DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

Permit Application Analysis
AP-8794

June 29, 2009

NAME OF FIRM:	US Bentonite Processing, Inc. (USBP)
NAME OF FACILITY:	Bucknum Bentonite Plant
FACILITY LOCATION:	12050 Bucknum Road #3, Casper, WY 82604 Natrona County NW¼ Section 12, T35N, R82W 367,500 m E; 4,764,300 m N (UTM Zone 13, NAD 27)
TYPE OF OPERATION:	Bentonite Processing
RESPONSIBLE OFFICIAL:	Dave Kinghorn, Operations Manager
MAILING ADDRESS:	12050 Bucknum Road #3 Casper, WY 82604
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REVIEWERS:	Rita Piroutek, NSR Permit Engineer James (Josh) Nall, NSR Dispersion Modeler

PURPOSE OF APPLICATION:

On December 24, 2008, the Division received an application from US Bentonite Processing, Incorporated to modify the Bucknum R&D Bentonite Plant with the installation of one (1) 60 MMBtu/hr coal fired stoker furnace, two (2) rotary dryers, two (2) Raymond Mills with two (2) 8.0 MMBtu/hr propane burners, numerous baghouses, and renaming the Bucknum R&D Bentonite Plant to Bucknum Bentonite Plant. The Bucknum Bentonite Plant is located at 12050 Bucknum Road (County Road 125), Casper, Natrona County, WY.

Modeling files were submitted on February 5, 2009.

A coal laboratory analysis was received on March 10, 2009.

The final modeling analysis was received on April 15, 2009.

A letter was submitted April 27, 2009, summarizing changes to the original application.

A letter was submitted on June 25, 2009, proposing 27.0 lb/hr as combined NO_x limit for Dryer #1 and Dryer #2.

A map of the facility location is attached in Appendix A.

PERMIT HISTORY:

Air Quality Permit CT-6666 was issued on November 15, 2007 to authorize the construction of the Bucknum R&D Bentonite Plant with a portable rotary dryer and process equipment controlled by numerous baghouses to produce approximately 262,800 tons per year of bentonite product.

PROCESS DESCRIPTION:

Coal for the two (2) dryers is delivered by truck and unloaded inside into the coal hopper. From there the coal is transferred by conveyor to the stoker air heater.

Mined bentonite is transported by truck to the processing plant and stockpiled outside in two (2) stockpiles. From the stockpiles the bentonite is loaded by front loaders into one of two (2) crude feed hoppers. From the crude hoppers the bentonite is routed on conveyors through a cutter/lump breaker to one of two (2) rotary dryers at the facility. The two (2) dryers are supplied by heated air from the 60 MMBtu/hr coal fired spreader stoker air heater. After being dried, the bentonite is first routed through the resizing area equipped with two (2) scalping screens, or directly through six (6) parallel dry bins through a screen, depending on the bentonite's size. From there, it is routed to the reclaim bin, to Silo #1 or Silo #2 in the product storage area, or to one of two (2) Raymond Mills for milling and drying. After passing through the Raymond Mills, the bentonite is transferred to Silo #3 or Silo #4 in the product storage area. Bentonite from the four (4) silos in the product storage area is routed to the packaging area, bulk rail loadout area, or bulk truck loadout area. Bentonite routed to the packaging area is routed to the granular packaging or powder packaging. The finished products, powder and granular bentonite, are shipped in bulk by trucks or rail cars.

ESTIMATED EMISSIONS:

Dryers:

US Bentonite Processing, Inc. is proposing one (1) coal fired 60 MMBtu/hr coal fired stoker air heater to supply heated air to the two (2) rotary type dryers (DR1 and DR2). The major pollutants emitted from the two (2) dryers are particulate emissions (PM/PM_{10}), controlled with baghouses DR1-BH1 and DR2-BH1, nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO) and volatile organic compounds (VOC). Hazardous air pollutants (HAPs) including hydrogen chloride (HCl) and hydrogen fluoride (HF) will also be emitted.

Dryer PM/PM_{10} baghouse emissions are shown in Table 1.

Table 1: PM/PM_{10} Baghouse Emissions for Dryers #1 and #2								
Source ID	Baghouse Location	Material Processed	Quantity (tpy)	DCFM	Operating Hours	gr/dscf	PM/PM10	
							lb/hr	tpy
DR1-BH1	DR1	Crude Bentonite	175,000	17,500	8,760	0.005	0.8	3.3
		Coal	16,425		8,760			
DR2-BH1	DR2	Crude Bentonite	175,000	17,500	8,760	0.005	0.8	3.3
		Coal	16,425		8,760			

The 60 MMBtu/hr spreader stoker coal fired air heater will be fired with coal with a heating value of 16.0 MMBtu/ton and a sulfur content of 0.6%. Emissions from the two (2) dryers were calculated using emission factors from AP-42 Chapter 1.1 – *Bituminous and Subbituminous Coal Combustion* (September 1998), Table 1.1-3 for NO_x, CO and SO_2, and Table 1.1-19 for VOC. HCl and HF emissions were determined from the chloride and fluoride content of coal, determined through a coal analysis. Emissions from the two (2) dryers will be controlled by baghouses DR1-BH1 and DR2-BH1. Dryer emission factors for NO_x, CO, VOC, and SO_2 are shown in Table 2.

Table 2: Dryer Emission Factors (lb/ton coal)					
Source	Heat Input (MMBtu/hr)	NO_x	CO	VOC	SO_2
Spreader stoker heater	60.0	8.8	5.0	0.05	21.0

The emissions for the two (2) dryers are shown in Tables 3 and 4. US Bentonite Processing Inc. proposes a combined NO_x limit of 27.0 lb/hr for Dryer #1 and Dryer #2. This limit will allow one or the other dryer to operate above or below 30 MMBtu/hr, while the coal fired stoker air heater's design emission rate remains at 60 MMBtu/hr. The combined NO_x limit in lb/hr is based on an emission rate of 0.45 lb/MMBtu (see BACT analysis). All other lb/hr and tpy limits are for the combined operation of Dryer #1 and Dryer #2 with a combined 60 MMBtu/hr heat input rate of the air heater, but each dryer may operate at a rate above or below a 30 MMBtu rate. The lb/MMBtu emission rate is based on the assumption that both dryers operate at 30 MMBtu each.

Table 3: Estimated NOx, CO, and VOC Emissions from the Dryers									
Source	NO_x			CO			VOC		
	lb/MMBtu	lb/hr	tpy	lb/MMBtu	lb/hr	tpy	lb/MMBtu	lb/hr	tpy
Dryer #1 and Dryer #2	0.45	27.0	118.3	0.313	18.8	82.2	0.003	0.2	0.8

The SO_2 control efficiency is assumed to be 50% due to the alkaline properties of bentonite, which provides a natural control of SO_2. HCl and HF emissions were calculated from the chloride and fluoride content of the coal, assuming 90% of chloride and fluoride will be converted.

Table 4: Estimated SO_2, HCl, and HF Emissions from the Dryers							
Source	SO_2 [1]			HCl [2]		HF [2]	
	lb/MMBtu	lb/hr	tpy	lb/hr	tpy	tpy	lb/hr
Dryer #1 and Dryer #2	0.656	39.4	172.4	<0.01	0.04	0.06	0.24

[1] Emissions are based on 50% reduction due to alkaline nature of bentonite.
[2] HCl and HF emissions were calculated from the chloride and fluoride content of the coal, assuming 90% of chloride and fluoride to be converted.

Raymond Mills:

US Bentonite Processing, Inc. is proposing two (2) Raymond Mills controlled with baghouses. The two (2) Raymond Mills are equipped with 8.0 MMBtu/hr propane heaters for flash drying. The primary pollutants emitted from the Raymond Mills #1 and #2 are PM/PM_{10} emissions, which will be controlled by baghouses MI1-BH1 and MI2-BH1, and are shown in Table 5.

Table 5: PM/PM_{10} Baghouse Emissions for Raymond Mills #1 and #2								
Source ID	Baghouse Location	Material Processed	Quantity (tpy)	DCFM	Operating Hours	gr/dscf	PM/PM10	
							lb/hr	tpy
MI1-BH1	MI1 - Raymond Mill #1	Bentonite	175,000	15,000	8,760	0.005	0.6	2.8
MI2-BH1	MI2 - Raymond Mill #2	Bentonite	175,000	15,000	8,760	0.005	0.6	2.8

There will also be NO_x, CO, and VOC emissions from combustion from the two (2) 8.0 MMBtu/hr Raymond Mill propane burners. The emissions were calculated with emission factors from AP-42, Chapter 1.5 – *Liquid Petroleum Gas Combustion* (July 2008), Table 1.5-1 for commercial boilers, shown in Table 6, and a fuel consumption of 745,500 gal/yr. Due to the low sulfur content of propane, SO_2 emissions from the two (2) propane burners were deemed insignificant. Estimated emissions are shown in Table 7.

Table 6: Propane Burner Emission Factors (lb/10^3 gal)				
Source	Heat Input (MMBtu/hr)	NO_x	CO	VOC
Raymond Mills #1 and #2 propane burners	8.0	13.0	7.5	0.2

Table 7: Estimated Emissions from the Raymond Mills									
Source	NO_x			CO			VOC		
	lb/MMBtu	lb/hr	tpy	lb/MMBtu	lb/hr	tpy	lb/MMBtu	lb/hr	tpy
Raymond Mill #1	0.138	1.1	4.8	0.075	0.6	2.8	0.021	0.2	0.7
Raymond Mill #2	0.138	1.1	4.8	0.075	0.6	2.8	0.021	0.2	0.7

Baghouses:

There are numerous baghouses at the facility which control various transfer points throughout the plant and loading operations. The major pollutants emitted from the baghouses are particulate matter. All baghouses have an outlet grain loading of 0.005 gr/dscf and are venting to the atmosphere or inside buildings. The baghouses are listed in Table 8.

Table 8: Baghouse Locations		
Source	**Vent to Atmosphere**	**Vent Inside Building**
Coal Delivery	CS1-BH1	-
Crude Hoppers #1 and #2	CF1-BV1, CF2-BV1	-
Dryer #1 and #2	DR1-BH1, DR2-BH1	-
Dryer Bypass Conveyors #1 and #2	-	DR1-BH2, DR2-BH2
Dry Bins #1 through #6	-	BV-DB1, BV-DB2, BV-DB3
Resizing	-	SC-NU2
Screen	-	SC-NU1
Raymond Mills #1 and #2	MI1-BH1, MI2-BH1	MI1-NU1
Packaging & Powder Product Storage Building (Silo #3 and #4)	PS-BV1	-
Packaging & Granular Product Storage Building (Silo #1 and #2)	PS-BV2	-
Powder Packaging	-	MI1-NU2
Bulk Truck Loadout	-	BT1-BH1
Bulk Rail Loadout #1 and #2	BR1-BH1, BR2-BH1	-

Particulate emissions for the baghouses venting to the atmosphere were determined with 8,760 hours of operation per year. Table 9 lists the emissions for the baghouses venting to the atmosphere, except baghouses DR1-BH1, DR2-BH1, MI1-BH1 and MI2-BH1.

Table 9: PM/PM_{10} Baghouse Emissions for Baghouses Venting to Atmosphere								
Source ID	**Baghouse Location**	**Material Processed**	**Quantity (tpy)**	**DCFM**	**Operating Hours**	**gr/dscf**	**PM/PM10**	
							lb/hr	**tpy**
CF1-BV1	CF1 - Crude Feed #1	Crude Bentonite	210,000	2,250	8,760	0.005	0.1	0.4
CF2-BV1	CF2 - Crude Feed #2	Crude Bentonite	210,000	2,250	8,760	0.005	0.1	0.4
CS1-BH1	CS1 - Coal Delivery Building	Coal	43,800	2,250	8,760	0.005	0.1	0.4
PS-BV1	PS - Powder Product Storage Building	Packaged Bentonite	350,000	1,350	8,760	0.005	0.1	0.3
PS-BV2	PS - Granular Product Storage Building	Packaged Bentonite	350,000	1,350	8,760	0.005	0.1	0.3
BR1-BH1	BR1 - Bulk Rail Loadout	Bentonite	350,000	3,150	8,760	0.005	0.1	0.6
BR2-BH1	BR2 - Bulk Rail Loadout	Bentonite	350,000	3,150	8,760	0.005	0.1	0.6
Total Baghouse Venting to Atmosphere Emissions							0.7	3.0

Tanks:

The primary pollutant emitted from the storage of diesel fuel and gasoline in storage tanks are VOCs. US Bentonite Processing, Inc. proposes to install four (4) diesel storage tanks and one (1) gasoline storage tank. Emission estimates from these tanks were calculated using EPA Tanks Program Version 4.09d. This program takes into account the construction of the tanks and the contents to be stored to estimate the emissions. Emissions from the tanks are shown in Table 10.

Table 10: Storage Tank VOC Emissions				
Source ID	**Tank**	**Throughput (gal/yr)**	**lb/hr**	**tpy**
D1	6,000 gal Diesel Tank	12,000	<0.1	<0.1
D2	6,000 gal Diesel Tank	12,000	<0.1	<0.1
D3	6,000 gal Diesel Tank	12,000	<0.1	<0.1
D4	6,000 gal Diesel Tank	12,000	<0.1	<0.1
G1	2,000 gal Gasoline Tank	10,000	0.1	0.4
Total Tank Emissions			**0.1**	**0.4**

Haul Road:

The primary pollutants emitted from the haul roads are PM/PM_{10} emissions, which will be controlled by monthly applications of a chemical dust suppressant and additional water application as necessary to prevent dust. The control efficiency is assumed to be 80% for a monthly application of chemical dust suppressant. The emissions were estimated with emission factors from AP-42, Chapter 13.2.2 (November 2006) – *Unpaved Roads*, equation (1a).

Stockpiles:

Material handling emissions associated with the storage piles includes adding bentonite to the two (2) storage piles by dropping the bentonite from trucks onto the storage pile (batch drop operation) and removing it from the storage piles by front loaders into one of two (2) crude feed hoppers. The material handling emissions were calculated with equation 1 from AP-42 Section 13.2.4 (November 2006) - *Aggregate Handling And Storage Piles*- assuming a material moisture content of 20%, and a wind speed of 12 mph at the location.

Stockpile emissions for two (2) raw bentonite stockpiles determined with emission factors from the EPA publication *Control of Open Fugitive Dust Sources* (EPA-450/3-88-008), for the raw bentonite with a moisture content of 20%, assuming 90 days of precipitation >0.01 in, a stockpile size of 259,200 tons, and assuming 90% control efficiency, as allowed by AP-42, Section 13.2.4.4 for watering and chemical application of stockpiles and roadways.

Table 11 shows the emissions from the Bucknum Bentonite Plant, permitted with Air Quality Permit CT-6666.

Table 11: Permitted Emissions Bucknum Bentonite Plant								
Source	NO_x		CO		TSP		PM_{10}	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Baghouses/Bin Vents BH-1, BH-2, BH-3, BV-1, BV-2, BV-3, BV-4, BV-5	Insignificant (vented indoors)							
Haul Road	-	-	-	-	0.9	3.8	0.3	1.4
Portable Dryer [1]	3.8	16.4	0.9	3.7	Insignificant		1.5	6.6
Total Existing Emissions	**3.8**	**16.4**	**0.9**	**3.7**	**0.9**	**3.8**	**1.8**	**8.0**

[1] Emissions estimated based on information provided by applicant for application AP-6162.

Table 12 shows the proposed emissions for the Bucknum Bentonite Plant.

Table 12: Emission Summary Bucknum Bentonite Plant[1]

Source	NO_x		CO		TSP		PM_{10}		VOC		SO_2 [2]		HCl		HF	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Existing Emissions from Permit CT-6666																
Existing Emissions	**3.8**	**16.4**	**0.9**	**3.7**	**0.9**	**3.8**	**1.8**	**8.0**	-	-	-	-	-	-	-	-
Proposed Emissions from Point Sources																
Baghouses [3]	-	-	-	-	0.7	3.0	0.7	3.0	-	-	-	-	-	-	-	-
Portable Dryer (remove)	-3.8	-16.4	-0.9	-3.7	Insignificant		-1.5	-6.6	-	-	-	-	-	-	-	-
Dryer 1 (install)	27.0	118.3	18.8	82.2	-	-	-	-	0.2	0.8	39.4	172.4	<0.01	0.04	0.06	0.24
Dryer 2 (install)					-	-	-	-								
Baghouse DR1-BH1 (install)	-	-	-	-	0.8	3.3	0.8	3.3	-	-	-	-	-	-	-	-
Baghouse DR2-BH1 (install)	-	-	-	-	0.8	3.3	0.8	3.3	-	-	-	-	-	-	-	-
Raymond Mill #1 (install)	1.1	4.8	0.6	2.8	-	-	-	-	0.2	0.7	-	-	-	-	-	-
Baghouse MI1-BH1 (install)					1.3	5.6	1.3	5.6	-	-	-	-	-	-	-	-
Raymond Mill #2 (install)	1.1	4.8	0.6	2.8	-	-	-	-	0.2	0.7	-	-	-	-	-	-
baghouse MI2-BH1 (install)					1.3	5.6	1.3	5.6	-	-	-	-	-	-	-	-
Tanks	-	-	-	-	-	-	-	-	0.1	0.4	-	-	-	-	-	-
Proposed Fugitive Emissions																
Haul Road (modified)	-	-	-	-	-0.9	-3.8	-0.3	-1.4	-	-	-	-	-	-	-	-
Haul Road (modified)	-	-	-	-	-	27.5	-	7.0	-	-	-	-	-	-	-	-
Stockpiles	-	-	-	-	0.9	3.9	0.9	3.9	-	-	-	-	-	-	-	-
Material Handling					<0.1	<0.1	<0.1	<0.1								
Emissions Change	**25.4**	**111.5**	**19.1**	**84.1**	**4.9**	**48.4**	**4.0**	**23.7**	**0.7**	**2.6**	**39.4**	**172.4**	**<0.01**	**0.04**	**0.06**	**0.24**
Total Emissions	**29.2**	**127.9**	**20.0**	**87.8**	**5.8**	**52.2**	**5.8**	**31.7**	**0.7**	**2.6**	**39.4**	**172.4**	**<0.01**	**0.04**	**0.06**	**0.24**

[1] Rounded to the nearest 0.1 ton, and based on 8,760 annual operating hours.
[2] SO_2 emissions assuming 50% control efficiency due to the alkaline nature of bentonite.
[3] Baghouses CF1-BV1, CF2-BV1, CS1-BH1, MI1-BH1, MI2-BH1, PS-BV1, PS-BV2, BR1-BH1, BR2-BH1 modified to vent to the atmosphere.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT):

PM:

Baghouses:

US Bentonite Processing proposes that all baghouses shall have an outlet grain loading of 0.005 gr/dscf. The Division considers an outlet grain loading of 0.005 gr/dscf to represent BACT for baghouses.

Fugitive emissions from the work areas and unpaved roads will be controlled by a monthly application of chemical dust suppressants. As stated in AP-42,"Past field testing of emissions from controlled unpaved roads has shown that chemical dust suppressants provide a PM-10 control efficiency of about 80 percent when applied at regular intervals of 2 weeks to 1 month." The Division considers the use of a chemical dust suppressant applied on a monthly basis, with the first monthly application of a 30% solution of magnesium chloride at a rate of 0.5 gallon per square yard and following applications to be reduced to 0.3 gallon per square yard, on the work areas and unpaved roads as representing BACT for control of fugitive particulate matter associated with vehicle and equipment traffic.

Stockpiled bentonite has a moisture content of 20-30%.

NO_x:

Dryers:

The BACT review process identifies theoretically possible control technologies for the control of NO_x emissions from the 60 lb/MMBtu bentonite dryers and eliminate not technically feasible options. The remaining options are reviewed in terms of emission reduction potential and energy, environmental, and economic consideration.

A. Identify Control Options

Methods to minimize formation of NO_x during the combustion process include:

- Low-NO_x Burners
- Exhaust Gas Recirculation (EGR)
- Combustion Optimization
- Combustion Reburn
- Low NO_x Injector Systems
- NO_x Tempering

Methods to reduce NO_x after the combustion process include:

- Selective Catalytic Reduction (SCR)
- Selective Non-Catalytic Reduction (SNCR)

EGR recirculates a portion of relatively cool exhaust gases back into the combustion process in order to lower the flame temperature and reduce NOx formation.

Low-NO_x burners control the formation of NO_x by reducing peak flame temperatures, and residence time which is the main cause of NO_x formation during combustion. The most common forms of low-NO_x burners are staged air or staged fuel burners.

Combustion optimization to lower NO_x production include operational parameters to create conditions that will lower the NO_x production, including burners out of service (BOOS), low excess air (LEA), and biased firing (BF). In BOOS, selected burners are removed from service by stopping fuel flow while maintaining the air flow to create a staged combustion in the furnace. LEA reduces air levels for combustion to the lowest possible ration without interfering with good combustion. BF involves injecting more fuel to some burners to create a staged combustion.

Combustion reburn destroys NO_x through chemically reducing conditions shortly after it is formed rather than minimizing its formation. This process accomplished in three zones. The main combustion zone is a normal air-to fuel ratio environment. In the second zone (reburn zone) the reburn fuel is injected into the dryer above the main burner region. Any fuel can be used, but natural gas is the most common used fuel. This fuel-rich environment reacts with and destroys NO_x formed in the main combustion zone. Over Fire Air (OFA) is injected above the reburn zone to complete the combustion.

Low NO_x injector systems, also called Dry Emissions Reduction Combustors (DER), utilize staged combustion and fuel-air mixing to lower the NO_x emissions without injection of water or steam to achieve a lean fuel/air mixture. The lean mixture results in a cooler flame temperature.

NO_x tempering reduces NO_x emissions by using injection equipment to deliver a cooling medium (usually water) directly into the high NO_x production zones to reduce NO_x formation temperatures in the near burner zone and therefore reducing the amount of NO_x produced.

Selective Catalytic Reduction (SCR) is a post-combustion NO_x control technology that reduces NO_x emissions by injecting ammonia into the exhaust gas stream upstream of a catalyst. The ammonia reacts with NO_x on the catalyst to form molecular nitrogen and water vapor. There are a number of catalysts available, including vanadium, titanium, tungsten, and various metal oxides, that can be used in a temperature range between 350 and 1,100 °F depending on the catalyst type used.

Selective non-catalytic reduction (SNCR) reduces NO_x emissions by injection of ammonia or urea into the exhaust gas stream. SNCR is similar to SCR in that both systems use ammonia to react with nitrogen; however, SNCR operates at higher temperatures than SCR and does not use a catalyst. The optimum temperature range for SNCR is between 1,100 and 1,400 °F.

B. Evaluate Control Technologies and Eliminate Technically Infeasible Options

The recirculation of a portion of cooled exhaust gases back to the combustion zone will lower the flame temperature and reduce NOx formation. US Bentonite Processing, Inc. will use a portion of the exhaust gas to transport the coal to the stoker air heater at the facility.

Combustion Optimization and low-NO_x burners can reduce NO_x emissions up to 40% from uncontrolled levels depending on the type of equipment and the type of fuel. These methods are not feasible for stoker type bentonite dryers.

Combustion reburn can reduce NO_x emissions up to 60% depending on the percentage of reburn fuel heat input, reburn fuel type and quanity, the initial NO_x level and combustion chamber design. The method can be best controlled with natural gas as reburn fuel, and is not feasible for stoker type bentonite dryers.

DER and NO_x tempering can reduce NO_x emissions in the premixed zone by up to 35%. These control methods use a cooling medium (air or water) to cool the temperature in the combustion zone. Because the bentonite dryers operate in lower range combustion temperatures these methods do not achieve large temperature drops and therefore are not effective as NO_x control methods for bentonite dryers.

The utilization of SCR and SNCR are based on the same principle of adding ammonia or urea to the exhaust gas to reduce NO_x emissions by up to 90%. The storage and use of ammonia, which is a toxic air pollutant, has to be considered. Operating the SCR and SNCR requires the use of excess ammonia which does not react with the NO_x and passes through the unit. This "ammonia slip" in the exhaust gas can contribute to formation of ammonium sulfates and negatively affect regional visibility. The catalyst disposal or regeneration also causes additional negative impacts on the environment.

The applicant did not review add-on control methods such as SCR and SNCR for this application.

B. Select BACT (Conclusion)

The Division reviewed the BACT/RACT/LEAR Clearinghouse and did not find an application that used an SCR control device on a dryer in the bentonite industry. The Division also reviewed the emission rate of other coal fired dryers in Wyoming and considers an emission rate of 0.45 lb/MMBtu for coal fired dryers as representing BACT. According to the applicant, there are no NO_x emission rates available from the manufacturer for the bentonite dryers. The applicant is not willing to commit to a lb/MMBtu limit until the initial performance testing of the dryers is done, but proposes a combined NO_x limit of 27.0 lb/hr for Dryer #1 and Dryer #2. This combined NO_x limit in lb/hr is based on an emission rate of 0.45 lb/MMBtu. This limit will allow one or the other dryer to operate above or below 30 MMBtu/hr, while the stoker air heater's emission rate remains at 60 MMBtu/hr. If the initial performance testing cannot show a compliance with 0.45 lb/MMBtu, the Division will require US Bentonite Processing, Inc. to install continuous emission monitoring (CEM) equipment in both dryer stacks to demonstrate continuous compliance with the NO_x limits in lb/hr. The Division considers a NO_x emission rate of 0.45 lb/MMBtu or the installation of CEM equipment to represent BACT for the two (2) dryers.

Raymond Mill:

The NO_x emission rate for the two (2) propane fired Raymond Mills is 0.138 lb/MMBtu. The Division considers these burners as representing BACT for heaters this size.

<u>SO_2:</u>

Bentonite Dryers:

Current SO_2 technologies include wet or dry scrubbing. Wet scrubber is an add-on technology in which a liquid sorbent, in most cases an alkaline slurry of limestone, is sprayed into the flue gas in an absorber vessel. The SO_2 comes into direct contact with the liquid sorbent and is dissolved or diffused (scrubbed) into the liquid, and a slurry is produced. In the dry scrubber process, hydrated lime is injected directly into a circulating fluid bed reactor. Flue gas enters the bottom of the vessel and exits the top. Both are considered cost prohibitive in the bentonite industry. The Division reviewed the BACT/RACT/LEAR Clearinghouse and did not find any applications that listed SO_2 control devices for coal fired dryers in the bentonite industry.

The bentonite absorbency is considered a natural scrubber for SO_2 due to the minerals contained in the clay. Depending on the quality and reactivity of the bentonite, the absorbancy has been shown to reduce SO_2 emissions over 50 % at existing facilities in the State of Wyoming. The Division considers the bentonite absorbency as representing BACT.

CHAPTER 6, SECTION 3 – MAJOR SOURCE APPLICABILITY:

Nitrogen oxide (NO_x) and sulfur dioxide (SO_2) emissions from the Bucknum Bentonite Plant exceed 100 tpy. Therefore, US Bentonite Processing, Inc. shall obtain an operating permit in accordance with Chapter 6, Section 3 of the Wyoming Air Quality Standards and Regulations (WAQSR).

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPs):

The Bucknum Bentonite Plant is not a major source of HAPs as defined by the WAQSR, as HAP emissions are less than 10 tpy of any individual HAP, or 25 tpy of any combination of HAPs. Sources that have the potential to emit less than 10 tpy of a single HAP or less than 25 tpy of a combination of HAPs are defined as area sources. The Bucknum Bentonite Plant is therefore considered an area source of HAP.

PREVENTION OF SIGNIFICANT DETERIORATION (PSD):

No air pollutant is emitted at a rate of 250 tpy or more. Therefore, the Bucknum Bentonite Plant is not a "major emitting facility" as defined by Chapter 6, Section 4 of the Wyoming Air Quality Standards and Regulations. Further analysis is not required under this section.

CHAPTER 5, SECTION 2 – NEW SOURCE PERFORMANCE STANDARDS (NSPS):

40 CFR part 60, subpart OOO - *Standards of Performance for Nonmetallic Mineral Processing Plants* – (April 28, 2009 revision) applies to each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station at a nonmetallic mineral processing plant. Therefore, all baghouses except the bentonite dryer baghouses (DR1-BH1 and DR2-BH1) are subject to 40 CFR part 60, subpart OOO. This standard applies to the two (2) Raymond Mills, bentonite processing equipment, bentonite conveyor belts, silos, and enclosed railcar and truck loadout loadout. All stacks shall meet a fugitive opacity limit of 10. All fugitive emissions from building openings shall meet a fugitive opacity limit of 7%. Fugitive emissions for crushers are limited to 15% if a capture system is used.

The two dryers (DR1 and DR2) at this facility are subject to 40 CFR, Part 60, Subpart UUU - *Standards of Performance for Calciners and Dryers in Mineral Industries* - which limits the particulate emissions from the two (2) 17,500 dscfm dryer baghouses to 10% opacity. Subpart UUU allows the operator of a bentonite dryer to use a certified visible emissions observer measure and record three six minute averages of the opacity or visible emissions to the atmosphere each day of operation in accordance with Method 9 of Appendix A of part 60 instead a continuous opacity monitoring system.

40 CFR part 60, subpart Y "*Standards of Performance for Coal Preparation Plants*" applies to dryers, coal processing and conveying equipment, coal storage systems, and coal transfer systems which process more than 200 tons per day. The Bucknum Bentonite Plant has a design capacity of 30 tons per day. Therefore, the Bucknum Bentonite Plant is not subject to Subpart Y.

PROJECTED IMPACT ON EXISTING NEAR-FIELD AMBIENT AIR QUALITY:

Model Selection

The EPA-preferred dispersion model for source-receptor distances of less than 50 kilometers (near-field) is a model developed by a working group called the AMS/EPA Regulatory Model Improvement Committee (AERMIC). The product of this workgroup's efforts, the AERMIC Model (AERMOD), was chosen by the EPA to replace ISC as the preferred near-field model in 2006, as described in Appendix W of 40 CFR Part 51, also known as the EPA's Guideline on Air Quality Models (GAQM).

Several components of AERMOD represent improvements over those contained within the ISC model, including the advanced treatment of turbulence/dispersion in the planetary boundary layer, plume interaction with terrain, and building downwash. The AERMOD modeling system consists of two preprocessors and a dispersion model. The two preprocessors are: 1) the AERMET meteorological preprocessor, and 2) the AERMAP terrain and receptor grid preprocessor.

The applicant used version 07026 of AERMOD to evaluate potential concentrations of nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter with diameter less than 10 microns (PM_{10}) for comparison to the Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS). The Division reviewed the applicant's model runs to verify proper model setup. Modeling results reported here were obtained from the Division's verification model runs. All model runs used the EPA-recommended regulatory default options for AERMOD:

- No exponential decay
- Elevated terrain effects
- Stack-tip downwash
- Calms processing
- Missing meteorological data processing

Meteorological Data

The meteorological data used to drive AERMOD consisted of 2002-2006 surface data collected at the National Weather Service (NWS) station at the Casper Natrona County Airport, located approximately 18 kilometers (km) southeast of the proposed plant. Upper-air data collected at the NWS station at Riverton Wyoming were combined with the surface data using AERMET. All data were processed with the latest version (06341) of AERMET.

Stage 3 of AERMET processing (also called the METPREP stage) requires the input of surface characteristics of the area from which the surface meteorological data were collected. These surface characteristics, which are used by AERMET in combination with the parameters measured at the NWS station to determine heat fluxes and atmospheric stability, include:

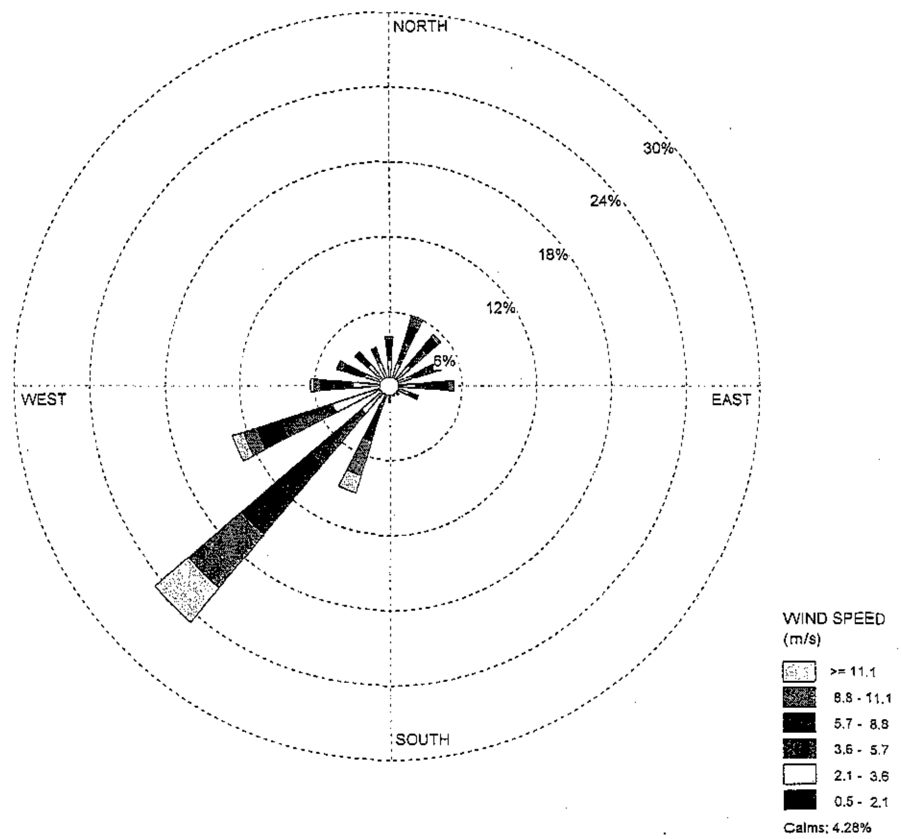
- midday albedo – fraction of solar radiation reflected at the surface
- daytime Bowen ratio – indicator of surface moisture
- surface roughness length – height of obstacles to the wind flow

Seasonal values of albedo, Bowen ratio, and surface roughness for twelve 30-degree sectors surrounding the measurement site (Casper Airport) were determined using the EPA AERSURFACE program (08009). This program, which was released in January of 2008, makes use of electronic land cover data from the U.S. Geological Survey to automatically calculate surface characteristics for a given modeling domain. An AERSURFACE user has the option of choosing Bowen ratios that are tailored for dry, average, or wet conditions. For this project, the Division compiled monthly precipitation data for 2002-2006 from the Casper airport to compare to long-term averages. Any seasonal total that was less than 50% of the seasonal average was classified as "dry". Similarly, any season for which precipitation was greater than 200% of the long-term average was classified as "wet". Specifically for this project, dry conditions were input to AERSURFACE for the winters of 2002, 2004, and 2005. Wet conditions were chosen for the summer of 2003. All other seasons were aligned with "average" conditions.

Seasonal classifications for the twelve months of the year followed the standard AERMET/AERSURFACE breakdown (e.g. spring = March, April, and May only). The study radius for surface roughness was set to the default value of 1 kilometer (km). A wind rose for the 2002 data is presented below.

Casper Wind Rose for 2002

WIND ROSE PLOT:	DISPLAY:
Casper SFC + RIW UA	Wind Speed Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2002 Jan 1 - Dec 31 00:00 - 23:00	MODELER:	
	CALM WINDS: 4.28%	TOTAL COUNT: 8716 hrs.	
	AVG. WIND SPEED: 5.56 m/s	DATE 5/30/2008	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Background Concentrations

Output from the AERMOD model was compared to the WAAQS/NAAQS after the addition of background concentrations to represent all emission sources that were not explicitly modeled. The Division approved the background levels listed in the table below for use with this analysis.

Table 13: Background Concentrations

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)
NO_2	Annual	14
PM_{10}	24-Hour	40
	Annual	18
SO_2	3-Hour	93
	24-Hour	32
	Annual	4

Notes:
NO_2 value is annual average from Belle Ayr Mine in Powder River Basin (PRB)
PM_{10} values are second highest or annual average measured at Antelope Mine (PRB)
SO_2 values are second highest or annual average measured at Lost Cabin Gas Plant

Receptor Grid

The base receptor grid for the dispersion modeling analysis was a discrete Cartesian grid that included 2,656 receptors distributed as follows:

- 50-meter (m) spacing along the ambient air boundary of the proposed facility
- 10-m spacing for selected areas beyond the ambient boundary near the main processing area
- 100-m spacing to a distance of approximately one kilometer (km) in each cardinal direction beyond the ambient boundary
- 500-m spacing to a total distance of approximately 5 km beyond the 100-m grid
- 1000-m spacing to a total distance of approximately 10 km beyond the 500-m grid

Because of uncertainty on the part of USBP in the exact shape of the fenceline that will surround the proposed facility, the ambient boundary receptors used for the Division's modeling include some receptors that may be located within the fenceline of the facility. Based on the information provided to the Division by USBP, the Division believes that the ambient boundary receptors used in the modeling described here provide a conservative estimate of the ultimate shape of the ambient boundary (fenceline).

Receptor elevations and hill heights for input to AERMOD were determined from electronic data contained in USGS 7.5-minute Digital Elevation Model (DEM) files using EPA's AERMAP (06341) program. Source and building base elevations were taken from construction plans. The base receptor grid configuration and the terrain patterns for the modeling domain, as generated from AERMAP output, are shown in the figures below.

Figure 1 – Receptor Configuration

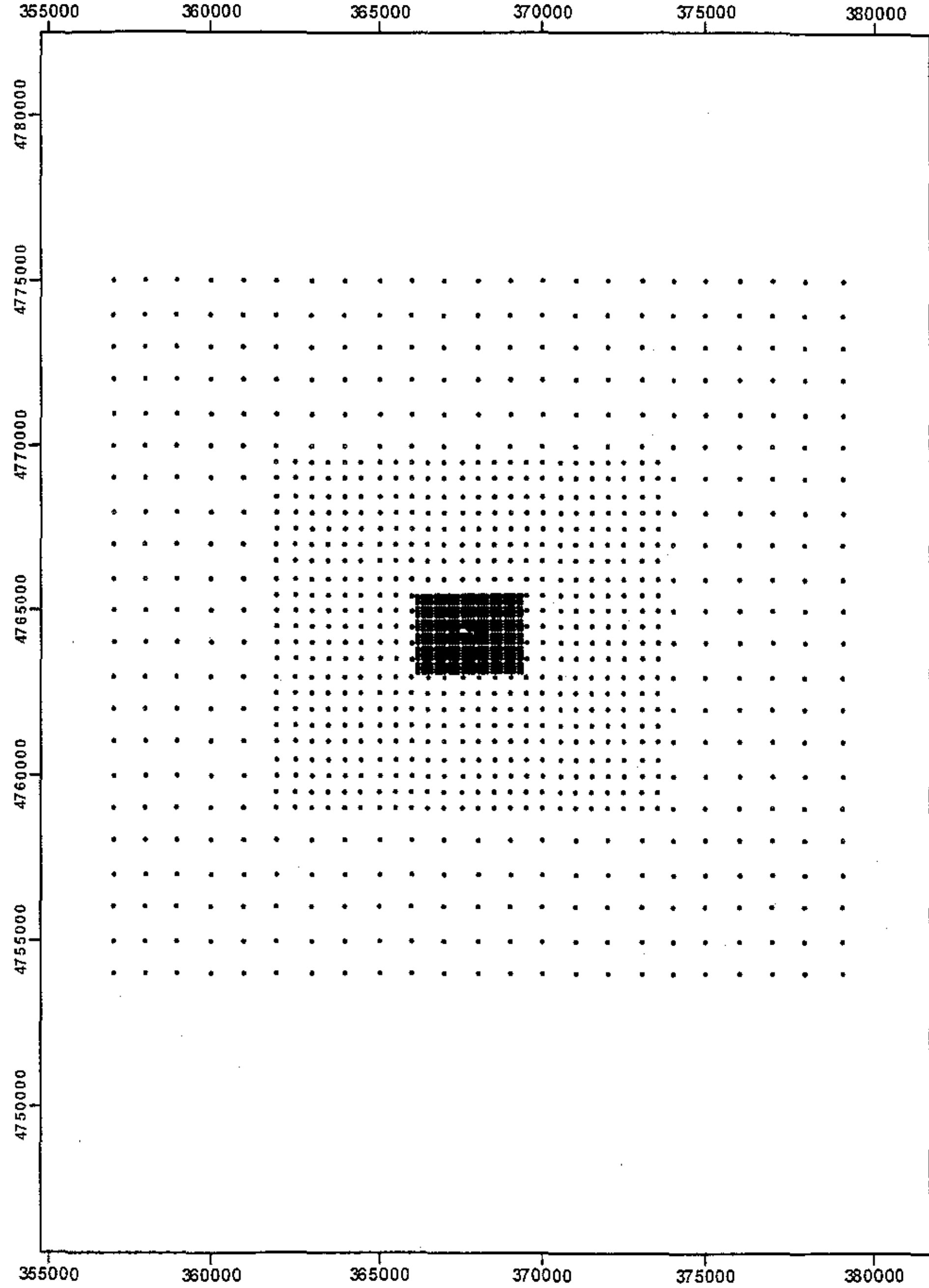
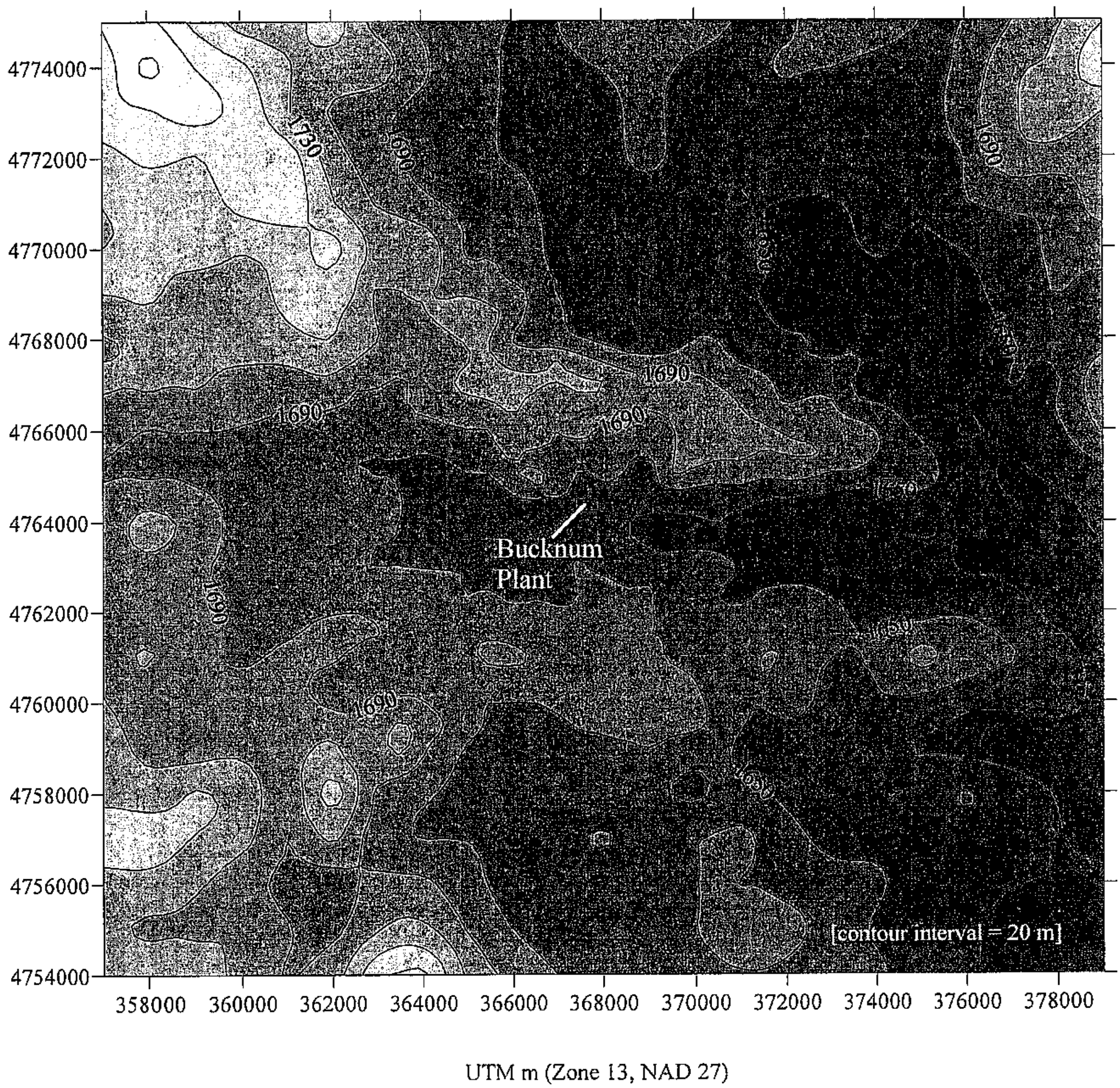


Figure 2 – Surrounding Terrain

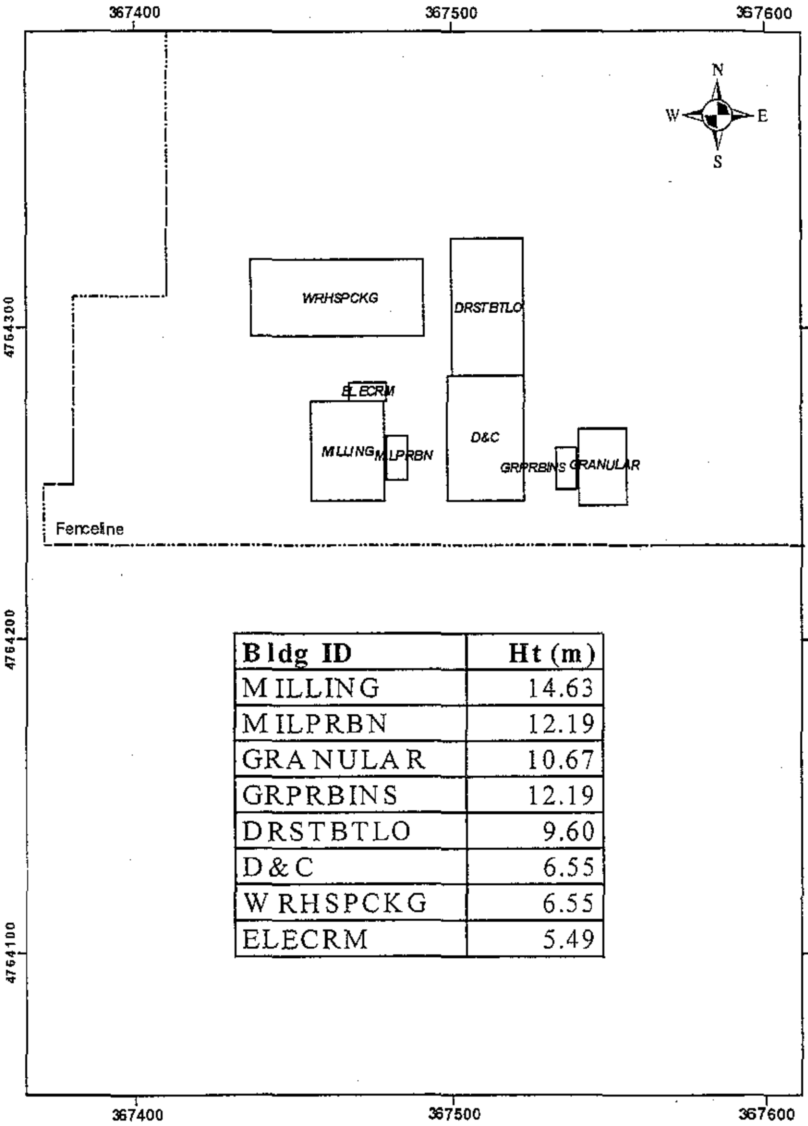


Building Profile Input Program

Building downwash was considered in the modeling analysis by entering building corners and heights into the EPA's Building Profile Input Program (BPIP-PRIME). Point sources for the plant were all modeled with stack heights that were below Good Engineering Practice (GEP) stack heights. Several of the buildings have peaked roofs, and were input with structure heights that were calculated from the mean of the heights of the eaves and the roof peaks.

Figure 3 shows the location of plant structures relative to the ambient air boundary.

Figure 3 – Building Locations Relative to Ambient Boundary



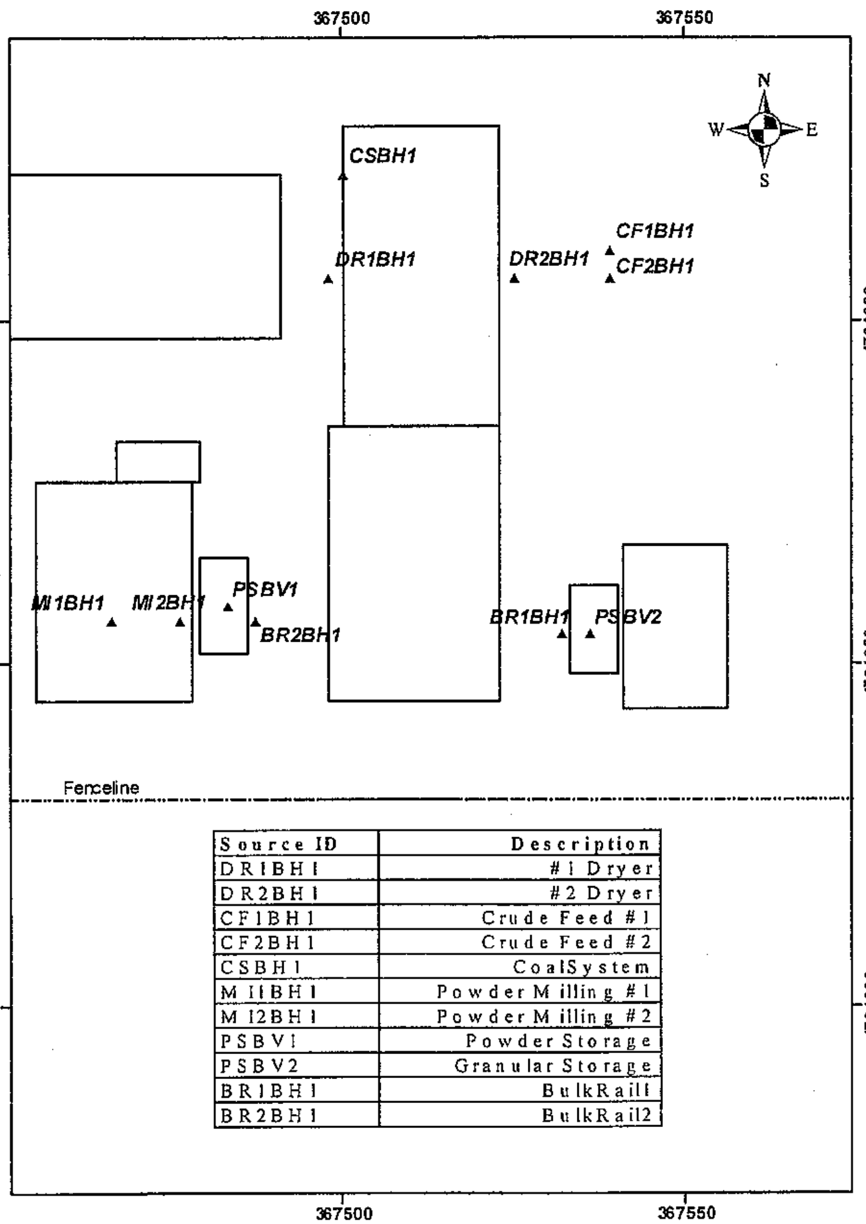
Bldg ID	Ht (m)
MILLING	14.63
MILPRBN	12.19
GRANULAR	10.67
GRPRBINS	12.19
DRSTBTLO	9.60
D&C	6.55
WRHSPCKG	6.55
ELECRM	5.49

UTM NAD 27, Zone 13

Emissions and Source Release Parameters

Proposed source locations at the Bucknum Plant are shown in the figure below. Stack parameters and emissions for the proposed plant sources are shown in the table below. No outside sources are located in the modeling domain, and therefore only the proposed Bucknum sources were modeled.

Figure 4 – Proposed Point Sources



Source ID	Description
DR1BH1	#1 Dryer
DR2BH1	#2 Dryer
CF1BH1	Crude Feed #1
CF2BH1	Crude Feed #2
CSBH1	CoalSystem
MI1BH1	Powder Milling #1
MI2BH1	Powder Milling #2
PSBV1	Powder Storage
PSBV2	Granular Storage
BR1BH1	BulkRail1
BR2BH1	BulkRail2

UTM NAD 27, Zone 13

Table 14: Stack Parameters for Bucknum Plant Point Sources

Modeling Source ID	Description	UTM East (m)	UTM North (m)	Base Elev. (m)	Stack Height (m)	Temp. (K)	Exit Velocity (m/s)	Stack Diam. (m)
DR1BH1	#1 Dryer	367498.2	4764306.32	1658.1	21.34	377.6	14.15	1.22
DR2BH1	#2 Dryer	367525.2	4764306.32	1658.1	21.34	377.6	14.15	1.22
MI1BH1	Powder Milling #1	367466.2	4764256.32	1657.5	18.29	305.4	14.37	0.91
MI2BH1	Powder Milling #2	367476.2	4764256.32	1657.6	18.29	305.4	14.37	0.91
CF1BH1	Crude Feed #1	367539.2	4764310.32	1658.1	6.10	*	9.10	0.41
CF2BH1	Crude Feed #2	367539.2	4764306.32	1658.1	6.10	*	9.10	0.41
CSBH1	Coal System	367500.2	4764321.32	1658.1	6.10	*	9.10	0.41
PSBV1	Powder Storage	367483.2	4764258.32	1657.6	13.72	*	9.70	0.30
PSBV2	Granular Storage	367536.2	4764254.32	1657.5	13.72	*	9.70	0.30
BR1BH1	Bulk Rail1	367532.2	4764254.32	1657.5	9.14	*	10.06	0.46
BR2BH1	Bulk Rail2	367487.2	4764256.32	1657.6	9.14	*	10.06	0.46

Note: UTM coordinates expressed in NAD 27, Zone 13
* These sources were modeled with ambient temperatures (taken from hourly data within AERMET file).

Table 15: Point Source Emission Rates

Modeling Source ID	SO_2 (lb/hr)	NO_x (lb/hr)	PM_{10} (lb/hr)	SO_2 (g/s)	NO_x (g/s)	PM_{10} (g/s)
DR1BH1	19.69	16.50	0.75	2.481	2.079	0.095
DR2BH1	19.69	16.50	0.75	2.481	2.079	0.095
MI1BH1	--	1.11	0.64	--	0.140	0.081
MI2BH1	--	1.11	0.64	--	0.140	0.081
CF1BH1	--	--	0.10	--	--	0.012
CF2BH1	--	--	0.10	--	--	0.012
CSBH1	--	--	0.10	--	--	0.012
PSBV1	--	--	0.06	--	--	0.007
PSBV2	--	--	0.06	--	--	0.007
BR1BH1	--	--	0.14	--	--	0.017
BR2BH1	--	--	0.14	--	--	0.017

Haul Roads

Emissions from the plant haul roads were determined using Section 13.2.2 (*Unpaved Roads*) of the EPA document AP-42. Both haul roads, the access road and the loop road, were modeled as a series of volume sources (see Figure XX). Volume source input parameters were determined from guidance found in the EPA AERMOD User's Guide and *Modeling Fugitive Dust Sources* from the National Stone, Sand & Gravel Association (NSSGA, 2004) as described below.

Haul road emission test data, as described in the NSSGA guidance document, suggest that the height of the plume from particles lifted and dropped from rolling haul truck wheels is approximately twice the height of a truck. Given that the center of the plume is approximately at the actual height of a given truck, the release height for the haul road volume sources was set at 3.66 m, which is the expected haul truck height for the proposed project.

Given that the vertical dimension of a typical plume from a haul truck is twice the height of the truck, the sigma-z value for the haul truck volume sources was set to: (2 x 3.66)/4.3 = 1.70 m. This is based on guidance in the AERMOD User's Guide for an *Elevated Source (h > 0) not on or adjacent to a building*, and the general principle that the total extent of a plume is 4.3 "sigmas" in a given direction.

The initial horizontal dimension for the haul road volume sources was based on the width of the haul road. According to the NSSGA guidance document, the effective width of a haul road volume source has been observed to be the actual road width plus 9.75 m. To reduce computer run time, the haul road volume sources were placed at twice the effective road widths. Initial sigma-y values were based on twice the effective road widths divided by 2.15, which is the recommended approach from the AERMOD User's Guide for *Line sources represented by Separated Volume Sources*. The horizontal volume source inputs are summarized below:

- Haul Road Actual Width = 36 feet (10.97 m)
- Twice the Road Width = 72 feet (21.94 m)
- Effective Width = 21.94 m + 9.75 m = 31.69 m
- Sigma-y = 31.69/2.15 = 14.74 m

Table 16 summarizes all of the volume source dimensions.

Table 16: Haul Road Volume Source Release Parameters

Source ID	Description	Release Height (m)	Sigma Y	Sigma Z	Total Emissions (lb/hr)	Number of Volume Sources	PM_{10} Emission for Each Volume (g/s)
ACRD, LOOPRD	Access Road and Loop Road	3.66	14.74	1.70	1.222	45*	0.0034

* Total emissions were calculated by applicant for 45 volume sources, 13 of which were outside of the ambient boundary. The calculated per source emission rate was applied to the 32 volume sources within the ambient boundary for modeling.

Storage Piles: Wind Erosion and Material Handling

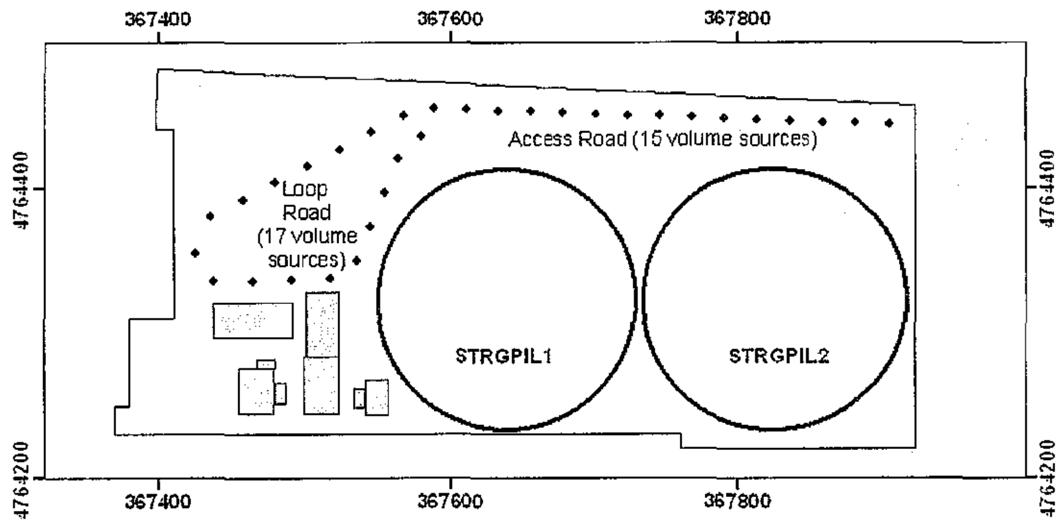
The applicant based the estimated wind erosion emissions from the bentonite storage piles on a formula from *Control of Open Fugitive Dust Sources* (EPA-450/3-88-008). Estimated emissions were adjusted by the expected silt content for the piles, the average number of days expected to produce 0.01 inch of precipitation or greater, and the percentage of time that the wind speed would exceed 12 miles per hour.

For emissions estimates of the material handling associated with the storage piles, the applicant used Equation 1 from AP-42 Section 13.2.4 (Aggregate Handling And Storage Piles). An additional component of the storage pile emissions will arise from haul truck traffic near the piles. These emissions were calculated with the same formula used for other haul truck traffic (see above), and added to the other emissions components of the piles. Both storage piles were modeled as circular area sources (AREACIRC). Table 17 summarizes the release parameters used to represent the storage piles, and Figure 5 shows the relative locations of the sources used to model the haul roads and the storage piles.

Table 17: Storage Pile Release Parameters

Source ID	Description	Release Height (m)	Radius of Circle (m)	Initial Vertical Dimension (m)	Emissions (each pile, lb/hr)
STRGPIL2, STRGPIL1	Bentonite Storage Piles	3.05	90	4.88	0.5819

Figure 5 – Haul Road Volume Sources and Storage Piles



Baghouses/Dust Collectors

Emissions from fabric filter baghouses were calculated based on expected flow rate and grain loadings of 0.005 grains per dry standard cubic foot (gr/dscf).

WYOMING AMBIENT AIR QUALITY STANDARDS (WAAQS) ANALYSIS

Sulfur Dioxide (SO_2)

All sources of SO_2 emissions from the proposed plant, which include the #1 and #2 dryers, were modeled with AERMOD to determine predicted impacts for comparison to WAAQS/NAAQS and PSD increments.

The highest predicted 3-hour SO_2 impact of 147.0 μg/m^3 occurred approximately 300 m southwest of the ambient boundary of the plant at a receptor with 10-m spacing. With the addition of the background level of 93 μg/m^3, the total predicted impact is 240.0 μg/m^3, which is well below the WAAQS/NAAQS of 1,300 μg/m^3.

For the 24-hour averaging period, the highest predicted impact of 85.5 μg/m^3 also occurred approximately 300 m southwest of the ambient boundary of the plant at a receptor with 10-m spacing. With the addition of the background level of 32 μg/m^3, the total predicted impact is 117.5 μg/m^3, which is well below the WAAQS of 260 μg/m^3 and the NAAQS of 365 μg/m^3.

The highest predicted annual SO_2 impact of 12.6 μg/m³ occurred on the northern ambient boundary of the plant. With the addition of the background level of 4 μg/m³, the total predicted impact is 16.6 μg/m³, which is well below the WAAQS of 60 μg/m³ and the NAAQS of 80 μg/m³.

Table 18 summarizes the results of the WAAQS/NAAQS modeling for SO_2. As a new source, the proposed Bucknum sources consume PSD increment, and therefore the modeled results were also compared to the PSD increments. Table 19 presents a summary of the modeled results, which were all below the allowable PSD increments.

Table 18: Results of WAAQS/NAAQS Analysis for SO_2

Year	Averaging Time	Modeled Impact (μg/m³)[1]	Background Concentration (μg/m³)	Total Modeled Impact (μg/m³)	WAAQS/NAAQS (μg/m³)
2002	3-Hour	146.9	93	239.9	1,300
2003		140.7		233.7	
2004		143.1		236.1	
2005		144.2		237.2	
2006		147.0		240.0	
2002	24-Hour	73.9	32	105.9	260/365
2003		78.5		110.5	
2004		66.9		98.9	
2005		62.4		94.4	
2006		85.5		117.5	
2002	Annual	12.0	4	16.0	60/80
2003		11.9		15.9	
2004		12.4		16.4	
2005		12.1		16.1	
2006		12.6		16.6	

[1] The reported 3-hour and 24-hour impacts are the highest second-high impacts
NAAQS = National Ambient Air Quality Standards
SO_2 = sulfur dioxide
μg/m³ = micrograms per cubic meter
WAAQS = Wyoming Ambient Air Quality Standards

Table 19: Results of PSD Increment Analysis for SO_2

Year	Averaging Time	Total Modeled Impact (µg/m³)	PSD Increment (µg/m³)
2002	3-Hour	146.9	512
2003		140.7	
2004		143.1	
2005		144.2	
2006		147.0	
2002	24-Hour	73.9	91
2003		78.5	
2004		66.9	
2005		62.4	
2006		85.5	
2002	Annual	12.0	20
2003		11.9	
2004		12.4	
2005		12.1	
2006		12.6	

[1] The reported 3-hour and 24-hour impacts are the highest second-high impacts
PSD = Prevention of Significant Deterioration
SO_2 = sulfur dioxide
µg/m³ = micrograms per cubic meter

<u>Nitrogen Oxides (NO_2)</u>

All sources of NO_x emissions from the proposed plant, which include the Dryers #1 and #2 and the Raymond Mills #1 and #2 sources, were modeled with AERMOD to determine predicted impacts for comparison to WAAQS/NAAQS and PSD increments. The modeled NO_x concentrations were converted to nitrogen dioxide (NO_2) concentrations using EPA's *national default ratio* of 0.75. Appendix W of 40 CFR Part 51 (GAQM) describes the use of the *national default ratio*, which provides for a 25% reduction in modeled NO_x concentrations for purposes of estimating the partial conversion of NO_x to NO_2.

The highest predicted annual NO_x impact of 12.9 µg/m³ occurred on the northern ambient boundary of the proposed plant. With the application of the national default ratio and the addition of the background level of 14 µg/m³, the total predicted impact is 23.7 µg/m³, which is well below the WAAQS/NAAQS of 100 µg/m³.

Table 20 summarizes the results of the WAAQS/NAAQS modeling for NO_2. As a new source, the proposed Bucknum sources consume PSD increment, and therefore the modeled results were also compared to the PSD increment. Table 21 presents a summary of the modeled results, which were all below the allowable PSD increment.

Table 20: Results of WAAQS/NAAQS Analysis for NO_2				
Year	Maximum Modeled Annual NO_2 Conc. (μg/m³)	Background Annual NO_2 Conc. (μg/m³)	Total Predicted NO_2 Conc. (μg/m³)	WAAQS/ NAAQS (μg/m³)
2002	9.2	14	23.2	100
2003	9.2		23.2	
2004	9.5		23.5	
2005	9.3		23.3	
2006	9.7		23.7	

NAAQS = National Ambient Air Quality Standards
NO_2 = nitrogen dioxide
μg/m³ = micrograms per cubic meter
WAAQS = Wyoming Ambient Air Quality Standards

Table 21: Results of PSD Increment Analysis for NO_2		
Year	Maximum Modeled Annual NO_2 Conc. (μg/m³)	PSD Increment (μg/m³)
2002	9.2	25
2003	9.2	
2004	9.5	
2005	9.3	
2006	9.7	

NO_2 = nitrogen dioxide
PSD = prevention of significant deterioration
μg/m³ = micrograms per cubic meter

Particulate Matter (PM_{10})

Current Division policy does not endorse short-term (24-hour) modeling for predicting impacts from fugitive particulate sources because of the uncertainties in the performance of the recommended EPA models. The State and EPA Region VIII entered into a Memorandum of Agreement in 1994 which allows the Division to conduct monitoring in lieu of short-term modeling for coal mine particulate concentrations in the Powder River Basin, and this practice has been applied to modeling of PM_{10} fugitive sources in other parts of the state.

Additionally, modeling short-term impacts from fugitive sources can be problematic because predicted impacts from area sources within AERMOD can be excessive, as described in the latest *AERMOD Implementation Guide* from the EPA (January 2008). The Implementation Guide states that concentration predictions for area sources may be overestimated under very light wind conditions because of the lack of "plume meander" in the area source algorithm.

All sources of PM_{10} from the proposed plant were included in model runs for the annual averaging period, but only point sources were included in model runs for the 24-hour averaging period.

For the 24-hour averaging period, the highest predicted impact of 27.6 $\mu g/m^3$ occurred at the southwest ambient boundary of the plant. With the addition of the background level of 40 $\mu g/m^3$, the total predicted impact is 67.6 $\mu g/m^3$, which is well below the WAAQS/NAAQS of 150 $\mu g/m^3$.

The highest predicted annual impact of 12.9 $\mu g/m^3$ occurred at the northern ambient boundary of the plant. With the addition of the background level of 18 $\mu g/m^3$, the total predicted impact is 30.9 $\mu g/m^3$, which is well below the WAAQS of 50 $\mu g/m^3$.

Table 22 summarizes the results of the WAAQS/NAAQS modeling for PM_{10}. As a new source, the proposed Bucknum sources consume PSD increment, and therefore the modeled results were also compared to the PSD increments. Table 23 presents a summary of the modeled results, which were all below the allowable PSD increments.

Table 22: Results of WAAQS/NAAQS Analysis for PM_{10}					
Year	Averaging Time	Modeled Impact (µg/m³)[1]	Background Concentration (µg/m³)	Total Modeled Impact (µg/m³)	WAAQS/NAAQS (µg/m³)
2002	24-Hour	26.6	40	66.6	150
2003		25.5		65.5	
2004		24.7		64.7	
2005		26.6		66.6	
2006		27.6		67.6	
2002	Annual	12.1	18	30.1	50
2003		12.7		30.7	
2004		12.2		30.2	
2005		12.6		30.6	
2006		12.9		30.9	

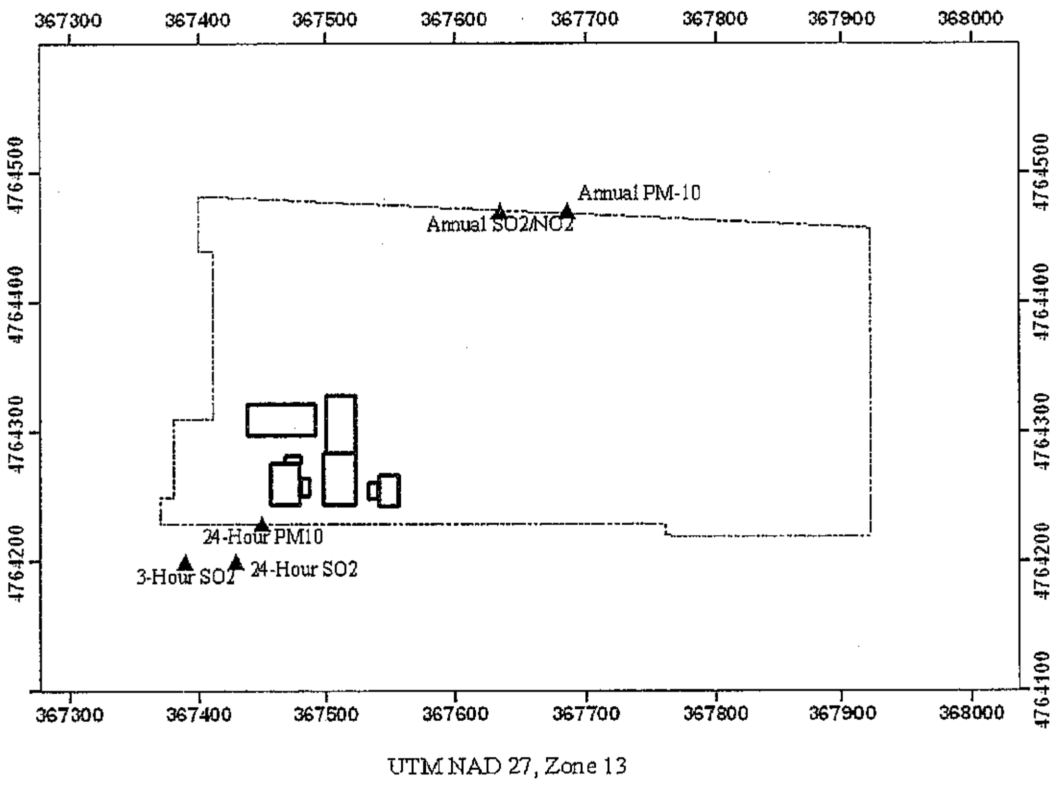
[1] The reported 24-hour impacts are the highest second-high impacts
NAAQS = National Ambient Air Quality Standards
PM_{10} = particulate matter
µg/m³ = micrograms per cubic meter
WAAQS = Wyoming Ambient Air Quality Standards

Table 23: Results of PSD Increment Analysis for PM_{10}			
Year	Averaging Time	Modeled Impact (µg/m³)[1]	PSD Increment (µg/m³)
2002	24-Hour	26.6	30
2003		25.5	
2004		24.7	
2005		26.6	
2006		27.6	
2002	Annual	12.1	17
2003		12.7	
2004		12.2	
2005		12.6	
2006		12.9	

[1] The reported 24-hour impacts are the highest second-high impacts
PM_{10} = particulate matter
PSD = Prevention of Significant Deterioration
µg/m³ = micrograms per cubic meter

Figure 6 shows the locations of the modeled maximums for the Bucknum Bentonite Plant.

Figure 6 – Locations of Maximum Modeled Impacts



PROPOSED PERMIT CONDITIONS:

The Division proposes to issue an air quality permit to US Bentonite Processing, Inc. for the modification of the Bucknum Bentonite Plant with the following conditions:

1. That authorized representatives of the Division of Air Quality be given permission to enter and inspect any property, premise or place on or at which an air pollution source is located or is being constructed or installed for the purpose of investigating actual or potential sources of air pollution and for determining compliance or non-compliance with any rules, standards, permits or orders.

2. That all substantive commitments and descriptions set forth in the application for this permit, unless superseded by a specific condition of this permit, are incorporated herein by this reference and are enforceable as conditions of this permit.

3. A major source, as defined by Chapter 6, Section 3 (b)(xvii) of the WAQSR, shall file a complete application to obtain an operating permit within twelve (12) months after commencing operations.

4. That written notification of the anticipated date of initial start-up, in accordance with Chapter 6, Section 2(i) of the WAQSR, is required not more than sixty (60) days or less than thirty (30) days prior to such date. Notification of the actual date of start-up is required fifteen (15) days after start-up.

5. That the date of commencement of construction shall be reported to the Administrator within thirty (30) days of commencement. In accordance with Chapter 6, Section 2(h) of the WAQSR, approval to construct or modify shall become invalid if construction is not commenced within twenty-four (24) months after receipt of such approval or if construction is discontinued for a period of twenty-four (24) months or more. The Administrator may extend the period based on satisfactory justification of the requested extension.

6. That performance tests be conducted, in accordance with Chapter 6, Section 2(j) of the WAQSR, within thirty (30) days of achieving a maximum design rate but not later than ninety (90) days following initial start-up, and a written report of the results be submitted. The operator shall provide fifteen (15) days prior notice of the test date. If a maximum design rate is not achieved within ninety (90) days of start-up, the Administrator may require testing be done at the rate achieved and again when a maximum rate is achieved.

7. Initial performance tests, as required by Condition 6 of this permit, shall be conducted on the following sources:

   i. Dryer #1 and #2 with baghouses DR1-BH1 and DR2-BH1:

      Performance tests shall be conducted simultaneously on both dryer stacks in accordance with 40 CFR Part 60 subpart UUU. Unless otherwise specified in an applicable regulation, performance tests shall consist of three (3) runs of a minimum of one (1) hour each.

Particulate Emissions:	Testing shall follow 40 CFR part 60, §60.736
NO_x Emissions	EPA Reference Methods 1-4, 7E
CO Emissions:	EPA Reference Methods 1-4, 10
SO_2 Emissions:	EPA Reference Methods 1-4, 6C
Opacity:	Testing shall follow 40 CFR part 60, §60.736

A test protocol shall be submitted to this office for review and approval prior to testing. Coal feed rate and bentonite throughput shall be recorded during each run. Notification of the test date shall be provided to the Division fifteen (15) days prior to testing. Results shall be submitted to this Division within forty-five (45) days of completion.

ii. Raymond Mills #1 and #2 with baghouses MI1-BH1 and MI2-BH1:

Performance tests shall be conducted in accordance with 40 CFR Part 60 Subpart OOO. Unless otherwise specified in an applicable regulation, performance tests shall consist of three (3) runs of a minimum of one (1) hour each.

Particulate Emissions:	Testing shall follow 40 CFR part 60, §60.675
NO_x Emissions	EPA Reference Methods 1-4, 7E
CO Emissions:	EPA Reference Methods 1-4, 10
Opacity:	Testing shall follow 40 CFR part 60, §60.675

A test protocol shall be submitted to this office for review and approval prior to testing. Propane consumption and bentonite throughput shall be recorded during each run. Notification of the test date shall be provided to the Division fifteen (15) days prior to testing. Results shall be submitted to this Division within forty-five (45) days of completion.

iii. Other baghouses venting to the atmosphere (CS1-BH1, CF1-BV1, CF2-BV1, PS-BV1, PS-BV2, BR1-BH1, BR2-BH1):

Performance tests shall be conducted in accordance with 40 CFR Part 60 Subpart OOO. Unless otherwise specified in an applicable regulation, performance tests shall consist of three (3) runs of a minimum of one (1) hour each.

Particulate Emissions:	Testing shall follow 40 CFR part 60, §60.675
Opacity:	Testing shall follow 40 CFR part 60, §60.675

iv. The buildings that contain baghouses DR1-BH2, DR2-BH2, BV-DB1, BV-DB2, BV-DB3, SC-NU1, SC-NU2, MI1-NU2, BT1-BH1:

Performance tests shall be conducted in accordance with 40 CFR Part 60 Subpart OOO.

Opacity: Testing shall follow 40 CFR part 60, §60.675

8. That the following lb/hr and tpy limits shall apply for the two (2) dryer baghouses combined:

Pollutant	gr/dscf	lb/hr	tpy
PM/PM_{10}	0.005	1.6	6.6

9. That the following lb/hr and tpy limits shall apply to both dryers combined:

Pollutant	lb/MMBtu	lb/hr	tpy
NO_x	-	27.0	118.3
CO	0.31	18.8	82.2
SO_2	0.66	39.4	172.4

10. That within nine (9) months of start-up of the dryers, US Bentonite Processing, Inc. shall
    a. Submit a request to establish lb/MMBtu NO_x limits for the dryers of no greater than 0.45 lb/MMBtu
    or
    b. Submit a schedule to install continuous emission monitoring (CEM) equipment in both dryer stacks to demonstrate continuous compliance with the NO_x limits in lb/hr.

11. That the two (2) dryers shall be tested annually, or more frequently as specified by the Administrator, for NO_x, SO_2 and PM emissions to determine if the dryers are operating within the emission limits specified in Conditions 8 and 9. Testing shall be conducted using EPA Reference Methods or a portable analyzer, following the State of Wyoming's Portable Analyzer Protocol. A written report of the results is to be submitted to the Division within forty-five (45) days of completion. Notification of the test date shall be provided to the Division fifteen (15) days prior to testing. The testing frequency may be revised without administratively amending the permit, but shall be approved by the Division prior to implementation.

12. For the two (2) dryer baghouses (DR1-BH1, DR1-BH1), US Bentonite Processing, Inc. shall comply with all applicable requirements of 40 CFR, Part 60, Subpart UUU.

13. Visible emissions from the two (2) dryer baghouses (DR1-BH1 and DR2-BH1) shall not exceed 10% opacity, as required by Subpart UUU. Compliance with the 10% opacity standard shall be determined by the installation and operation of a continuous opacity monitoring system (COMS). In lieu of a continuous opacity monitoring system for the two (2) dryer baghouses (DR1-BH1, DR1-BH1), US Bentonite Processing, Inc. may have a certified visible emissions observer measure and record three 6-minute averages of the opacity of visible emissions to the atmosphere each day of operation in accordance with Method 9 of 40 CFR part 60, Appendix A.

14. That the two (2) Raymond Mills shall each be limited as follows:

Pollutant	lb/MMBtu	gr/dscf	lb/hr	tpy
NO_x	0.138	-	1.1	4.8
CO	0.075	-	0.6	2.8
PM/PM_{10}	-	0.005	0.6	2.8

15. Visible emissions from the two (2) Raymond Mill baghouses (MI1-BH1 and MI2-BH1) shall not exceed 7%, as determined by 40 CFR part 60, §60.675.

16. That emissions from each baghouse listed in the following table shall be limited as follows:

Source ID	Baghouse Location	PM/PM10		
		gr/dscf	lb/hr	tpy
CF1-BV1	CF1 - Crude Feed #1	0.005	0.1	0.4
CF2-BV1	CF2 - Crude Feed #2	0.005	0.1	0.4
CS1-BH1	CS1 - Coal Delivery Building	0.005	0.1	0.4
PS-BV1	PS - Product Storage (Powder)	0.005	0.1	0.3
PS-BV2	PS - Product Storage (Granular)	0.005	0.1	0.3
BR1-BH1	BR1 - Bulk Rail Loadout	0.005	0.1	0.6
BR2-BH1	BR2 - Bulk Rail Loadout	0.005	0.1	0.6

17. Visible emissions from the baghouses listed in Condition 16 shall not exceed 7%, as determined by 40 CFR part 60, §60.675.

18. That all baghouses at the Bucknum Bentonite Plant shall be well maintained according to manufacturer specifications and shall operate during all bentonite processing activities.

19. US Bentonite Processing, Inc. shall, on a daily basis, check for the presence of any visual emissions at each baghouse on any day the baghouse is operating. The visual observation shall be conducted by personnel who are educated on the general procedures for determining the presence of visible emissions but not necessarily certified to perform Method 9 observations. Observation of any visible emissions from any of these units shall prompt immediate inspection and, if necessary, corrective action. Records of daily observations shall be kept and maintained.

20. The following baghouses shall have a minimum stack height as listed in the following table:

Baghouse	Location	Stackheight (m)
CS1-BH1	Coal Delivery	6.1
CF1-BV1, CF2-BV1	Crude Hopper #1	6.1
DR1-BH1, DR2-BH1	Crude Hopper #2	21.3
MI1-BH1, MI2-BH1	Milling Building	18.3
PS-BV1	Powder Product Storage Building	13.7
PS-BV2	Granular Product Storage Building	13.7
BR1-BH1, BR2-BH1	Bulk Rail Loadout	9.1

21. That the following baghouses and bin vents shall be vented inside their respective building as represented in the following table:

Building	Process	Vent Inside Building
Coal Delivery Building	Dryer Bypass Conveyors #1 and #2	DR1-BH2, DR2-BH2
Bentonite Delivery and Truck Loadout	Dry Bins #1 through #6	BV-DB1, BV-DB2, BV-DB3
Coal Stoker & Dryer Building	Resizing	SC-NU2
Milling Building	Screen	SC-NU1
Milling Building	Raymond Mills #1 and #2	MI1-NU1
Packaging & Product Storage Building	Powder Packaging	MI1-NU2
Bentonite Delivery and Truck Loadout	Bulk Truck Loadout	BT1-BH1

22. That the buildings listed in Condition 21 shall be maintained so that each building exhibits no visible emissions as determined by 40 CFR part 60, §60.675.

23. Fugitive emissions from all conveyor transfer points and loading operations without a capture system shall be limited to 7% opacity. All other sources not covered by NSPS regulations are subject to a 20% opacity limit as determined by Method 9 of 40 CFR part 60, Appendix A.

24. That all unpaved portions of haul roads, access roads, and work areas shall be treated once every month with magnesium chloride to control fugitive dust from vehicular traffic and wind erosion. The first monthly application of a 30% solution of magnesium chloride shall be applied at a rate of 0.5 gallon per square yard; the following applications can be reduced to 0.3 gallon per square yard. Additional applications of water shall be applied on a schedule sufficient to control fugitive dust from vehicular traffic. Records of the application date, product applied, and application rate shall be maintained for the unpaved roads, work areas, and stockpiles. The application rate may be revised without administratively amending the permit, but shall be approved by the Division prior to implementation.

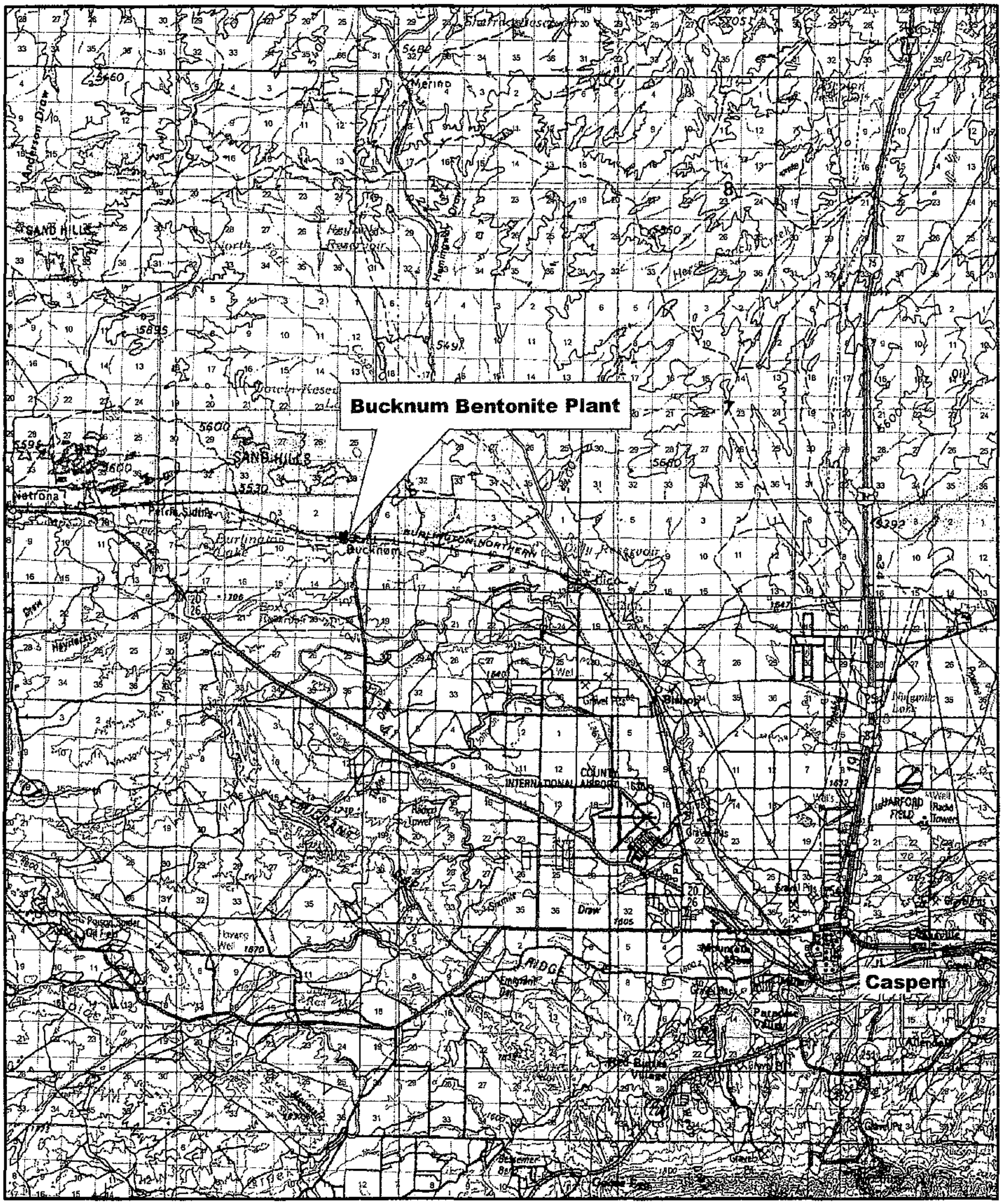
25. US Bentonite Processing, Inc shall comply with all applicable requirements of 40 CFR part 60, subpart OOO (April 28, 2009 revision) for the two (2) Raymond Mills, bentonite processing equipment, bentonite conveyor belts, silos, and enclosed railcar and truck loadout loadout. This supersedes the requirement to comply with Subpart OOO under Chapter 5, Section 2 of the WAQSR.

26. All records required by this permit shall be maintained for a period of at least five (5) years and shall be made available to the Division upon request.

27. That this permit shall supersede Air Quality Permit CT-6666.

Appendix A

Facility Location Map



US Bentonite Processing, Inc.

Bucknum Bentonite Plant

NW1/4 of Section 12, T35N, R82W

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DEPARTMENT OF ENVIRONMENTAL QUALITY
WYOMING

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