Ohio Environmental Protection Agency

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

AUGUST 20, 2015

Toby L Thomas
Cardinal Operating Company
155 West Nationwide Blvd., Suite 500
Columbus, OH 43215

Re: Cardinal Operating Company
Permit – Short Term
Approval
Beneficial Use
Jefferson County
BENU020785

Subject: Cardinal Operating Company- AEP Cardinal Plant
Land Application Management Plan Permit Approval
FGD Gypsum

Effective Date: AUGUST 20, 2015

Expiration Date: AUGUST 20, 2020

Dear Mr. Thomas:

The Ohio Environmental Protection Agency (Ohio EPA) has reviewed the land application management plan (LAMP) permit application submitted on December 15, 2014 by Beneficial Reuse Management (BRM) on behalf of Cardinal Operating Company (Cardinal) at the request of the American Electric Power Cardinal Plant (Cardinal Power Plant), pursuant to Chapters 6111 and 3734 of the Ohio Revised Code (ORC), for the proposed beneficial use of flue gas desulfurization gypsum (FGD gypsum) generated by the Cardinal Power Plant, located at 306 County Road 7 East, Brilliant, Ohio. The submitted LAMP permit application proposes to beneficially use FGD gypsum as an agricultural soil amendment and nutrient source. Cardinal will transport the FGD gypsum to locations in Ohio where it will be unloaded and stored temporarily at distribution sites. From these locations the FGD gypsum will be transported to and distributed by the owner/operator of the farms or the companies contracted by the receiving farm for distribution. Pursuant to the authority of the Director of Ohio EPA (Director) under ORC Chapters 6111 and 3734, this LAMP permit for the Cardinal Power Plant is approved subject to compliance with all conditions below.

Conditions

1. This LAMP permit authorizes beneficial use of FGD gypsum from the Cardinal Power Plant as an agricultural soil amendment and nutrient source in accordance with the LAMP permit application submitted on December 15, 2014, which is attached and incorporated herein. All other beneficial uses must be separately approved by Ohio EPA. Only FGD gypsum from the Cardinal Power Plant, as identified in this LAMP permit, is eligible for beneficial use under this permit.

2. Cardinal shall provide a copy of this LAMP permit and Sections 4 and 5 of the LAMP permit application to the recipient of any FGD gypsum intended for beneficial use.
3. The Director, or his authorized representative(s), may enter the site(s) authorized for land application of FGD gypsum at any reasonable time for the purpose of conducting inspections, collecting samples of FGD gypsum, or conducting tests pertaining to the beneficial use of FGD gypsum from the Cardinal Power Plant as an agricultural soil amendment.
4. Issuance of this LAMP permit does not relieve Cardinal of the duty to comply with all applicable federal, state, and local laws, ordinances, and regulations, except as exempted herein.
5. Cardinal shall notify Ohio EPA of any substantial change in the generating process or the raw materials used in the generating process of the FGD gypsum. Under such circumstances, the Director may request that Cardinal submit a revised LAMP permit application for approval. For the purposes of this LAMP permit, a substantial change in the raw materials is a change to a lower quality fuel or a lower quality limestone which may result in FGD gypsum with additional constituents or a higher concentration of constituents.
6. The following shall be maintained by Cardinal for a minimum of five years after the beneficial use of the FGD gypsum and made available to Ohio EPA upon request:
    a. Records identifying the recipients or distributors of FGD gypsum and the volume provided to each recipient or distributor for beneficial use during the previous year;
    b. A sampling plan detailing where samples of FGD gypsum are to be collected, how those samples are to be collected, how frequently those samples are to be collected, and a list of constituents that are used to analyze the samples;
    c. All laboratory reports of all analyses of the FGD gypsum.
7. Cardinal shall collect and analyze at least one sample per year of the FGD gypsum intended for beneficial use and Cardinal shall collect and analyze additional samples if there are substantial changes in the generation process or the raw materials used.
    a. The samples collected shall be representative of the FGD gypsum beneficially used for the calendar year.
    b. Cardinal shall have the sample(s) analyzed for the constituents listed in the table in Condition 8.
    c. The reported detection limit for the analysis shall be below the limit specified for each constituent in the table in Condition 8.
    d. Cardinal shall employ analytical methods that generate constituent results in units consistent with the units in the table in Condition 8.

8. Cardinal shall not designate, make available, or distribute for beneficial use any FGD gypsum that exceeds any limits for the specified constituents listed in the following table.

Constituent	Total (mg/kg)*
Arsenic	41
Barium	15,000
Beryllium	160
Boron	16,000
Cadmium	39
Chromium, total	180,000
Copper	1,500
Lead	300
Mercury	10
Molybdenum	75
Nickel	420
Selenium	100
Thallium	0.78
Zinc	2,800

* - dry weight basis

9. Ohio EPA reserves the right to add constituents to the table in Condition 8 as it deems necessary.
10. Cardinal shall analyze the FGD gypsum for the constituents necessary for users to determine the appropriate maximum agronomic application rate as determined by a qualified agronomist and/or soil test analysis.
11. By January 31 of each year, Cardinal shall submit a report regarding the beneficial use of the FGD gypsum for the previous calendar year. The annual report shall include the total amount, in tons, of FGD gypsum sold or distributed for beneficial use and the analytical results for any analyses performed pursuant to Condition 7.
12. In the Annual Report, Cardinal shall include the following annual certification statement. The certification statement shall be printed out and signed beginning one year after the effective date of this approval and annually thereafter:

    "I certify, under penalty of law, that the information used to determine compliance with the requirements contained in Chapters 3734 and 6111 of the Ohio Revised Code, and all rules thereunder, for the period beginning (insert date of last certification statement) and ending (insert current certification statement date) was prepared under my direction and supervision in accordance with a system designed to ensure that qualified personnel properly

gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

13. The certification statement shall be signed by one of the following persons: in the case of a corporation, by a principal executive officer of at least the level of vice president or the principal executive officer's duly authorized representative, if such representative is responsible for the overall operation of the facility; in the case of a partnership, a general partner; and in the case of a sole proprietorship, the proprietor. The signature shall constitute personal affirmation that all statements or assertions of fact in the records are true and complete and comply fully with applicable state requirements and shall subject the signatory to liability under ORC Section 2921.13.
14. The annual report shall be sent to the following address:

    Ohio EPA - DMWM
    Authorizing Actions and Engineering Unit
    P.O. Box 1049
    Columbus, OH 43216-1049

15. Storage and beneficial use of the FGD gypsum shall not create a nuisance and shall not adversely affect public safety or health or the environment. Should a nuisance condition develop, or a determination be made by Ohio EPA that storage or beneficial use of FGD gypsum is a threat to human health or the environment, this LAMP permit may be revoked upon written notification from the Director. Immediately upon the effective date of any such revocation, beneficial use of FGD gypsum from the Cardinal Power Plant under this LAMP permit shall cease.
16. The Director shall be notified in writing within seven days if Cardinal discovers noncompliance with this LAMP permit. The Director may add, delete, or change any conditions of this LAMP permit to protect human health or the environment.
17. This LAMP permit to beneficially use FGD gypsum from the Cardinal Power Plant shall expire at midnight on the expiration date shown above. In order to receive authorization to beneficially use FGD gypsum beyond the above date of expiration, Cardinal shall submit such information and forms as are required by Ohio EPA no later than 180 days prior to the above date of expiration.

The FGD gypsum shall be beneficially used in strict accordance with the conditions of this LAMP permit and as outlined in the LAMP permit application submitted for this approval to the Director. Approval of this LAMP permit does not constitute an assurance that use of the FGD gypsum in accordance with the approved LAMP permit will be in compliance with all Ohio laws and regulations.

You are hereby notified that this action of the Director is final and may be appealed to the Environmental Review Appeals Commission pursuant to ORC Section 3745.04. The appeal must be in writing and set forth the action complained of and the grounds upon

which the appeal is based. The appeal must be filed with the Commission within thirty (30) days after notice of the Director's action. The appeal must be accompanied by a filing fee of $70.00 which the Commission, in its discretion, may reduce if by affidavit it is demonstrated that payment of the full amount of the fee would cause extreme hardship. Notice of the filing of the appeal shall be filed with the Director within three (3) days of filing with the Commission. Ohio EPA requests that a copy of the appeal be served upon the Ohio Attorney General's Office, Environmental Enforcement Section. An appeal may be filed with the Environmental Review Appeals Commission at the following address:

Environmental Review Appeals Commission
77 South High Street, 17th Floor
Columbus, Ohio 43215

Sincerely,

Craig W. Butler
Director

PC

cc: Jason Sparks, Beneficial Reuse Management/Gypsoil, LLC

Plan Approval - Management Plan For Sludge or Industrial Byproducts other than Treated Sewage

Note: This form, with the attachments indicated, is intended to serve as the main substance of the management plan. If you prefer to submit a separate and complete document to serve as your management plan, then to respond to a question where a description or calculation is requested (such as Items C.1 through C.4), simply enter the page numbers of the submitted plan where the information requested can be found. Please respond on this form when just a check mark or brief statement is requested.

FOR AGENCY USE ONLY	
Application Number:	Date Received: / /

Applicant: Cardinal Operating Company

Facility Owner: AEP

Application/Plans Prepared by: Beneficial Reuse Management/Gypsoil, LLC

Project Name: Agricultural use of FGD Gypsum

A. Background Information

a. Briefly describe type and source of material to be land applied:
FGD gypsum generated at Cardinal Power Plant owned by AEP operated by Cardinal Operating Company

b. Briefly describe proposed uses of materials (agronomic uses, soil blends, structural fill, etc.):
Material will be used as a soil amendment and nutrient source

c. Existing Plan Approval number: _____ ■ N/A

B. Generating Facility ☐ N/A

a. Amount of sludge/byproduct generated	510,000 in 2013	dry tons/year
b. Amount proposed for beneficial use	510,000 in 2013	dry tons/year
c. Disposal method for amount not used	Disposal will be the plant Landfill	
d. Storage capacity at facility:		days

C. Land Application *(If N/A, Skip to D)* ☐ N/A

a. Use category of land application area (check all that apply): ■ Unrestricted Access site ■ Restricted Access site

b. Quantity of material to be land applied:
_____ Inches/acre/year (annual average-liquid) max of 2 Dry tons/acre/year (annual average-sludge)

c. Does the land application area have subsurface drains/tiles located less than 24 inches below natural grade?
☐ Yes ☐ No ■ Unknown at this time

d. Amount of land area available for land application if known (do not include buffer zones in the figure) unknown acres

e. Maximum slope of land to be used for land application = unknown %

f. Type(s) of crops or vegetation to be grown on land application area:

C.1 Describe the method or methods used for the storage and land application of sludge/other byproducts (including detailed information about the distribution system):

Addressed in management plan

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C.2 State what the maximum land application rate(s) are proposed to be and the total acres required and available for land application. Attach calculations and references showing how the application rates and acreage needs were determined.

Addressed in management plan

C.3 Describe the monitoring of the material to be land applied and the soils in the land application area(s), including frequency, methods and parameters that will be measured in each:

Addressed in management plan

C.4 Describe the appropriate weather conditions required for the land application of sludge/other byproducts and how they will be determined and documented:

addressed in management plan

C.5 Check which land application activities listed below are proposed. If yes, please explain how runoff, ponding or discharges to waters of the state will be prevented (attach separate pages as needed).

Do you propose to land apply during precipitation events? If **yes**, please explain:	☐ Yes	■ No
Do you propose to spray irrigate when instantaneous wind speeds exceed 20 miles per hour? If **yes**, please explain:	☐ Yes	■ No
Do you propose to land apply within 10-year floodplain? If **yes**, please explain:	☐ Yes	■ No
Do you propose to land apply in wetlands? If **yes**, please explain:	☐ Yes	■ No
Do you propose to land apply where the land application contract is expired or void? If **yes**, please explain:	☐ Yes	■ No
Do you propose to land apply when the ground is saturated at or near the surface? If **yes**, please explain:	☐ Yes	■ No
Do you propose to land apply where there is at less than 12 inches between final grade and bedrock, sand or gravel lenses, compacted glacial till, and/or normal ground water elevation? If **yes**, please explain:	☐ Yes	■ No

C.6 List setback distances that will be observed for all of the following:

Ditches/Streams/Waterways:	_____ feet	Private Water Supply Well:	_____ feet
Residences/Business:	_____ feet	Public Water Supply Well:	_____ feet
Sinkholes:	_____ feet	Public Surface Drinking Water Intake:	_____ feet
Pond or Lake:	_____ feet	Other:	_____ feet

Attach additional pages if different setbacks are proposed for different methods of application (e.g. greater setbacks should be observed for surface application than injection).

C.7 Land application on frozen/snow-covered ground is not recommended. If land application on frozen/snow-covered ground is proposed, please indicate which of the following practices will be used to minimize pollutant discharges or nuisances:

- ☐ Application rate is limited to 10 wet tons/acre for solid materials (50% moisture or more) and 5 wet tons/acre for material less than 50% moisture. For liquids the application rate is limited to 5,000 gallons/acre.
- ☐ Applications will be made on land with at least 90% surface residue cover.
- ☐ Material shall not be land applied on more than 20 contiguous acres, separated by breaks of at least 200 feet.
- ☐ Application setbacks shall be increased to at least 200 feet from all grassed waterways, drainage ditches, streams, surface inlets, and water bodies.
- ☐ The rate of application will not exceed: _____ lbs Nitrogen/acre or _____ lbs Phosphorus/acre
- ☐ Application will not take place on slopes greater than 6% unless material is applied in alternating strips less than 200' wide generally on the contour, or in the case of contour strips, on alternating strips.

If any of these practices are not proposed to be followed, please attach a description of how pollutant discharges will be minimized during application on frozen/snow covered ground. Addressed in management plan

C.8 Describe or list any other practices that will be used to minimize pollutant discharges or nuisances:

Addressed in management plan

C.9 Land Application Records

How will land application information be recorded? : Recording as required by Dept. of Agricultural and Ohio EPA

☐ Ohio EPA's Land Application Record Form ☐ Our Own Land Application Record Form (attached)

Where will the records be kept? : Cardinal Power Plant Environmental Files

C.10 Application Site Map *(If known)*

a. A map locating each land application site shall be attached. Each site shall be labeled "Restricted access site" or "Unrestricted access site". The map(s) should show the following items and are considered part of this plan:

- ☐ All present and known proposed occupied buildings within 300 feet of the land application area.
- ☐ All present and known proposed non occupied buildings within 300 feet of the land application area.
- ☐ All present and known proposed public and private water supply wells within 1,000 feet of the land application area.
- ☐ All sinkholes and waters of the state (including ditches, grass waterways, streams and rivers) within 200 feet of the land application area.
- ☐ All public surface drinking water supply intakes within 1500' of the land application area.
- ☐ All present and known proposed developments and public access areas within 300 feet of the land application area.

b. If the land application site(s) are not known, will site maps be submitted before land application starts? ☐ Yes ■ No

D. Other Beneficial Uses

1. Is this material one of the following:
   - ☐ Spent Foundry Sand
   - ☐ Bottom Ash From Coal Combustion
   - ☐ Fly Ash
   - ☐ Steel Slag
   - ☐ Sludge
   - ■ Other: FGD Gypsum
2. If the material is "Other", have you contacted Ohio EPA to discuss the applicable regulations? ■ Yes ☐ No
3. Is a comprehensive management plan attached for uses other than land application? ☐ Yes ■ No

E. Miscellaneous Information:

The following items shall be included with this land application management plan:

- ☐ Two copies of the Permit-to-Install/Plan Approval Application Form A or the NPDES Permit Application.
- ☐ If applicable, two copies of the site and soil evaluation(s) (For renewal applications, this is only needed if additional or different areas)
- ☐ One copy of the sampling results for the material to be beneficially used (the most recent, but no older than one year).
- ☐ Four copies of this management plan and any attachments or ■ Four copies of a separate/complete management plan.
- ■ Fee check payable to "Treasurer, State of Ohio."

The following additional information is included with this form:

F. The foregoing data is a true statement of facts pertaining to this proposed management plan.

Printed (Person Preparing Plan): Jason Sparks	Title: Director of Operations
Signed:	Date: 11 / 3 / 2014

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OhioEPA

State of Ohio Environmental Protection Agency
Division of Surface Water
Division of Environmental & Financial Assistance

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Form A

Permit-to-Install/Plan Approval Application

FOR AGENCY USE ONLY		
Date Received: 12/15/14	Application/Revenue ID:	Organization ID:
Document ID:	Place ID:	Check ID:
Check Date: 11/10/14	Check Number: 3000030096	Check Amount: 200.00

1. Project Name: Agricultural Use of Cardinal Power Plant FGD Gypsum

2. Applicant (see note after signature)

Name: Cardinal Operating Company
Mailing Address: 155 West Nationwide Boulevard, Suite 500
City: Columbus State: Ohio Zip: 43215
Contact Name: Toby L Thomas
Title: Vice President of Competitive Generation
Phone: (614)583-6416 Fax: ( ) - E-mail : tthomas@aepes.com

3. Application/Plans Prepared by:

Name: Beneficial Reuse Management/Gypsoil, LLC
Mailing Address: 372 West Ontario Street Suite 501
City: Chicago State: IL Zip: 60654
Contact Name: Jason Sparks
Title: Director of Operations
Phone: (312)784-0308 Fax: (312)784-0310 E-mail : Jsparks@beneficialreuse.com

4. Billing Address (if different than Applicant)

Name: American Electric Power Cardinal Plant
Mailing Address: 306 County Road 7 East
City: Brilliant State: Ohio Zip: 43913
Contact Name: Bernard J Lombard III
Title: Plant Environmental Coordinator
Phone: (740)598-6514 Fax: ( ) - E-mail : blombard@aepes.com

5. Future Owner (if different than Applicant)

Name: NA
Mailing Address:
City: State: Zip:
Contact Name:
Title:
Phone: ( ) - Fax: ( ) - E-mail :

6. Project Location

Street Address or Location Description: All of Ohio

County: _____ Township: _____

Municipality: _____ Latitude: _____ Longitude: _____

Method of Determination: _____

7. Brief Project Description: FGD Gypsum generated at Cardinal Power Plant owned by AEP and operated by Cardinal Operating Company will used as a soil amendment and nutrient source.

8. Will one or more acres be disturbed during construction of this project? ☐ Yes ■ No

If **Yes**, enter the date the NOI for coverage under the construction storm water NPDES permit was submitted: / / and the date coverage was granted: / /

9. Will wetlands be disturbed during construction of this project? ☐ Yes ■ No

If **Yes**, enter the date the 401/404 permit application was submitted: / /

10 a. Is this application part of a combined permit-to-install application? (for example air + water) ☐ Yes ■ No

b. Has an application for a Class V injection well permit been submitted? ☐ Yes ☐ No ■ N/A

If **Yes**, date submitted: / /

11. Compliance Status

a. Will this project connect to a collection/treatment system that has a NPDES permit? ■ Yes ☐ No

If **Yes**, list federal and state permit numbers:

OH 0IB00009*UD

b. Is this application filed in compliance with findings and orders, a consent decree, and/or NPDES permit schedule? ☐ Yes ■ No

If **Yes**, effective date of the document containing the schedule: / /

12. Compliance with 208 plan

Does the project conform to the 208/201 plan for the area? ☐ Yes ☐ No ■ N/A

If **Yes**, has the engineer submitted supporting documentation? ☐ Yes ☐ No

13. Designated Ohio, Wild, Scenic, & Recreational Rivers

Is this project located within 1000 feet of a designated wild, scenic, and recreational river? ☐ Yes ■ No

See http://watercraft.ohiodnr.gov/scenicriversmap for additional information

14. Estimated Project Schedule:

Beginning construction date: / / Ending construction date: / / Beginning operation date: / /

15. Project Cost:

*Installation/Construction Cost: $ NA (Mark one): ☐ Actual ☐ Bid ☐ Estimate

Annual Operation/Maintenance Cost (if applicable - this project only): $

Are Water Pollution Control Loan Funds going to be used for this project? ☐ Yes ☐ No

If **No**, Funding Source: _____

**This is costs of the treatment/dispersal/collection system that will serve the project*

16. Attachments

The following are included in this application package (check appropriate box(es) and indicate how many copies of each are provided):

- ☐ Detail Plans _____
- ☐ Soil Evaluation Form _____
- ☐ Hydrogeologic Site Investigation Report _____
- ☐ Site Evaluation Form _____
- ☐ Other (describe): _____
- ☐ Narrative Plans
- ■ Management Plan _____
- ☐ Engineering Report _____
- ☐ Engineering Specifications _____
- ☐ Sewer Authority Letter _____
- ☐ Antidegradation Addendum _____

17. Form B / C Submission (check all that apply):

- ☐ Sewer and Pump Station Construction – Form B1
- ☐ Onsite Sewage Treatment Systems – Form B2
- ☐ Wastewater Treatment Plants Less Than 100,000 GPD – Form B3
- ☐ Wastewater Treatment Plants Greater Than or Equal to 100,000 GPD and all Pond Systems – Form B4
- ☐ Industrial Direct Discharge Facility – Form B5
- ☐ Industrial Indirect Discharge Facility – Form B6
- ☐ Underground Storage Tank Remediation – Form B7
- ☐ Holding Tanks – Form B8
- ☐ Industrial Impoundment Ponds – Form B9
- ■ Land Application Management Plan for Sludge or Waste other than Treated Sewage – Form C1
- ☐ Treated Sewage Land Application Management Plan – Form C2
- ☐ Sewage Holding Tank Management Plan – Form C3

18. Fee Calculations:

Permit-to-Install (maximum total fee $15,100)	
a. Application fee:	$ 100.00
b. Plan review fee:	$ 100.00
c. Plan review fee (installation/construction cost x .0065):	$ 0.00
d. Total Fee (a + b + c):	$ 200.00
Sludge Management Plan Approval*	
a. Application fee:	$ 100.00
b. Plan review fee:	$ 100.00
c. Total fee (a + b):	$ 200.00

** No separate fee is needed for land application*

19. Antidegradation

Is this project subject to the Antidegradation Rule (OAC 3745-1-05)? ☐ Yes ■ No

*If **Yes**, an antidegradation addendum must be submitted (Note: It applies even if an exclusion and/or waiver is met)*

*If **No,** check all that apply:*

- ☐ Application with no direct surface water discharge (Projects that do not meet the applicability section of 3745-1-05 (B)1, i.e., onsite sewage treatment systems, sanitary sewer extensions, indirect discharger to POTW, etc.).
- ☐ Renewal NPDES application or PTI application with no requested increase in loading of currently permitted pollutants.
- ■ Narrative Plans (Examples: Land Application, General Plans, etc.)

20. Submittals:

To be considered complete, this application must include the following unless otherwise directed by Ohio EPA:

- ☐ Four copies of the detail plans including profile and plan views of all sewers (shown on the same sheet), existing (as applicable) and proposed pump station facilities, incorporating all of the details outlined in Section 20.1, 20.2 and 20.3 of *Recommended Standards for Wastewater Facilities.*
- ☐ Two copies of complete technical specifications.
- ☐ Two copies of the Permit-to-Install Application including Form A, pertinent B & C form(s), and the antidegradation addendum *(if applicable)*
- ■ Fee check payable to "Treasurer, State of Ohio."

21. Signature of the Applicant: (see Ohio Administrative Code 3745-42-03)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision and that all the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are substantial penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Typed name: Toby L Thomas Title: Vice President of Competitive Generation

Signature: Toby L. Thomas Date: 12/4/ 2014

NOTE (Who Must Sign):
The person signing as "Applicant" is not the applicant's engineer or architect or any other person submitting the Permit-to-Install Application on behalf of the owner. The "Applicant" should be owner of the facility, business, corporation, company, etc. or the legal responsibly entity. It is not the engineer who prepared the plans.

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Beneficial Reuse Management

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Management Plan for the Land Application of FGD Gypsum in Ohio for Agronomic Use

Introduction

This document outlines a management plan developed by Beneficial Reuse Management, LLC/Gypsoil (BRM) to use synthetic gypsum generated from the flue gas desulfurization (FGD) process used at coal-fired electric generating station as a soil amendment and nutrient source in Ohio. This document is being submitted to fulfill the information requirements outlined in OAC 3745-27-05 (A)(4) and to request that Cardinal Operating Company (COC) be issued an approval, as outlined in this plan, to use FGD gypsum from the Cardinal Power Plant (CPP) partially owned, but operated by the COC, for agricultural use. This plan addresses the requirements outlined in the aforementioned rule and application form including the following topics.

- Source and process generating the synthetic gypsum
- Beneficial Reuse Management's current operational experience in the agricultural use of gypsum
- Lab analysis of the pertinent environmental and agronomic constituents of the synthetic gypsum and a comparison of these results to those levels defined
- Environmental guidelines for transport, storage, and application
- Reporting and monitoring

1. Source of the synthetic gypsum and generating process

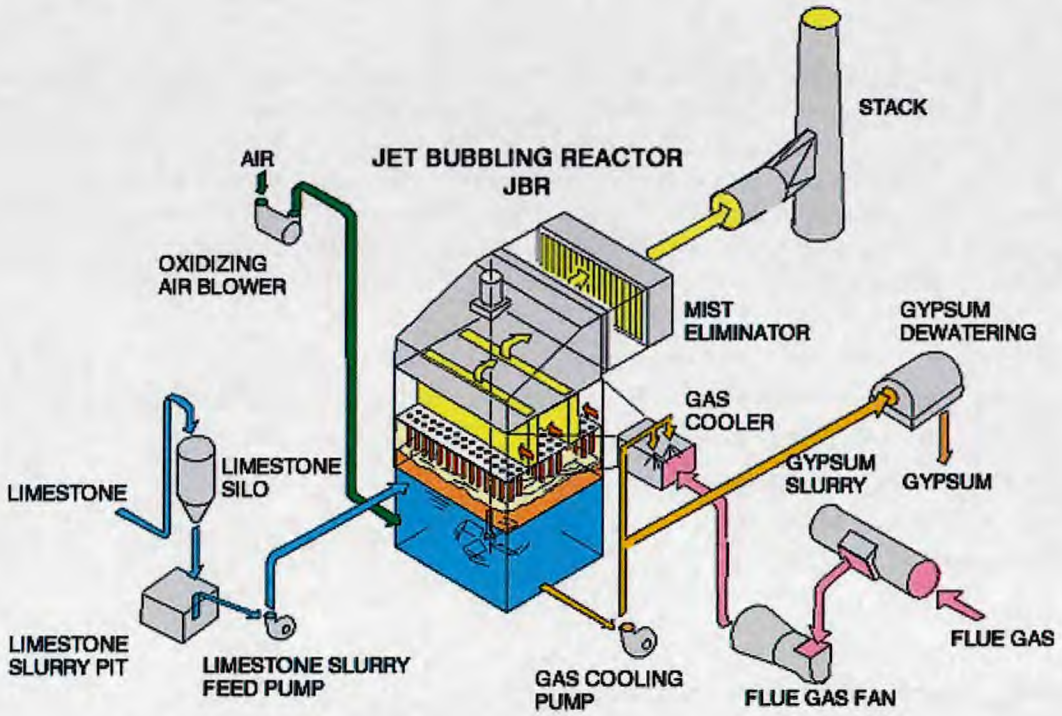
The source of synthetic gypsum to be supplied to the agricultural market in Ohio will be from the coal-fired Cardinal Power Plant. CPP is located along the Ohio River just south of Brilliant, Ohio. American Electric Power (AEP) owns Cardinal Unit 1 and placed it in commercial operations in late 1967. Unit 2 was placed in commercial operation later that same year and is owned by Buckeye Power. Each unit has generating capacity of 600 megawatts (MW). Unit 3, also owned by Buckeye Power, began operation in 1977, and has a generating capacity of 630 MW. Cardinal Operating Company operates the facility on behalf of all owners.

Effective in early 2012, flue gas desulfurization (FGD), or scrubbers, became operational on all three units. The FGD systems on these units use a limestone-water slurry to remove up to 98 percent of the sulfur dioxide (SO_2) that results from coal combustion. These three units produce a combined total of 800,000 tons/ year of synthetic gypsum when running at full capacity. The slurry is created by pulverizing limestone ($CaCO_3$) in ball mills and mixing it with water. The flue gas passes through the slurry resulting in $CaSO_2$ and $CaSO_4$. Then these

products are processed through a forced oxidation system to complete the conversion from calcium sulfite to calcium sulfate.

Cardinal Power Plant may utilize chemical products for scale control, pHREEdom 5200M (See Attachment 3 for MSDS), and for cooling water treatment, 3D TRASAR 3DT121 (See Attachment 4 for MSDS) in the JBR system. The chemicals are fed into the gas cooling pump discharge at a rate of 30 to 35 gallons per day. The concentrations of the additives in the system will be maintained at 120 ppm for 5200M and 20 ppm for 3DT121.

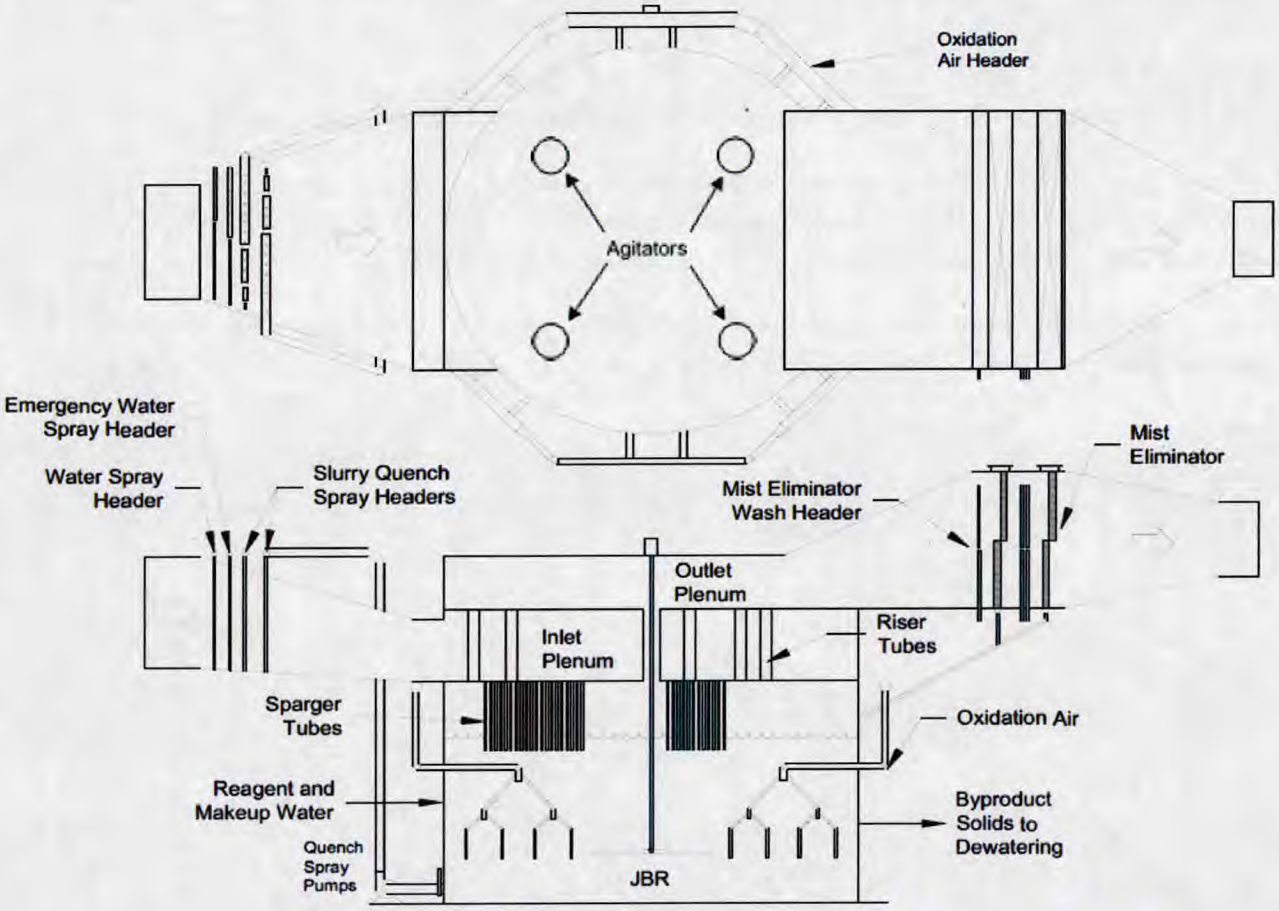
The calcium sulfate slurry is sprayed with water to remove soluble salts and then de-watered resulting in a synthetic gypsum material that is ready to be used as an agricultural soil amendment. Typically the synthetic gypsum from these type of systems is >95% pure calcium sulfate and a free moisture content of 10% to 15% containing about 20% calcium and >16% sulfur. A schematic outlining the major aspects of the FGD systems is presented below. The FGD gypsum at Cardinal Plant is designed to achieve ≥ 95% (dry weight) gypsum at ≤10% moisture content.



Source: *Chiyoda Throughbred 121(CT-121) Flue Gas Desulfurization Plant*. Digital image. *CHIYODA THOROUGHBRED 121 (CT-121) Flue Gas Desulfurization (FGD) Process*. Chiyoda Corporation, n.d. Web.

The amount of material that would be used for agriculture in Ohio from this plant is highly dependent on the location of its use and the cost of delivery. It is anticipated that gypsum would be supplied for markets primarily in the eastern half of the state but could be delivered in other areas if the economics of distribution and sale are feasible.

Diagram of FGD JBR Unit



2. Beneficial Reuse Management's current operational experience in land spreading gypsum

Beneficial Reuse Management is currently managing the marketing and distribution of more than 500,000 tons of synthetic gypsum annually in over 24 states adjacent to and east of the Mississippi River under regulatory permits or approvals issued by these state's environmental and agricultural agencies. In the states where BRM markets gypsum, its use in agriculture varies. Gypsum use in agriculture is well established as a soil amendment and a nutrient source. For example in Wisconsin, gypsum is used in agriculture as a soil amendment to improve the workability of clay soils and as a nutrient source for the potato industry and for certain forage crops in central Wisconsin. In Eastern and Southeastern US, gypsum has a long history of use as a nutrient for peanut growers.

In Ohio, BRM currently manages the marketing and distribution of FGD gypsum from the Indianapolis Power and Light Harding Street Plant, the Pleasants Power Station owned by Allegheny Energy, Inc., and the Dayton Power and Light J M Stuart Station. From November 1, 2012 through October 31, 2013, BRM sold a total of

approximately 41,000 tons of gypsum in Ohio from these plants. BRM maintains current license issued by the Ohio Department of Agriculture to market and sell this gypsum. AEP has asked BRM to prepare this application because of its experience in supplying gypsum to the agricultural market in Ohio and the US.

3. Lab analysis of the pertinent environmental and agronomic constituents of the synthetic gypsum

The lab analysis of seven representative samples of synthetic gypsum from CPP for a variety of chemical parameters is presented in Table 1 below. These samples are representative of the routine operation of the plant. The raw data from the lab analysis is attached at the end of this document.

The parameters that were analyzed were those recommended by the Ohio EPA and those heavy metals that are typically required of land spreading programs of municipal wastewater sludge, and agronomic nutrients of concern.

Table 1 Waste characterization limits				
Pollutant	CAS RN	Maximum Pollutant Limits (mg/kg)	COC CPP	Source of Maximum Limit
Aluminum	7429-90-5	77,000.0	86	USEPA RSL
Antimony	7440-36-0	31.0	<5.0 ND	USEPA RSL
Arsenic	7440-38-2	6.70	0.85	OEPA VAP GLBSV
Barium	7440-39-3	15,000.0	1.13	USEPA RSL
Beryllium	7440-41-7	160.0	<0.5 ND	USEPA RSL
Boron	7440-42-8	16,000.0	< 5.0 ND	USEPA RSL
Cadmium	7440-43-9	39.0	<0.5 ND	USEPA 503
Chromium VI	18540-29-9	230.0	<1 ND	OEPA VAP GLBSV
Cobalt	7440-48-4	23.0	< 1 ND	USEPA RSL
Copper	7440-50-8	1,500.0	< 1 ND	USEPA 503
Iron	7439-89-6	55,000.0	553	USEPA RSL
Lead	7439-92-1	300.0	<5.0 ND	USEPA 503
Manganese	7439-96-5	1,800.0	29.8	USEPA RSL
Mercury	7439-97-6	5.60	0.36	USEPA RSL
Molybdenum	7439-98-7	75.0	<1 ND	USEPA 503
Nickel	7440-02-0	420.0	< 1 ND	USEPA 503
Selenium	7782-49-2	100.0	3.64	USEPA 503
Silver	7440-22-4	390.0	<1 ND	USEPA RSL
Thallium	7440-28-0	6.10	<5 ND	OEPA VAP GLBSV
Vanadium	7440-62-2	390.0	2	USEPA RSL
Zinc	7440-66-6	2,800.0	8.1	USEPA 503

USEPA RSL= Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites-Residential Soil Ingestion pathway limits
OEPA VAP GLBSV= Ohio EPA Voluntary Action Program Generic Leach-Based Soil Values for Residential Soil
USEPA 503= Limits for metals in biosolids from Part 503 of Title 40 of the Code of Federal Regulations
AEP CPP = Highest concentration of the seven samples analyzed

Table 2 presents a comparison of the trace constituents in FGD gypsum, mined gypsum, and natural soils. Dr. Peter Grevatt USEPA, Office of Solid Waste, developed the table to support the use of FGD gypsum for agricultural and industrial uses. Multiple sources were utilized in the development of the table and are found in the footnote.

When examining the data of Table 2 in a conservative manner by comparing the highest potential concentrations of trace metals for FGD gypsum against the highest potential concentrations for mined gypsum, FGD gypsum exceeds on all trace metals with the exception of Thallium. Mercury in FGD gypsum has the potential to be 36 times greater than the average concentration found in soils (lower 25th percentile) and 3,181 times greater than mined gypsum (lowest concentration of Hg in mined gypsum). However, Arsenic and Lead are found in greater concentrations in natural soils compared to FGD and mined gypsum. Due to the potential of high trace metal concentrations, it is necessary to understand the soil's chemistry to be treated and the FGD gypsum's contents to determine the appropriate application rate that will produce the most favorable conditions for the crops.

From an agronomic basis, FGD gypsum contains a greater percentage of calcium and sulfur than mined gypsum (New Horizons in Soil Science, Issue #2 — 2010, Using Flue Gas Desulfurization (FGD) Gypsum in Wisconsin, Dept. of Sol Science, UW-Madison/UW-Extension). Mined gypsum averages 19% Calcium and FGD gypsum averages 23%. On a dry weight basis, mined gypsum averages 15% Calcium and FGD gypsum averages 19%.

Raw data from Midwest Labs attached to this report indicates that FGD gypsum from the CPP contains over 16% sulfur and 22% calcium on average on a dry weight basis. The moisture content generally remains less than 10%.

Based upon the laboratory analysis of the FGD gypsum presented in Table 1 and the application rates outlined in section 4, there will be no environmental impacts when FGD gypsum is used as a soil amendment and/or nutrient source as specified in this management plan.

CPP's synthetic gypsum will be sampled and analyzed on an annual basis. The attached lab report completed by Midwest Labs identifies the parameters that will be routinely sampled for. The report includes specific agronomic parameters required to license the FGD as a soil amendment and nutrient source with the Ohio Department of Agriculture. Lab analysis will be conducted if a change in the plant's operation occurs that would significantly alter the chemical constituents of concern.

Table 2

Trace Constituents in FGD Gypsum, Mined Gypsums, and Natural Soils			
Trace Constituent	FGD Gypsum (ppm)	Mined Gypsum (ppm)	National Background in Soils Lower 25th percentile (ppm)
Antimony	2.0 – 9.1	0.02 – 0.28	0.3
Arsenic	0.6 – 4.0	0.19 – 3.0	4.21
Cadmium	0.2 – 1.2	<2 – 0.5	0.19
Chromium	1.3 – 42.0	8.7 – 30.5	28.6
Lead	0.8 – 12.0	All <5	14.5
Mercury	0.01 – 1.4	0.00044 – 0.025	0.039
Molybdenum	0.5 – 12.0	All <3	0.44
Nickel	0.73 – 20.1	<4 – 11.9	11.8
Selenium	2.0 – 30.0	11.3 – 21.1	0.21
Thallium	0.6 – 2.0	All <15	0.3
Vanadium	<1 – 73.2	<2 – 12.7	45.9
Zinc	3.4 – 47.5	13.1 – 27.5	36.8

Sources: DOE. 2007. Unpublished data. U.S. Department of Energy; EPA. 2007. Unpublished data. Office of Research and Development, U.S. Environmental Protection Agency; EPRI. 2007. Unpublished data. Electric Power Research Institute; OSU. 2006. *Gypsum for Agricultural Use in Ohio–Sources and Quality of Available Products.* Ohio State University Extension Fact Sheet, ANR-20-05. http://ohioline.osu.edu/anr-fact/0020.html; Shacklette and Boerngen. 1984. *Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States.* U.S. Geological Survey Professional Paper 1270. Washington, D.C.: U.S. Government Printing Office; USGS. 2005. *Major- and Trace-Element Concentrations in Soils from Two Continental-Scale Transects of the United States and Canada.* Open-File Report 2005-1253, U.S. Geological Survey. http://pubs.usgs.gov/of/2005/1253/

4. Beneficial Use and Gypsum Application Rates

4.1 Beneficial Use

The documents entitled "Agricultural Uses For Flue Gas Desulfurization (FGD) Gypsum" dated March 2008 (EPA 530-F-008-09) and "A Review of Agricultural and Other Land Application Uses of Flue Gas Desulfurization Products", Electric Power Research Institute (EPRI), March 2006 outline some of the benefits to agriculture from the land application of both mined gypsum and synthetic FGD gypsum.

According to the US Environmental Protection Agency and EPRI, one of the primary uses for gypsum in agriculture is to improve the physical property of soils. Soils with higher clay content can suffer from

excessive crusting which inhibits the infiltration of water and nutrients. Gypsum is a good nutrient source for crops such as peanuts, potatoes, and forage crops because of its high calcium and sulfur content.

Beneficial Reuse Management has determined, through experience, that the application rate of 1 to 2 tons per acre of FGD gypsum every 1 to 2 years will improve the quality of certain clay soils by improving their ability to increase water infiltration and fertilizer utilization.

4.2 Gypsum Application Rates

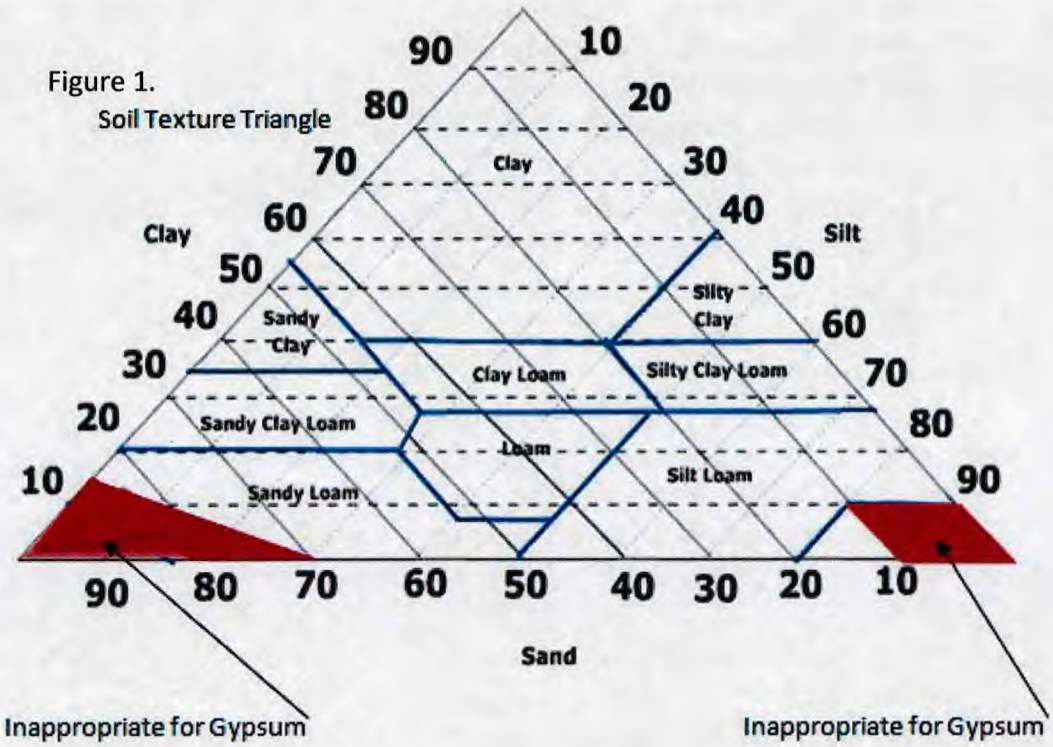
COC or contractors will follow the guidelines below to determine specific application rates for individual farms for soil amendment based on current soil chemistry and needs.

- Consult with staff at the Ohio State University Extension Service and others in the agronomic community to determine appropriate rates for using gypsum for use as a soil amendment and nutrient source.
- Develop and distribute informational brochures and user information sheets complying with the land spreading approval criteria outlined here.
- Gypsum shall be applied only to soils classified as acceptable throughout the top 3 feet of soil profile.

The application rates of gypsum for each farm as a soil amendment will be determined on the following applicable criteria with the maximum application rate of two tons per acre per year.

- The soil triangle below is the first step to eliminating certain soils for gypsum as a soil amendment. Soils with a Cation Exchange Capacity (CEC) less than 5 meq/ 100g of dry soil and represented in the following Soil Texture Triangle are not appropriate for gypsum application.

Figure 1.
Soil Texture Triangle



- Available soil test results and/or the NRCS Web Soil Survey will be used to determine the soil CEC. The Soil CEC will determine the gypsum application rates.
  - Cation Exchange Capacity (5 meq/100g of dry soil or greater).

CEC ($meq/100g$)	Gypsum Application Rate (#/acre/year)
5 -< 10	1000
10 – 15	2000
>15	4000

  - % Base Saturation for Calcium (<75%).
  - % Base Saturation for Magnesium (>13%).

- Other observations of soil properties will be used to supplement the CEC information, such as:
  - Soil Texture.
  - Soil is tight, compactable.
  - Water infiltration is slow, leaving water ponded in the field.
  - Rainwater moves off the field causing erosion of soil and crop residue.
  - Soils get hard when they dry out.
  - Soils are tight in the wheel tracks even though the soil is moist.
  - Soils seal up and stay wet after a rain.
  - Soil penetrometer indicates compacted zones in the soil profile.

- When digging crop roots, the soil clings tightly to the roots making it difficult to expose the roots without separating them from the plant.

- Observations of the performance of field equipment:
  - It is difficult to prepare a good seedbed with tillage and control planting depth due to the presence of clods.
  - It is difficult to maintain uniform seed depth with the no-till planter due to variations in soil structural conditions.
  - It is difficult to pull tillage and/or application equipment through the field due to tight soil structure.
- Observations of crop development:
  - Crop roots are limited by soil tightness or compaction layers.
  - Crop roots are swelled and crooked from growing through compacted soil.
  - Crops have trouble emerging evenly through the soil surface.
  - After the crop emerges, there are uneven growth patterns throughout the field.
  - When the corn crop is in the V2-V6 growth stages there are signs of a purple color in the plant.
  - When the corn crop begins rapid growth after V6, signs of Potassium deficiency begin to appear.
- Observations of the biological systems:
  - Crop residues break down slowly and are still present 1-3 years later.
  - There is a marked absence of earthworm activity.
  - Soils emit an odor commonly associated with vegetative decay, similar to a swamp, after rainfall events.

Application rates for FGD gypsum used as a nutrient source for crops is generally less than 1000 lbs/acre. The specific application rate will be determined from soil tests and the type of crop to be planted. In addition, public and private crop specialists may be consulted as subject matter experts.

5. Environmental guidelines for transportation, storage, and land application

Gypsum will be transported via covered truck from CPP to locations in Ohio where it will be unloaded and stored temporarily at distribution sites (See attachment for design criteria of distribution sites). From these locations the gypsum will be transported to and distributed by the owner/operators of the farms or the companies contracted by the receiving farm for distribution.

The following guidelines will be adhered to as the gypsum moves through the logistical chain:

5.1 Transport

- Delivery will be scheduled as close to the actual application date as practical.
- Vehicles will be loaded to comply with State licensing and load limits.
- Loaded vehicles will be covered to prevent gypsum from escaping during transport.

- Loaded vehicles will have sealed tailgates to prevent gypsum from escaping during transport.
- Loaded vehicles will be driven through the wash station prior to leaving the plant site.

5.2 Storage

- All in-field stockpile locations must meet the following criteria:
  - Synthetic gypsum contains enough moisture so that it minimizes windblown dust when being off-loaded or during short term storage prior to application. Unloading of gypsum into field stockpiles during high winds will be avoided.
  - Stockpiles will be configured such that rainwater does not flow toward the gypsum stockpile.
  - All gypsum will be stored at least 200 feet from any residence or public building, 200 feet from surface waters or a subsurface conduit to a subsurface feature and 500 feet from any potable water well.
  - Stockpile locations which support the immediate application of product will be formed into a peak to allow water to form a crust and be shed off the pile.

- BRM distribution sites
  - Will be outside any floodplain, floodway or area with seasonal high water table, which could cause off-site movement of gypsum.
  - Will consist of surface soil or other appropriate materials, which have been graded to allow water to drain away from the stockpile. If necessary, perimeter walls will be in place to allow for efficient storage and loading of the gypsum.
  - Stockpiles will be placed in a manner to deter any unauthorized persons.
  - Due to the nature of the gypsum and the frequency of inventory movement, nuisance animals are not expected to colonize on the stockpile site.
  - A facility containing a stockpile will be designed and constructed to protect both ground and surface water as well as the public. The design of the distribution facility will take into account the proximity to water supplies and soil drainage considerations. The stockpile may either be covered or placed under roof or designed with berms and impervious surfaces. The design criteria for these distribution sites are contained in an attachment to this document.
  - Long term storage of gypsum will comply with requirements of the Ohio Dept. of Agriculture.

5.3 Land Application

- Product will be loaded from stockpile locations using a loader in such a way as to minimize wastage and the mingling of foreign material into the loads.
- All gypsum will be spread at least 500 feet from a community water supply well or potable well and 200 feet from surface waters. Application will be avoided prior to an impending rainstorm or when fields have received greater than ¼ inch rainfall within the 24-hour period preceding the intended gypsum application.
- Gypsum will not be applied to land during precipitation or on land which is saturated or ponded with water.
- Application of gypsum will not be made during high wind situations.

6. Reporting

An annual report on the amount of gypsum sold in Ohio will be submitted to the Ohio EPA. This report will contain the total annual tonnage of FGD gypsum sold in the state as reported to the Ohio Department of Agriculture. FGD gypsum from CPP will be marketed and sold under a fertilizer license issued by the Ohio Department of Agriculture.

ATTACHMENTS

Beneficial Reuse Management

Attachment 1

FGD Non-Building Storage (Distribution) Facility Design Criteria

1. The base of the storage area shall incorporate a low permeability surface to control surface water run-on and off (low permeability material may include a clay type soil)

2. Soil Berms (vegetated) or curbs(e.g. interlocking concrete safety barriers or landscape nursery storage blocks) shall be constructed around the perimeter of the storage area. A setback will be maintained between the stored material and the edge of the pad where an egress opening may exist and between the stored material and the berms for access around the stored material.

3. The egress location in the berms shall be at the highest elevation point in the pad to prevent any surface water run-off of the stored material from exiting the facility.

4. The slope of the pad will be designed so that any surface water run-off with the material is directed toward one edge of the pad.

5. The height of the berms will be designed to collect and contain the volume of run-off as a result of a 25-year 24-hour storm and maintain separation from the stored material or provide sufficient height to allow surface water run-off to be drained to an external pond.

6. Contact water will be used to hydrate the stored material in order to minimize any windblown conditions. Any excess surface run-off water that exceeds the requirements for hydration will be used for irrigation with the approval from OEPA.

7. Any spilled material external to storage area will be removed.

Attachment 2

Report Number: 14-223-2034v2
Account: 19400
Page: 1 of 2

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Date Reported: 08/11/14
Date Received: 07/31/14

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This report supersedes all prior reports for the following reason(s): comment

BENEFICIAL REUSE MANAGEMENT
ANDREA ROSS
372 WEST ONTARIO ST STE 501
CHICAGO IL 60654

CARDINAL PLANT

Second Copy: (5592) CARDINAL PLANT

Lab number: 2300544 Sample ID: CDP072314

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Aluminum (total)	77	83	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Antimony (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Beryllium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Boron (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Chloride	n.d.	n.d.	mg/kg	10	SM 4500 - CL- E	jjd/08-07	cmw/08-11
Cobalt (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Hexavalent chromium	n.d.	n.d.	mg/kg	1	EPA 3060A/7196	jjd/08-06	cmw/08-11
Sulfate	512,065	549,544	mg/kg	9960	EPA 9056	jdb/08-05	cmw/08-11
Thallium (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Total Nitrogen (TKN + NO3)	17.0	18.2	mg/L	0.05	CALCULATION	cmw/07-31	aut/07-31
Vanadium (total)	1	1	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Free Moisture	6.82		%	0.01	ASTM C471-91	acm/08-04	mgn/08-05
Total Kjeldahl nitrogen (TKN)	16.8	18.0	mg/kg	12.5	PAI - DK 01	krs/08-07	cmw/08-11
Phosphorus (total)	n.d.	n.d.	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Potassium (total)	42.2	45.3	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Sulfur (total)	173,132	185,804	mg/kg	25	EPA 6010	trh/08-07	bab/08-10
Calcium (total)	209,067	224,369	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Magnesium (total)	864	928	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Sodium (total)	18.2	19.5	mg/kg	1	EPA 6010	trh/08-07	bab/08-10
Iron (total)	378	406	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Manganese (total)	14.8	15.9	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Copper (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Zinc (total)	4.6	5.0	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Ammoniacal Nitrogen	n.d.	n.d.	mg/kg	1	SM 4500-NH3 C	krs/08-06	cmw/08-11
Nitrate/Nitrite Nitrogen	n.d.	n.d.	mg/kg	1	EPA 353.2	lkd/08-04	cmw/08-11
Arsenic (total)	0.65	0.70	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10
Barium (total)	1.03	1.11	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Cadmium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Chromium (total)	2.0	2.2	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Lead (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Mercury (total)	0.20	0.22	mg/kg	0.05	EPA 7471	ccm/08-06	bab/08-10
Molybdenum (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Nickel (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Selenium (total)	2.90	3.11	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10

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Lab number: 2300544 Sample ID: CDP072314

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Silver (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Percent solids	93.18		%	0.01	SM 2540 G	raf/08-05	cmw/08-11
pH	7.8		S.U.		EPA 9045	jdb/08-05	cmw/08-11
Organic nitrogen	17.0	18.2	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Phosphate P2O5	0	0	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Potash K2O	51	55	mg/Kg		CALC	cmw/07-31	aut/07-31

COMMENTS

Sulfur calculated as CaSO4 2(H2O) = 92.95% (as received basis).
Percent Solids calculated from Free Moisture value.

For questions contact

Rob Ferris
Client Service Representative
rob.ferris@midwestlabs.com (402)829-9871

Report Number:
14-223-2035v2
Account:
19400
Page: 1 of 2

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Date Reported:
08/11/14
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BENEFICIAL REUSE MANAGEMENT
ANDREA ROSS
372 WEST ONTARIO ST STE 501
CHICAGO IL 60654

CARDINAL PLANT

Second Copy: (5592) CARDINAL PLANT

Lab number: 2300545 Sample ID: CDP072414

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Aluminum (total)	52	56	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Antimony (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Beryllium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Boron (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Chloride	n.d.	n.d.	mg/kg	10	SM 4500 - CL- E	jjd/08-07	cmw/08-11
Cobalt (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Hexavalent chromium	n.d.	n.d.	mg/kg	1	EPA 3060A/7196	jjd/08-06	cmw/08-11
Sulfate	510,599	548,383	mg/kg	9756	EPA 9056	jdb/08-05	cmw/08-11
Thallium (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Total Nitrogen (TKN + NO3)	22.0	23.6	mg/L	0.05	CALCULATION	cmw/07-31	aut/07-31
Vanadium (total)	1	2	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Free Moisture	6.89		%	0.01	ASTM C471-91	acm/08-04	mgn/08-05
Total Kjeldahl nitrogen (TKN)	22.5	24.2	mg/kg	12.5	PAI - DK 01	krs/08-07	cmw/08-11
Phosphorus (total)	13.3	14.3	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Potassium (total)	35.8	38.5	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Sulfur (total)	172,498	185,263	mg/kg	25	EPA 6010	trh/08-07	bab/08-10
Calcium (total)	210,215	225,771	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Magnesium (total)	914	982	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Sodium (total)	19.7	21.2	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Iron (total)	380	408	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Manganese (total)	12.6	13.5	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Copper (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Zinc (total)	7.2	7.8	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Ammoniacal Nitrogen	n.d.	n.d.	mg/kg	1	SM 4500-NH3 C	krs/08-06	cmw/08-11
Nitrate/Nitrite Nitrogen	n.d.	n.d.	mg/kg	1	EPA 353.2	lkd/08-04	cmw/08-11
Arsenic (total)	0.56	0.60	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10
Barium (total)	0.88	0.94	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Cadmium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Chromium (total)	1.8	1.9	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Lead (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Mercury (total)	0.22	0.23	mg/kg	0.05	EPA 7471	ccm/08-06	bab/08-10
Molybdenum (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Nickel (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Selenium (total)	2.27	2.43	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10

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Lab number: 2300545 Sample ID: CDP072414

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Silver (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Percent solids	93.11		%	0.01	SM 2540 G	raf/08-05	cmw/08-11
pH	7.9		S.U.		EPA 9045	jdb/08-05	cmw/08-11
Organic nitrogen	22.0	23.6	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Phosphate P2O5	30	33	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Potash K2O	43	46	mg/Kg		CALC	cmw/07-31	aut/07-31

COMMENTS

Sulfur calculated as CaSO4 2(H2O) = 92.63% (as received basis).
Percent Solids calculated from Free Moisture value.

For questions contact

Rob Ferris
Client Service Representative
rob.ferris@midwestlabs.com (402)829-9871

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BENEFICIAL REUSE MANAGEMENT
ANDREA ROSS
372 WEST ONTARIO ST STE 501
CHICAGO IL 60654

CARDINAL PLANT

Second Copy: (5592) CARDINAL PLANT

Lab number: 2300546 Sample ID: CDP072514

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Aluminum (total)	68	74	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Antimony (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Beryllium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Boron (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Chloride	15	16	mg/kg	10	SM 4500 - CL- E	jjd/08-07	cmw/08-11
Cobalt (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Hexavalent chromium	n.d.	n.d.	mg/kg	1	EPA 3060A/7196	jjd/08-06	cmw/08-11
Sulfate	505,323	546,413	mg/kg	9950	EPA 9056	jdb/08-05	cmw/08-11
Thallium (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Total Nitrogen (TKN + NO3)	22.0	23.8	mg/L	0.05	CALCULATION	cmw/07-31	aut/07-31
Vanadium (total)	2	2	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Free Moisture	7.52		%	0.01	ASTM C471-91	acm/08-04	mgn/08-05
Total Kjeldahl nitrogen (TKN)	22.4	24.2	mg/kg	12.5	PAI - DK 01	krs/08-07	cmw/08-11
Phosphorus (total)	11.1	12.0	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Potassium (total)	32.0	34.6	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Sulfur (total)	165,555	179,017	mg/kg	25	EPA 6010	trh/08-07	bab/08-10
Calcium (total)	203,526	220,076	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Magnesium (total)	1047	1132	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Sodium (total)	16.4	17.7	mg/kg	1	EPA 6010	trh/08-07	bab/08-10
Iron (total)	486	525	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Manganese (total)	24.3	26.3	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Copper (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Zinc (total)	4.8	5.2	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Ammoniacal Nitrogen	n.d.	n.d.	mg/kg	1	SM 4500-NH3 C	krs/08-06	cmw/08-11
Nitrate/Nitrite Nitrogen	n.d.	n.d.	mg/kg	1	EPA 353.2	lkd/08-04	cmw/08-11
Arsenic (total)	0.78	0.84	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10
Barium (total)	1.02	1.11	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Cadmium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Chromium (total)	1.9	2.1	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Lead (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Mercury (total)	0.31	0.33	mg/kg	0.05	EPA 7471	ccm/08-06	bab/08-10
Molybdenum (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Nickel (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Selenium (total)	3.20	3.46	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10

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Lab number: 2300546 Sample ID: CDP072514

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Silver (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Percent solids	92.48		%	0.01	SM 2540 G	raf/08-05	cmw/08-11
pH	7.8		S.U.		EPA 9045	jdb/08-05	cmw/08-11
Organic nitrogen	22.0	23.8	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Phosphate P2O5	25	27	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Potash K2O	39	42	mg/Kg		CALC	cmw/07-31	aut/07-31

COMMENTS

Sulfur calculated as CaSO4 2(H2O) = 88.87% (as received basis).
Percent Solids calculated from Free Moisture value.

For questions, contact

Rob Ferris
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rob.ferris@midwestlabs.com (402)829-9871

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BENEFICIAL REUSE MANAGEMENT
ANDREA ROSS
372 WEST ONTARIO ST STE 501
CHICAGO IL 60654

CARDINAL PLANT

Second Copy: (5592) CARDINAL PLANT

Lab number: 2300547 Sample ID: CDP072614

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Aluminum (total)	86	96	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Antimony (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Beryllium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Boron (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Chloride	70	78	mg/kg	10	SM 4500 - CL- E	jjd/08-07	cmw/08-11
Cobalt (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Hexavalent chromium	n.d.	n.d.	mg/kg	1	EPA 3060A/7196	jjd/08-06	cmw/08-11
Sulfate	492,750	548,475	mg/kg	9747	EPA 9056	jdb/08-05	cmw/08-11
Thallium (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Total Nitrogen (TKN + NO3)	39.0	43.4	mg/L	0.05	CALCULATION	cmw/07-31	aut/07-31
Vanadium (total)	2	2	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Free Moisture	10.16		%	0.01	ASTM C471-91	acm/08-04	mgn/08-05
Total Kjeldahl nitrogen (TKN)	38.8	43.2	mg/kg	12.5	PAI - DK 01	krs/08-07	cmw/08-11
Phosphorus (total)	12.5	13.9	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Potassium (total)	41.4	46.0	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Sulfur (total)	163,183	181,637	mg/kg	25	EPA 6010	trh/08-07	bab/08-10
Calcium (total)	202,301	225,179	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Magnesium (total)	1141	1270	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Sodium (total)	20.5	22.8	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Iron (total)	553	615	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Manganese (total)	29.8	33.2	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Copper (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Zinc (total)	8.1	9.0	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Ammoniacal Nitrogen	n.d.	n.d.	mg/kg	1	SM 4500-NH3 C	krs/08-06	cmw/08-11
Nitrate/Nitrite Nitrogen	n.d.	n.d.	mg/kg	1	EPA 353.2	lkd/08-04	cmw/08-11
Arsenic (total)	0.85	0.95	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10
Barium (total)	1.13	1.26	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Cadmium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Chromium (total)	2.5	2.8	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Lead (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Mercury (total)	0.36	0.40	mg/kg	0.05	EPA 7471	ccm/08-06	bab/08-10
Molybdenum (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Nickel (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Selenium (total)	3.64	4.05	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10

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This report supersedes all prior reports for the following reason(s): comment

Lab number: 2300547 Sample ID: CDP072614

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Silver (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Percent solids	89.84		%	0.01	SM 2540 G	raf/08-05	cmw/08-11
pH	7.8		S.U.		EPA 9045	jdb/08-05	cmw/08-11
Organic nitrogen	39.0	43.4	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Phosphate P2O5	29	32	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Potash K2O	50	55	mg/Kg		CALC	cmw/07-31	aut/07-31

COMMENTS

Sulfur calculated as CaSO4 2(H2O) = 87.63% (as received basis).
Percent Solids calculated from Free Moisture value.

For questions contact

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rob.ferris@midwestlabs.com (402)829-9871

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BENEFICIAL REUSE MANAGEMENT
ANDREA ROSS
372 WEST ONTARIO ST STE 501
CHICAGO IL 60654

CARDINAL PLANT

Second Copy: (5592) CARDINAL PLANT

Lab number: 2300548 Sample ID: CDP072714

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Aluminum (total)	61	66	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Antimony (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Beryllium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Boron (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Chloride	15	16	mg/kg	10	SM 4500 - CL- E	jjd/08-07	cmw/08-11
Cobalt (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Hexavalent chromium	n.d.	n.d.	mg/kg	1	EPA 3060A/7196	jjd/08-06	cmw/08-11
Sulfate	512,053	550,181	mg/kg	9891	EPA 9056	jdb/08-05	cmw/08-11
Thallium (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Total Nitrogen (TKN + NO3)	35.0	37.6	mg/L	0.05	CALCULATION	cmw/07-31	aut/07-31
Vanadium (total)	2	2	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Free Moisture	6.93		%	0.01	ASTM C471-91	acm/08-04	mgn/08-05
Total Kjeldahl nitrogen (TKN)	34.7	37.3	mg/kg	12.5	PAI - DK 01	krs/08-07	cmw/08-11
Phosphorus (total)	n.d.	n.d.	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Potassium (total)	31.8	34.2	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Sulfur (total)	170,969	183,699	mg/kg	25	EPA 6010	trh/08-07	bab/08-10
Calcium (total)	208,027	223,517	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Magnesium (total)	999	1073	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Sodium (total)	16.9	18.2	mg/kg	1	EPA 6010	trh/08-07	bab/08-10
Iron (total)	445	478	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Manganese (total)	22.6	24.2	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Copper (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Zinc (total)	4.2	4.5	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Ammoniacal Nitrogen	n.d.	n.d.	mg/kg	1	SM 4500-NH3 C	krs/08-06	cmw/08-11
Nitrate/Nitrite Nitrogen	n.d.	n.d.	mg/kg	1	EPA 353.2	lkd/08-04	cmw/08-11
Arsenic (total)	0.64	0.69	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10
Barium (total)	0.98	1.05	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Cadmium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Chromium (total)	1.9	2.1	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Lead (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Mercury (total)	0.25	0.27	mg/kg	0.05	EPA 7471	ccm/08-06	bab/08-10
Molybdenum (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Nickel (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Selenium (total)	2.68	2.88	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10

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Lab number: 2300548 Sample ID: CDP072714

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Silver (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Percent solids	93.07		%	0.01	SM 2540 G	raf/08-05	cmw/08-11
pH	7.9		S.U.		EPA 9045	jdb/08-05	cmw/08-11
Organic nitrogen	35.0	37.6	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Phosphate P2O5	0	0	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Potash K2O	38	41	mg/Kg		CALC	cmw/07-31	aut/07-31

COMMENTS

Sulfur calculated as CaSO4 2(H2O) = 91.77% (as received basis).
Percent Solids calculated from Free Moisture value.

For questions contact

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Client Service Representative
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BENEFICIAL REUSE MANAGEMENT
ANDREA ROSS
372 WEST ONTARIO ST STE 501
CHICAGO IL 60654

CARDINAL PLANT

Second Copy: (5592) CARDINAL PLANT

Lab number: 2300549 Sample ID: CDP072814

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Aluminum (total)	68	74	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Antimony (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Beryllium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Boron (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Chloride	14	15	mg/kg	10	SM 4500 - CL- E	jjd/08-07	cmw/08-11
Cobalt (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Hexavalent chromium	n.d.	n.d.	mg/kg	1	EPA 3060A/7196	jjd/08-06	cmw/08-11
Sulfate	510,092	553,065	mg/kg	9911	EPA 9056	jdb/08-05	cmw/08-11
Thallium (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Total Nitrogen (TKN + NO3)	34.0	36.9	mg/L	0.05	CALCULATION	cmw/07-31	aut/07-31
Vanadium (total)	2	2	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Free Moisture	7.77		%	0.01	ASTM C471-91	acm/08-04	mgn/08-05
Total Kjeldahl nitrogen (TKN)	34.0	36.9	mg/kg	12.5	PAI - DK 01	krs/08-07	cmw/08-11
Phosphorus (total)	11.5	12.5	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Potassium (total)	38.2	41.4	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Sulfur (total)	167,077	181,153	mg/kg	25	EPA 6010	trh/08-07	bab/08-10
Calcium (total)	204,762	222,012	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Magnesium (total)	1016	1102	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Sodium (total)	19.6	21.2	mg/kg	1	EPA 6010	trh/08-07	bab/08-10
Iron (total)	487	528	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Manganese (total)	28.6	31.1	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Copper (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Zinc (total)	5.1	5.5	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Ammoniacal Nitrogen	n.d.	n.d.	mg/kg	1	SM 4500-NH3 C	krs/08-06	cmw/08-11
Nitrate/Nitrite Nitrogen	n.d.	n.d.	mg/kg	1	EPA 353.2	lkd/08-04	cmw/08-11
Arsenic (total)	0.67	0.72	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10
Barium (total)	1.05	1.14	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Cadmium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Chromium (total)	2.0	2.2	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Lead (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Mercury (total)	0.29	0.32	mg/kg	0.05	EPA 7471	ccm/08-06	bab/08-10
Molybdenum (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Nickel (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Selenium (total)	2.73	2.96	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10

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This report supersedes all prior reports for the following reason(s): comment

Lab number: 2300549 Sample ID: CDP072814

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Silver (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Percent solids	92.23		%	0.01	SM 2540 G	raf/08-05	cmw/08-11
pH	7.8		S.U.		EPA 9045	jdb/08-05	cmw/08-11
Organic nitrogen	34.0	36.9	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Phosphate P2O5	26	29	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Potash K2O	46	50	mg/Kg		CALC	cmw/07-31	aut/07-31

COMMENTS

Sulfur calculated as CaSO4 2(H2O) = 89.73% (as received basis).
Percent Solids calculated from Free Moisture value.

For questions, contact

Rob Ferris
Client Service Representative
rob.ferris@midwestlabs.com (402)829-9871

Report Number:
14-223-2041v3
Account:
19400
Page: 1 of 2

Midwest Laboratories, Inc.®

Date Reported:
08/12/14
Date Received:
07/31/14

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This report supersedes all prior reports for the following reason(s): comment

BENEFICIAL REUSE MANAGEMENT
ANDREA ROSS
372 WEST ONTARIO ST STE 501
CHICAGO IL 60654

CARDINAL PLANT

Second Copy: (5592) CARDINAL PLANT

Lab number: 2300550 Sample ID: CDP072914

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Aluminum (total)	42	45	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Antimony (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Beryllium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Boron (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Chloride	n.d.	n.d.	mg/kg	10	SM 4500 - CL- E	jjd/08-07	cmw/08-11
Cobalt (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Hexavalent chromium	n.d.	n.d.	mg/kg	1	EPA 3060A/7196	jjd/08-06	cmw/08-11
Sulfate	509,828	549,798	mg/kg	9990	EPA 9056	jdb/08-05	cmw/08-11
Thallium (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Vanadium (total)	1	1	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Free Moisture	7.27		%	0.01	ASTM C471-91	acm/08-04	mgn/08-05
Total Kjeldahl nitrogen (TKN)	n.d.	n.d.	mg/kg	12.5	PAI - DK 01	krs/08-07	cmw/08-11
Phosphorus (total)	n.d.	n.d.	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Potassium (total)	28.2	30.4	mg/kg	10	EPA 6010	trh/08-06	bab/08-10
Sulfur (total)	166,900	179,985	mg/kg	25	EPA 6010	trh/08-07	bab/08-10
Calcium (total)	205,546	221,661	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Magnesium (total)	937	1011	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Sodium (total)	16.2	17.5	mg/kg	1	EPA 6010	trh/08-07	bab/08-10
Iron (total)	362	390	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Manganese (total)	16.3	17.6	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Copper (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Zinc (total)	3.8	4.1	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Ammoniacal Nitrogen	n.d.	n.d.	mg/kg	1	SM 4500-NH3 C	krs/08-06	cmw/08-11
Nitrate/Nitrite Nitrogen	n.d.	n.d.	mg/kg	1	EPA 353.2	lkd/08-04	cmw/08-11
Arsenic (total)	0.53	0.57	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10
Barium (total)	0.87	0.94	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Cadmium (total)	n.d.	n.d.	mg/kg	0.5	EPA 6010	trh/08-06	bab/08-10
Chromium (total)	1.9	2.1	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Lead (total)	n.d.	n.d.	mg/kg	5	EPA 6010	trh/08-06	bab/08-10
Mercury (total)	0.24	0.25	mg/kg	0.05	EPA 7471	ccm/08-06	bab/08-10
Molybdenum (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Nickel (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10
Selenium (total)	2.52	2.72	mg/kg	0.5	EPA 6020	akj/08-06	bab/08-10
Silver (total)	n.d.	n.d.	mg/kg	1	EPA 6010	trh/08-06	bab/08-10

Report Number: 14-223-2041v3
Account: 19400
Page: 2 of 2

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Date Reported: 08/12/14
Date Received: 07/31/14

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This report supersedes all prior reports for the following reason(s): comment

Lab number: 2300550 Sample ID: CDP072914

Analysis Performed	As Received	Dry Weight Basis	Units	Detection Limit	Method	Analyst Date	Verifier Date
Percent solids	92.73		%	0.01	SM 2540 G	raf/08-11	jsm/08-11
pH	7.9		S.U.		EPA 9045	jdb/08-05	cmw/08-11
Organic nitrogen	.00	.00	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Phosphate P2O5	0	0	mg/Kg		CALC	cmw/07-31	aut/07-31
Calculated Potash K2O	34	37	mg/Kg		CALC	cmw/07-31	aut/07-31

COMMENTS

Sulfur calculated as CaSO4 2(H2O) = 89.63% (as received basis).
Percent Solids calculated from Free Moisture value.

APPROVED
OHIO ENVIRONMENTAL PROTECTION AGENCY
AUG 20 2015
AS EVIDENCED BY COPY OF LETTER OF APPROVAL HERETO ATTACHED

For questions, contact

Rob Ferris
Client Service Representative
rob.ferris@midwestlabs.com (402)829-9871

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Shreveport, LA 71101
Phone: (318) 673-3802
Fax: (318) 673-3960

AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

Report ID : 31151
Date Received: 06/12/2015

Company: AEP - Cardinal Plant (JLG)
Contact: Jeffrey L. Gremelspacher
Phone: (740) 598-6527

Address: 306 County Road 7 East
Brilliant, OH 43913
Fax:

AEP Sample ID : 188883
Cust Sample ID:
Sample Desc.: Gympsum Barge

Collected Date:
Location: Cardinal Plant

By:
Matrix: Solid

Metals (188883)

Parameter	Value	Unit	Det. Limit	Dil./Conc.	Method	Analysis Date/Time	Codes	Tech
Aluminum	149	mg/Kg	0.25	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Antimony	< 0.25	mg/Kg	0.25	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Arsenic	< 0.25	mg/Kg	0.25	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Barium	1.04	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Beryllium	< 0.05	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Cadmium	< 0.05	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Calcium	198000	mg/Kg	25	1:2500	EPA 6010B 1996	07/09/2015 20:44	M4	JDB
Chromium	1.04	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Cobalt	0.152	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Copper	0.82	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Iron	427	mg/Kg	0.25	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Lead	0.391	mg/Kg	0.25	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Magnesium	1110	mg/Kg	25	1:2500	EPA 6010B 1996	07/09/2015 20:44	M4	JDB
Manganese	21.3	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Molybdenum	0.333	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Nickel	1.1	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Potassium	79.2	mg/Kg	0.5	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Selenium	1.69	mg/Kg	0.25	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Silver	< 0.05	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Sodium	19.8	mg/Kg	0.5	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Strontium	89.2	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Thallium	< 0.25	mg/Kg	0.25	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Tin	< 0.2	mg/Kg	0.2	1:50	EPA 6010B 1996	07/09/2015 20:49	T5	JDB
Titanium	2.87	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Vanadium	1.9	mg/Kg	0.05	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB
Zinc	3.43	mg/Kg	0.25	1:50	EPA 6010B 1996	07/09/2015 20:49		JDB

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AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

Report ID : 31151
Date Received: 06/12/2015

Company: AEP - Cardinal Plant (JLG)
Contact: Jeffrey L. Gremelspacher
Phone: (740) 598-6527

Address: 306 County Road 7 East
Brilliant, OH 43913
Fax:

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AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

Report ID : 31151
Date Received: 06/12/2015

Company: AEP - Cardinal Plant (JLG)
Contact: Jeffrey L. Gremelspacher
Phone: (740) 598-6527

Address: 306 County Road 7 East
Brilliant, OH 43913
Fax:

Quality Control Data

* Quality control units are the same as reported analytical results

Date	Parameter	Sample ID	Blank Value *	Standard			Spike			Surrogate % Recovery	Duplicate % Difference	Tech
				Value *	Recovery*	%	Value *	Recovery*	%			
7/9/2015	Aluminum	188883.1	<0.25	2	1.9622264	98.1	2	2.0252324	101.3		0.5	JDB
7/9/2015	Antimony	188883.1	<0.25	0.8	0.8249476	103.1	0.8	0.7702010	96.3		0.2	JDB
7/9/2015	Arsenic	188883.1	<0.25	0.8	0.8066374	100.8	0.8	0.7800312	97.5		0.8	JDB
7/9/2015	Arsenic	189405.1	<0.25	0.8	0.8066374	100.8	0.8	0.7800312	97.5		0.8	JDB
7/9/2015	Barium	188883.1	<0.05	0.2	0.2035451	101.8	0.2	0.20623	103.1		0.4	JDB
7/9/2015	Beryllium	188883.1	<0.05	0.2	0.2078865	103.9	0.2	0.1949457	97.5		0.2	JDB
7/9/2015	Beryllium	189031.1	<0.217	0.2	0.2078865	103.9	0.2	0.1949457	97.5		0.2	JDB
7/9/2015	Cadmium	188883.1	<0.05	0.2	0.2074651	103.7	0.2	0.1901900	95.1		0.2	JDB
7/9/2015	Cadmium	189031.1	<0.217	0.2	0.2074651	103.7	0.2	0.1901900	95.1		0.2	JDB
7/9/2015	Cadmium	189405.1	<0.05	0.2	0.2074651	103.7	0.2	0.1901900	95.1		0.2	JDB
7/9/2015	Calcium	188883.1	<25	1	1.0365627	103.7					0.7	JDB
7/9/2015	Chromium	188883.1	<0.05	0.4	0.4092740	102.3	0.4	0.3863445	96.6		0.2	JDB
7/9/2015	Chromium	189031.1	<5.425	0.4	0.4092740	102.3	0.4	0.3863445	96.6		0.2	JDB
7/9/2015	Chromium	189405.1	<0.05	0.4	0.4092740	102.3	0.4	0.3863445	96.6		0.2	JDB
7/9/2015	Cobalt	188883.1	<0.05	0.2	0.2048553	102.4	0.2	0.1869826	93.5		0.4	JDB
7/9/2015	Copper	188883.1	<0.05	0.3	0.2973115	99.1	0.3	0.2777328	92.6		0.5	JDB
7/9/2015	Iron	188883.1	<0.25	3	3.1086767	103.6	3	2.8915611	96.4		6.1	JDB
7/9/2015	Lead	189405.1	<0.25	1	1.0152745	101.5	1	0.9321361	93.2		0.2	JDB
7/9/2015	Lead	188883.1	<0.25	1	1.0152745	101.5	1	0.9321361	93.2		0.2	JDB
7/9/2015	Magnesium	188883.1	<25	2	2.0372291	101.9					0.3	JDB
7/9/2015	Manganese	188883.1	<0.05	0.2	0.2078485	103.9	0.2	0.199741	99.9		0.4	JDB
7/9/2015	Molybdenum	188883.1	<0.05	0.4	0.3931617	98.3	0.4	0.3775759	94.4		0.7	JDB
7/9/2015	Nickel	188883.1	<0.05	0.5	0.5186329	103.7	0.5	0.469054	93.8		0.1	JDB
7/9/2015	Potassium	188883.1	<0.5	10	8.753304	87.5	10	11.460193	114.6		0.3	JDB
7/9/2015	Selenium	188883.1	<0.25	2	1.9953309	99.8	2	2.0042774	100.2		0.4	JDB
7/9/2015	Silver	188883.1	<0.05	0.075	0.0702293	93.6	0.075	0.0689887	92.0		0.3	JDB
7/9/2015	Sodium	188883.1	<0.5	3	3.1829566	106.1					0.3	JDB
7/9/2015	Strontium	188883.1	<0.05	0.2	0.2083862	104.2	0.2	0.202709	101.4		0.1	JDB
7/9/2015	Thallium	188883.1	<0.25	2	2.0694838	103.5	2	1.8264406	91.3		0.3	JDB
7/9/2015	Tin	188883.1	<0.2	0.7	0.7202756	102.9	0.7	0.6657440	95.1		1.2	JDB
7/9/2015	Titanium	188883.1	<0.05	0.2	0.2086221	104.3	0.2	0.202657	101.3		0.2	JDB
7/9/2015	Vanadium	188883.1	<0.05	0.3	0.3102235	103.4	0.3	0.3021139	100.7		0.2	JDB

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AEP ANALYTICAL CHEMISTRY SERVICES

Analysis Report

Report ID : 31151
Date Received: 06/12/2015

Company: AEP - Cardinal Plant (JLG)
Contact: Jeffrey L. Gremelspacher
Phone: (740) 598-6527

Address: 306 County Road 7 East
Brilliant, OH 43913
Fax:

7/9/2015	Zinc	189031.1	<27.125	0.2	0.2055198	102.8	0.2	0.1831337	91.6		0.4	JDB
7/9/2015	Zinc	188883.1	<0.25	0.2	0.2055198	102.8	0.2	0.1831337	91.6		0.4	JDB

Code	***Code Description***
M4	The analysis of the spiked sample required a dilution such that the spike recovery calculation does not provide useful information. The associated blank spike recovery was acceptable.
T5	This parameter is not included in the Laboratory's LELAP Laboratory Scope of Accreditation.

Laboratory Manager

10-Jul-15
Report Date

NALCO

SAFETY DATA SHEET

PRODUCT

pHREEdom® 5200M

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **pHREEdom® 5200M**

APPLICATION : SCALE CONTROL

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 2 / 2 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium salt of phosphonomethylated diamine		10.0 - 30.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

WARNING
Irritating to eyes.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) and sulfur (SOx) under fire conditions. May evolve oxides of phosphorus (POx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Irritating, and may injure eye tissue if not removed promptly.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. No adverse effects expected.

INHALATION :
Not a likely route of exposure. No adverse effects expected.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. If irritation persists, repeat flushing. Get immediate medical attention.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If symptoms persist, call a physician.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : > 200 F/ > 93.3 °C

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Keep containers cool by spraying with water. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) and sulfur (SOx) under fire conditions. May evolve oxides of phosphorus (POx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Ensure clean-up is conducted by trained personnel only. Ventilate spill area if possible. Do not touch spilled material. Stop or reduce any leaks if it is safe to do so. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Wash site of spillage thoroughly with water. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled.

STORAGE CONDITIONS :
Protect product from freezing. Store the containers tightly closed. Store in suitable labeled containers. Store separately from oxidizers.

SUITABLE CONSTRUCTION MATERIAL :
HDPE (high density polyethylene), Stainless Steel 304, Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Respiratory protection is not normally needed. If significant mists, vapors or aerosols are generated an approved respirator is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gauntlets is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear Light yellow
ODOR	Slight
SPECIFIC GRAVITY	1.17 - 1.21 @ 77 °F / 25 °C
DENSITY	9.7 - 10.1 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	4.2 - 5.2
VISCOSITY	16 cps @ 40 °F / 4.4 °C
VOC CONTENT	0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures. Extremes of temperature

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of nitrogen, Oxides of sulfur, Oxides of phosphorus

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

Acute Fish Results :

Species	Exposure	Test Type	Value	Test Descriptor
Fathead Minnow	96 hrs	LC50	> 10,000 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	Test Type	Value	Test Descriptor
Daphnia magna	48 hrs	LC50	> 1,000 mg/l	Product
Ceriodaphnia dubia	48 hrs	LC50	3,536 mg/l	Product

CHRONIC FISH RESULTS :

Species	Exposure	Test Type	Value	End Point	Test Descriptor
Fathead Minnow	7 Days	EC25 / IC25	5,540 mg/l	Growth	Product
Fathead Minnow	7 Days	LOEC	2,500 mg/l	Growth	Product
Fathead Minnow	7 Days	NOEC	1,250 mg/l	Growth	Product

Chronic Invertebrate Results :

Species	Exposure	Test Type	Value	End Point	Test Descriptor
Ceriodaphnia dubia	7 Days	LOEC	250 mg/l	Reproduction	Product
Ceriodaphnia dubia	7 Days	EC25 / IC25	173 mg/l	Reproduction	Product
Ceriodaphnia dubia	7 Days	NOEC	125 mg/l	Reproduction	Product

PERSISTENCY AND DEGRADATION :

Chemical Oxygen Demand (COD) : 500,000 mg/l

Biological Oxygen Demand (BOD) :

Incubation Period	Value	Test Descriptor
5 d	329 mg/l	Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	10 - 30%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Sodium salt of phosphonomethylated diamine : Eye irritant

CERCLA/SUPERFUND, 40 CFR 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 147412
This product is acceptable for treatment of cooling and retort water (G5) in and around food processing areas. This product is acceptable for treating boilers, steam lines, and/or cooling systems (G7) where neither the treated water nor the steam produced may contact edible products in and around food processing areas.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Acrylic Acid	Sec. 112

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
This product contains substance(s) which are not listed on the Domestic Substances List (DSL) or the Non-Domestic Substances List (NDSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on or exempt from the Inventory of Existing Chemical Substances China (IECSC).

EUROPE

JAPAN
This product contains substance(s) which are not in compliance with the Law Regulating the Manufacture and Importation Of Chemical Substances and are not listed on the Existing and New Chemical Substances list (ENCS).

KOREA
This product contains substance(s) which are not in compliance with the Toxic Chemical Control Law (TCCL) and may require additional review.

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
This product contains substance(s) which are not in compliance with the Republic Act 6969 (RA 6969) and may require additional review.

16. OTHER INFORMATION

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 01/29/2013
Version Number : 2.3

Attachment 4

N-062

NALCO

SAFETY DATA SHEET

PRODUCT

3D TRASAR® 3DT121

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **3D TRASAR® 3DT121**

APPLICATION : COOLING WATER TREATMENT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 0 / 1 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER : -
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
May evolve oxides of carbon (COx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. May cause gastrointestinal irritation.

INHALATION :
Not a likely route of exposure. No adverse effects expected.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

INGESTION :
Get medical attention. Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : Not applicable

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Ventilate spill area if possible.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled.

STORAGE CONDITIONS :
Store in suitable labeled containers. Store the containers tightly closed.

SUITABLE CONSTRUCTION MATERIAL :
Polypropylene, Polyethylene, PVC, Plasite 7122, Polyurethane, Buna-N, Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

UNSUITABLE CONSTRUCTION MATERIAL :
Mild steel, Stainless Steel 304, Brass, EPDM, Neoprene, Chlorosulfonated polyethylene rubber, Fluoroelastomer

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit. This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gloves is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
When handling this product, the use of safety glasses with side shields is recommended.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Consider the provision in the work area of a safety shower and eyewash. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is:
Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Yellow
ODOR	Neutral

SPECIFIC GRAVITY	1.13 @ 60.0 °F / 15.5 °C
DENSITY	9.4 lb/gal
SOLUBILITY IN WATER	Complete
pH (100.0 %)	3.0
VISCOSITY	40.0 cst @ 68.0 °F / 20.0 °C
FREEZING POINT	26.6 °F / -3.0 °C
VOC CONTENT	0.0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Avoid extremes of temperature.

MATERIALS TO AVOID :
Bases Contact with strong alkalies (e.g. ammonia and its solutions, carbonates, sodium hydroxide (caustic), potassium hydroxide, calcium hydroxide (lime), cyanide, sulfide, hypochlorites, chlorites) may generate heat, splattering or boiling and toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon

11. TOXICOLOGICAL INFORMATION

The following results are for the product, unless otherwise indicated.

ACUTE ORAL TOXICITY :
Species: Rat
LD50: 5,000 mg/kg
Test Descriptor: Similar Product

ACUTE DERMAL TOXICITY :
Species: Rabbit
LD50: > 2,000 mg/kg
Test Descriptor: Similar Product

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product, unless otherwise indicated.

Acute Fish Results :

Species	Exposure	Test Type	Value	Test Descriptor
Bluegill Sunfish	96 hrs	LC50	> 5,000 mg/l	Similar Product
Rainbow Trout	96 hrs	LC50	1,279 mg/l	Product
Inland Silverside	96 hrs	LC50	3,736 mg/l	Similar Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	Test Type	Value	Test Descriptor
Mysid Shrimp (Mysidopsis bahia)	96 hrs	LC50	3,750 mg/l	Similar Product
Daphnia magna	48 hrs	EC50	718 mg/l	Product

PERSISTENCY AND DEGRADATION :

Total Organic Carbon (TOC) : 120,000 mg/l

Chemical Oxygen Demand (COD) : 310,000 mg/l

Biological Oxygen Demand (BOD) :

Incubation Period	Value	Test Descriptor
5 d	147 mg/l	Product

The organic portion of this preparation is expected to be poorly biodegradable.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

CERCLA/SUPERFUND, 40 CFR 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 176.170 Components of paper and paperboard in contact with aqueous and fatty foods and 21 CFR 176.180 Components of paper and paperboard in contact with dry foods.

For use only as a scale inhibitor (including use as a manganese dispersant) at a maximum level of 25 ppm in the process water used in the manufacture of paper and paperboard.

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 141582
This product is acceptable for treatment of cooling and retort water (G5) in and around food processing areas.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Sulfuric Acid • Sodium Bisulfite	Sec. 311

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on or exempt from the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

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SAFETY DATA SHEET

PRODUCT

3D TRASAR® 3DT121

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

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