters, and other communications, those potentially involved in such beneficial uses were well informed that agricultural use was an area EPA believed warranted further study, and that EPA was so engaged with USDA.

**OIG Response:** A bullet has been added to the Noteworthy Achievements section on page 3 to acknowledge the joint effort between EPA and the U.S. Department of Agriculture. However, EPA promoted the beneficial use of flue gas desulfurization gypsum in agriculture applications through the C<sup>2</sup>P<sup>2</sup> program prior to completing this study.

Finally, in raising concern regarding the toxicity characteristic leaching procedure (TCLP) leachate testing methods and not mentioning any other data sources available to EPA, the OIG draft report gives the impression that EPA's view of beneficial use is significantly flawed based on TCLP analyses. The OIG draft report should recognize that the Agency considered a wide variety of data sources in reaching its conclusions regarding the potential risks of various beneficial uses: TCLP, the synthetic precipitation leaching procedure (SPLP) test method, the Kosson leaching test method, total constituent analysis, as well as data from direct sampling of actual leachate. All of these types of data sources help formulate the Agency's understanding of this material, and its potential environmental risks. Employing a variety of data sources and methodologies has given the Agency a broader perspective, allowing the Agency to consider potential risks in diverse scenarios.

**OIG Response:** The OIG’s report does not state “significantly flawed based on TCLP analyses.” Rather, our report states, “EPA’s promotion of CCR beneficial uses to date has been based, in part, on limited leachate testing data that may not be applicable to beneficial use scenarios. In 1999, EPA used the TCLP to assess the mobility of CCR constituents, such as metals, and in 2000 determined that CCRs are not hazardous wastes. Recent research by the EPA Office of Research and Development shows that TCLP may not be the most accurate predictor of the mobility of metals under some beneficial use conditions. Therefore, use of the TCLP test may be limited for understanding risks of beneficial use of CCRs.” In addition, our report states, “EPA has acknowledged in its 2010 proposed rule that TCLP alone is not a good predictor of the mobility of metals from CCRs under a variety of conditions.” Our report also acknowledges the Agency’s efforts to evaluate leaching of CCR constituents at the top of page 9.

## Damage Cases

*Proven damage cases associated with sand and gravel pits (which is disposal, not beneficial use) should not be used to draw conclusions regarding beneficial use.*

The OIG draft report concludes that “EPA promoted beneficial uses of CCRs based on incomplete information,” in part, based on the fact that in the 2010 CCR proposed rule, EPA identified damage cases resulting from disposal of unencapsulated CCRs into sand and gravel pits and from large-scale fill operations. This is inaccurate in several regards. Placement of CCRs in sand and gravel pits has always been considered by EPA to be disposal, **not** beneficial use. Disposal of CCRs in sand and gravel pits makes up the vast majority of the proven damage cases identified in the May 2000 Regulatory Determination. Precisely because of the associated damage cases, EPA viewed placement in sand and gravel pits as disposal, not beneficial use.<sup>11</sup>

With respect to the placement of CCRs in large scale fill operations, the May 2000 Regulatory Determination had not identified any such damage cases, although one can view the disposal of CCRs in sand and gravel pits as a type of large scale fill operation.<sup>12</sup> Thus, in developing the proposed rule, the Agency also decided that it was appropriate to propose designating large-scale fill operations as disposal. This reflects the evolution of EPA’s thinking since the RTC that large-scale placement of unencapsulated CCRs may, and has, posed greater risk than other types of fill. Thus, damage cases at sand and gravel pits should not be used to claim that problems exist generally with all beneficial uses, nor should our recent action of proposing that large scale fill be considered disposal form a basis for characterizing the environmental risks associated with the breadth of beneficial use operations.

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<sup>11</sup> Sand and gravel pits are a mining operation, and had EPA not intended to regulate placement in sand and gravel pits as disposal, the operation would fall under minefilling.

<sup>12</sup> While beneficial use includes “fill” operations, not all “fill” operations are part of the beneficial uses promoted by EPA. For example, minefilling is a “fill” operation. Consistent with the May 2000 Regulatory Determination, our intent is to deal with minefilling through rulemaking under SMCRA and/or RCRA.

**OIG Response:** We disagree with EPA’s characterization of OIG conclusions. The statement in the OIG draft report, “EPA promoted beneficial uses of CCRs based on incomplete information,” contrary to EPA assertion, is not based on language in the 2010 CCR proposed rule related to damage cases for sand and gravel pits. Rather, the OIG’s conclusion that “EPA promoted beneficial uses of CCRs based on incomplete information” is based on OIG findings that “EPA’s application of risk assessment, risk screening, and leachate testing and modeling was significantly limited in scope and applicability. EPA has not defined procedures for applying such practices to CCR beneficial use analyses and believed it could rely on state programs to manage risks associated with CCR beneficial use.”

In its response, EPA states that it has always considered that coal ash in sand and gravel pits is disposal and not beneficial use. The OIG cannot attest to what EPA has “always considered.” However, as stated in our October 2010 report, *Website for Coal Combustion Products Partnership Conflicts with Agency Policies*, (text boxes on pages 9 and 10) the OIG does not agree that EPA has consistently and clearly communicated a position that coal ash in sand and gravel pits is disposal and not beneficial use. Further, EPA has not provided additional evidence here to support its position.

Furthermore, discussion of the Kingston catastrophe should be deleted as it was not associated with beneficial use, and does not reflect any known risk scenario associated with beneficial use. [Note: If the final report continues to mention the discussion of the Kingston spill, we would note that the report should correct the statement on page 2 under “Noteworthy Achievements” that EPA’s efforts to assess the structural integrity of units after the Kingston catastrophe led “... to the creation of the National Inventory of Dams hazard potential ratings, which address the potential consequences of failure or misoperation of dams.” because it is not accurate. The National Inventory of Dams (which addresses a much larger universe of dams – approximately 83,000) has been in place since 1975, and is the source of the hazard potential rating system. Prior to EPA’s assessment, many of the coal ash dams were already part of the National Inventory of Dams, and were classified according to their hazard potential. EPA adopted the existing rating system, and used the criteria to classify those units that had not previously been categorized. EPA suggests the IG reword this paragraph to say something like: This effort led to reports on the structural stability of these units, and recommendations for actions. EPA is monitoring the implementation of these actions. EPA has made all of the information on these assessments available to the public on our web site. EPA is continuing its assessment activities on units holding "wet" CCRs.]

**OIG Response:** EPA states that the OIG should delete mention of the Kingston catastrophe in the Background section of our report because the spill was not associated with beneficial use. We included reference to the Kingston catastrophe because it is associated with the development of the proposed rule and the rule is associated with beneficial use of CCRs. However, we have modified the language in the Noteworthy Achievements as suggested by EPA.

## Encapsulated Versus Unencapsulated Beneficial Uses

*Important distinctions need to be recognized between encapsulated and unencapsulated beneficial uses, as well as the different manner in which EPA addressed those uses.*

The OIG draft report fails to recognize that the risks associated with CCRs are distinct, based on the different types and applications of CCRs. Thus, the risks associated with the beneficial use of encapsulated CCRs, such as in cement, gypsum panels, or waste stabilization, which account for a substantial portion of beneficially used CCRs, do not present the same level or type of potential risk associated with the use of CCRs in unencapsulated uses, such as in soil modification or deicing operations. Stemming from the Agency's May 2000 Regulatory Determination, the manner in which EPA addressed unencapsulated beneficial uses differs substantially from encapsulated uses. EPA concluded that, nationally, unencapsulated beneficial uses could pose problems in some cases, and therefore warranted more site-specific evaluation by the state and/or user to account for the specific characteristics of the coal ash being used, the site conditions, the quantity of material placed, and other site-specific factors. EPA was clear that it was incumbent on state authorities and/or industry to conduct the appropriate site-specific assessments to determine whether the particular unencapsulated beneficial uses would be safe. The following are three illustrative quotations from publicly available EPA documents (which also demonstrate how EPA has also provided guidance to states and industry):

"Conduct an evaluation of local groundwater conditions prior to using coal combustion products as a fill material. Numerous groundwater models are available such as EPA's Industrial Waste Evaluation Model..."(Using Coal Ash in Highway Construction: A Guide to Benefits and Impacts, April 2005)

"In determining the environmental suitability of FGD gypsum for a particular location, you may find the USEPA's Industrial Waste Management Evaluation Model (IWEM) and the chapter on land application (Chapter 7) in the associated *Guide for Industrial Waste Management* (<http://www.epa.gov/epawaste/nonhaz/industrial/guide/index.htm>) to be useful resources. You should also consult with your State's department of environmental protection to comply with any regulations pertaining to the management of CCPs. You may also find it helpful to consult with your State's department of agriculture and agricultural extension service, and with the USDA Natural Resources Conservation Service."(Agricultural Uses for Flue Gas Desulfurization (FGD) Gypsum, March 2008)

"Unencapsulated use, however, has the potential for trace element leaching. Use of fly ash in stabilized base or embankments requires good management to ensure the environment is not impacted negatively. Although studies have shown that coal fly ash is typically safe to use in unencapsulated applications, precautions must still be taken to ensure environmental impacts are acceptable.<sup>(28;29;30;31)</sup> An evaluation of groundwater conditions, applicable state test procedures, water quality standards, and proper construction are all necessary considerations in ensuring a safe final product.<sup>(10)</sup>"(User Guidelines for Byproducts and Secondary Use Materials in Pavement Construction, July 28, 2008)

**OIG Response:** EPA’s response states, “The OIG draft report fails to recognize that the risks associated with CCRs are distinct, based on the different types and applications of CCRs. Thus, the risks associated with the beneficial use of encapsulated CCRs, such as in cement, gypsum panels, or waste stabilization, which account for a substantial portion of beneficially used CCRs, do not present the same level or type of potential risk associated with the use of CCRs in unencapsulated uses, such as in soil modification or deicing operations.” While it may be widely believed that different risks are imparted from different forms of CCRs, EPA did not provide sufficient information to support this belief. The OIG’s finding (page 5) is, “EPA did not follow accepted and standard practices in determining that the 15 categories of CCR beneficial uses it promoted through the C<sup>2</sup>P<sup>2</sup> program were safe for those uses.” These categories include both encapsulated and unencapsulated CCRs. EPA’s completion of recommendation 1, “Define and implement risk evaluation practices to determine the safety of the CCR beneficial uses EPA promotes,” should begin to address EPA’s assertion about the safety of encapsulated CCR use.

EPA’s response also states, “EPA was clear that it was incumbent on state authorities and/or industry to conduct the appropriate site-specific assessments to determine whether the particular unencapsulated beneficial uses would be safe.” EPA further provides three examples/documents to support its assertion. We disagree that the statements in these documents make EPA’s position clear, i.e., “that it was incumbent on state authorities and/or industry to conduct the appropriate site-specific assessments to determine whether the particular unencapsulated beneficial uses would be safe.” Further, our October 2010 report, *Website for Coal Combustion Products Partnership Conflicts with Agency Policies*, found that EPA’s C<sup>2</sup>P<sup>2</sup> website, its chief means of promoting beneficial use of CCRs, “did provide some general precautions on beneficial use, [however] the C<sup>2</sup>P<sup>2</sup> Website did not identify large-scale fill applications as disposal, did not list known beneficial use damage cases, and did not emphasize EPA’s concerns about beneficial use of unencapsulated CCRs in road embankments and agricultural applications.” The C<sup>2</sup>P<sup>2</sup> websites on “CCP Benefits and Risks” and “Environmental and Health Information” did not state that “it was incumbent on state authorities and/or industry to conduct the appropriate site-specific assessments.”

Finally, as the OIG reports here, reliance on state programs may have its limits. Only 34 states currently have beneficial use programs for recycled industrial materials, and beneficial use requirements vary in scope and rigor from state to state. States may rely on EPA for technical guidance and assistance because many do not have sufficient resources.

EPA’s use of differing approaches in addressing encapsulated and unencapsulated uses was reaffirmed in the 2010 CCR proposed rule:

“EPA is proposing this approach in recognition that some uses of CCRs, such as encapsulated uses in concrete, and use as an ingredient in the manufacture of wallboard, provide benefits and raise minimal health or environmental concerns. That is, from information available to date, EPA believes that encapsulated uses of CCR, as is common in many consumer products, does not merit regulation. On the other hand, unencapsulated uses have raised concerns and merit closer attention. For example, the placement of unencapsulated CCRs on the land, such as in road embankments or in agricultural uses, presents a set of issues, which may pose similar concerns as those that are causing the

Agency to propose to regulate CCRs destined for disposal. Still, the amounts and, in some cases, the manner in which they are used—*i.e.*, subject to engineering specifications and material requirements rather than landfilling techniques—are very different from land disposal.” (75 Fed. Reg. 35160)

Furthermore, as stated in the 2010 CCR Proposed Rule:

“The beneficial uses that EPA identifies as excluded under the Bevill amendment, for the most part, present a significantly different picture, and a significantly different risk profile. As a result, EPA is explicitly not proposing to change their Bevill status (although we do take comment on whether “unconsolidated uses” of CCRs need to be subject to federal regulation). (75 Fed. Reg. 35186)

**OIG Response:** The OIG acknowledges that EPA describes differing approaches to address encapsulated and unencapsulated uses in the proposed rule. However, this position comes after years of supporting and promoting both categories of beneficial uses of CCRs through the C<sup>2</sup>P<sup>2</sup> program, in the absence of adequate risk information. EPA’s concerns about unencapsulated uses of CCRs further support the OIG’s recommendation 2 in this report.

Additionally, while the Agency recognizes the need for regulations for the management of CCRs in landfills and surface impoundments, EPA strongly supports the legitimate, beneficial use of CCRs in a protective, environmentally sound manner because of the significant environmental benefits that accrue both locally and globally.

**OIG Response:** EPA’s continued support of CCR beneficial uses is acknowledged in the Noteworthy Achievements section on page 3, and in the Agency Response and OIG Evaluation on page 12.

The OIG draft report also criticizes EPA’s reliance on states in the context of site-specific evaluations. However, EPA’s message was not a statement that unencapsulated beneficial use is advocated solely on compliance with whatever state standards are in place, but rather that: “an evaluation of groundwater conditions, applicable state test procedures, water quality standards, and proper construction are all necessary in ensuring a safe final product.” (User Guidelines for Byproducts and Secondary Use Materials in Pavement Construction, July 28, 2008). It should also be recognized that CCRs are currently a RCRA Subtitle D waste, and outside of the municipal solid waste context, under RCRA Subtitle D, it is states, not EPA, who have primary regulatory authority over the disposal and recycling (beneficial use) of CCRs. EPA’s role is to establish minimum national criteria, which we have done, but otherwise have no direct authority to enforce or implement those requirements.

**OIG Response:** EPA established the C<sup>2</sup>P<sup>2</sup> program to encourage beneficial use of all types of CCRs. In establishing such a program, EPA has a responsibility to ensure that it is promoting safe practices and is clearly communicating any risks. As we identified in our October 2010 report, the risks were not clearly or fully communicated, which resulted in EPA removing access to the C<sup>2</sup>P<sup>2</sup> website. While EPA quotes a precaution from 2008 guidelines for pavement construction, this does not represent a clear communication of concerns about risks associated

with all unencapsulated CCRs. EPA's position that states are responsible for determining the risks of CCR beneficial uses is inconsistent with its stated position in the 2005 RCC Action Plan. As we note on pages 9 and 10 of this report, the 2005 RCC Action Plan included a strategy to characterize target materials and identify safe and beneficial use practices. According to the RCC, this information is needed to "provide a repository of information about these materials for use by the public, including States conducting beneficial use determinations." The action plan further states, "EPA's core mission is to protect human health and the environment. As a result, the public looks to us to assess and explain the safety of beneficial use practices." It appears that EPA used its management discretion, versus a specific authority, to seek to implement the goals of the RCC (also a voluntary program).

The Risk Assessment section of the OIG draft report, Chapter 2 (page 5), states that "EPA only initiated one risk assessment for beneficial use of a single type of CCR..." This reference is to an FBC<sup>13</sup> analysis for agricultural use. As indicated previously, EPA concluded that, nationally, unencapsulated beneficial uses could pose problems in some cases, and therefore warranted more site-specific evaluation by the state and/or user. Therefore, when we issued the March 2008, Agricultural Uses for Flue Gas Desulfurization (FGD) Gypsum, the Agency did not provide direction that the FBC analysis (referenced in the OIG draft report) indicated it was safe, but rather provided direction to the reader to consider using the land application module of the IWEM to assess risks, along with contacting the state environmental and agricultural authorities.

**OIG Response:** EPA's response states, "As indicated previously, EPA concluded that, nationally, unencapsulated beneficial uses could pose problems in some cases, and therefore warranted more site-specific evaluation by the state and/or user." EPA has not provided sufficient evidence that it either reached or clearly communicated this conclusion. In fact, the 2000 regulatory determination does not specifically mention unencapsulated beneficial uses.

References to FBC wastes in the report have been modified based on EPA's comments in footnote 6 of its response.

Finally, in a number of places, the OIG draft report refers to EPA's failure to follow "accepted and standard practices in determining that CCRs are safe for the beneficial uses it has promoted." EPA agrees that assessment of risk is a critical component in the decision-making associated with beneficial use. There are many different and appropriate ways to evaluate risk, and we believe we have generally conducted the risk evaluations that were appropriate to the circumstances, e.g., IWEM, RTC with public comment, damage cases, case studies, and weight of evidence. We also believe that there are situations where site-specific conditions are of critical importance (i.e., unencapsulated uses), and that any national risk evaluation could not adequately substitute for a site-specific assessment. In such cases, we highlighted that states or users should do a more extensive site-specific evaluation. We need to retain the flexibility to determine the best evaluation method given the risks, our resources, and state and industry capabilities and responsibilities.

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<sup>13</sup> The report describes FBC wastes as one type of CCR. This is inaccurate. We define CCR as fly ash, bottom ash, boiler slag, and flue gas desulfurization sludge. FBC is a type of combustion device; not a waste type.

**OIG Response:** The definition of accepted and standard practices for determining the risks of CCRs is important to objectively identify the process that will be followed for the public determination of risk. In our opinion, this does not necessarily mean that EPA must perform site-specific assessments for every beneficial use application of CCRs. The practices could be defined to clarify that a site-specific assessment should be performed under specific conditions. EPA did not provide sufficient evidence that its promotion of beneficial uses was preceded by completion of appropriate risk assessments or evaluations, or that other controls were in place to ensure that risks, for all forms of CCRs promoted by EPA, were properly characterized, studied, and communicated. Had EPA implemented its 2005 RCC plans to characterize target materials and identify safe and beneficial use practices, it may have had a sufficient basis to responsibly promote many uses of CCRs.

## **Proposed Rule**

*Since EPA is still in the process of assessing the comments received on the proposed rule, the OIG draft report should be very cautious in treating the proposal as a final statement.*

The proposed CCR rule included positions on a wide range of issues and solicited comment on those issues. Over 450,000 comments were received. EPA needs to assess and respond to those comments before issuing a final rule that will establish final Agency positions, including possible additional work that may be needed in the area of risk evaluation. The OIG needs to exercise greater caution in its final report in recognition of the fact that EPA's evaluation of the comments could affect the positions taken on various issues in the final rule. For example, in the proposed rule, the Agency solicited comment on a wide range of issues associated with unencapsulated beneficial uses, such as the need for and propriety of various leach tests, and the safety of agricultural uses and construction practices, etc. (65 Fed Reg 35165.) The OIG draft report appears to inappropriately use the solicitation of comment as a justification to infer a conclusive determination that problems currently exist with the beneficial use of CCRs.

**OIG Response:** The OIG has evaluated its references to the proposed rule and used due care in how we characterize Agency positions stemming from the rule.

## **The Recommendations**

As an overall comment, further actions taken by EPA on the beneficial use of CCRs will be done in a manner that is consistent with decisions made as part of the CCR rulemaking effort. As previously noted, EPA received over 450,000 comments from the comment period and hearings on the proposed CCR rule. Given the magnitude of comments and the time it will take for EPA to process this information, EPA recommends the OIG add language to the final report acknowledging that the Agency has proposed regulation and solicited comment on the beneficial use of CCRs, particularly as related to the unencapsulated uses of CCRs, and that the Agency will consider those comments in making final decisions.

The draft's first recommendation is:

***Define and implement risk assessment practices to determine the safety of CCR beneficial uses EPA promotes.***

As discussed above, many unencapsulated uses will necessitate evaluation of safety by the state and/or user, because of the site-specific nature of such uses. The Agency has evaluated a number of CCR beneficial uses already as noted above, but agrees that it will reexamine the range of risk evaluation practices that may be appropriate and determine how to proceed after evaluating the comments received on the CCR proposal, particularly on CCR unencapsulated uses.

In addition, EPA recommends that the OIG use the phrase "risk evaluation," rather than "risk assessment," as the latter is a term of art and in recognition of the fact that there are various ways that the safety of beneficial uses could be reviewed and evaluated.

**OIG Response:** The Agency agrees to reexamine the range of risk evaluation practices that may be appropriate and determine how to proceed after evaluating the comments received on the CCR proposal, particularly on CCR unencapsulated uses. We have replaced "risk assessment" with "risk evaluation" in recommendation 1.

This recommendation is open with agreed-to actions pending. In its 90-day response to this report, EPA should include a more detailed corrective action plan with estimated milestone dates for defining and implementing these practices.

The second recommendation is:

***Evaluate data on coal ash structural fill applications to identify and assess potential risks to human health and the environment resulting from inappropriate disposal described as beneficial use.***

We agree with the OIG that the safe beneficial use of CCRs is important. However, this recommendation appears to contemplate actions that are not feasible due to lack of information and ability to collect needed information. The draft OIG report on page 11 calls for "...EPA to retrospectively evaluate existing high-risk coal ash applications to identify potential risks to human health and the environment." The apparent intent is for EPA to identify where coal ash has been historically used in structural fill applications and conduct environmental assessments at those sites. This is not feasible. EPA had no requirements for record-keeping or reporting of such activities. We do not know whether states required records to be kept or reported to them. Further, it is not clear that the power plants that generated the CCRs have that information. In short, without a readily available source of information and data, it would be infeasible and impractical for EPA to undertake this recommendation.

As noted previously, the OIG has not presented any evidence to justify the need for a special national assessment of CCR structural fills. The risks that the draft OIG report

referenced in the proposed rule relate to the placement of CCRs in sand and gravel pits and the use of CCRs for large-scale fill operations. Of the damage cases identified in the proposed rule, corrective action has been taken at each site, and thus it is not clear why EPA would need to reassess those sites. We have examined the current and proposed Superfund National Priorities List<sup>14</sup> and out of approximately 1,700 sites, only four sites were listed on the National Priorities List (and none of them are currently listed). EPA is in the process of going through the over 450,000 comments to the proposed rule. We do not know yet whether there is sufficient justification to conduct a special national assessment of coal ash structural fill operations based on the comments submitted on the proposed rule, but at this point, it is premature to assume such action is warranted.

Prospectively, EPA will address large-scale fill operations in the rulemaking. We therefore suggest the recommendation be modified to call for EPA to determine if further EPA action is warranted to address historical CCR structural fill applications, based on comments on the proposed rule and other information available to EPA.

**OIG Response:** EPA’s response states that it will “prospectively . . . address large-scale fill operations in the rulemaking.” EPA also suggested a modification to recommendation 2 that it “determine if further EPA action is warranted to address historical CCR structural fill applications, based on comments on the proposed rule and other information available to EPA.” The OIG agreed to this modification and in a subsequent meeting, EPA agreed to the recommendation.

This recommendation is open with agreed-to actions pending. In its 90-day response to this report, EPA should include a corrective action plan with estimated milestone completion dates for the agreed-to recommendation.

In conclusion, OSWER appreciates the opportunity to review the OIG’s subject draft report. OSWER takes these issues very seriously, and will continue to evaluate these issues as part of the rulemaking effort.

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<sup>14</sup>The *National Priorities List* (NPL) is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is intended primarily to guide the EPA in determining which sites warrant further investigation. (<http://www.epa.gov/superfund/sites/npl/>)

## ATTACHMENT A

The specific findings in the May 2000 Regulatory Determination are excerpted below (see 65 Fed Reg. 32229-32230).

*“Beneficial purposes include waste stabilization, beneficial construction applications (e.g., cement, concrete, brick and concrete products, road bed, structural fill, blasting grit, wall board, insulation, roofing materials), agricultural applications (e.g., as a substitute for lime) and other applications (absorbents, filter media, paints, plastics and metals manufacture, snow and ice control, waste stabilization).”*

*“For beneficial uses other than minefilling, we have reached this decision because: (a) We have not identified any beneficial uses that are likely to present significant risks to human health or the environment; and (b) no documented cases of damage to human health or the environment have been identified. Additionally, we do not want to place any unnecessary barriers on the beneficial use of coal combustion wastes so that they can be used in applications that conserve natural resources and reduce disposal costs.”*

*“Currently, the major beneficial uses of coal combustion wastes include: Construction (including building products, road base and sub-base, blasting grit and roofing materials) accounting for approximately 21%; sludge and waste stabilization and acid neutralization accounting for approximately 3%; and agricultural use accounting for 0.1%. Based on our conclusion that these beneficial uses of coal combustion wastes are not likely to pose significant risks to human health and the environment, we support increases in these beneficial uses of coal combustion wastes.”*

*“Off-site uses in construction, including wallboard, present low risk due to the coal combustion wastes being bound or encapsulated in the construction materials or because there is low potential for exposure. Use in waste and sludge stabilization and in acid neutralization are either regulated (under RCRA for hazardous waste stabilization or when placed in municipal solid waste landfills, or under the Clean Water Act in the case of municipal sewage sludge or wastewater neutralization), or appear to present low risk due to low exposure potential. While in the RTC, we expressed concern over risks presented by agricultural use, we now believe our previous analysis assumed unrealistically high-end conditions, and that the risk, which we now believe to be on the order of  $10^{-6}$ , does not warrant national regulation of coal combustion wastes that are used in agricultural applications.”*

*“In the RTC, we were not able to identify damage cases associated with these types of beneficial uses, nor do we now believe that these uses of coal combustion wastes present a significant risk to human health or the environment. While some commenters disagreed with our findings, no data or other support for the commenters’ position was provided, nor was any information provided to show risk or damage associated with agricultural use. Therefore, we conclude that none of the beneficial uses of coal combustion wastes listed above pose risks of concern.”*

## ***Distribution***

Office of the Administrator  
Assistant Administrator for Solid Waste and Emergency Response  
Deputy Assistant Administrator for Solid Waste and Emergency Response  
Agency Followup Official (the CFO)  
Agency Followup Coordinator  
General Counsel  
Associate Administrator for Congressional and Intergovernmental Relations  
Associate Administrator for External Affairs and Environmental Education  
Director, Office of Resource Conservation and Recovery, Office of Solid Waste and  
Emergency Response  
Acting Deputy Director, Office of Resource Conservation and Recovery, Office of Solid Waste  
and Emergency Response  
Director, Resource Conservation and Sustainability Division, Office of Resource Conservation  
and Recovery, Office of Solid Waste and Emergency Response  
Audit Followup Coordinator, Office of Solid Waste and Emergency Response



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

SEP 02 2011

THE INSPECTOR GENERAL

**MEMORANDUM**

**SUBJECT:** Close-out of OIG Report No. 11-P-0173, *EPA Promoted the Use of Coal Ash Products With Incomplete Risk Information*, March 23, 2011

**TO:** Mathy Stanislaus, Assistant Administrator  
Office of Solid Waste and Emergency Response

We have reviewed your August 22, 2011, final response to the subject report. The OIG has now received a complete final response to the subject report, we will close this report in the OIG's tracking system. We acknowledge your efforts and commitment to address the OIG recommendations. The following describes the Agency's agreed-to actions on each recommendation and the estimated completion dates.

**Recommendation 1:**

*"Define and implement risk evaluation practices to determine the safety of the CCR beneficial uses EPA promotes."*

OSWER is developing a process or evaluation hierarchy to evaluate the potential risk of beneficial uses of CCRs. OSWER expects to use common evaluation techniques in a hierarchy to accommodate different levels of evaluation needed considering materials, nature, use, and the necessity for site specific evaluation. OSWER plans to develop the process or evaluation hierarchy in two parts due to the complexity of evaluating unencapsulated uses. Although development of the evaluation process/hierarchy may be informed by the comments on the proposed rule, its issuance is not linked to issuance of the final disposal rule.

**Estimated Completion Dates:**

1. By April 2012: OSWER will complete internal development of the process or evaluation hierarchy for encapsulated beneficial uses.
2. 2<sup>nd</sup> Quarter 2014: OSWER will complete development of the conceptual model for evaluating risks from unencapsulated uses.

**Recommendation 2:**

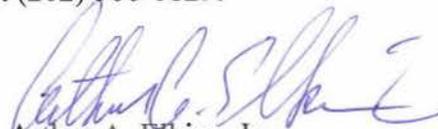
*“Determine if further EPA action is warranted to address historical CCR structural fill applications, based on comments on the proposed rule and other information available to EPA.”*

In the proposed CCR disposal rule, the Agency proposed that large-scale fill be considered disposal rather than beneficial use. OSWER is in the process of evaluating over 450,000 comments on the proposed rule, which includes comments on the issue of large-scale fill as disposal. OSWER considers the Agency’s evaluation of all of those comments and its final rulemaking decisions critical predicates to determining whether any further EPA action is warranted to address historical CCR structural fill applications. The schedule for promulgating the rule is still in preparation due to the large workload imposed by the overwhelming number of comments received, the complexity of the issues raised, and the resources available.

**Estimated Completion Date:**

By the end of FY 2012: OSWER will provide milestones for determining whether further action is warranted to address historical CCR structural fill applications.

If OSWER finds it necessary to modify any of the agreed-to corrective actions or planned milestones, the OIG should be consulted in advance. If you or your staff have any questions regarding this memo, please contact Wade Najjum, Assistant Inspector General for Program Evaluation, at (202) 566-0827, or Carolyn Copper at (202) 566-0829.

  
Arthur A. Elkins, Jr.

cc: Wade Najjum, OIG  
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

AUG 22 2011

OFFICE OF  
SOLID WASTE AND  
EMERGENCY RESPONSE

MEMORANDUM

**SUBJECT:** Response to OIG Evaluation Report, *EPA Promoted the Use of Coal Ash Products with Incomplete Risk Information*

**FROM:** Mathy Stanislaus  
Assistant Administrator

A handwritten signature in black ink that reads "Mathy Stanislaus".

**TO:** Arthur A. Elkins, Jr.  
Inspector General

Thank you for the opportunity to review and respond to the Office of Inspector General (OIG) evaluation report, *EPA Promoted the Use of Coal Ash Products with Incomplete Risk Information*, dated March 23, 2011. OSWER concurs with both recommendations, and agrees that protection of human health and the environment is a critical prerequisite to promoting the beneficial use of coal combustion residuals (CCR). As recognized in the OIG's report, EPA suspended active participation in the Coal Combustion Products Partnership (C2P2) program, while we are assessing comments on the beneficial use of CCRs through the CCR proposed rulemaking. The comments below present the response of the Office of Solid Waste and Emergency Response (OSWER) for the two recommendations included in the report:

**Recommendation 1:** Define and implement risk evaluation practices to determine the safety of the CCR beneficial uses EPA promotes.

Reuse of industrial materials, when performed properly, and in an environmentally sound manner, is environmentally preferable to the disposal of these materials, as it can provide significant environmental, economic, and/or product performance advantages. Consequently, it is important that we continue to encourage the reuse of industrial materials, including CCR, but that reuse must be in a safe and protective manner. In this regard, OSWER is developing a process or evaluation hierarchy to evaluate the potential risk of beneficial uses of CCR. We expect to use common evaluation techniques in a hierarchy to accommodate different levels of evaluation needed considering materials, nature, use and the necessity for site specific evaluation, for example. OSWER also expects to look at tools to be identified in *Evaluating Risk of Industrial Materials Recycling: A Compendium of Information and Tools*, and refinements to

the Industrial Waste Management Evaluation Model that are under development that may aid us in evaluating various beneficial uses. We plan to develop the process or evaluation hierarchy in two parts due to the complexity of evaluating unencapsulated uses. Although development of the evaluation process/hierarchy may be informed by the comments on the proposed rule, its issuance is not linked to issuance of the final disposal rule. OSWER expects to complete internal development of the process or evaluation hierarchy for encapsulated beneficial uses by April 2012. OSWER expects to complete development of the conceptual model for evaluating risks from unencapsulated uses by 2<sup>nd</sup> quarter FY2014.

**Recommendation 2:** Determine if further EPA action is warranted to address historical CCR structural fill applications, based on comments on the proposed rule and other information available to EPA.

In the proposed CCR disposal rule, the Agency proposed that large scale fill be considered disposal rather than beneficial use. OSWER is in the process of evaluating over 450,000 comments on the proposed rule, which includes comments on the issue of large scale fill as disposal. The Agency's evaluation of all of those comments and its final rulemaking decisions are critical predicates to determining whether any further EPA action is warranted to address historical CCR structural fill applications. The schedule for promulgating the rule is still in preparation due to the large workload imposed by the overwhelming number of comments received, the complexity of the issues raised, and the resources available. By the end of FY2012, OSWER will provide milestones for determining whether further action is warranted to address historical CCR structural fill applications.

If you have additional questions, please contact Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery, at 703-308-8895, or Johnsie Webster, OSWER Audit Liaison, at 202-566-1912.

cc: Lisa Feldt, OSWER  
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Roy Prince, ORCR

## Attachment 5

People QuickFacts	Baltimore	Maryland	
Population, 2012 estimate	621,342	5,884,868	
Population, 2010 (April 1) estimates base	620,961	5,773,623	
Population, percent change, April 1, 2010 to July 1, 2012	0.1%	1.9%	
Population, 2010	620,961	5,773,552	
Persons under 5 years, percent, 2010	6.6%	6.3%	
Persons under 18 years, percent, 2010	21.5%	23.4%	
Persons 65 years and over, percent, 2010	11.7%	12.3%	
Female persons, percent, 2010	52.9%	51.6%	
White alone, percent, 2010 (a)	29.6%	58.2%	
<b>Black or African American alone, percent, 2010 (a)</b>	<b>63.7%</b>	<b>29.4%</b>	
American Indian and Alaska Native alone, percent, 2010 (a)	0.4%	0.4%	
Asian alone, percent, 2010 (a)	2.3%	5.5%	
Native Hawaiian and Other Pacific Islander alone, percent, 2010 (a)	0.1%	0.1%	
Two or More Races, percent, 2010	2.1%	2.9%	
Hispanic or Latino, percent, 2010 (b)	4.2%	8.2%	
White alone, not Hispanic or Latino, percent, 2010	28.0%	54.7%	
Living in same house 1 year & over, percent, 2008-2012	82.5%	86.6%	
Foreign born persons, percent, 2008-2012	7.4%	13.8%	
Language other than English spoken at home, pct age 5+, 2008-2012	8.9%	16.5%	
High school graduate or higher, percent of persons age 25+, 2008-2012	79.6%	88.5%	
Bachelor's degree or higher, percent of persons age 25+, 2008-2012	26.1%	36.3%	
Veterans, 2008-2012	37,185	438,387	
Mean travel time to work (minutes), workers age 16+, 2008-2012		30	31.8
Housing units, 2010	296,685	2,378,814	
Homeownership rate, 2008-2012	48.8%	68.1%	
Housing units in multi-unit structures, percent, 2008-2012	32.5%	25.5%	
Median value of owner-occupied housing units, 2008-2012	\$161,300	\$304,900	
Households, 2008-2012	240,630	2,138,806	
Persons per household, 2008-2012		2.48	2.64
Per capita money income in past 12 months (2012 dollars), 2008-2012	\$24,155	\$36,056	
<b>Median household income, 2008-2012</b>	<b>\$40,803</b>	<b>\$72,999</b>	
<b>Persons below poverty level, percent, 2008-2012</b>	<b>23.4%</b>	<b>9.4%</b>	
Business QuickFacts	Baltimore	Maryland	
Total number of firms, 2007	42,307	528,112	
Black-owned firms, percent, 2007	34.6%	19.3%	
American Indian- and Alaska Native-owned firms, percent, 2007	0.6%	0.6%	
Asian-owned firms, percent, 2007	5.9%	6.8%	
Native Hawaiian and Other Pacific Islander-owned firms, percent, 2007	0.1%	0.1%	
Hispanic-owned firms, percent, 2007	2.1%	4.9%	
Women-owned firms, percent, 2007	37.0%	32.6%	
Manufacturers shipments, 2007 (\$1000)	5,730,887	41,456,097	
Merchant wholesaler sales, 2007 (\$1000)	4,843,424	51,276,797	
Retail sales, 2007 (\$1000)	4,348,797	75,664,186	
Retail sales per capita, 2007	\$6,793	\$13,429	
Accommodation and food services sales, 2007 (\$1000)	1,434,689	10,758,428	
Geography QuickFacts	Baltimore	Maryland	
Land area in square miles, 2010		80.94	9,707.24
Persons per square mile, 2010	7,671.5		594.8
FIPS Code		4000	24
Counties	Baltimore city		

(a) Includes persons reporting only one race.		
(b) Hispanics may be of any race, so also are included in applicable race categories.		
FN: Footnote on this item for this area in place of data		
NA: Not available		
D: Suppressed to avoid disclosure of confidential information		
X: Not applicable		
S: Suppressed; does not meet publication standards		
Z: Value greater than zero but less than half unit of measure shown		
F: Fewer than 100 firms		
<b>Source: US Census Bureau State &amp; County QuickFacts</b>		

**MATERIAL SAFETY DATA SHEET****1. Product and Company Identification**

**Material name** THE ORIGINAL BLACK BEAUTY®  
**Version #** 01  
**Issue date** 11-30-2012  
**Revision date** -  
**Supersedes date** -  
**CAS #** 68476-96-0  
**Product code** Slag, coal  
**Product use** Abrasives and Roofing Products and Other Aggregate Uses.  
**Manufacturer/Supplier** Harsco  
P.O. Box 0516, Camp Hill, PA 17001-0515  
reedcs@harsco.com  
Contact Person: Steve Stanislawczyk  
717-508-4666  
**Emergency** 855-393-9889  
Access code 13793

**2. Hazards Identification**

**Physical state** Solid.  
**Appearance** Black granular solid.  
**Emergency overview** WARNING  
Abrasive blasting agents may cause inflammation and pulmonary fibrosis. Dust may irritate the respiratory tract, skin and eyes.  
**OSHA regulatory status** This product is hazardous according to OSHA 29 CFR 1910.1200.  
**Potential health effects**  
**Routes of exposure** Inhalation. Eye contact. Skin contact.  
**Eyes** Dust in the eyes will cause irritation. May cause redness and pain.  
**Skin** Dust may irritate skin.  
**Inhalation** Abrasive blasting agents may cause inflammation and pulmonary fibrosis. Dust may irritate throat and respiratory system and cause coughing.  
**Ingestion** Ingestion of dusts generated during working operations may cause nausea and vomiting.  
**Target organs** Eyes. Respiratory system.  
**Chronic effects** Frequent inhalation of fume/dust over a long period of time increases the risk of developing lung diseases.  
**Signs and symptoms** Irritation of nose and throat. Irritation of eyes and mucous membranes.  
**Potential environmental effects** The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

**3. Composition / Information on Ingredients**

Components	CAS #	Percent
Coal, slag	68476-96-0	100
Constituents	CAS #	Percent
Silicon dioxide	7631-86-9	41-53
Iron oxide	1309-37-1	7-31
Aluminum oxide	1344-28-1	17-25
Calcium oxide	1305-78-8	3-15
Magnesium oxide	1309-48-4	0-4
Potassium Oxide	12136-45-7	0-3

BLACK BEAUTY®  
011790 Version #: 01 Revision date: - Issue date: 11-30-2012

CPH MSDS NA  
1 / 10

Constituents	CAS #	Percent
Titanium dioxide	13463-67-7	0-2
Silicon dioxide, crystalline	14808-60-7	<0.1
Manganese	7439-98-5	0-0.05
Beryllium	7440-41-7	0-0.001
Cadmium	7440-43-0	0-0.001

**Composition comments** All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

#### 4. First Aid Measures

##### First aid procedures

**Eye contact** Do not rub eyes. Remove any contact lenses. Flush eyes thoroughly with water, taking care to rinse under eyelids. If irritation persists, continue flushing for 15 minutes, rinsing from time to time under eyelids. If discomfort continues, consult a physician.

**Skin contact** Contact with dust: Wash with soap and water. Get medical attention if irritation develops or persists.

**Inhalation** Move to fresh air. Get medical attention if discomfort persists.

**Ingestion** Rinse mouth thoroughly if dust is ingested. Do not induce vomiting. Get medical attention if any discomfort continues.

**Notes to physician** Treat symptomatically.

**General advice** Show this safety data sheet to the doctor in attendance.

#### 5. Fire Fighting Measures

**Flammable properties** The product is non-combustible.

##### Extinguishing media

**Suitable extinguishing media** Use fire-extinguishing media appropriate for surrounding materials.

**Unsuitable extinguishing media** None known.

##### Protection of firefighters

**Specific hazards arising from the chemical** None known.

**Protective equipment and precautions for firefighters** Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

##### Fire fighting equipment/instructions

Move container from fire area if it can be done without risk. Cool containers with flooding quantities of water until well after fire is out.

#### 6. Accidental Release Measures

**Personal precautions** Avoid generation and spreading of dust. Avoid inhalation of dust and contact with skin and eyes. Wear suitable protective clothing. Use personal protection recommended in Section 8 of the MSDS.

**Environmental precautions** Prevent further leakage or spillage if safe to do so. Do not contaminate water.

**Methods for containment** Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).

**Methods for cleaning up** Collect dust using a vacuum cleaner equipped with HEPA filter. If not possible, gently moisten dust with water fog before it is collected with shovel, broom or the like. Avoid dust formation. After removal flush contaminated area thoroughly with water.

Never return spills to original containers for re-use.

##### Other information

Clean up in accordance with all applicable regulations.

#### 7. Handling and Storage

##### Handling

Avoid inhalation of dust and contact with skin and eyes. Use only with adequate ventilation. Use work methods which minimize dust production. Keep the workplace clean. Observe good industrial hygiene practices.

##### Storage

Keep container tightly closed. Store away from incompatible materials.

**8. Exposure Controls / Personal Protection**

**Occupational exposure limits**

**US. ACGIH Threshold Limit Values**

Constituents	Type	Value	Form
Beryllium (CAS 7440-41-7)	TWA	0.00005 mg/m3	Inhalable fraction.
Cadmium (CAS 7440-43-9)	TWA	0.01 mg/m3	
		0.002 mg/m3	Respirable fraction.
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Silicon dioxide, crystalline (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.
Titanium dioxide (CAS 13463-67-7)	TWA	10 mg/m3	
Calcium oxide (CAS 1305-78-8)	TWA	2 mg/m3	
Magnesium oxide (CAS 1309-48-4)	TWA	10 mg/m3	Inhalable fraction.
Aluminum oxide (CAS 1344-28-1)	TWA	1 mg/m3	Respirable fraction.
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable fraction.

**US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

Constituents	Type	Value
Cadmium (CAS 7440-43-9)	TWA	0.005 mg/m3

**US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)**

Constituents	Type	Value	Form
Manganese (CAS 7439-96-5)	Ceiling	5 mg/m3	Fume.
Titanium dioxide (CAS 13463-67-7)	PEL	15 mg/m3	Total dust.
Calcium oxide (CAS 1305-78-8)	PEL	5 mg/m3	
Magnesium oxide (CAS 1309-48-4)	PEL	15 mg/m3	Total particulate.
Aluminum oxide (CAS 1344-28-1)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Iron oxide (CAS 1309-37-1)	PEL	10 mg/m3	Fume.

**US. OSHA Table Z-2 (29 CFR 1910.1000)**

Constituents	Type	Value	Form
Beryllium (CAS 7440-41-7)	Ceiling	0.005 mg/m3	
	TWA	0.002 mg/m3	
Cadmium (CAS 7440-43-9)	Ceiling	0.6 mg/m3	Dust.
		0.3 mg/m3	Fume.
	TWA	0.2 mg/m3	Dust.
		0.1 mg/m3	Fume.

**US. OSHA Table Z-3 (29 CFR 1910.1000)**

Constituents	Type	Value	Form
Silicon dioxide, crystalline (CAS 14808-60-7)	TWA	0.3 mg/m3	Total dust.
		0.1 mg/m3	Respirable.
		2.4 mppcf	Respirable.
Silicon dioxide (CAS 7631-86-9)	TWA	0.8 mg/m3	
		20 mppcf	

**Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)**

Constituents	Type	Value	Form
Beryllium (CAS 7440-41-7)	STEL	0.01 mg/m3	
	TWA	0.002 mg/m3	
Cadmium (CAS 7440-43-9)	TWA	0.01 mg/m3	
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Silicon dioxide, crystalline (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable particles.
Titanium dioxide (CAS 13463-67-7)	TWA	10 mg/m3	
Calcium oxide (CAS 1305-78-8)	TWA	2 mg/m3	
Magnesium oxide (CAS 1309-48-4)	TWA	10 mg/m3	Fume.
Aluminum oxide (CAS 1344-28-1)	TWA	10 mg/m3	
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable.

**Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)**

Constituents	Type	Value	Form
Beryllium (CAS 7440-41-7)	STEL	0.01 mg/m3	
	TWA	0.002 mg/m3	
Cadmium (CAS 7440-43-9)	TWA	0.01 mg/m3	
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	Respirable.
Silicon dioxide, crystalline (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.
Titanium dioxide (CAS 13463-67-7)	TWA	3 mg/m3	Respirable fraction.
Calcium oxide (CAS 1305-78-8)	TWA	10 mg/m3	Total dust.
	TWA	2 mg/m3	
Magnesium oxide (CAS 1309-48-4)	STEL	10 mg/m3	Respirable dust and/or fume.
	TWA	3 mg/m3	Respirable dust and/or fume.
Aluminum oxide (CAS 1344-28-1)	TWA	10 mg/m3	Inhalable fume.
	TWA	1 mg/m3	Respirable.
Iron oxide (CAS 1309-37-1)	STEL	10 mg/m3	Fume.
		5 mg/m3	Fume.
	TWA	5 mg/m3	Dust.
		3 mg/m3	Respirable fraction.
Silicon dioxide (CAS 7631-86-9)	TWA	10 mg/m3	Total dust.
		4 mg/m3	Total
		1.5 mg/m3	Respirable.

**Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)**

Constituents	Type	Value	Form
Beryllium (CAS 7440-41-7)	STEL	0.01 mg/m3	
	TWA	0.002 mg/m3	
Cadmium (CAS 7440-43-9)	TWA	0.01 mg/m3	
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Silicon dioxide, crystalline (CAS 14808-60-7)	TWA	0.1 mg/m3	Respirable.
Titanium dioxide (CAS 13463-67-7)	TWA	10 mg/m3	

**Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)**

Constituents	Type	Value	Form
Calcium oxide (CAS 1305-78-8)	TWA	2 mg/m <sup>3</sup>	
Magnesium oxide (CAS 1309-48-4)	TWA	10 mg/m <sup>3</sup>	Inhalable fraction.
Aluminum oxide (CAS 1344-28-1)	TWA	1 mg/m <sup>3</sup>	Respirable fraction.
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m <sup>3</sup>	Respirable fraction.
Silicon dioxide (CAS 7631-86-9)	TWA	10 mg/m <sup>3</sup>	

**Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)**

Constituents	Type	Value	Form
Beryllium (CAS 7440-41-7)	TWA	0.00015 mg/m <sup>3</sup>	
Cadmium (CAS 7440-43-9)	TWA	0.025 mg/m <sup>3</sup>	
Manganese (CAS 7439-96-5)	STEL	3 mg/m <sup>3</sup>	Fume.
	TWA	5 mg/m <sup>3</sup>	Dust.
		1 mg/m <sup>3</sup>	Fume.
Silicon dioxide, crystalline (CAS 14808-60-7)	TWA	0.1 mg/m <sup>3</sup>	Respirable dust.
Titanium dioxide (CAS 13463-67-7)	TWA	10 mg/m <sup>3</sup>	Total dust
Calcium oxide (CAS 1305-78-8)	TWA	2 mg/m <sup>3</sup>	
Magnesium oxide (CAS 1309-48-4)	TWA	10 mg/m <sup>3</sup>	Fume.
Aluminum oxide (CAS 1344-28-1)	TWA	10 mg/m <sup>3</sup>	Total dust
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m <sup>3</sup>	Dust and fume.
		10 mg/m <sup>3</sup>	Total dust.
Silicon dioxide (CAS 7631-86-9)	TWA	6 mg/m <sup>3</sup>	Respirable dust.

**Mexico. Occupational Exposure Limit Values**

Constituents	Type	Value	Form
Beryllium (CAS 7440-41-7)	TWA	0.002 mg/m <sup>3</sup>	
Cadmium (CAS 7440-43-9)	TWA	0.01 mg/m <sup>3</sup>	Total dust.
		0.002 mg/m <sup>3</sup>	Respirable dust.
Manganese (CAS 7439-96-5)	STEL	3 mg/m <sup>3</sup>	Fume.
	TWA	1 mg/m <sup>3</sup>	Fume.
		0.2 mg/m <sup>3</sup>	
Silicon dioxide, crystalline (CAS 14808-60-7)	TWA	0.1 mg/m <sup>3</sup>	
Titanium dioxide (CAS 13463-67-7)	STEL	20 mg/m <sup>3</sup>	
	TWA	10 mg/m <sup>3</sup>	
Calcium oxide (CAS 1305-78-8)	TWA	2 mg/m <sup>3</sup>	
Magnesium oxide (CAS 1309-48-4)	TWA	10 mg/m <sup>3</sup>	Fume.
Aluminum oxide (CAS 1344-28-1)	TWA	10 mg/m <sup>3</sup>	
Iron oxide (CAS 1309-37-1)	STEL	10 mg/m <sup>3</sup>	
	TWA	6 mg/m <sup>3</sup>	

**Engineering controls** Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

**Personal protective equipment**

**Eye / face protection** Wear safety glasses with side shields. Use tight fitting goggles if dust is generated.  
**Skin protection** Use protective gloves. Wear suitable protective clothing.

**Respiratory protection** Selection and use of respiratory protective equipment should be in accordance with OSHA General Industry Standard 29 CFR 1910.134; or in Canada with CSA Standard Z94.4.

**General hygiene considerations** Wash hands after handling. Routinely wash work clothing and protective equipment to remove contaminants. Handle in accordance with good industrial hygiene and safety practice.

**9. Physical & Chemical Properties**

**Appearance** Black granular solid.  
**Physical state** Solid.  
**Form** Solid.  
**Color** Black.  
**Odor** Odorless.  
**Odor threshold** Not available.  
**pH** Not available.  
**Vapor pressure** Not available.  
**Vapor density** Not available.  
**Boiling point** Not available.  
**Melting point/Freezing point** > 2500 °F (> 1371.1 °C)  
**Solubility (water)** Negligible.  
**Specific gravity** 2.7  
**Flash point** Not available.  
**Flammability limits in air, upper, % by volume** Not available.  
**Flammability limits in air, lower, % by volume** Not available.  
**Auto-ignition temperature** Not available.

**10. Chemical Stability & Reactivity Information**

**Chemical stability** The product is stable and non reactive under normal conditions of use, storage and transport.  
**Conditions to avoid** None known.  
**Incompatible materials** Strong acids.  
**Hazardous decomposition products** None known.  
**Possibility of hazardous reactions** Hazardous polymerization does not occur.

**11. Toxicological Information**

**Toxicological data**

Constituents	Species	Test Results
<b>Cadmium (CAS 7440-43-9)</b>		
<i>Acute Inhalation</i>		
LC50	Rat	0.025 mg/l, 900 Days
<i>Oral</i>		
LD50	Rat	225 mg/kg
<b>Silicon dioxide (CAS 7631-86-9)</b>		
<i>Acute</i>		
<i>Oral</i>		
LD50	Mouse	> 15000 mg/kg
	Rat	> 22500 mg/kg

**Sensitization** Not a skin or respiratory sensitizer.

**ACGIH Sensitizer**

**Beryllium (CAS 7440-41-7)** Sensitizer.

**Acute effects** Abrasive blasting agents may cause inflammation and pulmonary fibrosis. Ingestion of dusts generated during working operations may cause nausea and vomiting.

**Local effects** May cause eye, skin and respiratory tract irritation.

**US. ACGIH Threshold Limit Values**

Beryllium (CAS 7440-41-7) Can be absorbed through the skin.

**Chronic effects** Frequent inhalation of fume/dust over a long period of time increases the risk of developing lung diseases.

**Carcinogenicity**

**ACGIH Carcinogens**

Aluminum oxide (CAS 1344-28-1)	A4 Not classifiable as a human carcinogen.
Beryllium (CAS 7440-41-7)	A1 Confirmed human carcinogen.
Cadmium (CAS 7440-43-9)	A2 Suspected human carcinogen.
Iron oxide (CAS 1309-37-1)	A4 Not classifiable as a human carcinogen.
Magnesium oxide (CAS 1309-48-4)	A4 Not classifiable as a human carcinogen.
Silicon dioxide, crystalline (CAS 14808-60-7)	A2 Suspected human carcinogen.
Titanium dioxide (CAS 13463-67-7)	A4 Not classifiable as a human carcinogen.

**IARC Monographs. Overall Evaluation of Carcinogenicity**

Beryllium (CAS 7440-41-7)	1 Carcinogenic to humans.
Cadmium (CAS 7440-43-9)	1 Carcinogenic to humans.
Iron oxide (CAS 1309-37-1)	3 Not classifiable as to carcinogenicity to humans.
Silicon dioxide (CAS 7831-88-9)	3 Not classifiable as to carcinogenicity to humans.
Silicon dioxide, crystalline (CAS 14808-60-7)	1 Carcinogenic to humans.
Titanium dioxide (CAS 13463-67-7)	2B Possibly carcinogenic to humans.

**US NTP Report on Carcinogens: Known carcinogen**

Beryllium (CAS 7440-41-7)	Known To Be Human Carcinogen.
Cadmium (CAS 7440-43-9)	Known To Be Human Carcinogen.
Silicon dioxide, crystalline (CAS 14808-60-7)	Known To Be Human Carcinogen.

**US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

Cadmium (CAS 7440-43-9) Cancer hazard.

**Mutagenicity** No data available.

**Reproductive effects** No data available.

**Symptoms and target organs** Irritation of nose and throat. Irritation of eyes and mucous membranes. May cause respiratory tract irritation. Shortness of breath.

**12. Ecological Information**

**Ecotoxicity** The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

**Environmental effects** An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

**Persistence and degradability** The product is not biodegradable.

**Bioaccumulation / Accumulation** The product is not bioaccumulating.

**13. Disposal Considerations**

**Waste codes** The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.

**Disposal instructions** Dispose in accordance with all applicable regulations.

**Waste from residues / unused products** Dispose in accordance with all applicable regulations.

**Contaminated packaging** Since emptied containers may retain product residue, follow label warnings even after container is emptied.

**14. Transport Information**

**DOT**

Not regulated as a hazardous material by DOT.

**IATA**

Not regulated as dangerous goods.

**IMDG**

Not regulated as dangerous goods.

**TDG**

Not regulated as dangerous goods.

**15. Regulatory Information**

**US federal regulations**

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.  
 All components are on the U.S. EPA TSCA Inventory List.

**TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**

Not regulated.

**Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**

- Beryllium (CAS 7440-41-7)
- Cadmium (CAS 7440-43-9)
- Manganese (CAS 7439-98-5)

**US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration**

Aluminum oxide (CAS 1344-28-1)	1.0 %
Beryllium (CAS 7440-41-7)	0.1 %
Cadmium (CAS 7440-43-9)	0.1 %
Manganese (CAS 7439-98-5)	1.0 %

**US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance**

Aluminum oxide (CAS 1344-28-1)	Listed.
Beryllium (CAS 7440-41-7)	Listed.
Cadmium (CAS 7440-43-9)	Listed.
Manganese (CAS 7439-98-5)	Listed.

**CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)**

None

**Superfund Amendments and Reauthorization Act of 1986 (SARA)**

**Hazard categories**

- Immediate Hazard - Yes
- Delayed Hazard - Yes
- Fire Hazard - No
- Pressure Hazard - No
- Reactivity Hazard - No

**Section 302 extremely hazardous substance (40 CFR 355, Appendix A)**

No

**Section 311/312 (40 CFR 370)**

Yes

**Drug Enforcement Administration (DEA) (21 CFR 1308.11-15)**

Not controlled

**Canadian regulations**

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

**WHMIS status**

Non-controlled

**Inventory status**

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	No

Country(s) or region	Inventory name	On inventory (yes/no)*
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes
*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).		
State regulations	WARNING: This product contains chemical(s) known to the State of California to cause cancer and birth defects or other reproductive harm.	
<b>US - California Hazardous Substances (Director's): Listed substance</b>		
	Aluminum oxide (CAS 1344-28-1)	Listed.
	Beryllium (CAS 7440-41-7)	Listed.
	Cadmium (CAS 7440-43-9)	Listed.
	Calcium oxide (CAS 1305-78-8)	Listed.
	Iron oxide (CAS 1309-37-1)	Listed.
	Magnesium oxide (CAS 1309-48-4)	Listed.
	Manganese (CAS 7439-96-5)	Listed.
	Silicon dioxide (CAS 7631-86-9)	Listed.
<b>US - California Proposition 65 - Carcinogens &amp; Reproductive Toxicity (CRT): Listed substance</b>		
	Beryllium (CAS 7440-41-7)	Listed.
	Cadmium (CAS 7440-43-9)	Listed.
	Silicon dioxide, crystalline (CAS 14808-60-7)	Listed.
	Titanium dioxide (CAS 13463-67-7)	Listed.
<b>US - California Proposition 65 - CRT: Listed date/Carcinogenic substance</b>		
	Beryllium (CAS 7440-41-7)	Listed: October 1, 1987 Carcinogenic.
	Cadmium (CAS 7440-43-9)	Listed: October 1, 1987 Carcinogenic.
	Silicon dioxide, crystalline (CAS 14808-60-7)	Listed: October 1, 1988 Carcinogenic.
	Titanium dioxide (CAS 13463-67-7)	Listed: September 2, 2011 Carcinogenic.
<b>US - California Proposition 66 - CRT: Listed date/Developmental toxin</b>		
	Cadmium (CAS 7440-43-9)	Listed: May 1, 1997 Developmental toxin.
<b>US - California Proposition 65 - CRT: Listed date/Male reproductive toxin</b>		
	Cadmium (CAS 7440-43-9)	Listed: May 1, 1997 Male reproductive toxin.
<b>US - New Jersey RTK - Substances: Listed substance</b>		
	Aluminum oxide (CAS 1344-28-1)	Listed.
	Beryllium (CAS 7440-41-7)	Listed.
	Cadmium (CAS 7440-43-9)	Listed.
	Calcium oxide (CAS 1305-78-8)	Listed.
	Iron oxide (CAS 1309-37-1)	Listed.
	Magnesium oxide (CAS 1309-48-4)	Listed.
	Manganese (CAS 7439-96-5)	Listed.
	Potassium Oxide (CAS 12136-45-7)	Listed.
	Silicon dioxide (CAS 7631-86-9)	Listed.
	Silicon dioxide, crystalline (CAS 14808-60-7)	Listed.
	Titanium dioxide (CAS 13463-67-7)	Listed.
<b>US - Pennsylvania RTK - Hazardous Substances: All compounds of this substance are considered environmental hazards</b>		
	Beryllium (CAS 7440-41-7)	LISTED
	Cadmium (CAS 7440-43-9)	LISTED
	Manganese (CAS 7439-96-5)	LISTED
<b>US - Pennsylvania RTK - Hazardous Substances: Special hazard</b>		
	Beryllium (CAS 7440-41-7)	Special hazard.
	Cadmium (CAS 7440-43-9)	Special hazard.
<b>US, Massachusetts RTK - Substance List</b>		
	Aluminum oxide (CAS 1344-28-1)	Listed.
	Beryllium (CAS 7440-41-7)	Listed.
	Cadmium (CAS 7440-43-9)	Listed.
	Calcium oxide (CAS 1305-78-8)	Listed.
	Iron oxide (CAS 1309-37-1)	Listed.
	Magnesium oxide (CAS 1309-48-4)	Listed.
	Manganese (CAS 7439-96-5)	Listed.
	Silicon dioxide (CAS 7631-86-9)	Listed.
	Silicon dioxide, crystalline (CAS 14808-60-7)	Listed.
	Titanium dioxide (CAS 13463-67-7)	Listed.

**US, New Jersey Worker and Community Right-to-Know Act**

Aluminum oxide (CAS 1344-28-1)	600 LBS
Beryllium (CAS 7440-41-7)	500 LBS
Cadmium (CAS 7440-43-9)	600 LBS
Manganese (CAS 7439-96-5)	500 LBS

**US, Pennsylvania RTK - Hazardous Substances**

Aluminum oxide (CAS 1344-28-1)	Listed.
Beryllium (CAS 7440-41-7)	Listed.
Cadmium (CAS 7440-43-9)	Listed.
Calcium oxide (CAS 1305-78-8)	Listed.
Iron oxide (CAS 1309-37-1)	Listed.
Magnesium oxide (CAS 1309-48-4)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Silicon dioxide (CAS 7631-86-9)	Listed.
Silicon dioxide, crystalline (CAS 14808-60-7)	Listed.
Titanium dioxide (CAS 13463-67-7)	Listed.

**Mexico regulations** This safety data sheet was prepared in accordance with the Official Mexican Standard (NOM-018-STPS-2000).

**16. Other Information**

**Further information**

HMIS® is a registered trade and service mark of the NFPA.  
A HMIS® Health rating including an \* indicates a chronic hazard.

**HMIS® ratings**

Health: 2\*  
Flammability: 0  
Physical hazard: 0

**NFPA ratings**

Health: 1  
Flammability: 0  
Instability: 0

**Disclaimer**

The information in the sheet was written based on the best knowledge and experience currently available.

## Attachment 7

Citation of an article published in The Baltimore Sun newspaper

[baltimoresun.com](http://baltimoresun.com)

Federal Agency Investigating Sand-Blasting Hazards: contaminants in coal and copper slag pose risks, critics say. By Timothy B. Wheeler, The Baltimore Sun, 6:05 PM EST, February 26, 2012