RefinedenergyHoldings

January 9, 2009

Mike Simon
Stationary Source Program Manager
Air Quality Division
Idaho Department of Environmental Quality
1410 North Hilton
Boise, ID 83706

Subject: ***Southeast Idaho Energy***
Facility ID Number: 077-00029
Permit Number: P-2008.0066
Trinity and SIE's Response to IDEQ Request for Additional Information Dated 12/24/2008

Dear Mr Simon:

In accordance with IDAPA 58.01.01.123 (Rules for the Control of Air Pollution in Idaho), I certify based on information and belief formed after reasonable inquiry, the statements and information in the attached document are true, accurate, and complete.

If you have any questions or comments, please feel free to call me at 303-953-4333

Sincerely,

Matt Lee
Executive Vice President
Southeast Idaho Energy, LLC

Trinity Consultants

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VIA E-MAIL (michael.simon@deq.idaho.gov)

January 9, 2009

Mr. Mike Simon
Stationary Source Program Manager
Air Quality Division
Idaho Department of Environmental Quality
1410 North Hilton
Boise, ID 83706

**RE: Facility ID No. 077-00029, Southeast Idaho Energy LLC, American Falls
Response to IDEQ Request for Additional Information
P-2008.0066, Power County Advanced Energy Center**

Dear Mr. Simon:

Trinity Consultants, on behalf of Southeast Idaho Energy LLC (SIE), is pleased to submit supplemental information to support the air permitting of the Power County Advanced Energy Center (PCAEC or Project). This information is provided as requested by the Idaho Department of Environmental Quality (IDEQ) in a December 24, 2008 letter from you to Tom Hornyak, Manager of Environmental Permitting for SIE. Trinity and SIE have provided specific responses to the IDEQ's questions regarding particulate matter emissions as mists, toxic air pollutants (silica, chloride, fluoride, mercaptans, nitrous oxide), supplemental BACT data (ammonium nitrate neutralizer vent and thermal oxidizer on the AGR CO_2 vent), and the modeling analysis (stack parameters and ozone). These responses follow the numbering format of the letter received by SIE on December 24; we have restated the IDEQ question (shown in bold text), and then provided an answer (in normal text).

EMISSIONS – PARTICULATE MATTER

1. **<u>PM Emitted as Mists</u>. Comments were received stating that NAAQS, PSD increment, and visibility analyses for PM_{10} did not include condensables, e.g., sulfuric acid mist, nitric acid, and other emissions present as droplets or mist from the Selexol AGR CO_2 Vent, sulfuric acid vent, nitric acid unit tailgas vent(s), and the urea melt plant vent.**

   DEQ received your December 10, 2008 addendum stating that the sulfuric acid plant option has been deleted from the proposed design. Please address the potential for emissions of mists from the other emission points described in the comment.

As summarized below, Trinity reviewed information provided to SIE from likely equipment vendors for the Project, confirming that no quantifiable particulate emissions are predicted for the units listed in IDEQ's letter. The specific components of the PCAEC listed by IDEQ are addressed in the response below.

Sulfuric Acid Plant. In the Draft Air Permit, SIE retained the option of building either a sulfuric acid plant or a Claus sulfur recovery unit. On December 9, 2008, SIE elected to pursue the Claus option and forego the right to build the sulfuric acid plant. SIE reconfirms that a sulfuric acid plant will not be built at the PCAEC. This decision eliminates a point source of emissions because the Claus unit is not a point source (all tailgas is recycled to the acid gas recovery system). Therefore, sulfuric acid mist emissions associated with the sulfuric acid plant initially proposed in the Project design are no longer relevant to the permitting action.

Nitric Acid Tailgas Vent. The nitric acid unit's tailgas vent is not expected to emit particulate matter, either filterable or condensable. Trinity reviewed SIE correspondence with the Project's potential technology providers (KBR and Weatherly), which confirmed that there are no particulate matter emissions from the nitric acid unit. The communication record from KBR is included as Attachment 1 to this letter. The Project's technology provider has estimated emissions of nitric acid (HNO_3) to be approximately 0.42 pounds per hour or 2.2 tons per year; however, nitric acid is not considered condensable particulate matter, because it remains gaseous at ambient temperature.[1] Therefore, nitric acid emissions are not appropriately considered a surrogate for condensable particulate emissions from the nitric acid unit's tailgas vent.

Selexol AGR CO_2 Vent. Emission estimates associated with the Selexol AGR CO_2 vent were obtained from UOP and CSM technologies. UOP is the licensor of the Selexol technology, and CSM is a potential provider of the thermal oxidizer for CO, H_2S, and COS abatement. UOP previously confirmed for SIE that the gas leaving the Selexol unit is free of moisture and other mists, as the syngas entering the Selexol system is treated to remove moisture. The CO_2 vent stream is composed of CO_2, CO, H_2S, and COS. According to UOP, there are no discernable acid compounds in the vent gas. The thermal oxidizer reduces the amount of CO, H_2S, and COS to form more CO_2, water, and SO_2. The thermal oxidizer has a destruction efficiency of 95 percent[2] for these compounds. Absent moisture or acid mist from the Selexol AGR process, it is reasonable to conclude that there are no quantifiable emissions of particulate matter (in the form of acid mist) from the Selexol system.

Urea Melt Plant Vent. According to the Project's potential technology providers for urea (KBR and StamiCarbon), the urea melt plant vent does not contain particulate matter. This information in contained in Appendix D of the Air Permit Application. The reason that there is no particulate matter is that the vent is coming off of the process water recovery system.

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[1] The dew point of nitric acid in the nitric acid stack is lower than ambient temperature. The dew point calculation for nitric acid is included as Attachment 2 to this letter.

[2] As further described in the response to question No. 7, CSM Technologies has revised the efficiency guarantee for the CO_2 vent thermal oxidizer from 90% to 95%. A communication record from CSM Technologies is included as Attachment 3.

TOXIC AIR POLLUTANTS

2. **<u>Coal Dust and Crystalline Silica Emissions</u>. Comments were received noting that coal dust and crystalline silica emissions had not been estimated or demonstrated to be in compliance with the applicable TAP increment listed in Section 585 of the Rules.**

   DEQ has already confirmed that the predicted 4.92 $\mu g/m^3$ maximum 24-hour ambient impact associated with facility-wide emissions of PM_{10} is about 1/20th of the applicable ambient concentration (AAC) of 0.1 mg/m^3 (100 $\mu g/m^3$) for coal dust. This easily demonstrates compliance with the applicable TAPs increment.

   A similar approach for crystalline silica may be used if it can be demonstrated that the crystalline silica that may be emitted from handling sand fluxant will be in the form of quartz or fused silica. Quartz is converted to cristobalite at temperatures above 1,470 °C (2,678 °F).

   Please provide a discussion regarding fluxant selection, the potential emissions of crystalline silica and cristobalite, and demonstrate that emissions of crystalline silica from sand fluxant handling (including crystalline silica that may be present in cristobalite) will comply with the applicable TAPs increment.

Coal dust and crystalline silica are regulated as non-carcinogenic TAPs under IDAPA 58.01.01.585. The modeling analyses included within the air permit application allow for a direct estimate of coal dust and crystalline silica ambient concentrations. IDEQ demonstrated conformity with the TAPs provisions for coal dust using a conservative analysis based on PM_{10} modeling results from the Air Permit Application. IDAPA 58.01.01.585 lists three species of crystalline silica: cristobalite, quartz, and silica. A similar conservative analysis, described below, demonstrates that the Project's emissions of crystalline silica will comply with the applicable acceptable ambient concentrations (AACs) for crystalline silica.

First, the Project's fluxant characteristics will depend upon the characteristics of the Project's coal and/or petcoke supplies. Typical gasifier fluxants include bauxite, iron ore, limestone, dirt, and sand. Sand, as a fluxant, has the highest potential silica concentration.

The most conservative approach to a TAPs analysis for crystalline silica assumes that 100% of PM_{10} emissions from the Project are crystalline silica. This assumption is especially conservative since much of the PM_{10} emissions at the PCAEC would not contain crystalline silica. Crystalline silica, in the form of quartz, will be present only as a component of coal ash and fluxant. Silica will not be present in any emission sources downstream of the gasifier because silica-containing materials are not added to the process at that stage.

Conservatively assuming that all potential PM_{10} emissions from the Project are crystalline silica will significantly overstate the predicted impact. Specifically, the Potential to Emit (PTE) for particulate matter (as PM_{10}) from feedstock handling is 0.43 lbs/hr (Appendix D of the Air Permit Application). The total PTE for PM_{10} from the Project is approximately 15.69 lbs/hr. Feedstock handling (coal, fluxant, slag) accounts for less than 3% of the total PM_{10} emissions associated with the Project, and the crystalline silica content of the feedstock is a small percentage of the total volume of feedstock (7.5% for coal).[3]

IDAPA 58.01.01.585 lists three species of crystalline silica. The following table summarizes the crystalline silica thresholds in IDAPA 58.01.01.585.

TABLE 1. IDAHO THRESHOLDS FOR CRYSTALLINE SILICA SPECIES

Species	**EL (lbs/hr)**	**AAC (mg/m^3)**
Cristobalite	0.0033	0.0025
Quartz	0.0067	0.005
Silica, fused	0.0067	0.005

According to the United States Department of the Interior[4], "*crystalline silica exists in seven different forms or polymorphs, four of which are extremely rare. The three major forms, quartz, cristobalite, and tridyminte, are stable at different temperatures…Alpha quartz is abundant, found on every continent in large quantities. In fact, alpha quartz is so abundant and the other polymorphs of crystalline silica are so rare, some writers use the specific term quartz in place of the more general term crystalline silica*." In the same document, the U.S. Department of the Interior (DOI) adds that sand and gravel consist mostly of quartz. Therefore, for conservatism, our estimate of ambient impacts assumes that the crystalline silica emissions will be composed of 100% quartz. Based upon these DOI statements, other forms of crystalline silica, including cristobalite, are not expected to be present in significant quantities.

The maximum 24-hour concentration for PM_{10} from the Project is 0.00492 mg/m^3 (see Table 5-7 in the Air Permit Application). The AAC for quartz is 0.005 mg/m^3. Therefore, even if all PM_{10} emissions from the Project are in the form of crystalline silica as quartz, the emissions will not result in an adverse impact to air quality, and concentrations will be within acceptable limits as defined by the AAC in IDAPA 58.01.01.585.

3. **<u>Chloride and Fluoride Emissions</u>. Comments were received stating that chloride and fluoride emissions for a gasification facility in Louisiana were predicted to be much higher than the levels estimated for the PCAEC. Please explain what differences, if any, between the referenced plant and the PCAEC might lead to this significant difference in estimated emissions for these compounds.**

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[3] The Project's coal supplies will have a crystalline silica content of approximately 7.5% by weight. This estimate assumes that the Project's coal will have an ash content of 15% and applies a typical silicon dioxide content for western coal ash of 50%. Therefore, 50% of 15% leads to an estimated crystalline silica content of 7.5% by weight. Typical coal analyses are included as Attachment 4.

[4] Special Publication, "Crystalline Silica Primer," Staff, Branch of Industrial Minerals, US Department of the Interior.

SIE provided information to Trinity supporting the conclusion that emissions of chlorides and fluorides will not be present in significant quantities from any point source of emissions associated with the PCAEC. Based on this information, emissions of these two particular compounds were not included in the Air Permit Application. A discussion of the process for treating trace compounds like chlorides was included on page 2-35 of the Air Permit Application, in a subsection entitled Syngas Scrubbing. Trace metals, chlorides, and fluorides are adverse to the PCAEC's product mix, metallurgy, and process catalysts, and must be removed to ensure the product specifications and equipment and catalyst life expectancies are met.

As noted in the IDEQ's letter, public comments were submitted questioning the potential chloride and fluoride emissions from the Project. The basis of the comments is a study performed by the Department of Energy (DOE) entitled, "A Study of Toxic Emissions From a Coal-Fired Gasification Plant" (referred to hereafter as the DOE study). The DOE study is not applicable to the gasification technology or downstream processes of the Project. The DOE study was performed on the predecessor to the Wabash Power Plant, which used E-Gas gasification technology that employs a convective syngas cooler. The PCAEC will utilize General Electric Quench gasifiers. Differences between the system evaluated in the DOE study and that proposed for the Project are discussed below.

Quench System. In contrast to the E-Gas technology, the Project's gasifiers employ a quench system, in which the syngas comes into contact with a water quench. The primary purpose of the quench system is to provide cooling and necessary water saturation to perform the downstream shift reaction. A secondary benefit of the quench system is the capture of certain ions, including chlorides and fluorides.

Use of the Syngas. Another difference between the facility evaluated in the DOE study and the PCAEC is the purpose of the syngas. In the DOE study, the facility burned the syngas to generate power. Therefore, any constituents that remained in the syngas would potentially end up in the air emissions of the power generating combustion unit. In contrast, the PCAEC is designed to process syngas into hydrogen, which is then consumed in the production of ammonia (NH_3). The syngas must be cleaned and trace constituents removed, because the PCAEC processes include several catalytic systems that would be adversely impacted by these potential contaminants. Additionally, only the pressure swing adsorber (PSA) tailgas will be burned in the steam superheater. All other syngas will be used in the ammonia production process. As a result, the potential for air emissions of trace constituents, like chlorides and fluorides, from combustion of the syngas at the PCAEC is materially less than from a comparably sized gasification-to-electric power project (like the facility evaluated in the DOE study). Fluorides from the PCAEC will exit the system as fluorite, CaF_2, in the slag. And chlorides will exit the system in the zero liquid discharge system solids (ZLDS), as ammonium chloride, NH_4Cl, salt. Both the fluorite and ammonium chloride salt in the ZLDS solids will be properly disposed of in a landfill.

Additional Limitations of the DOE Study. In addition to the significant differences between the type and use of the gasifier evaluated in the DOE study and the Project's gasifiers, other limitations of the DOE study are notable. First, the discussion of chloride and fluoride emissions in the DOE study was inconclusive. The following are two excerpts come from page 6-9 of the study:

(1) "The chloride material balance closure was about 54% This represents the upper boundary of the actual closure, since chloride was not detected in the incinerator and turbine exhausts, and the detection limits were used to estimate amounts in these streams. Internal mass balance closures around the sour water stripper and the gas turbine were also poor, in the range of 200-300 percent. The average measured chloride level in coal was 39 µg/g, with a standard deviation of 7.4 µg/g. Most of the chloride entering the plant in the coal would be expected to leave the system in the incinerator or turbine exhausts or in the stripped (sweet) water, but the measurements do not support this. Some chloride may also be fused into the slag matrix, and the slag analyzer may produce levels that are biased low. Therefore, a significant fraction of the chloride is unaccounted for in the plant."

(2) "The overall plant fluoride balance was poor, with an overall closure of only 28%. The average fluoride level of 66 µg/g in the coal was higher than the chloride content. However, these concentrations are still quite low and are subject to analytical uncertainty and imprecision, as indicated by QA/QC results. The standard deviation of the analysis was 16 µg/g, relatively high, but not enough to significantly impact the material balance. Most of the fluoride found in the discharge streams was contained in the slag, with a much smaller amount exiting in the sweet water. The fluoride analyses of the slag were consistent, with a low level of variability. Less than 1% of the fluoride in the coal was found in the incinerator and the turbine exhaust streams. The mode by which a substantial amount of fluoride leaves the plant is unknown, although its absence in the gas streams may indicate that the slag analysis was biased low and/or the coal analysis was biased high."

Close review of the DOE study reveals that the factors listed in Table ES-2 of the study are not appropriate, nor reliable, emission factors for the PCAEC.

4. <u>Mercaptan Emissions</u>. A comment was received suggesting that mercaptans, including methyl mercaptan and/or ethyl mercaptan, might be emitted from the proposed project. Discuss why these noncarcinogenic TAPs are not expected to be emitted or provide emission estimates for these TAPs and demonstrate that these emissions comply with the applicable 24-hour standard listed in IDAPA 58.01.01.585.

All thiols (or mercaptans) in the coal are expected to be destroyed in the gasifier. This is due to the high temperatures and pressures in the gasifier that react sulfur compounds, such as mercaptans, to form carbonyl sulfide (COS) and hydrogen sulfide (H_2S). This statement is supported by industry research. According to *Research Report 59, Gaseous Nitrogen and Sulphur Emissions from Coal Gasification*[5], the gasification process destroys mercaptans. This was demonstrated by process sampling that showed that no sulfur compounds except COS and H2S are formed in an entrained flow coal gasification process. Additionally, thiols are not reported in the industry literature as being in the product gases from a GE gasifier. For these reasons, the Air Permit Application for the Project did not include an estimate of mercaptan emissions.

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[5] Day, S.J., Nelson, P.F., and Park, D.C., "*Research Report 59, Gaseous Nitrogen and Sulphur Emissions from Coal Gasification,*" Cooperative Center for Coal in Sustainable Development, June 2006. http://www.ccsd.biz/publications/files/RR/RR%2059%20Gaseous%20Nitrogen%20formatted.pdf

5. <u>N_2O Emissions from the Nitric Acid Plant</u>. A comment was received noting that emissions had not been estimated for N_2O, a state-regulated TAP, from the nitric acid plant. Please provide an emissions estimate for N_2O and demonstrate that these emissions will comply with the applicable TAPs increment. If additional controls for N_2O will be installed, please identify the general type of control (e.g., a catalyst to decompose N_2O into nitrogen and oxygen), identify whether the use of the control device will result in new emissions of regulated NSR pollutants or state-only TAPs, and provide the basis for the estimated emissions of N_2O.

Nitric acid is produced by oxidizing ammonia with air over a catalyst to produce nitrogen oxides (NO and NO_2), which, in turn, react with water to form nitric acid (HNO_3). This process also results in the formation of nitrous oxide (N_2O), which does not "participate" in the downstream formation of nitric acid. The nitric acid production process is discussed in detail in Section 2, Page 2-46 of the Project's Air Permit Application.

A typical nitric acid plant vents the nitrous oxide to the atmosphere with a nitric acid plant's tailgas. The production of N_2O varies widely by nitric acid plant and technology, and can range in concentration from 300 to 3500 ppmv.[6] The EPA estimates that approximately 9.5 kg of N_2O is produced for every metric ton of acid produced unless additional controls are deployed.[7]

According to potential technology providers for the nitric acid plant at the PCAEC, an emission rate of 300 ppmv will be achieved using catalytic decomposition of N_2O to atmospheric nitrogen and oxygen. NO_x emissions will not be impacted by the catalytic decomposition of N_2O. Therefore, SIE will control N_2O emissions from the nitric acid plant to a concentration of 300 ppmv. Nitrous oxide is listed in Idaho as a non-carcinogenic TAP under IDAPA 58.01.01.585. It has a screening EL of 6 lbs per hour and an AAC of 4.5 milligrams per cubic meter (mg/m^3), on a 24-hr average. The 300 ppmv concentration corresponds to a mass emission rate of 88 lbs of N_2O per hour, which is greater than the EL.

The modeling analyses included with the application allow for a direct estimate of N_2O concentrations associated with nitric acid production. As discussed in the Air Permit Application (Section 5, Page 5-126), SIE modeled the nitric acid plant independently in order to determine part-load operating conditions and their associated impacts to air quality. As part of this analysis, nitric acid emissions and ammonia emissions were modeled, and their impacts to air quality are expressed on a 24-hr average basis, in accordance with IDAPA 58.01.01.585.

Ambient concentrations of nitrous oxide may be estimated by multiplying the modeled ambient concentration of either nitric acid or ammonia from the Air Permit Application by the emission rate of nitrous oxide, then dividing the resulting value by the corresponding emission rate of nitric acid or ammonia. The following table summarizes the nitrous oxide concentrations associated with the nitric acid plant utilizing this methodology.

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[6] Gary R. Maxwell (2004), "Synthetic Nitrogen Products, A Practical Guide to the Products and Processes," New York, Kluwer Academics/Plenum Publishers.

[7] U.S. Environmental Protection Agency (2001), "U.S. Adipic Acid and Nitric Acid N2O Emissions 1990-2020: Inventories, Projections, and Opportunities for Reductions."

TABLE 2. NITROUS OXIDE AMBIENT CONCENTRATION CALCULATION

Pollutant	Max 24-hr Concentration (mg/m^3)	Corresponding Emission Rate (lbs/hr)	Nitrous Oxide Emission Rate (lbs/hr)	Nitrous Oxide Max 24-hr Concentration (mg/m^3)
Nitric acid	0.00021	0.44	88	0.04
Ammonia	0.00104	2.19	88	0.04

The ambient concentration of N_2O from the nitric acid plant is approximately 0.04 mg/m^3, which is less than the AAC for nitrous oxide (4.5 mg/m^3). Therefore, nitrous oxide emissions from the nitric acid plant will not have an adverse impact to air quality, and concentrations will be within acceptable limits as defined in IDAPA 58.01.01.585.

BACT ANALYSIS

6. **<u>AN Neutralizer/Scrubber</u>. A comment was received noting that a pollution control device would be required to reduce PM emissions from the AN neutralizer vent to the reported value, and that BACT should apply. The commenter suggested that 90% control should be used as BACT. The application treats the AN neutralizer/scrubber as a single process unit, and the emissions inventory notes that the scrubber is presumed to have a 90% capture efficiency. "Good operating practices" were determined to be BACT based on the scrubber being an integral part of the process equipment. In the permit analysis, DEQ treated the scrubber as being integral to this process rather than as an add-on control device.**

   Please provide a more detailed description of the scrubber (e.g., packed bed) that is part of the AN neutralizer process and additional discussion in the BACT analysis regarding the capability within this process to reduce PM emissions by 90%.

The purpose of the AN Neutralizer vent is to vent steam, because the reaction of nitric acid with ammonia (to produce ammonium nitrate) produces steam. The purpose of the wet scrubber, as an integral part of the AN Neutralizer process, is product recovery and recycle. An inherent co-benefit to the scrubber operation is particulate matter emissions control. Per correspondence from KBR provided in Appendix D of the Air Permit Application, there may be a small amount of particulate matter in the steam vent. This particulate matter will be controlled using a properly operated wet scrubber system. Proper operation includes pH and temperature control. The following is a description of the wet scrubber process and a discussion of the scrubber as BACT for particulate matter emissions.

Process Description. The wet scrubber associated with the AN neutralizer vent is an integral part of the ammonium nitrate process, because the scrubber provides for product recovery and recycle. Prior to treatment, the process steam is sent to a venturi for desuperheating, where it is mixed with scrubbing liquor through a sprayer. The liquor is recycled from the cyclonic scrubber column, and therefore contains nitric acid to react with any ammonia still contained in the process steam. The steam then enters the cyclonic column where it goes through high-efficiency demisters, removing ammonium nitrate aerosol from the steam prior to venting.

BACT Discussion. The Project's potential technology provider, KBR, indicated that a wet scrubber is BACT for PM from an AN neutralizer vent (Appendix D of the Air Permit Application), and is capable of achieving a 90% control efficiency. Even if the scrubber were pollution control equipment, the emission inventory in the Air Permit Application, as noted in the IDEQ's question, was based on a 90% capture efficiency for the scrubber.

7. **<u>BACT for Thermal Oxidizer on AGR CO_2 Vent</u>. A comment was received noting that typical T.O. efficiencies for CO are about 95% rather than the 90% presumed in the BACT analysis. DEQ's understanding was that the lower efficiency was the result of treating a gas stream that is primarily CO_2 rather than CO. Please provide additional discussion and justification for the 90% T.O. efficiency.**

Trinity reviewed correspondence from CSM Worldwide, the control technology vendor, to SIE regarding the design of the catalytic oxidation system. The correspondence from CSM indicates that improved catalyst manufacturing technology and higher catalyst surface area will now allow the manufacturer to guarantee 95% control of CO on the AGR CO_2 vent. With these improvements, SIE agrees that 95% control of CO represents BACT for CO from the AGR CO_2 vent.

8. **<u>Stack Parameters</u>. A comment was received suggesting that modeled exit velocities for the Urea Melt Plant Vent (55.3 m/sec), Urea Granulation Vent (55.3 m/sec), and the AN Neutralizer Vent (91.4 m/sec) did not appear to be reasonable. Please provide additional information regarding the source and justification (e.g., manufacturer design values, measured performance test parameters) for these stack parameters.**

Trinity reviewed a December 17, 2008 email from KBR to SIE regarding the stack parameters. This email is included as Attachment 5. According to the email, stack exit velocities for the Urea Melt Plant Vent, Urea Granulation Vent, and the AN Neutralizer Vent were estimated by KBR based on their experience with similar plants and similar technologies. The basis for the modeling parameters for these sources is contained in a letter report, attached to the Air Permit Application in Appendix D. KBR reconfirmed these values in their December 17, 2008 email. In their email, KBR states that the basis for the stack exit velocities and for the emission rate estimates are similar to other plant designs with which KBR is familiar.

9. **<u>Ozone</u>. A comment was received stating that because the PCAEC will emit large amounts of ozone precursors NO_x (127 tpy) and VOCs (5 tpy), that the facility impacts should be compared against the 8-hour ozone standard. The commenter noted that the EPA had recently lowered the ozone standard from 0.08 ppm to 0.075 ppm, and stated that ozone modeling should be performed to assess the impacts of project emissions on ozone air quality in Power county and other nearby areas.**

   DEQ does not believe that it is appropriate to require ozone modeling for this project. Until EPA publishes guidance for ozone compliance for individual sources, the use of the Scheffe tables (Richard Scheffe, EPA OAQPS, September 1988) is recommended as a screening method for predicting ozone impacts for VOC-dominated sources. Please provide an estimate of the predicted ozone impacts using the Scheffe tables, as well as a

discussion regarding the limitations of this method for a source with predominantly NO_x emissions.

Trinity concurs with the IDEQ that it is not appropriate to require ozone modeling for this project. The level of VOC emissions (5 tons per year) from the project are far below levels that would warrant ozone modeling, or even an assessment using a screening method such as the Scheffe tables. However, at the IDEQ's request, Trinity has reviewed the values on the Scheffe tables to provide a conservative estimate of the ozone impacts from the project.

Ozone impacts from the Project are evaluated using *VOC/NO_x Point Source Screening Tables* generated by Richard Scheffe (referred to as the Scheffe method) to demonstrate that the proposed project is not expected to result in ozone concentrations that exceed the corresponding National Ambient Air Quality Standards (NAAQS).[8] Scheffe developed screening tables to evaluate ozone impacts in rural and urban areas. For the Project, which is located approximately four kilometers southwest of American Falls, Idaho, the rural screening table is used. The rural screening table provides an estimated ozone increment (i.e., a calculated increase in ozone levels above an assumed ambient concentration) based on a site's emissions of non-methane organic compounds (NMOC) expressed in units of tons per year (tpy) and the ratio of NMOC to nitrogen oxides (NO_x) emissions. For the purposes of our analysis, we have used the Project's VOC emissions to represent for the NMOC component of the analysis.

The June 2008 Addendum to the PCAEC Permit to Construct reports annual average total NO_x emissions of 127 tpy and VOC emissions of 5 tpy. These potential emission rates result in a VOC/NO_x ratio of 0.04 from the Project. The IDEQ correctly notes the limitations of using the Scheffe screening tables for evaluating sources with predominantly NO_x emissions (that is, sources that have very low VOC emissions). The Scheffe tables provide values of incremental ozone impacts for NMOC emission levels ranging from 50 tons per year to 10,000 tons per year. In comparison, the Project's VOC emissions (5 tpy) are far below the minimum range provided on the Scheffe tables, meaning that any result taken directly from the Scheffe tables will greatly overestimate the ozone impact from the Project.

The Scheffe tables require calculation of the project's short term emission rate into an annualized number. The maximum short-term VOC emission rate is provided as 1.83 pounds per hour (corresponding to an annualized rate of 8.02 tpy) in the addendum.

The annualized VOC emission rate of 8.02 tpy for the Project is more than 6 times less than the lowest NMOC emission rate listed in the Scheffe screening table (Table 1) for a rural-based ozone increment (50 tpy). For this reason, any value provided by the already-conservative Scheffe tables will greatly overestimate impacts from the project. For a NMOC/NO_x ratio of 0.04, the lowest value on the Scheffe screening table (corresponding to a 50 tpy VOC emission rate) is a 1-hour ozone concentration increment of 0.011 parts per million (ppm). If we assume that the Project emission rate of 8.02 tpy results in half this impact, the Project would increase ozone concentrations by 0.0055 ppm (1-hour).

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[8] Richard Scheffe, *VOC/NO_x Point Source Screening Tables*, U.S. EPA Office of Air Quality Planning and Standards, September 1988.

There are additional reasons to consider that this estimated concentration increment is conservative. First, the values provided in the Scheffe screening table were developed from a series of modeling analyses performed by Scheffe at several additional NMOC/NO_x emissions ratios. The Scheffe screening tables applied an additional scale-up factor of 1.5 to these underlying modeling results. The underlying modeling data in Scheffe's Table A2 for rural areas shows that the model run with the lowest NMOC/NO_x ratio (a ratio of 1) and lowest NMOC emission rate (50 tpy) resulted in a modeled ozone concentration increment of 0.007 ppm. An additional source of conservatism is that the Scheffe screening tables are based on a 1-hour averaging period for ozone, rather than the longer 8-hour basis of the current NAAQS standard. For these reasons, we consider an ozone concentration increment of 0.0055 ppm to provide a very conservative (i.e., high) estimate of the effect of the Project on ozone.

The NAAQS for ozone is 0.075 ppm, which should be compared to the fourth-highest daily maximum 8-hour average ozone concentration. The fourth highest 8-hour ozone concentration measured at the nearest ozone monitor (at Craters of the Moon National Monument, Site ID 160230101) in 2007 was 0.067 ppm. By conservatively adding the 1-hour ozone concentration increase estimated above for the project (0.0055 ppm) to the 8-hour monitored values, the estimated Project ambient ozone concentration is anticipated to be 0.0725 ppm for the 8-hour averaging period. This impact is less than the 8-hour ozone NAAQS of 0.075 ppm.

OTHER QUESTIONS

An additional question was received from IDEQ requesting further detail on fugitive emissions downstream of the urea storage building.

The Project is being designed to manufacture granular urea, which will be bulk loaded into railcars and tractor trailers. Urea will be stored onsite in covered, humidity controlled building(s) designed for up to 100,000 tons of storage. The Project will not be equipped for bagging operations.

Fugitive emissions downstream of the urea storage building are not readily quantifiable. EPA guidance is limited to AP-42 Chapter 8.2. In Chapter 8.2 EPA states that:

> *"Urea manufacturers presently control particulate matter emissions from prill towers, coolers, granulators, and bagging operations….Nationwide, approximately 90% of urea produced is bulk loaded. Few plants control their bulk loading operations. Generation of visible fugitive particles is negligible."*

Granular urea loading operations downstream of the urea storage building are an insignificant source of fugitive dust emissions. These emissions were estimated to be very low, as granular urea is a very consistent product with regards to granule size and distribution.[9] There are very few fines in the finished product. This is due to the process configuration of the PCAEC, where fines are recycled back to the granulation process. This process is discussed on pages 2-44 through 2-46 of the Air Permit Application. Additionally, WorleyParsons estimated the emission

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[9] The Project's urea specification, included as Attachment 6 to this letter, states that 100% of the urea granules will be retained by a 1.18 (14 Tyler) screen. Average granule size is estimated to be 2.64mm.

associated with Urea Product Loading as “no emission.” This estimate was presented in Appendix D on page 42 of WorleyParsons’ final report for regulatory support.

If you have any questions or comments about the information presented in this letter, please do not hesitate to call me at (253) 867-5600.

Sincerely,

TRINITY CONSULTANTS

Aaron M. Day
Principal Consultant

Attachments (6)

cc: Cheryl Robinson, Idaho Department of Environmental Quality
Matt Lee, Southeast Idaho Energy
Tom Hornyak, Southeast Idaho Energy
Krista McIntyre, Stoel Rives

ATTACHMENT 1

KBR EMAIL CORRESPONDENCE – NITRIC ACID PARTICULATE MATTER EMISSIONS

RE: Permitting QUestion - Message (HTML)

File Edit View Insert Format Tools Actions Help Adobe PDF

Reply | Reply to All | Forward

From: Laura Aguilar [Laura.Aguilar@kbr.com] Sent: Thu 12/18/2008 12:43 PM
To: Tom Hornyak; Matt Lee
Cc: Vishnu Singh
Subject: RE: Permitting QUestion

Tom,

Please see the following response we received from the vendor.

"There are no particulate emissions from the nitric acid plant exhaust stack. There may be some catalyst that is eroded away from the SCR abatement system, but there is not a normal design particulate matter emission."

Please let me know if you need any additional information.

Regards,
Laura Aguilar, P.E.
Engineering Management
KBR, Inc.
601 Jefferson Avenue
Houston, TX, 77002
Office: 713-753-6895
Fax: 713-753-6266

ATTACHMENT 2

NITRIC ACID DEW POINT CALCULATIONS

From Aspen Plus calculation, Aspen One, Version 7.0

Nitric Acid Stack Gas

Flow	60500	ACFM		
Temp	400	Kelvin		
Dew Point	270.6	Kelvin	27.41	F
Composition				
H_2O	492.111	lb/hr		
HNO_3	0.436	lb/hr		
NH_3	2.19	lb/hr		
NOx	15.333	lb/hr		
N_2	159858.5	lb/hr		
O_2	4727.423	lb/hr		

Dew Point calculation based upon, Aspen One, Version 7.0
Physical Properties, Chen Mixed Solvent Electrolyte Model

References:

C.-C. Chen, H.I. Britt, J.F. Boston, and L.B. Evans, "Local Compositions Model for Excess Gibbs Energy of Electrolyte Systems: Part I: Single Solvent, Single Completely Dissociated Electrolyte Systems:, AIChE J., Vol. 28, No. 4, (1982), p. 588-596.

C.-C. Chen, and L.B. Evans, "A Local Composition Model for the Excess Gibbs Energy of Aqueous Electrolyte Systems," AIChE J., Vol. 32, No. 3, (1986), p. 444-459.

B. Mock, L.B. Evans, and C.-C. Chen, "Phase Equilibria in Multiple-Solvent Electrolyte Systems: A New Thermodynamic Model," Proceedings of the 1984 Summer Computer Simulation Conference, p. 558.

B. Mock, L.B. Evans, and C.-C. Chen, "Thermodynamic Representation of Phase Equilibria of Mixed-Solvent Electrolyte Systems," AIChE J., Vol. 32, No. 10, (1986), p. 1655-1664.

CSM CATALYTIC OXIDIZER LETTER

CSM Worldwide www.csmworldwide.com

To: Matt Lee
Refined Energy Holdings, LLC

Date: January 5, 2009

From: Atul Shah

Ref: 95 % DRE for CO removal

Dear Mr. Lee,

It is CSM's pleasure to provide our customers with engineered solutions in addition to technical support for the Catalytic Oxidizer (Cat-ox). For over 30 years CSM Worldwide has been the leader in providing air pollution control equipment to the commercial industry. During this time it has been our objective to provide our customers with proven technology while also providing cost effective solutions for their plant air pollution regulation compliance of 95% plus successfully.

We have reviewed this Cat-ox application and process conditions in detail with the catalyst manufacturer (BASF). With the improved catalyst manufacturing technology and higher catalyst surface area, CSM Worldwide guarantees that a 95% DRE is consistently achievable for this application.

Virtually all of the States in the U.S. have adopted the guidelines presented in the Alternative Control Technology (ACT) specifying 95% DRE for commercial industry. These guidelines have been established by what is achievable in practice. CSM Worldwide guarantees that a 95% DRE is consistently achievable and an optimally designed air pollution control device for a cost effective solution for minimizing pollutants from commercial industry.

If you have any questions or would like to discuss any other concerns, please do not hesitate to call.

Sincerely,

Atul Shah
Director of Engineering
CSM Worldwide Inc.
Direct Phone 908 233 2882
Mobile Phone 908 451 3152
Email ashah@csmworldwide.com

Cc: Michael Torstrup, President CSM
Sam Wiley,

ATTACHMENT 4

COAL ANALYSES

Colorado Mines

Bowie #2 Mine

Owner

Bowie Resources, Limited

Mine Contact

William Bear, Jr., (970) 527-4135, P.O. Box 1488, Paonia, CO 81428

Location

Paonia, Delta County, Colorado

Rail Loading Point

Converse, Colorado

Background on Mine

The Bowie #2 mine began commercial production in November 1997 and has a capacity of 6 million tons per year.

Bowie's primary product is a high Btu, low sulphur run-of-mine steam coal. The coal can be supplied as a stoker product. Mining is done underground in the thick Paonia Somerset "B" and "D" seams. Recoverable reserves presently leased exceed 100 million tons. The property has 60 million tons under permit.

The Bowie #2 mine utilizes continuous miners for development and plans to install a longwall mining system in November 1998. The longwall will mine in both the "B" and "D" coal seams. Demonstrated low cost production, coupled with high-Btu, low-sulphur product will make this a product in demand by the electric utility industry.

The Bowie #2 mine is all salaried, union-free organizations. Employees are also eligible to participate in production and safety incentive programs. A high percentage of the workforce holds mine foreman papers. This, along with their demonstrated safety and productivity, makes them one of the most skilled workforces in the industry.

A modern, fast-loading system complements the capacity and productivity of the mine operation. Over 21,000 tons of closed storage at the train loadout site assures loading of 100 car trains in under two hours per train.

With a proven production and safety record and long-term reserves in hand, the Bowie #2 mine should remain one of Colorado's primary producers well into the 21st century.

Mine Type

Longwall mining

Recoverable Reserves

"D" Seam: 35 million tons
"B" Seam: 48 million tons
TOTAL: 83 million tons

Annual Production (1996)

800,000 tons

Current Annual Production Capacity

6 million tons

Rail Loading Point Storage Capacity

Total: 140,000 tons
Preload: 21,000 in three 7,000 ton silos

Loadout Description and/or Configuration

Over-track train loader is fed by a high speed belt reclaiming from three 7,000 ton preload storage silos.

Weighing System

Thayer belt scale

System Used to Assure Maximum Loading per Car

Computerized weight system

Loading Rate per Hour

6,000 tons, 100-car train within two hours

Load Track Configuration and Capacity

Single ended empty-load track which is the extended tail of the Converse loadout. Holds 105 empties behind the loader and 92 loads below the loader to clear the main track.

Loading Mode

Plug. Downgrade coupled-load-in-motion with train in buff against locomotive.

Maximum Cars per Train

105 cars

Washing Capability

None

Coal Specifications

Bituminous coal, 12,000 Btu/lb., 0.5% Sulphur

PROXIMATE ANALYSIS (%)		
	As Received	Air Dry Basis
Moisture	9.0	--
Ash	9.0	9.7
Volatile Matter	36.5	39.3
Fixed Carbon	49.0	52.7

Sulphur	0.50	0.54
OTHER		
Btu/lb.	12,000	13,225
Kcal/kg	6,830	7,348
Mineral Matter Free (Btu/lb)	--	14,391
Mineral Matter Free (Kcal/kg)	--	7,992

MINERAL ANALYSIS OF ASH (%)		
	Ash Basis	SO3 Free
Silica	48.3	56.4
Alumina	24.0	26.9
Titania	0.68	0.9
Ferric Oxide	13.7	5.5
Calcium Oxide	4.65	4.3
Magnesium Oxide	1.96	1.1
Phos. Pentoxide	1.17	0.6
Sodium Oxide	1.85	2.3
Potassium Oxide	0.54	0.8
Sulphur Trioxide	1.70	
Undetermined		

SULPHUR FORMS (%)		
	As Received	Dry
Pyritic Sulphur	0.05	0.06
Organic Sulphur	0.40	0.45
Sulfate Sulphur	0.00	0.00

COMBUSTION PRODUCTS (LBS/MM BTU)	
H2O	58.30
Ash	6.14
Sulphur	0.39
SO2	0.79

ULTIMATE ANALYSIS (%)		
	As Received	Dry
Moisture	6.0	--
Carbon	69.8	74.2
Hydrogen	4.9	5.2
Nitrogen	1.3	1.4
Chlorine	0.0	0.0
Sulphur	0.40	0.43
Ash	6.1	6.5
Oxygen	11.5	12.3

FUSION TEMPERATURE OF ASH

	Reducing:		Oxidizing:	
	°F	°C	°F	°C
Initial Deformation	2,450	1,343	2,460	1,350
Softening (H=W)	2,480	1,360	2,500	1,371
Hemispherical (1=1/2W)	2,500	1,371	2,520	1,382
Fluid	2,550	1,400	2,560	1,404

MISCELLANEOUS

Hardgrove Grindability Index	58 @ 3.6% Moisture
Equilibrium Moisture Free Swelling Index	3
T250 Temperature (°F)	
Base	Acid Ratio

Colorado Mines

Elk Creek Mine

Owner

Oxbow Mining, LLC

Rail Loading Point

Somerset, Colorado

Background on Mine

Developed in 2003, the Elk Creek Mine, located near Somerset in Gunnison County, Colorado, annually produces approximately 6,000,000 tons of high-quality steam coal. This underground longwall mine uses two continuous miners for development. It operates in the "D" Seam in Gunnison County, North Fork Valley. From the mining face, the coal is conveyed directly to one of two stack tubes, then into a reclaim system, and finally into the batch-weigh bin loading facility. Prior to shipping, all coal is screened and crushed to a nominal size of 2"x0".

Coal from the Elk Creek Mine can also be supplied as stoker coal, which is processed and loaded from Oxbow Carbon & Minerals LLC's Terror Creek Processing and Loadout facility located in Paonia, Co.

Oxbow Mining LLC operated the Sanborn Creek Mine from 1991-2003.

Mine Type

Underground/Longwall

Recoverable Reserves

+65,000,000 tons

Current Annual Production Capacity

6,000,000 tons

Loadout Description and/or Configuration

Direct train loading using batch-weigh bin system.

Weighing System

Kanawa scales with batch-weigh bin loading.

Loading Rate per Hour

+6,000 tons

Load Track Configuration and Capacity

Double ended empty/load track paralleling main track, 58 cars between silo and east clearance point. Loading trains occupy main line.

Loading Mode

Up grade with locomotive power.

Maximum Cars Per Train

115 cars

Washing Capability

None

Coal Specifications

12,000+ Btu/lb., 0.43% Sulphur

COMPOSITION ANALYSIS		
	As Received	Dry Basis
Moisture	8.00%	--
Ash	8.25%	8.90%
Volatile Matter	34.00%	36.75%
Fixed Carbon	50.00%	54.00%
Heating Value Btu/lb	12,000	13,000
Sulphur	0.43%	0.46%

MINERAL ANALYSIS OF ASH	
	Dry Basis
Silica	53.20
Alumina	24.37
Titania	0.88
Ferric Oxide	6.26
Lime	4.59
Magnesia	1.43
Potassium Oxide	1.40
Sodium Oxide	1.19
Sulphur Trioxide	2.98
Phos. Pentoxide	0.63
Strontium Oxide	0.16
Barium Oxide	0.28
Magnesium Oxide	N/A
Undetermined	2.60

FUSION TEMPERATURE OF ASH (°F)		
	Reducing	Oxidizing
Initial Deformation	2,398	2,529
Softening (H=W)	2,476	2,594
Softening (H=1/2W)	2,509	2,632
Fluid	2,636	2,722

OTHER CHARACTERISTICS	
Hardgrove Grindability Index	50+
Free Swelling Index	1.5
Silica Value	83.00

KBR EMAIL CORRESPONDENCE – STACK EXIT VELOCITIES

RE: Permitting QUestion - Message (HTML)

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Reply | Reply to All | Forward

From: Laura Aguilar [Laura.Aguilar@kbr.com] Sent: Thu 12/18/2008 12:43 PM
To: Tom Hornyak; Matt Lee
Cc: Vishnu Singh
Subject: RE: Permitting QUestion

From: Laura Aguilar [mailto:Laura.Aguilar@kbr.com]
Sent: Wednesday, December 10, 2008 2:19 PM
To: Matt Lee
Cc: Tom Hornyak; Vishnu Singh
Subject: RE: Permitting QUestion

Matt,

The basis for the stack exit velocities and for the emission rate estimates are similar plant designs that KBR is familiar with.

We will have to contact the nitric acid licensor to determine if the nitric acid plant particulate matter emission rate estimate includes "back-half" or condensable particulate matter emissions. I will advise you on the vendor's response.

Thanks, and please let me know if you need additional information.

Regards,
Laura Aguilar, P.E.
Engineering Management
KBR, Inc.
601 Jefferson Avenue
Houston, TX, 77002
Office: 713-753-6895
Fax: 713-753-6266

ATTACHMENT 6

UREA SPECIFICATION

UREA

46-0-0

GUARANTEED ANALYSIS

Total Nitrogen (N) 46.0%

46.0% Water Soluble Organic Nitrogen

Derived from Urea.

Warning: This product contains a chemical known to the State of California to cause cancer, birth defects or other reproductive harm. Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, requires notification of potential exposure to substances identified by the State of California as causing cancer, birth defects or other reproductive harm.	**Information regarding the contents and levels of metals in this product is available on the Internet at http://www.regulatory-infojr.**

PHYSICAL CHARACTERISTICS

Lbs. of Nutrients/Ton:	920
Color:	White
Bulk Density:	46-48 lbs. per cubic foot
Solubility in Water:	100%
Granule Size:	96% passes through a 4mm (5 Tyler) and is retained by a 2.0mm (9 Tyler) screen. 100% retained by a 1.18mm (14 Tyler) screen. Average granule size 2.64mm.

USES

1. The high analysis of urea makes aerial application very attractive. It is also suited for ground application methods. The 100% solubility of urea allows it to be totally dissolved so it can be applied through the irrigation water by flood, furrow or sprinkler method.
2. Because of urea's chemical characteristics, it should be incorporated soon after application. Band application in close proximity to seeds and young plants should be avoided.
3. For specific crop recommendations, see your local distributor.

ADVANTAGES

1. Urea is the most concentrated dry nitrogen fertilizer on today's market. This high-analysis fertilizer saves the farmer money on handling, freight, storage, and application costs.
2. Urea is 100% water soluble and is mobile in the soil, moving with soil moisture until soil organisms initiate the nitrification process that changes the organic nitrogen to ammoniacal nitrogen and eventually to nitrate nitrogen. Urea will supply a continuous, long-lasting supply of nitrogen to the growing crop.

SAFETY

Urea 46-0-0 - Slight irritation may result from eye contact or prolonged skin contact. Not generally considered toxic.

Nonflammable.11020 (PDS R.9-6-02)