ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
AIR PERMITS PROGRAM

TECHNICAL ANALYSIS REPORT
for
Air Quality Control Minor Source Permit AQ1227MSS02

Usibelli Coal Mine, Inc.
Wishbone Hill Coal Mining and Processing Operation

DEVELOPMENT OF COAL MINING OPERATIONS

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ABBREVIATIONS/ACRONYMS

AAC..... Alaska Administrative Code
ACMP..... Alaska Coastal Management Program
ADEC ..... Alaska Department of Environmental Conservation
AS ..... Alaska Statutes
ASTM ..... American Society of Testing and Materials
BAE ..... Baseline Actual Emissions
CEMS ..... Continuous Emission Monitoring System
C.F.R..... Code of Federal Regulations
EPA..... Environmental Protection Agency
MACT..... Maximum Achievable Control Technology
NA ..... Not Applicable
NAICS ..... North American Industry Classification System
NESHAPS..... National Emission Standards for Hazardous Air Pollutants
NSPS..... New Source Performance Standards
ORL ..... Owner Requested Limit
PAE..... Projected Actual Emissions
PS..... Performance Specification
PSD..... Prevention of Significant Deterioration
PTE ..... Potential to Emit
RM ..... Reference Method
SIC..... Standard Industrial Classification
SN ..... Serial Number
TBD ..... To Be Determined

Units and Measures

bhp ..... brake horsepower or boiler horsepower
gr./dscf ..... grains per dry standard cubic feet (1 pound = 7,000 grains)
dscf ..... dry standard cubic foot
gph ..... gallons per hour
kW ..... kiloWatts
kWe..... kiloWatts electric[1]
lbs ..... pounds
mmBtu ..... million British thermal units
ppm ..... parts per million
ppmv ..... parts per million by volume
tph ..... tons per hour
tpy ..... tons per year
wt%..... weight percent

Pollutants

CO..... Carbon Monoxide
HAPS ..... Hazardous Air Pollutants
H_2S..... Hydrogen Sulfide
NO_X ..... Oxides of Nitrogen
NO_2 ..... Nitrogen Dioxide
NO ..... Nitric Oxide
PM-10 ..... Particulate Matter with an aerodynamic diameter less than 10 microns
SO_2..... Sulfur Dioxide
VOC……Volatile Organic Compound

Permit Specific

VMT…….Vehicle Miles Travelled

[1] kWe refers to rated generator electrical output rather than engine output.

1.0 Introduction

This Technical Analysis Report (TAR) provides Alaska Department of Environmental Conservation's basis for issuing Air Quality Control Minor Permit AQ1227MSS02 to Usibelli Coal Mine, Inc. (Permittee) for the Wishbone Hill Coal Mining and Processing Operation, Development of Mining Operations, under 18 AAC 50.502(b)(5) and 18 AAC 50.502(c)(1).

The Permittee submitted an application for a minor dated May 07, 2010. The Department of Environmental Conservation (Department) sent an email follow-up for the Permittee to provide a revised dust control plan, to which the Permittee responded to, within the specified timeframe requested.

1.1 Stationary Source Description

The Permittee is planning to operate a coal mining and processing facility at Wishbone Hill located northeast of Palmer, Alaska. Exploration and development work on the Wishbone Hill Project has been in progress since 1983. Exploration drilling discovered a reserve of high quality bituminous coal yielding as much as 1.0 million metric tons per year (Approximately 1,102,311 short tons per year).

This permit will establish the site as a Stationary Source under 18 AAC 50.502(c)(1) and 18 AAC 50.502(b)(5). The permit will also have a dust control plan to help minimize the impact of fugitive dust on ambient air.

1.2 Permit History

The Permittee does not currently have an active Air Quality Permit for Wishbone Hill. The Department issued a Permit to Operate (9022-AA002) to The Permittee for the Wishbone Hill site on October 12, 1990 for operations to process coal, the Permittee allowed that permit expired and the permit was never renewed. On May 26, 2009, The Permittee submitted a permit application for processing coal at the Wishbone Hill. The project ID was AQ1227MSS01, the Department, during its review requested additional information associated with this request, the Permittee never submitted the requested data and the Department considered the application withdrawn. Subsequently, the Permittee submitted a new application dated May 7, 2010 for mining and processing operations. This permit action will re-establish the stationary source.

1.3 Project Description

The mine lies at the western end of the Wishbone Hill coal district on the southwestern extent of Wishbone Hill. The Permittee provided a location map as Figure A-1 in the permit application. Wishbone Hill is a synclinal structure bisected by several major transverse and low angle thrust faults. The Permittee has proposed four main coal seam groups for mining during the life of the project. These groups, in descending order are, the Jonesville, Premier, Eska, and Burning Bed groups, with the majority of the recoverable coal located in the Premier group. The Permittee also is planning to mine another individual coal seam not associated with the other coal groups, the Midway seam, which lies between the Premier and Eska groups. The Permittee provided a more detailed map of the planned mine in Figure A-2 of their permit application.

The Permittee stated that the selected mining plan required careful consideration of the geologic conditions, climatic conditions, and mine plan for the project. The Permittee designed the mining

method to allow for optimal equipment utilization and coal recovery to accomplish a continuous pattern from topsoil removal through reclamation while ensuring environmental protection.

The Permittee will remove topsoil with dozers and/or scrapers and the Permittee either will use the topsoil immediately for reclamation or stockpiled for later use. The Permittee will be removing the overburden and coal, with a hydraulic excavator, and the Permittee will place it into 150-ton capacity haul trucks. Due to steeply dipping seams and the depth of the mining pit, direct haul back of overburden and inter-burden material is not always possible, and so the Permittee will temporarily stockpile these materials in designated areas.

The Permittee will wash or clean the coal using simple washing and separation techniques without the use of chemicals. The Permittee will haul the coarse coal refuse generated at the wash plant, back to the mine area for backfill in the pit. The Permittee will deposit the fine coal refuse in a storage pond. The clean coal will be hauled offsite using road-legal trucks.

The main elements of the coal processing plant are a run-of-mine stockpile, a run-of-mine hopper, the crushing and screening plant, the preparation plant, and the clean coal stockpile. The Permittee provided a plot plan of the coal processing plant facilities in Figure A-3. The Permittee also provided a process flow diagram of the coal treatment process in Figure A-4.

The Permittee will transport the coal to the wash plant from the pit area in 150-ton capacity haul trucks.

At the wash plant, the coal will be either stockpiled or direct loaded into the run-of-mine hopper for processing through the wash plant. The run-of-mine stockpile has a capacity of 100,000 tons to enable continued plant operation during any unexpected lapses in haulage from the pit area. The Permittee will use a front-end loader will be used to load the stockpiled coal into the hopper for processing.

The hopper will feed coal to a grizzly for sizing, and then if required, the Permittee will send it to a feed breaker, to get the material size to a maximum of 8 inches. This feed will proceed to the crushing and screening circuit for sizing at 3-inch and 3/8-inch. The material falling between 3-inch and 3/8-inch will be the feed to the preparation circuit. In addition, The Permittee will crush 3-inch material in a grizzly, to a maximum 3-inch size. The Permittee will combine these two streams before entering the preparation circuit. The minus 3/8-inch material will be separated and will either be blended into the feed stream for the washing circuit or blended with the clean coal being shipped from the facility. The Permittee will process the 3-inch to 3/8-inch material through the wash plant, which will consist of heavy media cyclones and spirals to separate the coal from the parting material. The Permittee will use as a final step to centrifuge the fine clean coal to reduce the moisture content. The Permittee plans to operate the plant under maximum production of seven days per week, three 8-hour shifts per day. No chemicals, other than inert flocculent used to settle the fine coal waste, will be used in the washing process. The Permittee will accomplish the drying using a centrifuge. Therefore, the Permittee is not planning to use thermal drying of washed coal.

Coarse coal refuse will be loaded from the coarse coal refuse bin into the same trucks hauling coal to the plant for transport back to the pit area. The refuse will be directly placed in areas of current backfilling and will be buried a minimum of four feet below the regarded surface of the overburden material.

Onsite coal storage will be located adjacent to the processing plant. The Permittee will use a truck load-out bin to load the stockpiled coal into highway-legal, covered trucks for delivery.

1.4 Application Description

In this application, The Permittee proposed to establish the Wishbone Hill Stationary Source with the main purpose of coal extraction and processing. The Permittee requested the following:

1. Install a new diesel electric generator - Emission Unit 1;
2. Maintain adherence to the Dust Control Plan;
3. Install some space heaters;
4. Use centrifugal centrifuge for drying the coals and not using thermal dryers in the preparation of the coal
5. Not use thermal dryers in preparation of the coal and not becoming a special category under PSD; and
6. Characterize the fugitive emissions and their impact on ambient air quality.

The Permittee provided an emissions unit inventory in the application as shown in Table 1 – Emission Unit Inventory of Minor Permit AQ01227MSS02.

The majority of the emissions identified in the permit application, are fugitive dust emissions. Even though these emissions do not count towards permit applicability, under 18 AAC 50, the Permittee evaluated these emissions to ensure that they do not cause or contribute to an AAAQS exceedance, and provided this analysis to the Department.

1.5 Project Emissions Summary

In their application dated May 7, 2010, the Permittee provided emissions calculations for the engines, heaters and fugitive dust sources. The Permittee used the following assumptions in their calculations.

1. Units 1 (Diesel Engine) will provide electric power for the operations at the Wishbone Hill mine site. The emission factors are as supplied by the manufacturer.
2. Unit 2 (Heaters) will provide space heating to the structures at the mine site. The emission factors are from AP-42, Table 1.3-1.
3. Fugitive sources – the estimates for these sources are based on the maximum expected operation associated with the fugitive dust generating activity or object.

Based on unlimited operation of the emissions units, there are no restrictions required on any of the emissions units.

Table 1 shows the stationary source's potential emissions with this project, from Emission Units 1 through 36. Emissions from the primary diesel generator (EU ID 1) were calculated using emission factors provided by the manufacturer. Emissions from EU ID(s) 2 through 36 were calculated using emission factors from AP-42. The emissions summary uses 100% load for all the fuel burning equipment.

Table 1 shows the Potential to Emit and Assessable Emissions associated with this stationary source.

Table 1 – Emissions Summary for Permit Applicability and Assessable Emissions Review

Parameter	NO_x (TPY)	CO (TPY)	SO_2 (TPY)	PM-10 (TPY)	VOC (TPY)	Total (TPY)
900 hp diesel fired engine	61.3	7.8	0.04	0.8	0.6	
10 MMBtu/hr diesel fired heater	6.5	1.6	0.1	0.6	0.1	
Fugitive emission sources	0	0	0	557.2[a]	0	
PTE for Permit Applicability	67.8	N/A	0.14	1.4	0.7	
Minor Permit 18 AAC 50.502(c)(1) threshold (tpy)	40	N/A	40	15	N/A	
Minor Permit Triggered?	Yes	N/A	No	No	No	
PSD Permit Thresholds (tpy)	250	250	250	250	250	
PSD Permit Triggered?	No	No	No	No	No	
Operating Permit Threshold (tpy)	100	100	100	100	100	
Operating Permit Triggered?	No	No	No	No	No	
Assessable Emissions	68	0	0	0	0	68

Table 2 Notes:

[a] See Appendix for calculations. Fugitive emissions do not belong to a source category listed in 40 CFR 52.21(b)(1)(iii) are not counted towards PSD or minor permit applicability determination.

[b] If thermal dryers are used at Wishbone Hill, then the PSD Major Source threshold is 100 tpy for regulated NSR pollutants.

The uncontrolled emissions (applicable to determining permitting thresholds[2]) from this stationary source are less than 100 tpy and the stationary source does not trigger Title V permitting requirements.

The application states fugitive emissions (associated with EU ID(s) 29 – 35) will be reduced by 50% by water suppression or other dust control techniques. The Department has thus imposed a permit condition requiring that the permittee employ techniques that result in a 50% reduction when the permittee is operating in those areas (identified, as EU's 29-35).

1.6 Emission Factor Summary

The Permittee used emission factors from a variety of sections of AP-42 and manufacturer data. Therefore, the Department has included a Table in Exhibit A a list of Emissions Factors as a single concise reference for the origin of each factor.

1.7 Department Findings

Based on the review of the application, the Department finds that:

1. The Permittee stated that they <u>will not</u> be using thermal dryers to dry the coal. If the Permittee <u>does use</u> thermal dryers at some point in the future, the stationary source would then require review under 40 CFR 52.21 as a PSD major source.
2. This project is classified under 18 AAC 50.502(c)(1) because The Permittee is establishing a new stationary source with the potential to emit NO_X emissions by greater than 40 tpy.

[2] Emissions characterized as fugitive emissions are not used in determining the stationary sources classification, unless the stationary source is one of the special catagories under 40 CFR 52.21(b)(1), which this is not, unless they begin to use thermal dryers in the preparation of the coal.

3. The Stationary Source Identification Form provided in the application indicates that the stationary source is classified under 18 AAC 50.502(b)(5) for a coal preparation plant.
4. The Permittee is not proposing to burn coal at the stationary source. Therefore, there was no need to evaluate Hazardous Air Pollutant emissions.
5. The Permit application for Wishbone Hill contains all the elements required by 18 AAC 50.540.
6. The emissions from the fuel burning equipment has sufficient margin from the ambient standards and the Permitting trigger thresholds such as the 100 tpy Operation Permit threshold and the 250 tpy PSD thresholds.
7. Wishbone Hill is located in the City of Palmer in the Matanuska Borough, and its physical location is outside of the designated coastal area boundary and therefore not subject to consistency review.

2.0 Permit Requirements

State regulations in 18 AAC 50.544 describe the elements that the Department must include in minor permits. This section of the TAR provides the technical and regulatory basis for the permit requirements in Minor Permit AQ1227MSS02, which is, classified under 18 AAC 502(b)(5) and 18 AAC 50.502(c)(1).

2.1 General Requirements for all Minor Permits

This permit includes the following requirements necessary for all minor permits as described in 18 AAC 50.544(a)(1) through (4):

1. The cover page identifies the stationary source, the project, the Permittee, and contact information.
2. Emission fee requirements are required for each minor permit issued under 18 AAC 50.542, as described in 18 AAC 50.544(a). The Department is establishing the fee requirements in Permit AQ1227MSS02, and Table 1 shows the assessable emissions are 68 tpy. The fee requirements are included in Section 4 of the permit.
3. There are no specific requirements established under 18 AAC 50.201.
4. The Department included an ORL to operate the source without the use of thermal dryers to avoid PSD classification. The Department specified the reporting requirement for compliance with this condition.
5. Conditions necessary to protect the ambient air quality are included in Section 2 of the permit. This is further discussed in Section 2.5 of this TAR.
6. The permit includes the standard permit condition in 18 AAC 50.345. These conditions are included in Sections 6 through 9 of the permit.

2.2 Requirements for a Permit Classified under 18 AAC 50.502(b)(5) and 18 AAC 50.502(c)(1)

This permit includes the following requirements necessary for all minor permits under 18 AAC 50.502(b) as described in 18 AAC 50.544(b)(1) through (2) and 18 AAC 50.544(c) for a Minor permit under 18 AAC 50.502(c):

1. Sections 6 through 8 of the Permit contain the applicable requirements for:
    a. Sampling emissions according to the methods prescribed by the department and at locations and intervals, and by the procedures specified by the department;
    b. Providing source test reports, monitoring data, emissions data, and information on analyses of any test samples;
    c. Keeping records; and
    d. Making periodic reports on process operations and emissions;
    e. Perform regular maintenance considering the manufacturer's or the operator's maintenance procedures;
    f. Keep records of any maintenance that would have a significant effect on emissions; the records may be kept in an electronic format; and
    g. Keep a copy of either the manufacturer's or the operator's maintenance procedures.
2. Terms and conditions requiring performance tests for emission limits under 18 AAC 50.050 – 18 AAC 50.090. Since Wishbone Hill will not have Title V operating permit after issuance of AQ1227MSS02, the Department included the periodic monitoring, recordkeeping, and reporting (MR&R) that would be necessary to ensure continued compliance with the state emissions standards. These requirements are in Section 4 of the permit and are discussed in detail in Section 2.4 of this TAR; and
3. Terms and conditions requiring maintenance of equipment according to the manufacturer's or operator's maintenance procedures, including requirements to keep a copy of either the manufacturer's or the operator's maintenance procedures. These requirements are in Section 8 of the permit.

2.3 Requirements for a Stationary Sources not Subject to Title V Permitting:

As required by 18 AAC 50.544(d), each stationary source that is not subject to Title V permitting under 18 AAC 50.326 must periodically affirm that the stationary source is still accurately described by the application and minor permit and whether the owner or operator has made changes that would trigger the requirement for a new permit under this chapter. This provision is included in Section 6 of the minor permit.

For this project, the requirement pertains to an annual affirmation that there have not been any changes to the source described in the application. This requirement will preclude the additions

of new emissions units, addition of thermal dryers or other like changes to the source that could affect Air Quality.

2.4 State Emissions Standards

2.4.1 Visible Emission Standard

The diesel fired engine and the diesel heaters (Emission Unit 1 and Emission Unit 2) are *fuel-burning equipment* subject to the state standards for visible emissions in 18 AAC 50.055(a)(1). Sources such as transfer points etc… are *industrial processes* subject to the state standard for visible emissions in 18 AAC 50.055(a) (1).

Oil fired heaters, have historically complied with visible emission standards of 18 AAC 50.055(a)(1) when properly operated and maintained. Therefore, the Department is requiring only an initial compliance demonstration for the heater, within 30 days of startup.

Diesel-fired engines have the potential to exceed the visible emission standard. Therefore, the Department is requiring the Permittee to verify compliance by conducting an initial visible emission surveillance within 30-days after startup and periodic monitoring for continued compliance with the standard.

2.4.2 Particulate Matter Standard

Emission Unit 1 (diesel engine) and Emission Unit 2 (heaters) are *fuel-burning equipment* subject to the state standards for PM emissions of 0.05 grains per dry standard cubic foot of exhaust gas (gr./dscf) in 18 AAC 50.055(b)(1). All transfer points and other like sources are *industrial processes* subject to the state standard for PM in 18 AAC 50.055(b)(1).

Usibelli included a compliance demonstration in the application for the diesel engine, Emission Unit 1 and Emission Unit 2. The PM emissions for these diesel engines is derived from manufacturer supplied emission data. The Department concurs with these demonstrations. The permit does not include requirements of an initial source test for these units, as the department concurs with the submitted compliance demonstration.

2.4.3 Sulfur Dioxide Standard

Emission Unit 1 and Emission Unit 2 are fuel-burning equipment subject to the state standards for SO_2 emissions in 18 AAC 50.055(c).

Usibelli did not provide an initial compliance demonstration showing that the heaters, generators, and engines will comply with the state standard. The Department does not expect the units to exceed the state standards of 18 AAC 50.055(c) because Usibelli will use ULSD throughout the stationary source. The state standard for sulfur is 500 ppm while ULSD is 15 ppm. The Department is not requiring any compliance demonstration for the heaters, generators, or engines. The Permittee may show compliance with the state sulfur standard for distillate fuel burning equipment just by keeping records of fuel grade and amount.

2.5 Ambient Air Quality Protection Requirements

Section 2 of the permit contains Conditions to protect the ambient air quality standards for the annual NO_2 and for the 24-hour PM-10.

Because this stationary source has the potential to create fugitive dust, the Department included Conditions in Section 2 for adherence to the fugitive dust plan proposed by the Permittee. The Permittee stated that they will reduce emissions associated with the vehicle movements inside and on the access road to the mine. Therefore, the Department has included permit conditions to adhere to these reduction techniques in the Dust Control Plan. The Department also added additional monitoring requirement to ensure that the Permittee perform visual surveys at regular intervals, initiate corrective actions of discovering dust leaving the boundary, keep records of visual surveys, record any complaints and if necessary to revise the Dust Control Plant with Department approval.

3.0 Permit Administration

Usibelli may construct and operate the stationary source upon issuance.

New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) requirements are not part of the State of Alaska's minor permit program, and are not included in Minor Permits. The stationary source based on its emissions level is not subject to Title V permitting (18 AAC 50.326), where the NSPS requirements would reside in a State issued permit. The Permittee is obligated to coordinate all associated NSPS requirements with EPA. The Department has determined, that at a minimum, the stationary source is subject to one NSPS, specifically 40 CFR 60 Subpart Y, as a Coal Preparation and Processing Plant.

Exhibit A: Emissions Calculations

ID	Unit ID/ Description	Expected Operation	NO_X		CO		SO_2		VOC		PM-10	
			Emission factor	PTE TPY	Emission actor	PTE TPY	Emission factor	PTE TPY	Emission factor	PTE TPY	Emission Factor (In lb/ton unless otherwise noted)	PTE TPY
1	Power Generation	8760 hrs/yr	14.0 lb/hr	61.3	1.77 lb/hr	7.8	15 ppmw	0.04	0.14 lb/hr	0.6	0.18 lb/hr	0.8
2	Heaters	8760 hrs/yr	20 lb/10^3 gal	6.5	0.036 lb/MMBtu	1.6	15 ppmw	0.1	0.002 lb/MMBtu	0.1	2 lb/10^3 gal	0.6
3	Topsoil removal and storage	2,660 hrs/yr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	32.0 lb/hr	42.5
4	Overburden blasting	240 blast/yr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.27 lb/blast	0.99
5	Coal blasting	120 blasts/yr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.27 lb/blast	0.50
6	Overburden truck loading	10,306,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00103266	5.3
7	Overburden dumping	10,306,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00103266	5.3
8	Coal removal	1,815,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0178	16.1
9	Coal dumping –Crusher feeder	1,815,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0178	16.1
10	Coal dumping from run of mine pile	605,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0178	5.4
11	Coal Reclaim from run of mine pile	605,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0178	5.4
12	Crusher	1,815,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0024	2.2
13	Transfer-Crusher to conveyor	1,815,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0024	2.2
14	Transfer-Conveyor 1 to raw stockpile	1,815,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00058537	0.5
15	Transfer-Raw stockpile to conveyor 2	1,815,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00058537	0.5
16	Transfer-Conveyor 2 to Jig Plant	1,815,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00058537	0.5
17	Transfer-Jig Plant to Conveyor 3	815,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00058537	0.2
18	Transfer-Conveyor 3 to reject stockpile	815,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00039131	0.2
19	Transfer- Jig plant to conveyor 4	1,000,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00039131	0.2
20	Transfer-Conveyor 4 to clean stockpile	1,000,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00039131	0.2
21	Transfer-Clean stockpile to conveyor 5	1,000,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00039131	0.2
22	Transfer-Conveyor 5 to loadout bin	1,000,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00039131	0.2
23	Transfer-Loadout bin to truck	1,000,000 tpy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00039131	0.2
24	Wind erosion- mine area	168 Acres	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.38 ton/acre/yr	63.8
25	Wind erosion - run-of-mine coal stockpile	4 Acres	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	36.6 g/m^2/yr	0.7
26	Wind erosion- raw coal stockpile	1.5 Acres	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	36.6 g/m^2/yr	0.2
27	Wind Erosion – clean coal stockpile	1.5 Acres	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	36.6 g/m^2/yr	0.2

28	Wind Erosion –reject stockpile	0.1 Acres	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	36.6 g/m^2/yr	0.02
29	Mobile Equipment – grader operations	13,122 VMT[3]/yr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.765 lb/VMT	5.0
30	Mobile Equipment – overburden hauling - backfill	19,340 VMT/yr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.52 lb/VMT	21.8
31	Mobile Equipment – overburden hauling - stockpile	204,517 VMT/yr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.52 lb/VMT	230.8
32	Mobile Equipment – coal hauling within mine	14,103 VMT/yr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.874 lb/VMT	65.7
33	Mobile Equipment – miscellaneous mine traffic	50,000 VMT/yr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
34	Mobile Equipment – other vehicle traffic	236,520 VMT/yr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
35	Mobile Equipment – coal truck haul – loop road	4,410 VMT/yr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.42 lb/VMT	2.7
36	Off Source – coal truck haul – access road	101, 430 VMT/yr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.42 lb/VMT	61.4
	Total (Not Fugitive)			**67.8**		**9.3**		**0.1**		**0.7**		**1.4**
	Total Fugitive											**557.2**

Emission factors used in emissions calculations

EU ID	NO_X	CO	SO_2	VOC	PM-10
1	Vendor	Vendor	Vendor	Vendor	Vendor
2	AP-42 Table 1.3-1	AP-42 Table 1.3-1	AP-42 Table 1.3-1	AP-42 Table 1.3-1	AP-42 Table 1.3-1
3,4, 5	N/A	N/A	N/A	N/A	AP-42, Table 11-9.1
6, 7	N/A	N/A	N/A	N/A	AP-42 Section 13.2.4 Equation 1
8, 9, 10, 11	N/A	N/A	N/A	N/A	AP-42, Table 11-9.1
12	N/A	N/A	N/A	N/A	AP-42, Table 11.19.2-2
13 through 23	N/A	N/A	N/A	N/A	AP-42 Section 13.2.4 Equation 1
24 through 28	N/A	N/A	N/A	N/A	AP-42 Section 13.2.5, Equation 3
29	N/A	N/A	N/A	N/A	AP-42, Table 11.9.1
30 through 36	N/A	N/A	N/A	N/A	AP-42 Section 13.2.2, Equation 1a

[3] VMT = Vehicle Miles Travelled

Exhibit B: Modeling Memo

MEMORANDUM

State of Alaska
Department of Environmental Conservation
Division of Air Quality

TO: File

DATE: March 10, 2011

THRU: Alan Schuler, P.E.
Environmental Engineer
Air Permits Program

FILE NO:

PHONE: 269-7577
FAX: 269-7508

FROM: Krystin Bablinskas
Environmental Engineering Assoc. I
Air Permits Program

SUBJECT: Review of Usibelli's Ambient Assessment

This memorandum summarizes the Department's findings regarding the ambient analysis submitted by Usibelli Coal Mine, Inc. (Usibelli) for the Wishbone Hill Coal Mining and Processing Operation (Wishbone Hill). Usibelli submitted this analysis in support of their May 7, 2010 minor permit application (AQ1227MSS02). As described in this memorandum, Usibelli's analysis adequately shows that operating their emission units within the requested constraints will not cause or contribute to a violation of the annual average nitrogen dioxide (NO_2) and 24-hour particulate matter with an aerodynamic diameter of less than 10 microns (PM-10) Alaska Ambient Air Quality Standards (AAAQS) provided in 18 AAC 50.010.

BACKGROUND

Usibelli is planning to develop the coal reserves at Wishbone Hill through topsoil removal and reclamation. The project includes installation of a coal preparation plant to grind and wash the coal before hauling away from the site.

Usibelli submitted the application on May 7, 2010. Hoefler Consulting Group (now SLR) prepared the minor permit application, including the ambient assessment, on behalf of Usibelli. SLR submitted additional information on January 17, 2011, February 8, 2011, and February 18, 2011 in response to Department comments.

Usibelli's application triggers minor permit review under 18 AAC 50.502(c)(1) for oxides of nitrogen (NO_X). Per 18 AAC 50.540(c)(2)(A), applicants subject to 18 AAC 50.502(c)(1) must provide an ambient AAAQS analysis for each pollutant for which a permit is required under 50.502(c)(1). Therefore, Usibelli submitted an AAAQS analysis for NO_2 under 18 AAC 50.540(c)(2)(A).

Usibelli's application also triggers minor permit review under 18 AAC 50.502(b) for a coal preparation plant (18 AAC 50.502(b)(5)). Per 18 AAC 50.540(c)(2)(D), applicants subject to

18 AAC 50.502(b) must provide an ambient AAAQS analysis for each pollutant for which the Department requests an analysis. The Department requested an analysis for PM-10 in order to assess the potential fugitive dust impacts associated with this project. Therefore, Usibelli submitted an AAAQS analysis for PM-10 under 18 AAC 50.540(c)(2)(D).

APPROACH

Usibelli used computer analysis (modeling) to predict the ambient air quality impacts. Usibelli did not conduct a significant impact level (SIL) analysis on either pollutant.

Model Selection

There are a number of air dispersion models available to applicants and regulators. The U.S. Environmental Protection Agency (EPA) lists these models in their *Guideline on Air Quality Models* (Guideline), which the Department has adopted by reference in 18 AAC 50.040(f). Usibelli used EPA's AERMOD Modeling System (AERMOD) for the ambient analysis. AERMOD is an appropriate modeling system for this application.

The AERMOD Modeling System consists of three components: AERMAP (which is used to process terrain data and develop elevations for the receptor grid/emission units), AERMET (which is used to process the meteorological data), and the AERMOD dispersion model (which is used to estimate the ambient concentrations). Usibelli used the current version of each component (version 09292 for AERMOD, version 09040 for AERMAP and version 06341 for AERMET).

Meteorological Data

AERMOD requires hourly meteorological data to estimate plume dispersion. According to the Guideline, a *minimum* of one-year of site-specific data, or five years of representative National Weather Service (NWS) data should be used. When modeling with site-specific data, the Guideline states that additional years (up to five) should be used when available to account for year-to-year variation in meteorological conditions. In all cases the data must be representative of the meteorological transport conditions at the source. Section 8.3 of the Guideline states that "[t]he representativeness of the data is dependent on: (1) The proximity of the meteorological monitoring site to the area under consideration; (2) the complexity of the terrain; (3) the exposure of the meteorological monitoring site; and (4) the period of time during which data are collected."

The nearest NWS data is from the Palmer Municipal Airport. However, this dataset is not representative of the meteorological conditions at Wishbone due to distance and the large variation in terrain features. Usibelli therefore used the meteorological data they collected in 1990 at Wishbone Hill. While old, the data meets the Guideline requirements for representativeness.

The Guideline does not discuss when meteorological data becomes stale. Section 8.3.1.2 only indicates that the "most recent" data should be used. In the previous section (Section 8.3.1.1), EPA discussed annual variability and the length of record needed to adequately represent a 17-year period. While the discussion essentially regards statistics, the reference to a 17-year period

implies that data collected within a 17-year window could be considered for use in a modeling analysis. Usibelli's 1990 dataset is a few years older than the 17-year period referenced by EPA. However, it's not that much older in comparison to the time it takes for climatologically changes to occur. The Department therefore considers Usibelli's 1990 site-specific data set to still be adequately representative of the meteorological conditions experienced within the Wishbone area. Usibelli used this set and corresponding upper air data from Anchorage International Airport.

AERMOD requires specific meteorological inputs for preprocessing into AERMET. The Wishbone Hills data set includes all of the required parameters except for cloud cover or solar radiation data. Usibelli therefore used NWS cloud cover data from the Palmer Airport. In order to address Department concerns as to whether Palmer cloud-cover data is representative of the expected cloud-cover conditions at Wishbone Hill, Usibelli performed an analysis to show that the modeled results are insensitive to variations in cloud cover. Their sensitivity analysis is described below in detail under *Sky Cover Sensitivity*.

AERMET requires the area surrounding the meteorological tower to be characterized in regards to the following three surface characteristics: noon-time albedo, Bowen ratio, and surface roughness length. EPA has provided additional guidance regarding the selection and processing of these values in their *AERMOD Implementation Guide*.

Usibelli segregated the surrounding area into a single sector to reflect the main type of surface condition: deciduous and coniferous forest. Usibelli assigned the values by month in order to adjust the surface characteristics according to each season. The Department agrees with Usibelli's approach. The accepted values are repeated below in Table 1.

Table 1 – Approved AERMET Surface Parameters for Wishbone Hill

Month	Season	Albedo	Bowen Ratio	Surface Roughness
January	Winter	0.43	2	0.9
February		0.43	2	0.9
March		0.43	2	0.9
April		0.43	2	0.9
May	Spring	0.12	1.5	1.15
June		0.12	1.5	1.15
July	Summer	0.12	0.6	1.3
August		0.12	0.6	1.3
September	Autumn	0.12	1.8	1.05
October	Winter	0.43	2	0.9
November		0.43	2	0.9
December		0.43	2	0.9

EPA allows applicants to compare the high second-high (h2h) modeled concentration to the short-term air quality standards if at least one year of temporally representative site-specific, or five years of representative NWS data, are used. When these criteria are not met, then applicants must use the high first-high (h1h) concentration. In all cases, applicants must compare the h1h

modeled concentration to the annual average standards. The Department allowed Usibelli to compare the h2h concentration to the short-term AAAQS since they used site-specific data.

Sky Cover Sensitivity
The dataset collected at Usibelli did not contain cloud cover data required for the calculation of surface heat fluxes in AERMET. Usibelli used cloud cover from nearby Palmer Airport as a surrogate data for the AERMET processing. The Palmer Airport is far enough from Wishbone Hills where cloud cover could vary between the two sites. Usibelli conducted a cloud cover sensitivity analysis to determine the effect of cloud cover on the h2h 24-hr PM-10 impact. The assessment modeled PM-10 impacts under clear and fully overcast skies. Table F-5 of Usibelli's ambient assessment shows the variation in PM-10 concentration based on cloud cover. The table shows that there is some variation with cloud cover, but the difference is inconsequential. Therefore, the Department agrees with Usibelli that the use of Palmer Airport's cloud cover data is an acceptable surrogate for Wishbone Hills.

Emission Unit Inventory

Wishbone Hills has a large emission unit inventory covering a variety of activities occurring at the mine. Usibelli's emission unit inventory includes:

- Diesel-fired generator and comfort heaters,
- Topsoil Operations,
- Blasting Operations,
- Overburden,
- Coal Mining,
- Coal Processing,
- Wind Erosion,
- Mobile Equipment (such as coal hauling); and
- Off-source access roads.

Only two of the emission units (the diesel-fired generator and the diesel-fired comfort heaters) emit NO_X. Usibelli therefore limited the annual average NO_2 assessment to just those two units.

All of the emission units listed in Usibelli's permit application emit PM-10 (either directly or as fugitive dust). Many of the units operate sequentially, rather than concurrently. The large number of emission units and wide range of combinations/duration that could occur within a 24-hour period could easily lead to an unmanageable matrix of modeling scenarios. Usibelli therefore grouped emission units with similar operating schedules, emission characteristics and location in their modeling analysis. Table F-3 of Usibelli's ambient assessment details the individual units in each group. The resulting PM-10 analysis consisted of two point sources, an open pit source, and several volume sources, as discussed below in detail under *Emission Rates and Stack Parameters*. Usibelli also assumed that all operations occur on a daily basis. Their approach provides a worst-case estimate of the 24-hour PM-10 impacts.

Emission Rates and Stack Parameters

The assumed emission rates and stack parameters have significant roles in an ambient demonstration. Therefore, the Department checks these parameters very carefully.

Usibelli used vendor data to estimate the NO_X emissions from the diesel-fired generator and EPA's *Compilation of Air Pollutant Emission Factors* (AP-42) to estimate the NO_X emissions from the comfort heaters. Usibelli assumed these emission units operate continuously. Usibelli used reasonable stack parameters.

For the 24-hr PM-10 impacts, Usibelli primarily used AP-42 to estimate emissions. As previously noted, Usibelli assumed that all operations occur within a 24-hour period. However, they tempered this assumption by assuming the highly intermittent operations do not continuously run throughout the entire 24-hour period. These assumptions, along with several other aspects of Usibelli's 24-hour PM-10 analysis, are discussed below in detail.

Topsoil Operations and Overburden

The mining operations at Usibelli are planned to follow a sequential operation for coal removal. Topsoil is removed and stored. Overburden is removed through blasting and then hauled away before mining can commence. For safety reasons, topsoil removal, blasting, overburden hauling, and coal mining cannot occur within the same 24-hour period. Usibelli therefore characterized this sequential operation by making the following assumptions in the 24-hour ambient assessment.

- Topsoil removal, blasting, overburden hauling, and coal mining occur concurrently.
- Topsoil removal occurs 2,660 hours per year (hr/yr) and was modeled using the annual average, rather than maximum short-term, emission rate to reflect the intermittent activity.
- Overburden loading and dumping occurs no more than 30 days per year, and therefore, is not part of the typical daily emission profile. Instead of specifically including this limited activity in the analysis, Usibelli assumed the emissions are represented through their assumption that overburden hauling occurs continuously throughout the 24-hour averaging period.
- While Usibelli intends to blast no more than 240 times per year for overburden removal and 120 times per year for coal removal, they conservatively assumed both types occurs continuously during the 24-hour averaging period.
- All other emission units operate continuously within a 24-hour period.

The Department conducted a sensitivity analysis to determine if the modeled results are highly sensitive to Usibelli's use of an annual, rather than maximum, emission rate for the topsoil removal. The scope of the Department's sensitivity analysis is to determine if Usibelli could still comply with the 24-hr PM-10 standard at full operation, but without *concurrent* operation, of the Topsoil and Overburden Operations. Usibelli's modeling assessment notes that for safety reasons, Topsoil and Overburden Operations cannot occur concurrently in reality, but they assumed concurrent operation, with assumptions, to create a reasonable approach for modeling purposes.

The Department conducted two runs. Each run excludes either the Topsoil or Overburden Operations. All other operations, such as coal operations and assumed blasting, were included in each run. Run 1 assumes no Top Soil Operations and full Overburden Operations. The

Overburden Operations were modified to include the additional dumping and loading emission rates that were previously excluded. Because Usibelli did not specifically model these operations, their emission contribution was added to the overburden hauling. Run 2 assessed the opposite scenario: no Overburden Operations (except overburden blasting) while assuming full Topsoil Operations. The topsoil removal emission rate was modified from the annual emission rate to the short-term emission rate. The maximum 24-hour impacts, in micrograms per cubic meter ($\mu g/m^3$), are listed below in Table 2:

Table 2 – Results of Topsoil/Overburden Sensitivity Analysis

Run	24-hr PM-10 results ($\mu g/m^3$)
1	112.9
2	110.9

The results listed in Table 2 do not include background data. Both runs result in values lower than Usibelli's non-cumulative impact listed in Table 3. Thus, this shows that Usibelli's assumed daily profile is conservative and operational restrictions regarding the Topsoil and Overburden Operations are not required.

Wind Erosion

Usibelli did not include the impacts of wind erosion on material piles and mining operations, such as digging and hauling. Wind erosion requires high velocity winds to exceed the threshold friction velocity of the materials, such as overburden and coal. The threshold friction velocity is dependent on the surface roughness of the material. Based on AP-42, Table 13.2.5-2 Threshold Friction Velocities, the threshold wind velocity for overburden is approximately 20 meters per second (m/s) for overburden and 15 m/s for coal. Usibelli assessed the meteorology at Wishbone Hills and concluded that most of the days do not have high enough wind speeds to cause erosion. High winds that did occur were most likely to coincide with the winter months where snow cover should diminish erosion.

The Department finds this assumption acceptable. The Department is nevertheless requiring Usibelli to adhere to the "Active Controls for Fugitive Emission Sources" section in their August 10, 2010 Fugitive Dust Control Plan in order to further reduce the likelihood for erosion.

Particle Deposition

Usibelli utilized the particle deposition algorithms in AERMOD to refine their 24-hr PM-10 estimates. Particle deposition is defined as a tendency for particles to settle out of an emissions stream due to gravitational impacts. AERMOD has two options for particle deposition: "Method 1" and "Method 2". Method 1 requires general knowledge of the particle size and distribution, while Method 2 assumes little about the particle distribution is known. Usibelli used Method 1 for the open pit source and Method 2 for the point and volume sources. Additional details may be found in the following open pit and volume source sub-sections.

Open Pit Sources

Usibelli modeled the mine group as a large open pit source. The mine group includes blasting for both overburden and coal, and various coal removal emission units. The open pit encompasses Usibelli's planned mine area for mine area 1 and a portion of the overburden stockpile, shown in

the Wishbone Hills facility map in Figure A-2 of Usibelli's application. This is a conservative estimate as to the size of the mining area, since the actual mining area is much smaller. Usibelli plans to mine the pit down several hundred feet. However, Usibelli modeled the open pit at only 50 feet deep. This is a conservative estimate since a shallower depth allows for more particulates to be advected out of the mine pit.

Usibelli used Method 1 for the open pit sources since the particle size and distribution is known for the coal at Wishbone Hills. Usibelli used input parameters based on the type of coal present at the mine. Usibelli used reasonable open pit parameters and particle deposition values.

Volume Sources

Usibelli modeled most of the emission units as volume sources. This includes some of the emission units within the open pit mine and all off-site roadway sections. The assumed release height, initial lateral dimension of the volume (σ_y), and initial vertical dimension of the volume (σ_z) for each source are found in Table F-2 of Usibelli's ambient assessment. Usibelli developed these values based on typical operations of the emission units in each emission unit group. The Department verified these values and found them appropriate for this analysis.

For the particle deposition, Usibelli used the Method 2 algorithm. This is a "non-guideline" option and requires Department and EPA approval, per 18 AAC 50.215(c)(2). The Air Permits Program Manager gave approval on January 27, 2011.[4] EPA Region 10 granted permission on February 22, 2011.

Method 2 requires two specific inputs: the fine mass fraction and a representative mean mass particle diameter. The fine mass fraction represents the fraction of particles that falls in the fine category, or has an aerodynamic diameter of less than 2.5 microns (PM-2.5). Usibelli assumed that all of the particles are fine, and thus chose to enter a "1" into this category. Use of the fine particle category is a conservative assumption, since fine particles are less likely to be deposited out of an emission stream due to their low settling velocities.

The representative diameter is an aerodynamic diameter specific to the property of the material. Usibelli estimated this also as "1" because of the low density of coal and the variety of other materials present at Wishbone Hills. This value is consistent with the material properties of coal and gravel which are the primary dust sources at the mine. Therefore, the Department considers Usibelli's Method 2 inputs adequate for this analysis.

Method 1 vs. Method 2 Sensitivity Analysis

Usibelli is the first Alaskan applicant to use deposition in an AERMOD analysis. The Department therefore conducted a sensitivity analysis to determine the affects of using the non-guideline Method 2 algorithm instead of the guideline Method 1 algorithm. The Department reran Usibelli's assessment using Method 1 for the volume sources rather than Method 2. The Department used the same Method 1 parameters as used by Usibelli for the open pit source. With all units subject to Method 1, the resulting 24-hour PM-10 concentration is less than Usibelli's assessment: 93.8 $\mu g/m^3$ using only Method 1 versus the 113.2 $\mu g/m^3$ Method 2 for all units other

[4] The Commissioner delegated his authority regarding the use of non-guideline models to the Air Permits Program Manage on June 3, 2008.

than the open pit mine. Therefore, the Department considers Usibelli's use of Method 2 a conservative approach to modeling the 24-hr PM-10 impacts at Wishbone Hills.

Ambient NO_2 Modeling

The modeling of ambient NO_2 concentrations can sometimes be refined through the use of ambient air data assumptions. Applicants generally use the national default ambient NO_2-to-NOx ratio of 0.75, as provided in the Guideline, to refine the estimated ambient NO_2 concentrations. Usibelli's assessment mentions the use of this method, but they did not apply it to their modeled impacts. Therefore, the Department included the 0.75 ratio in the results shown below in Table 3.

Ambient Air Boundary

For purposes of air quality modeling, "ambient air" means outside air to which the public has access. Ambient air typically excludes that portion of the atmosphere within a stationary source's boundary. Usibelli used the boundary of Wishbone Hills as the ambient air boundary. The boundary encompasses land owned by Usibelli as well as land leased from the State of Alaska and the Matanuska-Susitna Borough. Usibelli can legally preclude access to the facility due to public safety concerns.

The land includes an existing public trail that Usibelli intends to relocate to the outer edge of the proposed mining area. Usibelli plans to close off the old trail by installing a berm at the junction. Due to the surrounding terrain, the relocated trail will still transect sections of the mine. Usibelli correctly treated these transects as ambient air. They will also install barriers along the transects to prevent access to the rest of the mine. One transect crosses the access road into the mine site. Usibelli plans to put gates on both sides of the trail at the road crossings. The other section runs along the southwestern portion of the mine boundary. Usibelli plans to preclude public access by installing a fence between the trail and mining area. Because of the extent of Usibelli's boundary and the trails within the boundary, Usibelli does not plan to install a fence around the entire perimeter of the mine. Usibelli does plan to gate the entrance onto the access road at the Glenn Highway in addition to the gates enclosing the public trail. Usibelli plans additional fencing around the coal processing plant and slurry pond for additional safety reasons. Usibelli also developed a Public Access Control Plan to preclude public access within the mine boundary (except for the previously noted public trails). The Department accepts Usibelli's approach for precluding public access. The Department is also including a permit condition in Minor Permit AQ1227MSS02 that will require Usibelli to comply with their Public Access Control Plan.

Receptor Grid

Usibelli used a 50 meter (m) spacing around the boundary of Wishbone Hills and along the public trails that transect the ambient boundary. Usibelli extended the receptor grid outward about 200 m at 100 m spacing from the Wishbone Hills boundary.

Usibelli's receptor grids are acceptable.

Downwash

The facilities within Wishbone Hills do not contain any large structures near emission units that would warrant a downwash analysis. Therefore, Usibelli did not include any of the planned buildings in the modeling. The Department verified the building locations with the emission points and finds this assumption acceptable for this analysis.

Off-Site Impacts

In a cumulative impact analysis, the applicant must include impacts from large sources located within 50 km of the applicant's significant impact area. These impacts from "off-site" sources are typically assessed through modeling. However, the off-site impacts in an AAAQS analysis can also be accounted for with ambient monitoring data, if representative data is available.

Usibelli checked to see if there are any off-site sources within 50 km of Wishbone Hills. Usibelli noted that there were no stationary sources within 50 km that would warrant an off-site impact analysis. The Department agrees with Usibelli's conclusion.

Background Concentrations

The background concentration represents impacts from sources not included in the modeling analysis. Typical examples include natural, area-wide, and long-range transport sources. The background concentration must be evaluated on a case-by-case basis for each ambient analysis. Once the background concentration is determined, it is added to the modeled concentration to estimate the total ambient concentration.

There is no current ambient pollutant data from the Wishbone Hill area. Since pre-construction monitoring is *not* required or expected under the minor permit program, surrogate values must be used to estimate the expected background concentrations.

Usibelli presented North Slope data in their application to represent the NO_2 and PM-10 background concentrations at Wishbone Hills. The Department disagrees with this approach. The large distance and regional differences between the Matanuska-Susitna (Mat-Su) Valley and the North Slope make Usibelli's approach untenable.

For NO_2, the Department instead used data from the Swanson River Field (northern Kenai Peninsula). Union Oil Company of California (UOCC) collected this data between May 2008 and April 2009 to support future ambient assessments of their oil and gas production activities. The data likely includes impacts from the existing oil and gas infrastructure. It should therefore be a conservative estimate of the expected background concentration at Wishbone Hills.

The Department discussed its concerns with using North Slope PM-10 data with Usibelli. The Department proposed that Usibelli should instead use the maximum concentration measured at Eagle River. Eagle River is the nearest monitoring site to Wishbone Hills with a readily available data set. Like Wishbone Hills, Eagle River is subject to the wind-blown dust events prevalent in the Mat-Su Valley. The station would also include impacts from anthropogenic sources, such as dust from the Glenn highway and local streets. The maximum 24-hr PM-10 Federal Reference Method (FRM) concentration is 50 $\mu g/m^3$ – which is a third of the ambient standard.

Usibelli felt the Eagle River data would be overly conservative since the Eagle River traffic is much greater than what occurs in the Wishbone Hill area. They also felt the use of a maximum impact was overly conservative. They therefore elected to average the dataset based on the meteorological period(s) of concern, per Section 8.2.2 of the Guideline. The goal of this methodology is to identify under which meteorological conditions high impacts occur, and then average the concentrations with similar meteorology, to develop a representative background concentration. Depending on the data, there may be more than one meteorological condition of concern. The Guideline is silent on how these periods are identified. However, Phillips Alaska, Inc. developed an approach in March 2002 for processing PM-10 data measured at Nuiqsut[5]. Their approach was reviewed and approved by the Department and EPA Region 10.

In a February 9, 2011 response to Department questions, Usibelli agreed to replace their North Slope PM-10 value with Eagle River data processed in a manner similar to the method used for the Nuiqsut dataset. In summary, Usibelli examined the data as follows:

1. Usibelli first calculated the 95th percentile of the Eagle River hourly concentrations to create a subset of the highest concentrations. Hourly concentrations were used over the FRM values so that wind speed and direction can be correlated to each hourly value. This value, which they referred as the significant monitoring concentration, was determined to be 56 µg/m^3.
2. Usibelli then sorted the high values by wind direction to determine if there were specific directions of concern. Spikes in concentration level were attributed to wind directions between 010 – 050 degrees and 340 – 360 degrees. For the rest of the sectors, the data was primarily below the significant monitoring concentration.
3. Usibelli then investigated the wind speed for each sector of concern:
    a. For the 010 – 050 sector, the wind speeds were as high as 45 mph, with a significant cluster of high concentrations between 15 mph and 45 mph. This suggests the high values may be due to wind-driven dust events from the Matanuska Glacier.
    b. For the 340 – 360 sector, the wind speeds were primarily between 5 mph and 15 mph. Usibelli stated these values are likely dust impacts due to vehicular traffic on the nearby Glenn highway. Usibelli provided a figure showing spikes in PM-10 concentration during rush hour in April (the time of year when gravel is most prevalent on roads).

Usibelli then averaged the data for each sector, and the remaining 060 – 330 sector. The highest average concentration was 28.5 µg/m^3. This was the value Usibelli proposed as the background concentration for Wishbone Hills.

The Department conducted a lengthy review of Usibelli's method for averaging the Eagle River PM-10 data. In general, the Department agrees with Usibelli's method and final results. The

[5] *Short-Term PM-10 Background Concentration Determination for the Proposed Alpine CDN & CDS Satellite Drilling Pads Colville River Unit, Alaska*, March 2002, Prepared by SECOR International Incorporated on behalf of Phillips Alaska, Inc.

Department independently averaged the background data using a slightly different and simpler method. The Department's cursory approach provided a higher value than Usibelli's, but the higher value did *not* result in a modeled violation of the 24-hr PM-10 AAAQS. Therefore, the Department accepts Usibelli's averaged background concentration for the 24-hr PM-10.

RESULTS AND DISCUSSION

The maximum annual average NO_2 and 24-hour PM-10 AAAQS impacts, along with the background concentrations, total impacts, and AAAQS are shown in Table 3. All of the total impacts are less than the AAAQS. Therefore, Usibelli has demonstrated compliance with the AAAQS.

Table 3 – Maximum AAAQS Impacts

Air Pollutant	Avg. Period	Maximum Modeled Conc ($\mu g/m^3$)	Bkgd Conc ($\mu g/m^3$)	TOTAL IMPACT: Max conc plus bkgd ($\mu g/m^3$)	Ambient Standard ($\mu g/m^3$)
NO_2	Annual	2.01	13.2	**15.2**	100
PM-10	24-hr	113.2	28.5	**141.7**	150

It is important to note that since ambient concentrations vary with distance and direction from each emission unit, the maximum values shown represent the highest annual and high second high short term values that may occur within the area. Except for maximum short term concentrations which are allowed to exceed the respective standards once per year, the concentrations at other locations within the modeling domain should be less than the values reported above.

CONCLUSION

The Department reviewed Usibelli's modeling analysis for Wishbone Hills and concluded the following:

1. The NO_2 and PM-10 emissions associated with operating the proposed emission units will not cause or contribute to a violation of the AAAQS listed in 18 AAC 50.010.
2. . Usibelli's modeling analysis fully complies with the showing requirements of 18 AAC 50.540(c)(2).
3. Usibelli conducted their modeling analysis in a manner consistent with EPA's *Guideline on Air Quality Models*, as required under 18 AAC 50.215(b)(1).

The Department developed conditions in Minor Permit AQ1227MSS02 to ensure Usibelli complies with the AAAQS. These conditions are summarized below.

1. Comply with the Public Access Control Plan provided as part of the May 10, 2010 application.

2. Comply with the Fugitive Dust Control Plan provided to the Department on August 10, 2010.

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