



February 9, 2010

Lewis Dendy
North Dakota Department of Health
Division of Air Quality
918 East Divide Avenue, 2nd Floor
Bismarck, ND 58501-1947

Dear Lew,

Great River Energy (GRE) respectfully submits our response to questions raised by US EPA concerning ammonia in fly ash relevant to our Coal Creek Station (CCS). To address the issues raised by Amy Platt of US EPA in a November 30, 2009 email message to Tom Bachman of NDDH, GRE provides the following responses:

1. Response to Amy Platt's email
2. Fly Ash usage and properties

Response to Amy Platt's email

Amy Platt's email references Dynegy's Baldwin Energy Complex and Progress Energy's Roxboro Generating Station as facilities that have post combustion NO_x control and market their fly ash. Both facilities have Selective Catalytic Reduction (SCR) installed, not Selective Non-Catalytic Reduction (SNCR) technology. It is typical for SCR technology to operate with lower ammonia injection and slippage rates than comparable SNCR technology. With SCR technology additional mixing and chemical reaction assistance is introduced in the catalyst packing resulting in reduction in NO_x emissions. SNCR technologies require additional ammonia injection to ensure contact with the NO_x molecules in the flue gas, as they do not benefit from additional mixing or the benefit of enhanced chemical reactions provided by the catalyst packing. Headwaters Resources, GRE's fly ash marketer, on average sees ammonia content in ash from 200-600 ppm for SNCR units and from 50-400 ppm for SCR units. *See Attachment 3 section.*

Dynegy's 1,800 MW Baldwin Energy Complex has 3 units burning Powder River Basin (PRB) coal. Two of the units have SCR installed, the third unit has no post-combustion NO_x control technology. Headwaters Resources, GRE's fly ash marketer, is also the ash marketer for the Baldwin Energy Complex. Headwaters only markets ash from the one pulverized coal unit that does not have either SCR or SNCR installed and therefore the ash sold does not contain ammonia. Please see attached letter from Herbert Moeckel of Headwaters Resources. *In Attachments 1 section.*

Currently there are no installations of SCR or SNCR burning North Dakota Fort Union lignite. As GRE does not have any data or experience with ammoniated ash we have asked our fly ash marketer, Headwaters Resources, to respond to Amy Platt's chemistry statement that alkaline ashes experience lower uptake of ammonia. Headwaters has extensive experience with ammoniated ash and they have observed higher ammonia odor emissions from a plant (East Lake Plant, OH) producing a higher alkaline

ash. The mechanism for this higher evolution of ammonia has not been identified and is currently being investigated. *See email thread of December 29, 2009-in Attachment 2 section.* Without empirical evidence on uptake of ammonia on ash from ND lignite GRE cannot assume ammonia slippage rates or retention rates on fly ash. We have also presented the question about expected ammonia in ash for lignite units to Tony Facchiano, Sr. Program Manager at the Electric Power Research Institute (EPRI) and although they have done work for other types of coal they have not conducted research with ND lignite and would not be able to correlate the ammonia in ash with ammonia slip at this time.

As there are no data from Fort Union lignite on SNCR ammonia retention in ash we have provided testimony from GRE customers. As noted by our customers, ammonia-impregnated ash would have an economic impact not only on GRE but also to our marketers who sell the ash. *See enclosures from Lafarge and GCC of America in the Attachment 1 section.*

Fly Ash

Fly ash for use in concrete is classified in 3 classes: Class N – raw or calcined natural pozzolans that comply with ASTM C618-08; Class F - typically produced from burning anthracite or bituminous coal, but lignite also; Class C – typically produced from burning lignite's, but may also be produced from burning anthracite or bituminous coal as long as the total calcium contents are higher than 10% and the ash has some cementitious properties. CCS ash is classified as a Class F ash. Introduction of ammonia will not affect the class of our fly ash but will decrease the desirability and thus the marketability of our ash if the customer perceives a health risk or is able to procure the same material without the objectionable qualities.

The original investments made in the infrastructure for the marketing of fly ash was predicated on the fact that CCS is a mine mouth plant with a consistent coal source which is producing a high quality fly ash which is very desirable in the concrete market. The introduction of undesirable characteristics into the fly ash, such as an odor or inhalation risk, will force our concrete customers to pursue alternate marketers for their feedstock. *See testimonials from Headwaters Resources, Lafarge, and GCC in the Attachments 1 section.*

Please contact me at 763-445-5208 regarding any questions or comments.

Sincerely,

GREAT RIVER ENERGY

A handwritten signature in black ink that reads "Debra Nelson". The signature is written in a cursive, flowing style.

Debra Nelson

c: Diane Stockdill
File

Attachment 1: Testimonials



Adding Value to Energy

January 28, 2010

Mr. Al Christianson
Manager, North Dakota Business
Development & Governmental Affairs
1611 East Century Avenue
Suite 200
Bismarck, ND 58503

Dear Mr. Christianson:

I am writing in regards to the Dynegy Midwest Generation – Baldwin Energy Complex located in Baldwin, Illinois. Headwaters Resources is the marketing company for all five Dynegy Midwest Generation plants located in Illinois.

The Baldwin Energy Complex is composed of three – 600 MW units, totaling 1800 MW. Units 1 and 2 are cyclone fired boilers and Unit 3 is a pulverized coal boiler, all three units are burning PRB coal. Units 1 and 2 are equipped / operating with an SCR and Unit 3 has neither a SCR or SNCR installed.

Headwaters Resources has mainly marketed the cyclone boiler fly ash produced from Units 1 and 2 into the cement industry as a raw feed ingredient since 1998. Since 2000, we were able to market approximately 17,000 tons of this material into "flowable fill" on a few mine subsidence projects in the East St. Louis, Illinois area. We have performed ammonia testing on the fly ash produced from Unit 1 and 2 utilizing the Headwaters SOP using dragger tubes. This material fluctuates between 35 and 125 ppm ammonia in the fly ash. The ammonia odor was noticeable when used on the flowable fill mixes which contained high volumes of fly ash per yard. The ammonia odor did not have an impact on our sales agreement with Buzzi Unicem, since they were using the material as a raw feed ingredient in the production of cement. Starting in July 2009 new mercury regulation forced the power stations in Illinois to use activated carbon injection to reduce mercury emissions. Units 1 and 2 did begin activated carbon injection in July 2009 at which time the material was no longer allowed to be used in the production of cement. At this time 100% of the fly ash material produced from these units is being disposed of in an on site impoundment. Dynegy is constructing SDA scrubbers which should be complete by 2013, at which time the injection point of the activated carbon will be moved allowing the use of the fly ash material in cement production. The fly ash produced from these two units is not suitable for use in concrete.

Unit 3 at the Baldwin Energy Complex was granted a temporary variance which did not force this unit to inject activated carbon until the SDA / Bag house is operational at the end of 2010. Headwaters Resources has marketed the ASTM C618 Class C fly ash produced from unit 3 into ready mix concrete, concrete paving, and soil stabilization since 1998.

Please feel free to contact me at 612-963-7093 regarding any questions or comments.

Respectfully

Hérbert Moeckel
Technical Sales Representative
Headwaters Resources
P.O. Box 566
Osage Beach, MO 65065
P: 612-963-7093
F: 866-449-8130



January 21, 2010

Mr. Al Christianson
GREnergy
Manager, North Dakota Business
Development & Governmental Affairs
1611 East Century Avenue
Suite 200
Bismarck, ND 58503

Al,

We would like to take this opportunity to express concern about GRE's potential injection of ammonia into the flue gas during coal burning operations as an effort to reduce NOx emissions. As a wholesale marketer and end-user of your fly ash from the Coal Creek facility in North Dakota, our concern surrounds the impact this process will have on the fly ash when used in concrete.

The ammonia in fly ash is not present as ammonia gas. Rather, it is in the fly ash as ammonium sulfate. Once in the high alkaline environment of concrete the ammonia is released. This becomes a problem because of the odor, especially in enclosed spaces such as residential basements. The smell of ammonia is objectionable and would potentially impact external fly ash sales for GCC of America and internal use in the concrete operations owned by GCC Ready Mix..

Our professional experience with this situation in the past had been limited to the senses, i.e. eye and nose irritation and unpleasant odor. The corrective action taken was at the expense of the concrete producer, causing those customers to do business elsewhere.

We value our relationship with your company and prefer to use your product because of its quality and performance. Please do not allow these attributes to be compromised. If you should have any questions, or if we may be of further assistance, please contact either of us our Denver offices at (303) 739-5900.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Mark R. Lukkarila'.

Mark R. Lukkarila,
Technical Services Manager
GCC of America

A handwritten signature in cursive script, appearing to read 'Joe Finnegan'.

Joseph E. Finnegan,
Regional Sale Manager
GCC of America

Building Together

Corporate Offices
130 Ram part Way, Suite 200
Denver, CO 80230

Telephone: 303-739-5900
Fax: 303-739-5938
www.gcc.com

January 11, 2010

Mr. Al Christianson
Manager, North Dakota Business
Development & Governmental Affairs
1611 East Century Avenue
Suite 200
Bismarck, ND 58503

Dear Mr. Christianson:

The Eastlake power plant in Eastlake, Ohio had a SNCR installed over 2 years ago. Prior to the installation the plant produced a high quality F-ash which was sold out every year during the construction season. The ammonia level was between 200-400 PPM after the installation which was when the problems started. Anything over 100 PPM seemed to be a noticeable at this plant.

We started shipping the material when it was in the 100-200 PPM range and the customers, batch plants and several contractors started calling with complaints especially in confined spaces such as buildings and basements. In one case a Ready Mix plant employee stuck his head in the back of the truck to add air entraining agent and it burned his eyes. He spent the night in the emergency room getting his eyes washed out not knowing it was the fly ash causing the ammonia smell.

We quit shipping anything over 100 PPM and business started dropping off; contractors did not want fly ash in their mixes. Since you're only checking a small amount of ammonia in the load it would test for less than 100 PPM but in some cases the Ready Mix producer still had problems which indicated the entire load was not less than 100 PPM. We shut down a block plant and the customer made us take the fly ash out of his silo and he quit buying fly ash from us.

Bill Newkirk

Bill Newkirk
Headwaters Resources
Technical Sales Rep
440-725-0088



Cement

January 26, 2010

**Mr. Al Christianson
Manager, North Dakota Business
Development & Governmental Affairs
1611 East Century Avenue
Suite 200
Bismarck, ND 58503**

Subject: Ammonia Injection in Fly Ash

Lafarge has used fly ash from power sources where SNCR ammonia injection units have been installed. We have found that when the ammonia levels exceed 40 parts per million in the fly ash that the consumer notices the ammonia and find it to be objectionable.

Lafarge is concerned that if ammonia injection units are installed at Great River Energy's Coal Creek Station it may cause the fly ash that is produced to be unmarketable. Lafarge currently purchases a large percentage of the fly ash that is produced at this station and would be placed at an economic disadvantage if we were no longer able to market this high quality ash to our ready mix customers.

This would cause our customers in turn to be at an economic disadvantage if they had to use fly ash from another source that is further away or use slag cement that perhaps would be more expensive than Coal Creek ash.

A handwritten signature in cursive script, appearing to read 'Roy V. Sander, Jr.'.

Roy Sander/General Manager

LAFARGE Dakota.

684 15th Ave. SW, PO Box 757, Valley City, ND 58072

Telephone: (701) 845-2421 Fax: (701) 845-1849 Toll Free: 1-800-533-8662

Attachment 2: Email Thread Headwater to GRE

From: Stockdill, Diane GRE-CC
Sent: Tuesday, December 29, 2009 3:38 PM
To: Nelson, Debra GRE-MG
Subject: FW: Where are we at?
Attachments: STI ammonia removal.pdf

Let's talk tomorrow

-----Original Message-----

From: Christianson, Al GRE-BI
Sent: Tuesday, December 29, 2009 3:35 PM
To: Stockdill, Diane GRE-CC
Subject: FW: Where are we at?

Fyi, they are working on it. al

Al Christianson
Manager, North Dakota Business Development & Governmental Affairs
1611 East Century Avenue
Suite 200
Bismarck, ND 58503
701-250-2164 Direct
701-442-7664 Direct
701-220-4881 Cell
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achristianson@greenergy.com
www.greatriverenergy.com

-----Original Message-----

From: Jerry Smith [mailto:jsmith@headwaters.com]
Sent: Tuesday, December 29, 2009 3:34 PM
To: Christianson, Al GRE-BI
Subject: FW: Where are we at?

Al: Attached is Bruce's response to your latest inquiry. It appears that we are still waiting on Mr. O'Conner (EPRI) to review our data on Sammis and East Lake ash. The attached brochure from STI may be helpful in the comparison of SNCRs and SCRs in regard to ammonia being introduced into the ash. I don't know if this is sufficient for your needs. If not, I suggest that we (Diane, you, and I) get on a conference call with Bruce to discuss what else we may be able to provide. Just let me know. Thanks.

From: Bruce Boggs
Sent: Tuesday, December 29, 2009 2:35 PM
To: Jerry Smith
Subject: RE: Where are we at?

Jerry,

There was no official document generated by EPRI to circulate on this issue. The curious finding that the more alkaline ashes had higher ammonia odor emissions was reported to EPRI but the reason for the finding was never identified. Dave O'Connor at EPRI will review our data showing the data on Sammis and East Lake comparisons.

The data from our East Lake plant with SNCR and higher alkaline ash should be available shortly to compare with the much lower levels of ammonia from an SNCR associated with low alkalinity ash at Sammis.

STI found it necessary to develop an ammonia removal/treatment system in addition to the carbon removal system they operate at several locations. I do not know if the Roxboro plant uses this system but I would point out that with the storage dome at Coal Creek, the ammonia levels that could accumulate would be extremely hazardous. A little known fact is that ammonia is an explosive gas at certain levels when it accumulates with air present. See attached STI brochure on ammonia removal. In that brochure they support the fact that SNCR units will introduce much more ammonia to the ash than SCRs but both can prevent ash from being used in the market.

Bruce

From: Jerry Smith
Sent: Tuesday, December 29, 2009 2:46 PM
To: Bruce Boggs
Subject: FW: Where are we at?

Bruce: Please see Al's and Diane's comments below. Have we heard anything from EPRI on this issue? Thanks.

From: Christianson, Al GRE-BI [AChristianson@GREnergy.com]
Sent: Tuesday, December 29, 2009 1:22 PM
To: Jerry Smith
Subject: FW: Where are we at?

Anything new, people want to know?

Al Christianson
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www.greatriverenergy.com<http://www.greatriverenergy.com>

From: Stockdill, Diane GRE-CC
Sent: Tuesday, December 29, 2009 1:15 PM
To: Christianson, Al GRE-BI

Subject: Where are we at?

Where is Headwaters at on the SNCR justification documentation? I saw the waiting for EPRI response but when do they plan on having something to us?

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Attachment 3: Headwaters information on SCR vs. SNCR

Ammonia Contamination Levels

| Air Pollution Control Process | NH ₃ "Slip" ppm _v | NH ₃ in Ash mg/kg |
|-------------------------------|--|---------------------------------|
| SCR | 2 to 10 | 50 to 400 |
| SNCR | 5 to 20 | 200 to 600 |
| SO ₃ Control | 10 to 20 | 300 to 600 |
| ESP Conditioning | 20 to 30 | 600 to 1200 |

Actual ammonia concentrations will depend on ammonia injection rates, coal type, sulfur content, and other operating parameters.