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DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

PERMIT APPLICATION FORM

Date of Application: 11/10/2005

1. Name of Firm or Institution: Basin Electric Power Cooperative

2. Mailing Address

Number	Street	City	State
1717 East Interstate Avenue		Bismarck	ND

County	Zip	Telephone
Burleigh	58503	701-223-0441

3. Plant Location

Number	Street	City	State
Highway 59	North of Gillette		Wyoming

County	Zip	Telephone
Campbell		701-355-5655

4. Name of owner or company official to contact regarding air pollution matters

Name	Title	Telephone
Jerry Menge	Air Quality Program Coordinator	701-355-5655

Number	Street	City	State	Zip
1717 East Interstate Avenue		Bismarck	ND	58503

5. General nature of business

Coal Fired Electric Generation

SECTION 7.0

Near-Field Air Quality Impact Analysis

Basin Electric Power Cooperative (BEPC) proposes to construct the Dry Fork Station Project (project) near Gillette, Wyoming. The proposed power plant would include one pulverized coal (PC) boiler that would be capable of generating a nominal 422 MW (gross) of power.

The source of coal for the project will be the Dry Fork Mine. Coal from the mine, which is adjacent to the proposed location for the project, will be delivered to the power plant via a covered, overland conveyor. Emissions associated with the PC boiler will be controlled through various reduction methods. Specifically, the sulfur dioxide (SO_2) emissions will be reduced with dry scrubber equipment. Boiler particulate emissions will be controlled with a fabric filter, and emissions of nitrogen oxides (NO_X) will be controlled by Selective Catalytic Reduction (SCR). The primary cooling of the unit will be done with an air-cooled (dry) condenser.

7.1 Project and Site Description

BEPC proposes to construct the Dry Fork Station approximately four miles northeast of the Gillette-Campbell County Airport. The proposed location is at an approximate elevation of 4,250 feet above mean sea level (msl), in rolling terrain. In general, the terrain trends upward toward the south. Figure 7-1 presents a location map for the project that also depicts the local terrain.

7.2 Regulatory Status

7.2.1 Source Designation

The proposed project will be a major stationary source with respect to the Prevention of Significant Deterioration (PSD) rules established under the Federal New Source Review program. The source will belong to one of the 28 categorical sources listed under PSD regulations with a major source threshold of 100 tons per year of any regulated pollutant (fossil-fuel boilers, combinations thereof, totaling more than 250 million British thermal units per hour heat input). The goals of the air quality modeling analysis were to demonstrate compliance with state and federal air quality regulations that are applicable to the proposed project. CH2M HILL performed a dispersion modeling analysis for each criteria pollutant for which the annual emission rate was equal to or greater than the significant emission rates for PSD analysis (Table 7-1). Table 7-2 summarizes the modeling significance levels, PSD increments, and air quality standards that apply to criteria pollutant emissions from the project.

7.7.5 Preliminary Analysis for PM_{10}

The preliminary analysis for PM_{10} included the proposed boiler, the auxiliary cooling tower, and sources associated with material handling for the new unit. Dust collectors and bin vent filters will serve as emissions controls for many of the material handling sources. The sources associated with fly ash/FGD waste/bottom ash handling, including the loading of haul trucks, hauling, and the dumping of material into the landfill, were modeled with a 12-hour per day operation (0600-1800 daily). Detailed emissions calculations for all sources are provided in Appendix B.

The highest predicted 24-hour impact of PM_{10} with the base ISC-PRIME receptor grid and 10-m meteorological data was 4.2 $\mu g/m^3$, which is well below the Class II modeling significance level of 5.0 $\mu g/m^3$ for 24-hour PM_{10}. This predicted impact occurred approximately 1 km to the northeast of the boiler stack, at the edge of the portion of the base receptor grid with 100-m spacing. To further refine this estimated impact, a fine-spaced receptor grid with 100-meter spacing was built around the maximum course-grid receptor. With this fine-spaced grid, the maximum estimated 24-hour impact remained at 4.2 $\mu g/m^3$.

The highest predicted annual impact of PM_{10} with the base ISC-PRIME receptor grid and 10-m meteorological data was 0.89 $\mu g/m^3$. This impact was predicted to occur at the facility fenceline to the northeast of the power block. Because this receptor was located in an area of 50-m spacing, no further analysis was required to further refine the impact, which is below the Class II modeling significance level of 1.0 $\mu g/m^3$ for annual PM_{10}.

The preliminary analysis demonstrates that the Dry Fork Station Project will not produce a significant impact of PM_{10}. Table 7-7 presents the results of the preliminary analysis for PM_{10}.

TABLE 7-7
Results of Preliminary Analysis for PM_{10}

Averaging Period	Maximum Project Predicted ($\mu g/m^3$)	Class II Modeling Significance Level ($\mu g/m^3$)
24-Hour PM_{10}	4.20	5
Annual PM_{10}	0.89	1

7.7.6 Full-Impact Analysis for Sulfur Dioxide (SO_2)

Results of the preliminary modeling analysis for SO_2 indicated that predicted impacts from the Dry Fork Station Project would exceed the 24-hour modeling significance level, and therefore the project would trigger a full-impact analysis for 24-hour SO_2. A full-impact analysis includes model runs for the determination of compliance with WAAQS/NAAQS and PSD increments.

To determine compliance with the allowable PSD increment for 24-hour SO_2, CH2M HILL modeled the Dry Fork Station boiler and other increment-consuming sources and compared the highest predicted 2nd-high 24-hour impact to the allowable Class II 24-hour increment of 91 $\mu g/m^3$.

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October 23, 1997

MEMORANDUM

SUBJECT: Interim Implementation of New Source Review Requirements for PM2.5

FROM: John S. Seitz, Director Office of Air Quality Planning & Standards (MD-10)

TO: See Addressees

This memorandum addresses the interim use of PM10 as a surrogate for PM2.5 in meeting new source review (NSR) requirements under the Clean Air Act (Act), including the permit programs for prevention of significant deterioration of air quality (PSD). The revised national ambient air quality standards (NAAQS) for particulate matter, which include the revised NAAQS for PM10 and new NAAQS for PM2.5, became effective on September 16, 1997. In view of the significant technical difficulties that now exist with respect to PM2.5 monitoring, emissions estimation, and modeling (described below), EPA believes that PM10 may properly be used as a surrogate for PM2.5 in meeting NSR requirements until these difficulties are resolved. The EPA's views on implementing the ozone and PM10 NAAQS during the interim period following the effective date of the new 8-hour ozone and revised PM10 NAAQS will be set forth in a separate EPA memorandum.

Section 165(a)(1) of the Act provides that no new or modified major source may be constructed without a PSD permit. Moreover, section 165(a)(3) provides that the emissions from any such source may not cause or contribute to a violation of any NAAQS. Also, section 165(a)(4) requires best available control technology for each pollutant subject to regulation under the Act. The EPA's recent promulgation of the primary and secondary standards for PM2.5 marks the first time that EPA has specifically regulated fine particles--less than 2.5 microns in diameter--as a discrete indicator for particulate matter. Hence, this memorandum addresses how to implement PSD for PM2.5 in light of significant technical difficulties which presently exist.

Of specific concern is the lack of necessary tools to calculate emissions of PM2.5 and related precursors and project ambient air quality impacts so that sources and permitting authorities can adequately meet the NSR requirements for PM2.5. Any comprehensive system for regulating PM2.5 must take into account not only the fine particles emitted directly by stationary sources but also the various precursors, emitted by certain sources, which result in secondarily-formed fine particles through chemical reactions in the atmosphere. Recent studies suggest that secondary particulate matter may account for over half of total ambient PM2.5 nationwide. Emissions factors for the fine particles emitted directly by stationary sources, and for some important precursors (e.g., ammonia), are largely unavailable at the present time.

The EPA is in the process of developing a comprehensive modeling system which will be designed to include precursor emissions and account for secondary fine particle formation. The modeling system will also incorporate a method for nesting small local impacts from individual point sources within a greater modeling domain. Before this can be completed, it will be necessary to collect sufficient monitoring data to verify and validate protocol modeling results.

Ambient monitoring for PSD purposes must be collected from appropriately designed monitors. Sufficient quantities of such monitors will not be available specifically for PSD monitoring purposes in the near future. Initially, as these monitors become available, they will be needed to establish the new monitoring stations for the national network of PM2.5 sites, including the required core PM2.5 State and local air monitoring stations. A high priority has been placed on the establishment of the necessary PM2.5 monitoring sites nationwide so that the information from these sites can be analyzed and evaluated in order to establish plans and priorities for implementing the PM2.5 NAAQS, including the promulgation of section 107 designations.

For the reasons stated above, EPA believes that it is administratively impracticable at this time to require sources and State permitting authorities to attempt to implement PSD permitting for PM2.5. The EPA has projects underway that will address the current technical and informational deficiencies, but it will take 3-5 years to complete these projects. Until these deficiencies are corrected, EPA believes that sources should continue to meet PSD and NSR program requirements for controlling PM10 emissions (and, in the case of PM10 nonattainment areas, offsetting emissions) and for analyzing impacts on PM10 air quality. Meeting these measures in the interim will serve as a surrogate approach for reducing PM2.5 emissions and protecting air quality.

This memorandum presents EPA's views on the issues associated with implementation of the new PM2.5 NAAQS under Federal, State and local NSR programs. The statements do not bind State and local governments and the public as a matter of law. When the technical difficulties are resolved, EPA will amend the PSD regulations under 40 CFR 51.166 and 52.21 to establish a PM2.5 significant emissions rate, and EPA will also promulgate other appropriate regulatory measures pertinent to PM2.5 and its precursors. Because the earliest date on which PM2.5 nonattainment areas will be designated is in 2002, and nonattainment NSR does not apply until after nonattainment designations are made, implementation of the nonattainment NSR requirements under part D of title I of the Act need not be addressed at this time.

If you have any questions concerning this memorandum or wish to address any issues raised herein, please contact Dan deRoeck at (919) 541-5593.

Addressees: Director, Office of Ecosystem Protection, Region I
Director, Division of Environmental Planning and Protection, Region II
Director, Air, Radiation, and Toxics Division, Region III
Director, Air, Pesticides, and Toxics Management Division, Region IV
Director, Air and Radiation Division, Region V
Director, Multimedia Planning and Permitting Division, Region VI
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April 5, 2005

MEMORANDUM

SUBJECT: Implementation of New Source Review Requirements in PM-2.5 Nonattainment Areas

FROM: Stephen D. Page
Director

TO: See Addressees

What is the purpose of this memorandum?

This memorandum provides guidance on the implementation of the major New Source Review (NSR) provisions under title 1, Part D of the Clean Air Act (Act) in fine particulate (PM-2.5) nonattainment areas in the interim period between the effective date of the PM-2.5 National Ambient Air Quality Standard (NAAQS) designations (April 5, 2005) and when we promulgate regulations to implement nonattainment major NSR for the PM-2.5 NAAQS. This memorandum also re-affirms the Memorandum from John S. Seitz, Director Office of Air Quality Planning and Standards, to Regional Air Directors, *Interim Implementation of New Source Review for PM2.5* (Oct. 23, 1997) that applies in Prevention of Significant Deterioration of Air Quality (PSD) programs for PM-2.5 attainment and unclassifiable areas.

Why are we issuing this memorandum?

On January 5, 2005, we promulgated nonattainment designations for the PM-2.5 NAAQS. These designations become effective on April 5, 2005. *See* 70 FR 944. Under Section 172(b) of the Clean Air Act (Act), the Administrator may provide States up to 3 years from the effective date of designations to submit State Implementation Plan (SIP) revisions meeting the applicable nonattainment requirements. In the near future, we plan to issue a proposed and final rule setting forth the schedule for these plan submissions. We also plan to establish the requirements that State and local agencies (States) and Tribes must meet in their implementation plans for attainment of the PM-2.5 NAAQS including provisions to address the major NSR requirements of title I, Part D of the Act (nonattainment major NSR program). Notwithstanding the absence of these implementing regulations, we interpret Section 172(c)(5) of the Act to require States to issue major New Source Review (NSR) permits for the construction and major modifications of major stationary sources located in any nonattainment area. Accordingly, once nonattainment designations for PM-2.5 become effective on April 5, 2005, States must issue major NSR permits that address the Section 173, nonattainment major NSR requirements for PM-2.5. We are issuing this memorandum to address how States should implement major NSR for PM-2.5 until we promulgate the PM-2.5 implementation rule.

What applies in PM-2.5 nonattainment areas?

During the SIP development period, EPA generally requires States to issue major NSR permits using the authority of States' approved nonattainment major NSR programs (to the extent these provisions apply automatically to the pollutant) or using the authority of 40 CFR Part 51, Appendix S (where a State lacks a nonattainment major NSR program covering the pollutant.) [1] However, in this case, the absence of a final PM-2.5 implementation rule makes administering a PM-2.5 nonattainment major NSR program infeasible. Accordingly, until we promulgate the PM-2.5 major NSR regulations, States should use a PM-10 nonattainment major NSR program as a surrogate to address the requirements of nonattainment major NSR for the PM-2.5 NAAQS. By applying a PM-10 nonattainment major NSR program in the interim period, States will effectively mitigate increases in PM-2.5 emissions and protect air quality because PM-2.5 is a subset of PM-10 emissions.

Using the surrogate PM-2.5 nonattainment major NSR program, States should assume that a major stationary source's PM-10 emissions represent PM-2.5 emissions and regulate these emissions using either Appendix S or the State's SIP-approved nonattainment major NSR program for PM-10. In most cases, we believe that States will need to rely on Appendix S for authority to issue permits during this interim period, because their existing State programs are not designed to accommodate the surrogate PM-2.5 nonattainment major NSR program.[2] Moreover, we expect that most States will need to implement a transitional PM-2.5 nonattainment major NSR program under Appendix S even after we finalize the PM-2.5 implementation rule until EPA approves changes to the States' SIP programs.

What is the major stationary source threshold and offset ratio under the surrogate PM-2.5 nonattainment major NSR program?

Section 302(j) defines a major stationary source as any source that emits or has the potential to emit 100 tpy of any regulated pollutant, and Section 173(c) of the Act requires major stationary sources to offset emissions increases resulting from construction or major modifications in a ratio of at least 1 to 1. Appendix S and the majority of SIP-approved PM-10 nonattainment major NSR programs apply this major source threshold and corresponding offset requirement. Accordingly, these provisions should be used to define the major stationary source threshold and offset ratio for the surrogate PM-2.5 nonattainment major NSR program. This means that during the interim period, a source is major for PM-2.5 if it emits or has the potential

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[1]The terms of 40 CFR 52.24(k), Appendix S of Part 51 provide provisions for a transitional nonattainment major NSR program until we approve a State's Part D major NSR program into the SIP.

[2]If a State lacks authority to issue a major NSR permit consistent with these requirements, then EPA will issue the permit under the authority of 40 CFR 52.24(k) and Appendix S.

to emit 100 tpy of PM-10.[3] A State that uses its SIP-approved PM-10 program as a surrogate PM-2.5 program need not apply the separate major stationary source level for serious PM-10 nonattainment areas in the surrogate PM-2.5 program. We do not interpret the specific PM-10 requirements of Part D, Subpart 4 of the Clean Air Act to apply to PM-2.5 and do not believe they should be applied under a surrogate PM-2.5 nonattainment major NSR program.

For any major stationary source whose particulate emissions are predominantly coarse particulate (particulate matter that ranges in size between PM-10 and PM-2.5), assuming that all of the source's PM-10 emissions represent the source's PM-2.5 emissions could inappropriately trigger nonattainment major NSR for PM-2.5. To avoid such an outcome, a source may quantify its PM-2.5 fraction. One approach is to apply two test methods in series - Conditional Test Method 40 (which adds a PM-2.5 cyclone separator between the Method 201A cyclone and filter) followed by the Method 202 sampler to collect condensible materials. The sum of the PM mass in these two fractions (i.e., the Conditional Test Method 40 filterable mass plus the Method 202 condensible mass) represents the primary PM-2.5 emissions from the source for the test period. Under appropriate circumstances (e.g., construction of a new unit, where it is not possible to conduct testing prior to start up), testing of similar existing units can be an appropriate means of obtaining relevant emissions data. Also, other approaches for quantifying PM-2.5 emissions besides the testing methods described above would be considered where they can be shown to produce reliable data.

If the source demonstrates that it is not a major stationary source for PM-2.5, then the nonattainment major NSR provisions for PM-2.5 need not be applied to the source. Conversely, if a source is major for PM-10 and does not quantify its PM-2.5 emissions, then States should presume that the source is major for PM-2.5 and subject it to the surrogate PM-2.5 nonattainment major NSR program if it constructs a major stationary source or undergoes a major modification.

What is the significant emissions rate for the surrogate PM-2.5 nonattainment major NSR program?

On July 1, 1987, we established a significant emissions rate for PM-10 of 15 tpy. *See* 52 FR 24683. States should use this rate for the surrogate PM-2.5 program. At the time we established the 15 tpy significant emissions rate, we amended only our PSD regulations to incorporate the PM-10 value because the PM-10 NAAQS did not yet apply to nonattainment areas. Nonetheless, we established the PM-10 significant emissions rate through notice and

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[3] The definition of PM-10 includes condensible particulate matter. For a detailed discussion of condensible particulate matter, see the General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990 (April 16, 1992, 57 FR 13542).

comment rulemaking; and, accordingly, the same value should apply for PM-10 under Appendix S and State SIP-approved programs in the interim period.[4]

Will any precursors be regulated under the surrogate PM-2.5 nonattainment major NSR program?

Not at this time. Section 302 (g) includes precursors to the formation of any air pollutant within the term "air pollutant" to the extent the Administrator identifies the precursors for the particular purpose for which the term "air pollutant" is used. To date, the Administrator has not identified any precursors to the formation of PM-2.5 for purposes of the major NSR program. On November 5, 2003, the Administrator proposed to require that regional emissions analysis for the purposes of transportation conformity under Section 176(c) of the Act include certain precursors (68 FR 62690). In the Clean Air Interstate Rule, we require states to reduce emissions of NOx and SO2 on the grounds that they are precursors for PM-2.5. However, several novel issues need to be resolved before the NSR program can be applied to PM-2.5 precursors (e.g., how many SO2 or NOx offsets will be needed to accommodate the fine particles formed by these constituents; can SO2 emissions reductions be used to offset NOx emissions, and vice versa). We plan to request comment on regulating these pollutants and other potential PM-2.5 precursors for purposes of major NSR in the PM-2.5 implementation rule.

What major NSR requirements apply in PM-2.5 attainment and unclassifiable areas?

The revised NAAQS for particulate matter, which include the revised NAAQS for PM-10 and new NAAQS for PM-2.5, became effective on September 16, 1997. On October, 23, 1997, we issued a memorandum addressing the interim use of PM-10 as a surrogate for PM-2.5 in meeting Prevention of Significant Deterioration of Air Quality Program (PSD) provisions for PM-2.5 as required by title 1, Part C of the Act. *See* Memorandum from John S. Seitz, Director Office of Air Quality Planning and Standards, to Regional Air Directors, *Interim Implementation of New Source Review for PM2.5* (Oct. 23, 1997). This memorandum referenced provisions of Part C of the Act which we interpret to require PSD permits for PM-2.5 upon the effective date of the PM-2.5 NAAQS, and identified significant technical difficulties with implementing PSD for PM-2.5 because of limitations in ambient monitoring and modeling capabilities. Because we have not promulgated the PM-2.5 implementation rule, administration of a PM-2.5 PSD program remains impractical. Accordingly, States should continue to follow the October 23, 1997, guidance for PSD requirements.

This memorandum presents EPA's policy on the implementation of major NSR requirements until EPA promulgates a final PM-2.5 implementation rule. The statements in this policy guidance do not bind State and local governments and the public as a matter of law.

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[4] We intend to issue a final rule adding a PM-10 significant emissions rate of 15 tpy to Appendix S in a forthcoming rulemaking.

If you have any questions concerning this memorandum, please contact Raj Rao at (919) 541-5344, or Lynn Hutchinson at (919) 541-5795.

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The Dry Fork Station Will Not Cause or Contribute to Violations of the Air Quality Standards in Northern Cheyenne Indian Reservation, Montana

A report prepared by
Robert L. Pearson, Ph.D., P.E.

CH2MHILL

CH2M HILL
9193 South Jamaica Street
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June 16, 2008

Executive Summary

The Protestants in this matter have expressed a concern that the construction of the Dry Fork Station of Basin Electric will cause or contribute to violations of the Class I sulfur dioxide (SO_2) increment levels in the Northern Cheyenne Indian Reservation (NCIR) in Southern Montana.

An increment is the small amount of SO_2 pollution that is allowed to be added under federal and state law to a clean air area such as the NCIR after a designated baseline date. This assertion by the Protestants is contrary to the evidence and is therefore false. The Dry Fork Station will not cause or contribute to any violation of the Class I SO_2 increments in the NCIR.

There are three levels of increments, Class I, Class II and Class III, which apply to different areas. Class I areas are national parks and wilderness areas which are the most protected areas. The NCIR has been classified as a Class I clean air protected area. This means that the NCIR is given special air quality protection under federal and state law and the Class I increments apply there.

The Class I SO_2 increments are 25 $\mu g/m^3$, (micrograms per cubic meter, a measure of the concentration of SO_2 in the ambient air), for a three hour average, 5 $\mu g/m^3$ for a 24 hour average and 2 $\mu g/m^3$ for an annual average. National Ambient Air Quality Standards (NAAQS) have also been established by EPA at levels to protect human health and the environment. The following are the NAAQS for SO_2: 1300 $\mu g/m^3$ three hour average, 365 $\mu g/m^3$ 24 hour average and 80 $\mu g/m^3$ annual average. The Class I increments are therefore 1.9% of the three hour NAAQS, 1.4% of the 24 hour NAAQS and 2.5% of the annual NAAQS-small fractions of the levels established by EPA to protect human health and the environment.

The Protestants submitted a report prepared by Mr. Khanh Tran dated April 28, 2008. In the report Mr. Tran states that the combined impacts of the Dry Fork Station and all other increment consuming sources exceeds the 24 hour Class I increment in the NCIR, therefore no further degradation of air quality should be allowed in the NCIR.

This report addresses those issues raised by Mr. Tran. Simply put, modeling conducted in accordance with applicable air quality regulations and EPA guidance shows there is no increment violation in the NCIR. Additionally, although modeling that was contrary to EPA guidance predicts increment violations, that same modeling shows that Dry Fork does not cause or contribute to any such violations. Therefore, DEQ was correct to issue the construction permit for Dry Fork. The permit was and is valid and there is no reason to overturn the permit. If there is a possible degradation of air quality in the NCIR in excess of the allowed Class I increment, it is being caused by a source in Montana and is not being caused or contributed to in any way by the Dry Fork Station.

CH2M HILL prepared the permit application for the Dry Fork Station. As required for the application, CH2M HILL modeled the air quality impact on surrounding protected Class I air quality areas including the NCIR. This permit could only be issued if the Dry Fork Station didn't cause or contribute to a violation of any air quality standard including the Class I increment within the NCIR. A source is considered to not cause or contribute to a violation of the increment if its impact is less than the applicable significant impact level (SIL).

The Class I SIL for SO_2 is a small fraction of the increment and is a very small concentration of SO_2. Compared to the NAAQS that are established at levels to protect human heath and environment, as discussed above, the three hour SIL of 1.0 $\mu g/m^3$ is 0.07% of the NAAQS and the 24 hour SIL of 0.2 $\mu g/m^3$ is 0.06% of the NAAQS.

If the modeled impact of a new source alone is less than these SILs, the source is determined to have no significant impact on the air quality in the protected area and no further cumulative modeling needs to be done. If the modeling results exceed a SIL then cumulative modeling needs to be done. This cumulative modeling includes all sources of SO_2 increases after the baseline date in the area to determine whether these combined sources taken together are exceeding the increment.

Therefore, the first step of the modeling done for the permit application was to see if Dry Fork by itself exceeded the SIL. This modeling analysis was conducted using an air pollution transport and dispersion model prescribed by EPA, the CALPUFF model. This model is used for calculating impacts from sources on areas greater than 50 kilometers (31 miles) away.

The CALPUFF modeling of the Dry Fork Station by itself showed that the three hour and 24-hour average SO_2 impacts in the NCIR exceeded the SIL on one or more days. Therefore a cumulative modeling analysis was required. An exceedance of the SIL simply indicates the need to do further modeling and does not indicate that any adverse impact to human health or the environment exists.

Modeling was done using meteorological data from a period of three years: 2001, 2002 and 2003. The model predicted results for every day and for every location within the NCIR during this three year modeling period.

Applicable regulations and EPA guidance prescribe that the cumulative modeling must be done using the actual emissions of all sources being modeled. Since determining actual emissions for the past several years for more than a dozen sources in several states is a very laborious process, a first analysis was done with higher permitted emissions levels for all except two sources. This resulted in a conservative (higher) modeling result.

More realistic actual emission levels were obtained for the two largest sources that are located close to the NCIR, Colstrip Units 3 and 4. These two units were likely to have the greatest impact on the NCIR and could most distort the modeling results if they were modeled at permit limits rather than actual emissions as required by regulations and EPA guidance. The other sources that were modeled are smaller and farther away from the NCIR and modeling them at their higher permit limits would not have the same distorting effect on the results.

The Colstrip Units 3 and 4 were first modeled at their 90th percentile of actual emissions using a method EPA approved for sources in North Dakota for a similar analysis. This analysis showed no violation of increment levels within the NCIR. The permit application was completed with these results and the application was filed with Wyoming DEQ.

The Wyoming DEQ reviewed the application and requested that a second analysis be done. The second analysis was to be conducted with all units including Colstrip 3 and 4 modeled at their higher permitted emissions levels instead of actual emission levels. CH2M HILL performed this second analysis requested by Wyoming DEQ despite the fact that this is not the approach that applicable regulations prescribe for the purpose of determining increment consumption.

The second analysis predicted that the 24 hour increment would be exceeded on nine days out of 1095 days (three years) within the NCIR in the three year time frame of 2001, 2002, and 2003. Modeling predicted that the three hour increment would be exceeded on 24 days out of the 1095 days modeled. It is this second analysis that Mr. Tran points at to say that the Dry Fork Station should not be allowed to be built and to operate.

However these modeling exceedances are not the end of the story for this modeling analysis. For each modeled exceedance of the increment on each of these nine or 24 days, CH2M HILL looked at each occurrence to determine if the contribution of the Dry Fork Station was above the three hour or 24 hour SIL. Contrary to Mr. Tran's assertion, it is standard practice sanctioned by EPA to use SILs in this situation to determine whether a source causes or contributes to an increment violation. In every case on these nine and 24 days the contribution of Dry Fork was below the SIL and many times it was zero. Therefore the contribution from Dry Fork to this alleged violation of increment is not significant and the Dry Fork Station is not causing or contributing to any increment exceedance in the NCIR.

In the spring of 2007 at the request of Basin Electric CH2M HILL did a third modeling analysis. This third analysis used the highest actual emission rates from Colstrip Units 3 and 4 rather than the 90th percentile of actual emissions used in the first analysis. This third analysis determined that the cumulative impact results show no violation of 24 hour increment within the NCIR.

All three analyses were essentially the same except for the emissions levels modeled for Colstrip 3 and 4. The Dry Fork Station was modeled the same in all three analyses and did not affect the varying outcomes. In the two analyses when Colstrip was run with either the 90th or 100th percentile of actual emissions, the air quality levels within the NCIR showed no violations of the increment. These analyses were consistent with EPA guidance that prescribes the use of actual emissions in performing the modeling. When Colstrip was modeled with the much higher permitted emissions levels, the increments within the NCIR were sometimes predicted to be exceeded. However, in each instance Dry Fork did not cause or contribute to these exceedances of the increment.

To further demonstrate the point that Dry Fork is not contributing to this concern, we evaluated the pattern of winds during the times in the second cumulative modeling analysis when the increments in the NCIR were predicted to be exceeded. In every case, the winds were blowing the Dry Fork emissions away from the NCIR. It was not physically possible for Dry Fork to contribute to this problem since the winds were blowing the Dry Fork emissions away from the NCIR at these times. Therefore the modeling is consistent with the meteorological facts during these days.

Dry Fork does not cause or contribute to any violations of air quality standards in the NCIR. If there is an issue here (we think there is not) the issue involves a Montana source's impact on a Montana Class I area. There is nothing the State of Wyoming can do to address this issue at the NCIR. Even if Dry Fork was not placed into operation, no change in these modeled exceedances of the increment caused by Colstrip would be seen at NCIR. This is strictly a Montana issue and Wyoming has nothing to do with it.

Qualifications of Dr. Robert Pearson

I am currently a Vice President in the CH2M HILL Denver office with emphasis in the Energy and Industrial Systems Environmental Practice Area. I have 35 years of experience evaluating the air quality impacts from the operation of coal fired power plants, including working for 19 years as a senior environmental engineer and then the Administrator of Environmental Affairs for the Public Service Company of Colorado (now Xcel Energy), a large electric utility company.

In addition, I have been involved in two regional air quality studies in the Denver area and was appointed by the governor of Colorado to the Grand Canyon Visibility Transport Commission and by the Secretary of Energy to the National Coal Council. Finally, I have either managed or been a senior technical resource to the air quality permitting of five large coal fired power plants including the Dry Fork Station. Based on this experience, I am very familiar with the air quality issues involved in the operation of large industrial sources such as the Dry Fork Station.

I hold three college level degrees. I graduated from the Colorado School of Mines in 1964, with a degree of Professional Geophysical Engineer. I then graduated from Colorado State University in 1971, with a Master of Science Degree and again from Colorado State University in 1973, with a Doctor of Philosophy degree. I am a registered professional engineer in Colorado (license number 12582) and I am currently certified as a Qualified Environmental Professional by the Institute of Professional Environmental Practice.

In my day to day work I routinely oversee air quality dispersion modeling of industrial facilities, especially coal fired power plants. Therefore I have the knowledge and experience to state the expert opinions contained herein regarding the use of air dispersion modeling to predict air quality impacts. The model we routinely use for long distance air quality modeling predictions is the EPA CALPUFF model. I have routinely managed and technically guided the use of the CALPUFF model for these types of air quality analyses.

A copy of my Curriculum Vitae is attached as Exhibit 1.

Introduction

The Protestants have expressed a concern that the construction of the Dry Fork Station will cause or contribute to SO_2 increment violations in the Northern Cheyenne Indian Reservation (NCIR) in Southern Montana. They have submitted a report prepared by Mr. Khanh Tran dated April 28, 2008 in which Mr. Tran asserts that emissions from Dry Fork and other sources in the area result in violations of the Class I SO_2 increment in the NCIR. This report addresses the issues raised by Mr. Tran, and concludes that Dry Fork emissions do not cause or contribute to violations of the Class I SO_2 increments in the NCIR.

An increment is the small amount of SO_2 pollution that is allowed to be added under federal and state law to a clean air area such as the NCIR after the designated baseline date. The total amount of new pollution that will be allowed in the future can not exceed the increment.

There are three levels of increments, Class I, Class II and Class III, which apply to different areas. Certain clean air areas are given special protection status and are called Class I areas. These areas usually are national parks and wilderness areas. The NCIR in Southern Montana has been given Class I special protection status.

The Class I SO_2 increments are 25 $\mu g/m^3$, (micrograms per cubic meter, a measure of the concentration of SO_2 in the ambient air), for a three hour average, 5 $\mu g/m^3$ for a 24 hour average and 2 $\mu g/m^3$ for an annual average. National Ambient Air Quality Standards (NAAQS) have also been established by EPA at levels to protect human health and the environment. The following are the NAAQS for SO_2: 1300 $\mu g/m^3$ three hour average, 365 $\mu g/m^3$ 24 hour average and 80 $\mu g/m^3$ annual average. The Class I increments are therefore 1.9% of the three hour NAAQS, 1.4% of the 24 hour NAAQS and 2.5% of the annual NAAQS-small fractions of the levels established by EPA to protect human health and the environment.

As a part of the application for the construction permit for the Dry Fork Station submitted in November 2005, CH2M Hill conducted an analysis of the air quality impact on Class I areas surrounding the Dry Fork Station including the NCIR. This analysis was conducted using an air pollution transport and dispersion model prescribed by EPA, the CALPUFF model. This model is used for calculating impacts from sources on areas greater than 50 kilometers (31 miles) away from the source.

This permit could only be issued if the Dry Fork Station didn't cause or contribute to a violation of any air quality standard including the Class I increment within the NCIR. A source will be considered not to cause or contribute to a violation of the increment if its impact is less than the significant impact level (SIL).

The SIL is a small fraction of the increment. Compared to the NAAQS as discussed above, the three hour SIL of 1.0 $\mu g/m^3$ is 0.07% of the NAAQS and the 24 hour SIL of 0.2 $\mu g/m^3$ is 0.06% of the NAAQS that are established to protect human health and the environment.

If the modeled impact of a new source alone on the Class I area is less than the SIL, the source is determined to have no significant impact on the air quality in the protected area and no further cumulative modeling needs to be done. If the modeling results exceed the SIL then cumulative modeling needs to be done. This cumulative modeling includes all sources in the area of increased SO_2 after the baseline date to make sure that these combined sources taken together are not exceeding the increment.

The CALPUFF modeling of the Dry Fork Station by itself showed that the 24-hour average SO_2 impact in the NCIR exceeded the SIL on one or more days. Therefore a cumulative modeling analysis was required and was conducted. An exceedance of the SIL simply indicates the need to do further modeling and does not indicate that any adverse impact to human health or the environment exists.

Cumulative Modeling Analyses

A cumulative 24-hour SO_2 increment consumption analysis was done at the NCIR Class I area using meteorological data for the three years 2001, 2002, and 2003, to determine whether Class I three hour or 24 hour SO_2 increments were exceeded at any receptor within the NCIR for any three or 24 hour period in the three year period that was modeled. This report describes the methods used and the results from three different modeling analyses.

The conduct of a cumulative impact analysis includes all sources of SO_2 in the area that were added after the baseline date. To determine the inventory of sources to include in the cumulative Class I SO_2 increment consumption analysis, CH2M HILL considered the states that fall within a 300-km radius of the NCIR. These states include Montana, Wyoming, the northwest corner of South Dakota, and the extreme southwest corner of North Dakota.

The following increment consuming sources and the states where they are located were identified and included in this cumulative analysis:

- Dry Fork, WY
- Colstrip Unit 3, MT
- Colstrip Unit 4, MT
- Colstrip Energy LP, MT
- Rocky Mountain Power Hardin, MT
- Rocky Mountain Ethanol, MT
- Roundup Unit 1, MT
- Roundup Unit 2, MT
- Gascoyne, ND
- Neil Simpson Unit 2, WY
- Wyodak Unit 1, WY
- KFX Unit 1, WY
- KFX Unit 2, WY
- 2 Elk Unit 1, WY
- Wygen Unit 1, WY
- Wygen Unit 2, WY

The identification of these sources was obtained from the air quality agencies in the respective states where the sources are located. These agencies also provided the permitted emission limits that were used in the cumulative modeling.

First Analysis, Colstrip Unit 3 and 4 Modeled at 90% of Actual.

Air quality rules and EPA guidance provide that the calculation of increment consumption within a Class I area is to be based on actual emission increases and decreases from all sources that contribute to that protected area. The 90th percentile of actual emissions from Colstrip Units 3 and 4 were used for modeling. This 90th percentile method is the same one used by Kevin Golden, EPA Region 8 regional modeler for a very similar cumulative SO_2 Class I increment modeling analysis done for the Theodore Roosevelt National Park in North Dakota.

Actual, hourly emissions for Colstrip Units 3 and 4 for the two most recent full calendar years of 2003 and 2004 were downloaded from the EPA Clean Air Markets website (EPA, 2007) and imported into an Excel spreadsheet. Using this spreadsheet, 3-hour and 24-hour block averages of the actual emission rates were calculated for the entire 2-year period.

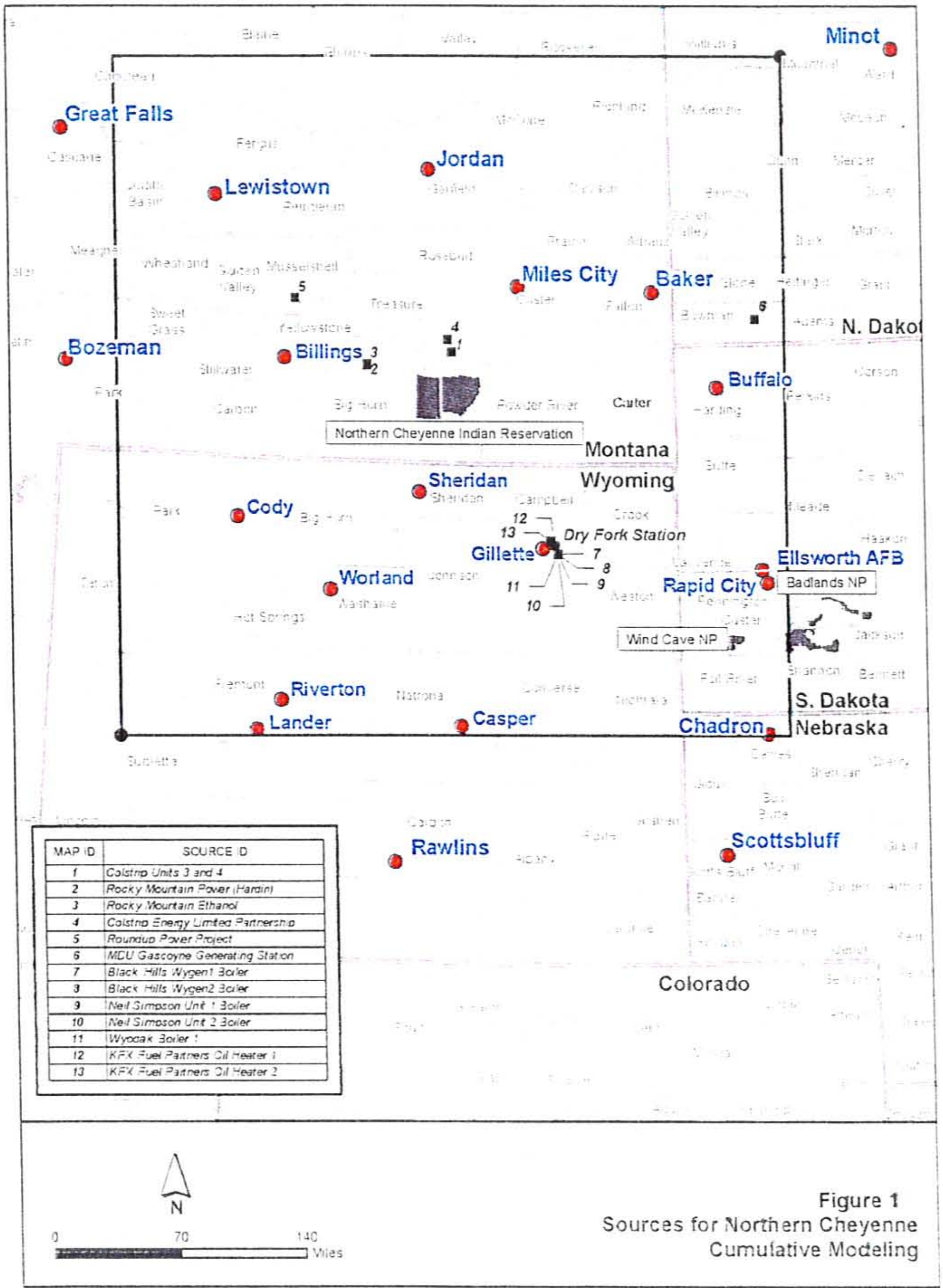
These block average emissions were sorted into numerical order and the 90th percentiles of these block averages were then determined. The resulting emissions rates were:

- Colstrip Unit 3: 878.5 lb/hr for 3-hour, 835.7 lb/hr for 24-hour
- Colstrip Unit 4: 882.9 lb/hr for 3-hour, 838.1 lb/hr for 24-hour

The permitted emission rates for the other increment consuming sources were obtained from their respective state air permitting agencies. Even though the regulations specify that increment consumption analyses be based on actual emissions, permitted emissions for the non-Colstrip sources were conservatively used. This was because the process of gathering the actual emissions for all of these sources would have been laborious and time consuming. Except for Colstrip, it was concluded that modeling these smaller and more distant sources at their higher permitted levels would not significantly alter the modeling results. Colstrip was modeled at the 90th percentile because it is the largest source modeled that is located close to the NCIR and was most likely to skew the modeling results if actual emissions were not used as prescribed by the regulations and EPA guidance. The Dry Fork emissions were modeled at the requested emissions limits contained in the permit application.

The results of the modeling analysis showed that the cumulative impacts of the increment-consuming sources in the area surrounding the NCIR are below the allowable increments (Table 1). The highest 2nd-high 3-hour impact of 16.7 $\mu g/m^3$ was modeled with 2003 meteorology. This modeled impact is well below the Class I increment of 25 $\mu g/m^3$. For 24-hour impacts, the highest 2nd-high impact of 4.0 $\mu g/m^3$ was modeled with 2002 meteorology. This modeled impact is also below the Class I PSD increment of 5 $\mu g/m^3$.

FIGURE 1
LOCATIONS OF THE MODELED SOURCES IN RELATION TO DRY FORK AND THE NCIR



MAP ID	SOURCE ID
1	Colstrip Units 3 and 4
2	Rocky Mountain Power (Hardin)
3	Rocky Mountain Ethanol
4	Colstrip Energy Limited Partnership
5	Roundup Power Project
6	MDU Gascoyne Generating Station
7	Black Hills Wygen1 Boiler
8	Black Hills Wygen2 Boiler
9	Neil Simpson Unit 1 Boiler
10	Neil Simpson Unit 2 Boiler
11	Wyodak Boiler 1
12	KFX Fuel Partners Oil Heater 1
13	KFX Fuel Partners Oil Heater 2

TABLE 1
FIRST ANALYSIS CUMULATIVE MODELED CLASS I SO_2 INCREMENT CONSUMPTION IN NORTHERN CHEYENNE INDIAN RESERVATION (µg/m3)

Year of Meteorology	Highest 2nd-High 3-hour SO_2	Highest 2nd-High 24-Hour SO_2
2001	15.3	2.9
2002	15.1	4.0
2003	16.7	3.2
Class I PSD Increment	25	5

Notes:
PSD = Prevention of Significant Deterioration

µg/m^3 = micrograms per cubic meter

These results show no violations of the increment in the NCIR and were included as part of the permit application filed with the Wyoming DEQ for the Dry Fork Station.

Second Analysis, All Sources Modeled at Permitted Limits.

After Wyoming DEQ reviewed the permit application, they requested that a second analysis be done. They asked that this second analysis be performed with all of the sources, including Colstrip Units 3 and 4 modeled at permitted (not actual) levels. This analysis was performed even though applicable rules and EPA guidance don't prescribe that the consumption of increment be calculated in this manner.

The results of the second modeling analysis show the impacts exceed the allowable Class I increments in the NCIR. The highest 2nd-high 3-hour impact of 38.9 µg/m^3 was modeled with 2003 meteorology. This modeled impact is above the Class I PSD increment of 25 µg/m^3. For 24-hour impacts, the highest 2nd-high impact of 7.2 µg/m^3 was modeled with 2002 meteorology. This modeled impact is above the Class I increment of 5 µg/m^3. The results of the cumulative modeling are shown in Table 2. There were a total of nine days out of 1095 days (three years) when exceedances of the 24 hour Class I increment were modeled. The number of receptors that had elevated 24 hour SO_2 concentrations on any single day ranged from one (March 29, 2003) to thirteen (August 8, 2002). Taking into account all of these receptor locations on all of these nine days, there are a total of 47instances of modeled exceedances of the Class I Increment at NCIR.

The next step was to determine if Dry Fork was causing or contributing to these modeled increment violations. Contrary to Mr. Tran's assertion, it is standard practice sanctioned by EPA to use SILs in this situation to determine whether a source causes or contributes to an increment violation. In every case for these 47 modeled exceedances on these nine days the contribution of Dry Fork was below the SIL and many times it was zero. Therefore the contribution from Dry Fork to this alleged violation of increment is not significant and the Dry Fork Station is not causing or contributing to any increment exceedance in the NCIR.

TABLE 2
SECOND ANALYSIS CUMULATIVE MODELED CLASS I SO_2 INCREMENT CONSUMPTION IN NORTHERN CHEYENNE INDIAN RESERVATION ($\mu g/m^3$)

Year of Meteorology	Highest 2nd-High 3-hour SO_2	Highest 2nd-High 24-Hour SO_2
2001	37.8	5.2
2002	37.2	7.2
2003	38.9	5.1
Class I PSD Increment	25	5
Class Modeling Significance Level*	1.0	0.2

Notes:
PSD = Prevention of Significant Deterioration
$\mu g/m^3$ = micrograms per cubic meter

Exhibit 2, Table 1 presents the detailed receptor by receptor results of the second analysis on a 24 hour average basis. The table shows each day and each receptor within the NCIR when the cumulative modeled 24 hour average SO_2 concentration is greater than the 5 $\mu g/m^3$ increment. Also shown for each day and each receptor is the impact of the Dry Fork Station for that receptor on that day. For many of these instances the impact of Dry Fork is zero and in all cases it is below the SIL of 0.2 $\mu g/m^3$.

This demonstrates that Dry Fork did not cause or contribute to any exceedance of the 24 hr increment. These results do not include the highest modeled concentrations for each receptor since the 24-hr SO_2 Class I Increment is allowed to be exceeded at each receptor once per year.

We also evaluated whether the three hour increment was exceeded in the NCIR during this same three year period. Exhibit 2 Table 2 below presents the detailed receptor by receptor results of the three hour average analysis. The table shows each of the receptors within the NCIR and the days when the cumulative modeled three hour average SO_2 concentration is greater than 25 $\mu g/m^3$. Also shown for each day is the impact of the Dry Fork Station for that receptor and that three hour period.

There are 24 separate days within the 1095 day (three year) period where there were modeled three hour exceedances of the increment. The number of occurrences on each day ranged from one location for one three hour period to 25 total three hour periods at multiple locations. Taking into account all receptors for all three hour periods, there are a total of 111 instances of modeled exceedances of the three hour Class I increment at NCIR in the three year period. These results do not include the highest modeled concentrations for each receptor since the three hr SO_2 Class I Increment is allowed to be exceeded at each receptor once per year.

As before, CH2M HILL analyzed the contribution of Dry Fork to each of these three hour exceedances and in every one of the 111 cases the contribution of Dry Fork was less than the SIL. Dry Fork did not cause or contribute to any of these three hour exceedances.

These second analysis results show that even though cumulative exceedances of the three hour and 24 hour Class I increment were modeled, the Dry Fork Station impacts to each of these receptors on these days are well below the Class I SIL. Therefore, the Dry Fork Station does not cause or contribute to the modeled cumulative three hour 24-hr SO_2 increment exceedances.

Figure 2 shows the locations of the modeled 24-hr increment exceedances in relation to the Dry Fork Station Project. The blue dots represent the receptor locations within the NCIR that were modeled. The red dots represent those receptors where at least one exceedance was modeled on any 24 hour period during the three years. The green star shows the location of the Dry Fork Station located approximately 105-miles southeast of the NCIR Class I area. The pink sun is the location of the Colstrip Plant approximately 13 miles to the north of the NCIR. All of the cumulative modeled exceedances are clustered in a small area of the northern part of NCIR. This indicates that Colstrip is heavily contributing to the modeled exceedances in these receptors.

Meteorological Analysis of Second Model Results

To further understand these second modeling analysis results, we gathered meteorological data collected at the Gillette Campbell County Airport. These data were used to determine winds in the area of the Dry Fork project during the nine days on which cumulative modeling predicts exceedances of the 24 hour SO_2 increment.

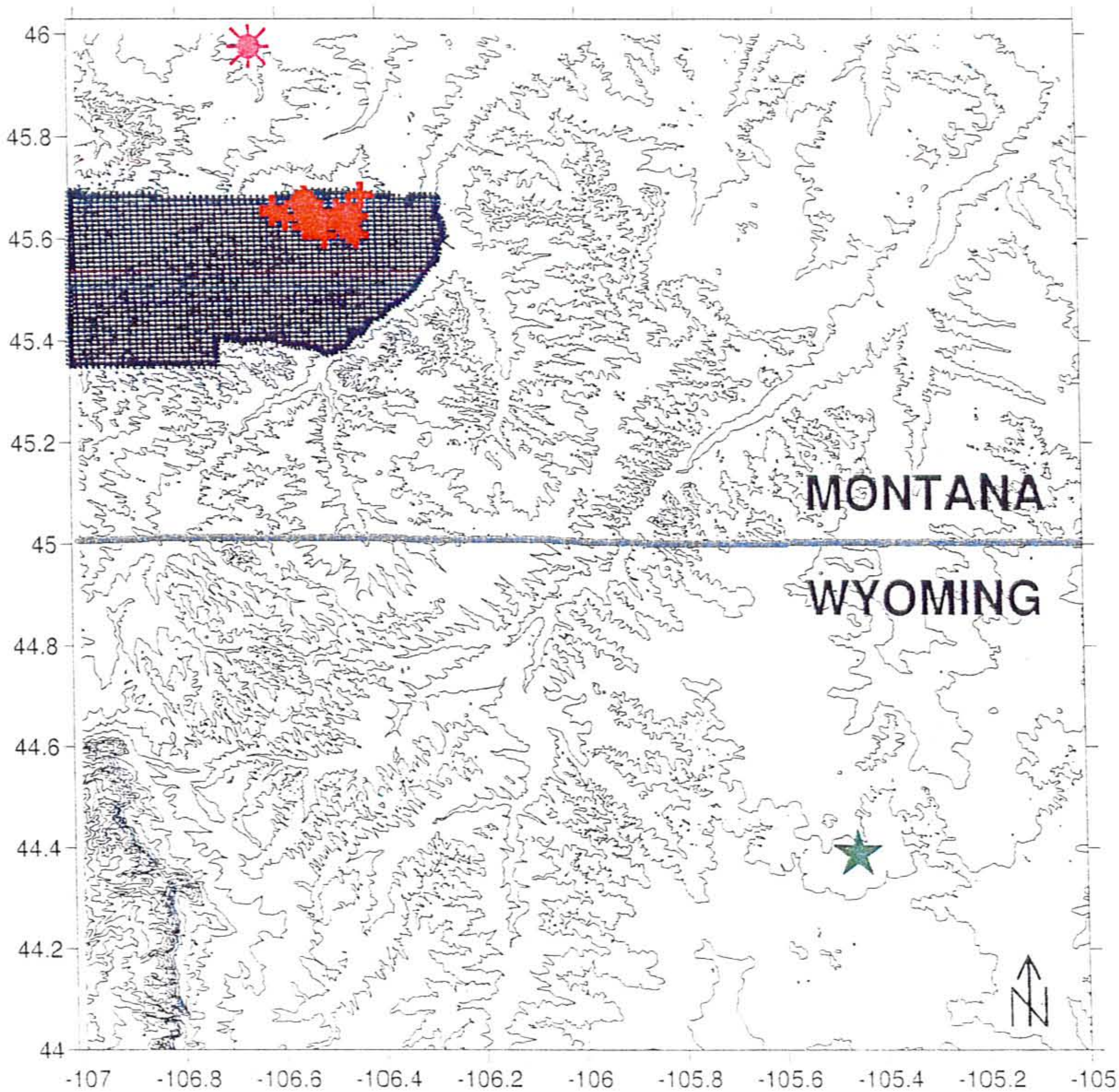
The Gillette Campbell Airport wind data demonstrate that the winds during the nine days of the modeled 24 hour exceedances do not blow from Gillette toward NCIR. Therefore, the winds do not blow the Dry Fork plume toward the NCIR for all or most of those days when 24 hour increment exceedances were modeled. On two of days the winds did blow from the southeast for a small part of the day (10 to 20%) but the general wind direction throughout the day carried the Dry Fork emissions away from the NCIR. The CALPUFF model took all of this into account in calculating the modeled concentrations at NCIR on these days. This meteorological evaluation explains and validates the model results that Dry Fork did not cause or contribute to modeled increment violations at NCIR.

Third Analysis, Colstrip 3 and 4 Modeled at Peak Actual

A third modeling analysis was conducted that used actual maximum daily SO_2 emission rates for Colstrip Units 3 and 4. Hourly SO_2 emissions for Colstrip Units 3 and 4 for the years 2004 and 2005 were obtained from the USEPA Clean Air Markets web site (EPA, 2007). Emissions for both units were combined for each hour. The maximum 24-hour combined emissions for 2004 and 2005 were used for the CALPUFF runs. This approach is the most conservative method that is consistent with EPA guidance since it assumes that the Colstrip Plant operates at its maximum emissions rate continuously for three years. This is the worst case scenario possible under the air quality regulations and EPA guidance. All other sources were modeled at their higher permitted emissions rates for the reasons noted above.

Table 3 compares the 90^{th} percentile Colstrip emission rates used in the first analysis to the peak actual emission rates used in the third analysis.

FIGURE 2
INCREMENT EXCEEDANCE LOCATIONS



Green Star = Dry Fork Station Site
Pink Sun = Colstrip Plant
Blue Shaded Area = NCIR
Red Highlighted Areas = Class I Increment Exceedance Locations.

TABLE 3
COMPARISON OF COLSTRIP SO_2 EMISSIONS IN FIRST AND THIRD ANALYSIS

Colstrip Unit	Modeled Emissions (lb/hr)	
	90th Percentile Actual Emissions Used in First Modeling Analysis	Highest Actual Emissions Used in Third Modeling Analysis
Unit 3	835.7	863.3
Unit 4	838.1	863.3

Table 4 presents the results of the third analysis. The 24-hour average SO_2 Class I increment is 5 µg/m³. Note that for both Colstrip Units 3 and 4 alone and for all sources combined, the highest 24-hour average SO_2 concentration at the highest receptor in the Northern Cheyenne Indian Reservation does not exceed the Class I increment of 5 µg/m³.

TABLE 4
RESULTS OF THIRD 24-HOUR SO_2 INCREMENT CONSUMPTION MODELING AT NCIR

Meteorological Year	24 Hour Highest Modeled Impacts at NCIR (µg/m³)*	
	From Colstrip Units 3 and 4 Alone	From All Sources
2001	4.33	4.69
2002	3.78	3.91
2003	3.81	4.08

* The Class I 24 hour SO_2 Increment is 5µg/m³

Conclusion

Because Dry Fork when modeled alone showed exceedances of the Class I three hour and 24 hour SILs within the NCIR we did cumulative modeling. The cumulative modeling was performed three different ways.

The two analyses that used actual emissions for Colstrip 3 and 4 demonstrated that the cumulative increment consumption at NCIR is below the allowed increments in the Northern Cheyenne Indian Reservation. This use of actual emissions is prescribed by air quality rules and EPA guidance for determining cumulative increment consumption. Air quality within the NCIR is being protected and no exceedance of the Class I increments is occurring.

The other cumulative analysis, requested by the WDEQ, was performed with all of the sources including Colstrip emitting at their permitted emissions levels and predicts modeled exceedances of the three hour and 24-hour Class I SO_2 increments within the NCIR for nine days (24 hour increment) and 24 days (three hour increment) out of the 1095 days modeled. The contribution of Dry Fork to the impacted receptors during these times is zero on many days and is below the Class I SILs on all days for both the three and 24 hour increments. Dry Fork does not cause or contribute to any violations of air quality standards in the NCIR.

Further, the receptors that experience exceedances are all clustered in a small area on the northern border of the NCIR. This indicates that Colstrip located to the north of NCIR is the cause of the modeled exceedances.

This is reinforced by the fact that the only emissions that changed between the three analyses were for Colstrip 3 and 4. When Colstrip was modeled at actual emissions no exceedances were seen. When Colstrip was modeled at permitted emissions exceedances were seen. Finally, the days when the exceedances were modeled in the second analysis were when the regional winds carried the Dry Fork emissions away from NCIR.

Dry Fork does not cause or contribute to any violations of air quality standards in the NCIR. If there is an issue here it involves a Montana source and a Montana Class I area. There is nothing the State of Wyoming can do to address this concern. Even if Dry Fork was not placed into operation, no change in these modeled increment violations by Colstrip would be seen at NCIR. This is strictly a Montana issue and Wyoming has nothing to do with it.

References

USEPA 2007. Clean Air Markets, Data and Maps, Emissions.
http://cfpub.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard

1

Pearson Exhibit 1

Exhibit 1

Curriculum Vitae

ROBERT L. PEARSON, Ph.D., PE

Vice President, Principal Technologist

Education

Ph.D., Remote Sensing of Natural Resources, Colorado State University, 1973.
M.S., Remote Sensing of Natural Resources, Colorado State University, 1971.
Professional Geophysical Engineer, Colorado School of Mines, 1968.

Professional Registrations/Certifications

Qualified Environmental Professional, Institute of Professional Practice (Air and Waste Management Association)
Registered Professional Engineer in Colorado (12582)

Experience

Vice President Energy and Industrial Systems CH2M HILL, Denver, Colorado, 2000 to present
Project Manager, URS-Radian, Denver, CO, 1994-2000.
Senior Staff Scientist, Radian Corporation, Denver, CO, 1992-1994.
Administrator, Environmental Affairs, Public Service Company of Colorado, Denver, CO, 1979-1992.
Senior Environmental Engineer, Public Service Company of Colorado, Denver, CO, 1973-1979.
Project Geophysicist, Chevron Oil Company, Geophysical Division, Los Angeles, CA and Houston, TX, 1968-1969.

Professional Societies

Air and Waste Management Association

Appointments

Colorado Water Quality Control Commission, 1983. Appointed by Governor Lamm for a three year term, confirmed by the Colorado Senate.
Colorado Plant Operator Certification Board, 1984. Appointed by Governor Lamm for a three year term.
Colorado Water Quality Control Commission, 1986. Appointed by Governor Lamm for a three year term, confirmed by the Colorado Senate.

Colorado Plant Operator Certification Board, 1987. Appointed by Governor Lamm for a three year term, Chairman, 1986-89.

Colorado Water Quality Control Commission, 1989. Appointed by Governor Romer for a three year term, confirmed by the Colorado Senate, Chairman 1988-91.

Governor's Blue Ribbon Panel on the Future of Health Care in Colorado, 1989. Appointed by Governor Romer.

Colorado Center of Environmental Management, 1992. Appointed by Governor Romer.

Grand Canyon Visibility Transport Commission, Public Advisory Committee, 1992. Appointed by Governor Romer.

National Coal Council, 2006 to present. Appointed by Secretary of Energy Samuel Bodman.

University Teaching Experience

Team teaching masters level course titled Air Quality Planning and Policy, URP 6686-002, Department of Urban and Regional Planning, College of Architecture & Planning, University of Colorado at Denver, 1995 to 2003.

Faculty Advisor, Regis University, 1996

Fields of Experience

Dr. Pearson is currently Vice President Energy and Industrial Systems and a Principal Technologist in the Denver office of CH2M HILL with responsibility for developing programs to respond to clients in all areas of environmental services with a particular emphasis to clients in the electric utility industry. Previously, he was a Project Manager in the Denver technical staff of Radian International responsible for the technical conduct of research and analysis projects for these clients. He has over 35 years of experience in environmental and technical engineering, regulatory review and assessment, preparation of industrial compliance policy, and environmental consulting. He has proven ability to work with clients to assess regulatory programs, define needs, and develop programs to satisfy those needs including getting needed constructions permits with acceptable terms and conditions on time. . His program administrative experience includes projects in electric and magnetic fields, air pollution control and assessment, water quality control, environmental permitting, and environmental research and development. Prior to joining Radian, Dr. Pearson was a nationally recognized expert concerning environmental issues in the electric utility industry. He was also a state water quality regulatory commissioner and commission chairman appointed by the governor, as well as a member and chairman of a water quality operator certification board, also governor appointed. He is also a member of the adjunct faculty of the University of Colorado, Denver campus, where he team teaches a masters level air pollution class.

Air Quality

- Participated as senior technical consultant for Phase 2 best available retrofit technology (BART) assessments for nineteen units at nine coal fired power plants for major electric utility companies in the West. These BART reviews consist of engineering assessments of feasible retrofit controls that could be added to these nine units. The BART reviews then assess the air quality impact of these candidate added controls on nearby Class I areas using the CALPUFF modeling approach. Dr Pearson also acted as project manager and senior consultant for reviewing the Phase I subject to BART analysis conducted for these nine coal fired units as well as two other coal fired industrial boilers.
- Since 2001, Dr. Pearson has managed or participated as senior review for the PSD air quality permitting of twelve coal fired power plant units at ten plants including: Springerville Units 3 and 4 (400 MW each) for Tucson Electric Power Company in Arizona (2001-2002), Council Bluffs Energy Center Unit 4 (750 MW) for MidAmerican Energy Company in Iowa (2003), Intermountain Power Project Unit 3 (950 MW) for Intermountain Power Agency in Utah (2003-4), Hunter Unit 4 for PacifiCorp (550 MW) in Utah (2003), Comanche Unit 3 (750 MW) for Xcel Energy in Colorado (2004), a confidential 500 MW unit for a confidential utility in a western state (2004), the re-permitting of a 500MW unit in a Western state to a smaller size to overcome environmental objections to the plant (we were not involved in the original permitting), the siting and permitting of a two unit coal fired fluidized combustion unit in a western state and the siting and licensing of a 500 MW cal fired power plant in a western state. Two of these plants are under construction (Springerville 3 and Council Bluffs 4) and one other(Intermountain Power Project Unit 3) has had its permit issued. In addition in 2004 we began the air permitting of a new 750 MW unit the Pawnee Station of Xcel Energy in Colorado that has now been deferred pending the Comanche Station getting further through the development process.

- Participating as senior review for the siting and environmental analysis for a new 350 to 500 MW coal fired unit for Dairyland Power Cooperative in Wisconsin. The work is to perform siting studies to locate candidate sites for this unit in either Wisconsin, Minnesota or Iowa and to perform the environmental impact studies for the Wisconsin Public Service Commission and the federal Rural Utilities Service.

- Managed a team to prepare air pollution permit applications for thirteen simple and combined cycle natural gas fired combustion turbines at eight sites along the Colorado Front Range. The application preparation process consisted of state of the science dispersion modeling using the long range EPA dispersion model CALPUFF in a screening and full option mode, Best Available Control Technology analysis and applicable regulatory analysis. To date, permits for seven machines were issued in the form requested by the applicant, permit applications for three machines are under review by the state health department and one application is in preparation. All applications resulted in permits with terms and conditions satisfactory to the applicants and all permitted facilities were built and are in operation

- Participated in the management of the state of the art Denver Brown Cloud Study. This two-phase study, lasting several years, contains two unique features. The first feature was a field receptor modeling study data collection program involving a receptor modeling study data collection program keyed to a coordinated fuel switch of 1,000 megawatts of electric generation in the urban area. The second unique feature was a follow-on application of the U.S. Environmental Protection Agency (EPA) Regional Acid Deposition Model scaled to the urban area modified to contain a light scattering visibility prediction component.

- Appointed by Governor Romer as one of four members representing the State of Colorado on the Public Advisory Committee of the Grand Canyon Visibility Transport Commission. The Commission, made up of the governors of eight western states, is charged by the Clean Air Act to evaluate and recommend solutions for any regional haze that may be affecting visibility in several national parks and wilderness areas in the West.

- Served as the chairman of the Quality Control Committee of the Front Range Air Quality Study commissioned by the Colorado Legislature in House Bill 95-1345. The committee directly reported to the Technical Advisory Panel that served as the executive steering committee for the $2 million study to be completed in October 1996. The study analyzed the current air pollution control strategies for their effectiveness and determined the relative contribution of various sources to the urban haze in the Denver area.

- Conducted a review of regional visibility monitoring tools in the Denver metropolitan area being used by the Denver Regional Air Quality Council. We used a neural network model to understand the interrelationships between meteorological and air quality variables and resulting visibility. Also evaluated the use of a SAQM AERO, a regional fine particle simulation model, to predict PM10 concentrations.

- Conducting an examination of the association between children living proximate to high traffic streets and the occurrence of childhood cancer and leukemia. The study is being conducted in Denver and Los Angeles.

- Conducted an analysis of greenhouse gas emissions for the Australian Government Greenhouse Gas Office. We provided a benchmark for Australian power plants of the state of the art of emissions reduction and energy efficiency of natural gas fired used in power plants in the United States and Europe. This information was used to gauge the possible level of improvement possible in the Australian plants to assist Australia meet its commitments under the Kyoto Protocol.

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Pearson Exhibit 2

Exhibit 2

Analysis of the Contribution of the Dry Fork Station to Modeled Increment Exceedances

TABLE 1
ANALYSIS OF THE CONTRIBUTION OF DRY FORK TO 24 HOUR AVERAGE INCREMENT EXCEEDANCES IN NCIR

Receptor Number	Cumulative Modeled Concentration (μ/m^3)* Class I Increment = 5 ($\mu g/m^3$)	Dry Fork Impact (μ/m^3) Class I SIL = 0.2 ($\mu g/m^3$)
	February 12, 2001	
1437	5.0300	0.1310
1552	5.2100	0.1340
	July 6, 2002	
1559	5.9700	0.0002
1560	5.9400	0.0002
1616	6.0700	0.0002
1673	6.1400	0.0002
	August 8, 2002	
1324	5.6000	0.0004
1329	5.0000	0.0005
1386	5.5700	0.0005
1438	5.2400	0.0004
1496	5.2200	0.0004
1501	6.1400	0.0005
1502	5.2500	0.0005
1552	5.6100	0.0004
1553	5.9200	0.0005
1558	5.6400	0.0005
1666	5.7700	0.0005
1722	5.1600	0.0005
1771	5.7300	0.0005
	August 12, 2002	
1443	5.3800	0.0000
1557	5.3300	0.0000
1614	6.2900	0.0000
	August 21, 2002	
1604	5.0000	0.0813
1661	5.0700	0.0766
	August 28, 2002	
1501	5.0200	0.0009
1502	5.1500	0.0009
1558	5.4000	0.0009
1559	5.6500	0.0009
1560	5.6400	0.0009
1614	5.5200	0.0008
1616	5.7800	0.0009
1673	5.9600	0.0008
	September 18, 2002	

TABLE 1 ANALYSIS OF THE CONTRIBUTION OF DRY FORK TO 24 HOUR AVERAGE INCREMENT EXCEEDANCES IN NCIR		
Receptor Number	Cumulative Modeled Concentration (μ/m³)* Class I Increment = 5 (μg/m³)	Dry Fork Impact (μ/m³) Class I SIL = 0.2 (μg/m³)
1549	5.5900	0.0000
1610	5.7000	0.0000
1667	5.1800	0.0000
1497	5.0700	0.0000
1724	5.5700	0.0000
	October 12, 2002	
1439	5.3200	0.0000
1440	5.3000	0.0000
1497	6.2800	0.0000
1498	5.1600	0.0000
1611	7.1500	0.0000
1724	6.1500	0.0000
1553	5.4100	0.0000
1610	5.3800	0.0000
1667	5.0500	0.0000
	March 29, 2003	
1821	5.0700	0.0000

*The modeled exceedance is either the High-2nd-high or High-3rd-high impacts above the increment standard. The High-1st-high above the standard is not an exceedence since the increment is allowed to be exceeded once per year per receptor..

TABLE 2 ANALYSIS OF THE CONTRIBUTION OF DRY FORK TO THREE HOUR AVERAGE INCREMENT EXCEEDANCES IN NCIR			
Time*	Receptor Number	Cumulative Modeled Concentration ($\mu g/m^3$) Class I Increment = 25 ($\mu g/m^3$)	Dry Fork Impact ($\mu g/m^3$) Class I SIL = 1 ($\mu g/m^3$)
February 11, 2001			
200	1263	34.6000	0.2850
1200	1379	36.7000	0.2750
1200	1436	29.4000	0.2690
1200	1437	37.8000	0.2690
1200	1495	26.6000	0.2640
1200	1551	25.9000	0.2580
1200	1552	35.9000	0.2590
1200	1609	25.2000	0.2530
1200	1610	26.7000	0.2530
1200	1611	28.0000	0.2540
1200	1666	25.9000	0.2480
April 22, 2001			
1200	1821	26.3000	0.0000
July 21, 2001			
600	1605	26.1000	0.0154
August 15, 2001			
0	1552	27.9000	0.0001
September 4, 2001			
600	1611	26.3000	0.0001
September 29, 2001			
300	1553	30.5000	0.0001
300	1666	32.5000	0.0001
300	1438	26.8000	0.0001
300	1496	27.1000	0.0001
300	1609	25.2000	0.0001
300	1552	27.1000	0.0001
600	815	25.9000	0.0000
600	924	26.7000	0.0000
600	979	27.7000	0.0000
600	1036	25.6000	0.0000
600	1037	27.0000	0.0000
600	1093	26.4000	0.0000
600	1149	26.9000	0.0000
600	1150	32.7000	0.0000
600	1206	33.1000	0.0000
600	1207	27.6000	0.0000
600	1262	28.7000	0.0000

TABLE 2 ANALYSIS OF THE CONTRIBUTION OF DRY FORK TO THREE HOUR AVERAGE INCREMENT EXCEEDANCES IN NCIR			
Time*	Receptor Number	Cumulative Modeled Concentration (μg/m^3) Class I Increment = 25 (μg/m^3)	Dry Fork Impact (μg/m^3) Class I SIL = 1 (μg/m^3)
600	1264	30.5000	0.0000
600	1321	30.0000	0.0000
600	1322	30.9000	0.0000
600	1380	35.3000	0.0000
600	1438	33.6000	0.0000
600	1496	28.0000	0.0000
600	1771	25.9000	0.0000
600	1553	27.9000	0.0000
		November 7, 2001	
600	1502	25.0000	0.0001
600	1558	25.7000	0.0001
		March 19, 2002	
1500	1604	25.0000	0.0001
		July 1, 2002	
300	1666	26.4000	0.0114
300	1771	27.2000	0.0105
		July 5, 2002	
300	1673	33.6000	0.0007
300	1559	29.9000	0.0007
300	1560	29.7000	0.0007
300	1616	31.9000	0.0007
600	1502	30.9000	0.0003
600	1559	34.6000	0.0003
600	1560	30.6000	0.0003
600	1616	32.0000	0.0003
600	1673	28.4000	0.0003
		August 7, 2002	
300	1441	29.9000	0.0003
300	1498	26.3000	0.0003
300	1611	35.1000	0.0003
300	1668	25.2000	0.0003
300	1724	28.3000	0.0003
1500	1771	27.5000	0.0008
1500	1722	25.7000	0.0008
1500	1724	27.3000	0.0008
		August 20, 2002	
1200	1605	25.2000	0.1420
		August 27, 2002	
600	1500	26.9000	0.0006
		September 6, 2002	
0	1666	26.2000	0.0121
600	1614	28.0000	0.0000
		September 17, 2002	

TABLE 2 ANALYSIS OF THE CONTRIBUTION OF DRY FORK TO THREE HOUR AVERAGE INCREMENT EXCEEDANCES IN NCIR			
Time*	Receptor Number	Cumulative Modeled Concentration (μg/m³) Class I Increment = 25 (μg/m³)	Dry Fork Impact (μg/m³) Class I SIL = 1 (μg/m³)
600	1380	30.1000	0.0000
600	1438	30.6000	0.0000
600	1496	27.7000	0.0000
600	1497	26.8000	0.0000
600	1552	37.2000	0.0000
600	1553	30.5000	0.0000
600	1609	25.7000	0.0000
600	1610	27.6000	0.0000
600	1666	31.2000	0.0000
600	1722	31.7000	0.0000
600	1724	25.5000	0.0000
October 1, 2002			
1200	1611	25.0000	0.0000
October 11, 2002			
300	1437	27.3000	0.0000
600	1499	32.4000	0.0000
October 21, 2002			
0	1611	28.7000	0.0000
February 14, 2003			
600	1322	26.3000	0.0079
600	1380	31.1000	0.0079
600	1438	33.5000	0.0080
600	1497	26.3000	0.0082
600	1724	28.7000	0.0082
600	1771	35.3000	0.0082
May 27, 2003			
0	857	29.0000	0.0003
0	912	26.3000	0.0004
0	913	30.3000	0.0004
0	969	25.4000	0.0004
June 22, 2003			
900	1667	25.7000	0.0000
900	1666	25.9000	0.0000
900	1722	27.8000	0.0000
1200	1611	26.3000	0.0000
July 3, 2003			
0	1379	26.3000	0.0000
0	1437	31.1000	0.0000
0	1495	27.2000	0.0000
0	1496	32.1000	0.0000
0	1552	38.9000	0.0000
0	1553	33.0000	0.0000
0	1609	30.5000	0.0000

TABLE 2
ANALYSIS OF THE CONTRIBUTION OF DRY FORK TO THREE HOUR AVERAGE INCREMENT EXCEEDANCES IN NCIR

Time*	Receptor Number	Cumulative Modeled Concentration (μg/m^3) Class I Increment = 25 (μg/m^3)	Dry Fork Impact (μg/m^3) Class I SIL = 1 (μg/m^3)
0	1610	28.6000	0.0000
0	1665	25.3000	0.0000
0	1666	32.2000	0.0000
0	1722	31.7000	0.0000
July 29, 2003			
600	1724	25.7000	0.0000
October 10, 2003			
300	697	27.6000	0.0005
600	492	27.6000	0.0008
600	593	26.1000	0.0007
600	645	26.4000	0.0007

* Time described on 24 hour clock where 600 means the three hour block ending at 6:00 AM
** The modeled exceedance is either the High-2nd-high or High-3rd-high impacts above the increment standard. The High-1st-high above the standard is not an exceedance since the increment is allowed to be exceeded once per year per receptor..