MEMORANDUM

DATE: February 19, 2010

TO: Eric Clark, Air Quality Analyst, Air Program

FROM: Kevin Schilling, Stationary Source Modeling Coordinator, Air Program

PROJECT NUMBER: P-2010.0131

SUBJECT: Modeling Review for the C & A Paving, Permit to Construct Application for a Hot Mix Asphalt Plant

1.0 Summary

C & A Paving (C&A) submitted a Permit to Construct (PTC) application for modifications to their hot mix asphalt plant (HMA) operated near Ten Mile Creek Rd and Pleasant Valley Road near Boise, Idaho. Air quality analyses involving atmospheric dispersion modeling of emissions associated with the proposed project were performed to demonstrate the modified facility would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02 [Idaho Air Rules Section 203.02]) or Toxic Air Pollutant (TAP) increment (Idaho Air Rules Section 203.03). C&A Asphalt submitted applicable site-specific ambient air impact analyses in support of the application.

A technical review of the submitted analyses and information was conducted by DEQ. DEQ staff also performed verification analyses accounting for some minor changes in the emissions inventory. Results from the submitted analyses in combination with DEQ's analyses were used to establish minimum setback distances between emissions points and the property boundary of the site. The submitted information, in combination with DEQ's air quality analyses: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data; 3) adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed either a) that predicted pollutant concentrations from emissions associated with the facility were below significant contribution levels (SCLs) or other applicable regulatory thresholds; or b) that predicted pollutant concentrations from emissions associated with the facility, when appropriately combined with background concentrations, were below applicable air quality standards at all locations outside of the required setback distance (closest distance from pollutant emission points to the property boundary).

Air impact analyses are required by Idaho Air Rules to be conducted according to methods outlined in 40 CFR 51, Appendix W (Guideline on Air Quality Models). Appendix W requires that facilities be modeled using emissions and operations representative of design capacity or as limited by a federally enforceable permit condition. The submitted analyses, in combination with DEQ's analyses, demonstrated to the satisfaction of the Department that operation of the proposed facility or modification will not cause or significantly contribute to a violation of any ambient air quality standard, provided the following key conditions are representative of facility design capacity or operations as limited by a federally enforceable permit condition:

- Maximum throughput of 240 ton per hour and 250,000 ton per year.
- A maximum of one generator powered by a diesel engine of less than 750 hp operating at the site.
- Emissions points are no closer to the property boundary than 150 meters.

- Fugitive emissions from material handling and vehicle traffic are controlled to a high degree.
- The HMA plant is not located where there are co-contributing pollution sources within 1,000 feet of emissions sources associated with the HMA plant.
- T-RACT is used to control TAP emissions.
- Emissions rates for applicable averaging periods are not greater than those used in the modeling analyses, as listed in this memorandum.
- Stack heights for the drum dryer, tank heater, and generator are as listed in this memorandum.
- Stack parameters of exhaust temperature and flow rate should not be less than 75 percent of values listed in this memorandum.

Table 1 presents key assumptions and results that should be considered in the development of the permit.

Table 1. KEY CONDITIONS USED IN MODELING ANALYSES

Criteria/Assumption/Result	Explanation/Consideration
Emissions units must maintain a 150 meter (492 foot) setback distance from the nearest property boundary.	This setback distance is necessary to assure compliance with applicable air quality standards at all ambient air locations.
Co-contributing emissions sources such as other HMAs, rock crushing plants, or concrete batch plants may not be operated at the site.	Emissions are considered co-contributing if they occur within 1,000 feet (305 meters) of each other.

2.0 Background Information

2.1 Applicable Air Quality Impact Limits and Modeling Requirements

This section identifies applicable ambient air quality limits and analyses used to demonstrate compliance.

2.1.1 Area Classification

The C&A HMA plant is located near Boise, Idaho. The area is designated as an attainment or unclassifiable area for carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}), and sulfur oxides (SOx). Boise operates under a maintenance plan for CO and PM_{10}.

There are no Class I areas within 10 kilometers of this location.

2.1.2 Significant and Cumulative NAAQS Impact Analyses

If estimated maximum pollutant impacts to ambient air from the emissions sources associated with the facility exceed the significant contribution levels (SCLs) of Idaho Air Rules Section 006.102, then a cumulative NAAQS impact analysis is necessary to demonstrate compliance with National Ambient Air Quality Standards (NAAQS) and Idaho Air Rules Section 203.02. A cumulative NAAQS impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions, and emissions from any nearby co-contributing sources, to DEQ-approved background concentration values that are appropriate for the criteria pollutant/averaging-time at the facility location and the area of significant impact. The resulting maximum pollutant concentrations in ambient air are then compared to the NAAQS listed in Table 2. Table 2 also lists SCLs and specifies the modeled value that must be used for comparison to the NAAQS.

Table 2. APPLICABLE REGULATORY LIMITS				
Pollutant	Averaging Period	Significant Contribution Levels[a] ($\mu g/m^3$)[b]	Regulatory Limit[c] ($\mu g/m^3$)	Modeled Value Used[d]
PM_{10}[e]	Annual[f]	1.0	50[g]	Maximum 1[st] highest[h]
	24-hour	5.0	150[i]	Maximum 6[th] highest[j]
$PM_{2.5}$[k]	Annual	Not established	15	Use PM_{10} as surrogate
	24-hour	Not established	35	Use PM_{10} as surrogate
Carbon monoxide (CO)	8-hour	500	10,000[l]	Maximum 2[nd] highest[h]
	1-hour	2,000	40,000[l]	Maximum 2[nd] highest[h]
Sulfur Dioxide (SO_2)	Annual	1.0	80[g]	Maximum 1[st] highest[h]
	24-hour	5	365[l]	Maximum 2[nd] highest[h]
	3-hour	25	1,300[l]	Maximum 2[nd] highest[h]
Nitrogen Dioxide (NO_2)	Annual	1.0	100[g]	Maximum 1[st] highest[h]
Lead (Pb)	Quarterly	NA	1.5[g]	Maximum 1[st] highest[h]
	3-month[m]	NA	0.15[g]	Maximum 1[st] highest[h]

a. Idaho Air Rules Section 006.102.
b. Micrograms per cubic meter.
c. Idaho Air Rules Section 577 for criteria pollutants or as incorporated by reference as per Idaho Air Rules Section 107.
d. The maximum 1[st] highest modeled value is always used for the significant impact analysis.
e. Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers.
f. The annual PM_{10} standard was revoked in 2006. The standard is still listed because compliance with the annual $PM_{2.5}$ standard is demonstrated by a PM_{10} analysis that demonstrates compliance with the revoked PM_{10} standard.
g. Never expected to be exceeded in any calendar year.
h. Concentration at any modeled receptor.
i. Never expected to be exceeded more than once in any calendar year.
j. Concentration at any modeled receptor when using five years of meteorological data.
k. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
l. Not to be exceeded more than once per year.
m. 3-month rolling average. Not yet incorporated by reference into Idaho Air Rules.

New source review requirements for assuring compliance with $PM_{2.5}$ standards have not yet been completed and promulgated into regulation. EPA has asserted through a policy memorandum that compliance with $PM_{2.5}$ standards will be assured through an air quality analysis for the corresponding PM_{10} standard. Although the PM_{10} annual standard was revoked in 2006, compliance with the revoked PM_{10} annual standard must be demonstrated as a surrogate to the annual $PM_{2.5}$ standard.

2.1.3 Toxic Air Pollutant Analyses

Emissions of toxic substances are generally addressed by Idaho Air Rules Section 161:

> *Any contaminant which is by its nature toxic to human or animal life or vegetation shall not be emitted in such quantities or concentrations as to alone, or in combination with other contaminants, injure or unreasonably affect human or animal life or vegetation.*

Permit requirements for toxic air pollutants (TAPs) from new or modified sources are specifically addressed by Idaho Air Rules Section 203.03 and require the applicant to demonstrate to the satisfaction of DEQ the following:

> *Using the methods provided in Section 210, the emissions of toxic air pollutants from the stationary source or modification would not injure or unreasonably affect human or animal life or vegetation as required by Section 161. Compliance with all applicable toxic air pollutant carcinogenic increments and toxic air pollutant non-carcinogenic increments will also*

demonstrate preconstruction compliance with Section 161 with regards to the pollutants listed in Sections 585 and 586.

Per Section 210, if total project-wide emissions increase associated with a new source or modification exceeds screening emission levels (ELs) of Idaho Air Rules Section 585 or 586, then the ambient impact of the emissions increase must be estimated. If ambient impacts are less than applicable Acceptable Ambient Concentrations (AACs) for non-carcinogens of Idaho Air Rules Section 585 and Acceptable Ambient Concentrations for Carcinogens (AACCs) of Idaho Air Rules Section 586, then compliance with TAP requirements has been demonstrated. If DEQ determines T-RACT is used to control emissions of carcinogenic TAPs, then modeled concentrations of 10 times the AACC are considered acceptable, as per Idaho Air Rules Section 210.12.

2.2 Background Concentrations

Background concentrations are used in the cumulative NAAQS impact analyses to account for impacts from sources not explicitly modeled. Table 3 lists appropriate background concentrations for the general area where the facility is located.

Background concentrations were revised for all areas of Idaho by DEQ in March 2003[1]. Background concentrations in areas where no monitoring data are available were based on monitoring data from areas with similar population density, meteorology, and emissions sources. Background concentrations in these analyses were based on DEQ default values for rural/agricultural areas.

Table 3. BACKGROUND CONCENTRATIONS

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)[a]
PM_{10}[b]	24-hour	73
	Annual	26
Carbon monoxide (CO)	1-hour	3,600
	8-hour	2,300
Sulfur dioxide (SO_2)	3-hour	34
	24-hour	26
	Annual	8
Nitrogen dioxide (NO_2)	Annual	17
Lead (Pb)	Quarterly	0.03

a. Micrograms per cubic meter
b. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

3.0 Modeling Impact Assessment

3.1 Modeling Methodology

This section describes the modeling methods used by the applicant and DEQ to demonstrate compliance with applicable air quality standards.

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1 Hardy, Rick and Schilling, Kevin. *Background Concentrations for Use in New Source Review Dispersion Modeling.* Memorandum to Mary Anderson, March 14, 2003.

3.1.1 Overview of Analyses

Spidell and Associates Environmental Consultants (Spidell), C&A's consultant, performed the initial site-specific ambient air impact analyses. The modeling performed only supports operation of the HMA within the Treasure Valley area.

Table 4 provides a brief description of parameters used in the Spidell and DEQ modeling analyses.

Table 4. MODELING PARAMETERS

Parameter	Description/Values	Documentation/Addition Description[a]
General Location	Treasure Valley	HMA plant can only operate within the Treasure Valley area. Site-specific analyses for the C&A site were performed by Spidell.
Model	AERMOD	AERMOD with the PRIME downwash algorithm, version 07026, was used for the submitted site-specific analyses. AERMOD version 09202 was used for DEQ verification analyses.
Meteorological Data	Boise surface and upper air	1988-1992 data were provided to Spidell from DEQ. DEQ analyses were performed using updated 2001-2005 data.
Terrain	Not Considered	Accounting for terrain in the model is not necessary considering the nature of the emissions sources and the surrounding terrain.
Building downwash	Considered	Buildings present on the site that could reasonably cause plume downwash were included in the analyses through the use of the BPIP-PRIME program
Receptor Grid	Grid 1	10-meter spacing from the boundary out to 200 meters. 5-meter spacing to 150 meters for DEQ verification analyses.
	Grid 2	25-meter spacing out to 275 meters. 10-meter spacing out to 210 meters for DEQ verification analyses.
	Grid 3	50-meter spacing out to 700 meters.

3.1.2 Modeling protocol and Methodology

A modeling protocol was submitted to DEQ prior to the application and DEQ provided approval of the protocol. Modeling was generally conducted using data and methods described in the protocol and the *State of Idaho Air Quality Modeling Guideline*.

3.1.3 Model Selection

Idaho Air Rules Section 202.02 require that estimates of ambient concentrations be based on air quality models specified in 40 CFR 51, Appendix W (Guideline on Air Quality Models). The refined, steady state, multiple source, Gaussian dispersion model AERMOD was promulgated as the replacement model for ISCST3 in December 2005. EPA provided a 1-year transition period during which either ISCST3 or AERMOD could be used at the discretion of the permitting agency. AERMOD must be used for all air impact analyses, performed in support of air quality permitting, conducted after November 2006.

AERMOD retains the single straight line trajectory of ISCST3, but includes more advanced algorithms to assess turbulent mixing processes in the planetary boundary layer for both convective and stable stratified layers.

AERMOD offers the following improvements over ISCST3:

- Improved dispersion in the convective boundary layer and the stable boundary layer
- Improved plume rise and buoyancy calculations
- Improved treatment of terrain affects on dispersion
- New vertical profiles of wind, turbulence, and temperature

AERMOD was used for the DEQ analyses in support of locating the facility at alternate locations in Idaho.

Site-specific analyses performed by Spidell and DEQ used AERMOD. Spidell used AERMOD version 07026 rather than the October 2009 updated version 09292. This was acceptable since the new version was issued after the application was submitted to DEQ. DEQ verification analyses were performed using version 09292.

3.1.4 Meteorological Data

DEQ provided model-ready meteorological data to Spidell, processed from five years (1988–1992) of National Weather Service data collected at the Boise Airport. These data were used for the analyses submitted with the application. Prior to receiving the application, DEQ updated the model-ready data, processing data for 2001-2005. These updated data were used for DEQ verification analyses.

3.1.5 Terrain Effects

Terrain effects on dispersion were not considered in the analyses. Flat terrain was an appropriate assumption because most emissions sources associated with the HMA plant are near ground-level and the surrounding area is typically flat for dispersion modeling purposes. Emissions sources near ground-level typically have maximum pollutant impacts near the source, minimizing the potential affect of surrounding terrain to influence the magnitude of maximum modeled impacts.

3.1.6 Facility Layout

The submitted analyses and DEQ's analyses used a generic facility layout. This was done because the specific layout will vary depending upon product needs and specific characteristics of the site. The generic layout will support relocation of the plant within the Treasure Valley area.

3.1.7 Building Downwash

Downwash effects were considered in both the submitted analyses and DEQ's verification analyses. The submitted analyses assumed two buildings: a generator trailer 30 ft x 10 ft x 12 ft high; the silo at 12 ft x 12 ft x 28 ft high. DEQ's analyses used a 20 ft x 20 ft x 12 ft high building centered on the generator source. The effects from the storage silo were accounted for in DEQ's analyses by modeling the silo-filling and loadout source as a point source stack with the stack diameter equal to the diameter of the silo, allowing the stack-tip downwash algorithm to account for downwash.

3.1.8 Ambient Air Boundary

The submitted analyses and DEQ's analyses used a generic facility layout. The submitted analyses were performed assuming a circular ambient air boundary 150 meters from closest emissions sources.

An ambient air boundary was not used in DEQ's analyses. DEQ's analyses were based on determining a required setback distance needed to assure compliance with standards, as described in Section 3.1.9. The issued permit will require this distance be maintained at all locations.

3.1.9 Receptor Network and Generation of Setback Distances

A circular grid with 5.0 meter receptor spacing, extending out to 100 meters was used in the modeling files for the DEQ analyses. To establish a setback distance, the following procedure was followed:

1) Trigger values for the modeling analyses were determined. These are values, when combined with background concentrations, would indicate an exceedance to a standard. They were calculated by subtracting the background value from the standard (because the model does not specifically include background in the results). The following are trigger values:

PM_{10}	24-hour	77 $\mu g/m^3$
	annual	24 $\mu g/m^3$
SO_2	3-hour	1266 $\mu g/m^3$
	24-hour	339 $\mu g/m^3$
	annual	72 $\mu g/m^3$
CO	1-hour	36400 $\mu g/m^3$
	8-hour	7700 $\mu g/m^3$
NO_2	annual	83 $\mu g/m^3$

2) For each pollutant, averaging period, and meteorological data set, all receptors with concentrations equal or greater than the trigger value were plotted. This effectively gave a plot of receptors where the standard may be exceeded for that pollutant and averaging period.

3) The controlling receptor for each pollutant, averaging period, and meteorological data set was identified. First, the receptor having a concentration in excess of the trigger value that is the furthest from any emissions source was identified. The controlling receptor was the next furthest downwind receptor from that point.

4) The minimum setback distance was calculated. This was the furthest distance between an emissions point and the controlling receptor.

3.2 Emission Rates

Emissions rates used in the modeling analyses for the proposed project were equal to or greater than those presented in other sections of the permit application or the DEQ Statement of Basis.

Emissions rates calculated by the DEQ permit writer differed somewhat from what was used in the submitted ambient air impact analyses for some sources. The impact analyses are still valid provided modeled rates are not less than those calculated in other sections of the application.

3.2.1 Criteria Pollutant Emissions Rates

Table 5 lists criteria pollutant emissions rates used in the submitted analyses and DEQ's verification analyses for all averaging periods. Attachment 1 provides additional details of DEQ emissions calculations.

Table 5. EMISSIONS RATES USED FOR FULL NAAQS IMPACT MODELING						
Emissions Point	Description	Averaging Period	Emissions Rates (lb/hr) Values in Parentheses are those used in the Submitted Analyses			
			Carbon Monoxide	PM_{10}[a]	Sulfur Dioxide	Oxides of Nitrogen
DRYER (DRYER)	Asphalt Dryer Stack	1-/8-hour	(31.2)			
		3-hour			(13.9)	
		24-hour		5.52 (5.52)	(13.9)	
		annual		0.656[b] (5.52)	(13.9)	(13.2)
SILO (SILO)	Asphalt Silo Filling	1-/8-hour	(0.283)			
		24-hour		0.141 (0.141)		
		annual		0.0167[b] (0.141)		
LOADOUT (LOADOUT)	Asphalt Loadout	1-/8-hour	(0.324)			
		24-hour		0.125 (0.125)		
		annual		0.0149[b] (0.125)		
HOTOIL (TNHHTR)	Asphalt Oil Heater	1-/8-hour	(0.015)			
		3-hour			(0.429)	
		24-hour		9.63E-3 (0.149)	(0.429)	
		annual		7.23E-3[c] (0.149)	(0.429)	(0.058)
GEN1 (GEN)	500 kW Generator	1-/8-hour	(3.99)			
		3-hour			(2.37)	
		24-hour		0.247[d] (0.269)	(2.37)	
		annual		0.0294[e] (0.269)	(2.37)	(15.0)
MATHNDHI (MATHND)	Material Handling – Loader – Moderate Controls[f]	24-hour		0.352 (0.461)		
		annual		0.0419[b] (0.461)		
CONVEY (CONVEY)	Scalping Screen and Conveyors[g]	24-hour		0.202 (0.179)		
		annual		0.0241[b] (0.179)		

a. Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
b. Based on 250,000 ton/yr.
c. Based on 6,570 hr/yr.
d. Emissions based on 560 kW engine to power a 500 kW generator.
e. Based on 1,042 hr/yr.
f. Emissions calculated for a base 10 mph wind speed and a moisture content of 5%. Emissions in the model are varied with windspeed.
g. Calculated using a factor for controlled emissions.

Fugitive dust emissions from frontend loader handling of aggregate materials for the HMA plant were designated as emissions point MATHNDHI in the DEQ model. Two transfers were included for the source: 1) transfer of aggregate from truck unloading to a storage pile; 2) transfer of aggregate from the storage pile to a hopper. Attachment 1 provides details on emissions calculations.

Emissions from truck unloading of aggregate, screening of aggregate, and three conveyor transfers were combined into one source (emissions point CONVEY in the model). DEQ calculated emissions for truck unloading and used emissions factors for controlled screening and conveyor transfers. Controlled emissions were used for screening and conveyor transfers because compliance with the 24-hour PM_{10} standard could not be demonstrated with a reasonable setback distance when using uncontrolled screening and conveyor transfer emissions.

Emissions modeled for the asphalt tank heater were substantially higher in the submitted analyses than in the DEQ verification analyses, which were based on emissions calculated from DEQ's HMA emissions inventory spreadsheet. The emissions inventory submitted with the application also listed emissions from the tank heater at a substantially lower rate than what was modeled. Since a higher emissions rate was used in the submitted modeling results, the submitted analyses are fairly conservative.

The submitted air impact analyses for criteria pollutant annual averages was also very conservative because maximum short-term emissions rates were used to model long-term impacts. Table 5 shows how much annual PM_{10} emissions were over-estimated as compared to emissions rates that account for requested annual hours of operation or annual production rates.

3.2.2 TAP Emissions Rates

Table 6 provides TAP emissions associated with operation of the proposed HMA. The table only includes those TAPs where total emissions exceeded emissions screening levels of Idaho Air Rules Section 585 and 586. Allowable impacts of carcinogenic TAPs may be 10 times the AACC if DEQ determines the facility uses T-RACT to control emissions. When T-RACT is used, DEQ has determined that compliance with a concentration of 10 times the AACCs is assured if emissions remain below 10 times the ELs. This approach is valid because conservative modeling was used to generate the emissions screening levels (ELs) of Idaho Air Rules Section 586, assuring that impacts are less than AACCs when emissions are less than ELs. Consequently, if emissions are below 10 times the ELs it is assured that impacts are below 10 times AACCs.

DEQ determined no additional control is T-RACT for non-particulate TAP emissions from the drum dryer, including acetaldehyde, benzene, formaldehyde, POM, and PAHs. Control by baghouse has previously been determined as meeting T-RACT for particulate TAP emissions.

The submitted analyses did not identify PAHs for comparisons to ELs. Naphthalene is the PAH with the largest emissions, so only naphthalene was modeled in the DEQ analyses.

Table 7. EMISSIONS RATES USED FOR TAPS IMPACT MODELING

TAP	Emissions Rates[a] (lb/hr) Values in Parentheses are those used in the Submitted Analyses				
	DRYER	SILO	LOAD OUT	HOTOIL	GEN1
Acetaldehyde	3.71E-2				1.41E-5
Arsenic	1.60E-5			4.58E-7	
Benzene	1.11E-2	1.11E-4	6.17E-5		4.33E-4
Formaldehyde	8.85E-2	2.40E-3	1.04E-4	1.22E-6	4.40E-5
Cadmium	1.17E-5			1.38E-7	
Chromium 6+	1.28E-5			8.61E-8	
Dioxin/Furan	8.72-11			1.02E-13	
Nickel	1.80E-3			2.93E-5	
PAH[b]					
POM	1.56E-5	1.93E-5	1.31E-5	3.47E-8	2.51E-6
Propionaldehyde	3.12E-2				
Quinone	3.84E-2				

a. Annual emissions averaged over 8,760 hours per year.

b. Any individual PAH. Naphthalene was the PAH with the largest emissions rates. PAH emissions were not modeled in the analyses submitted with the application.

3.3 Emission Release Parameters

Table 7 provides emissions release parameters for the analyses including stack height, stack diameter, exhaust temperature, and exhaust velocity. Asphalt silo filling and loadout emissions were modeled as point sources in DEQ's verification analyses, rather than volume sources, to account for thermal buoyancy of the emissions. Release parameters were based on the following:

- Release point of silo filling was established as the top of the storage silo and the release point of asphalt loadout operations was set to correspond to the top of a truck bed.
- Stack diameter of 3.0 meters was used to approximately correspond to a typical silo. Model-calculated stack tip downwash will account for downwash affects potentially caused by the silo.
- Stack gas temperature of 344K was calculated by assuming the gas temperature would be half that of the default asphalt temperature of 325°F.
- Flow velocity of 0.1 m/sec was used to establish a reasonably conservative total flow from the source of 1,500 actual cubic feet per minute, caused by convection.

Table 7. EMISSIONS RELEASE PARAMETERS

Release Point /Location	Source Type	Stack Height (m)[a]	Modeled Diameter (m)	Stack Gas Temp. (K)[b]	Stack Gas Flow Velocity (m/sec)[c]
DRYER	Point	7.32	1.30	386	16.4
SILO	Point	9.0	3.0	346	0.1
LOADOUT	Point	5.0	3.0	346	0.1
HOTOIL	Point	4.0	0.3	672	2.3
Volume Sources					
Release Point /Location	**Source Type**	**Release Height (m)**	**Initial Horizontal Dispersion Coefficient σ_{y0} (m)**	**Initial Vertical Dispersion Coefficient σ_{z0} (m)**	
MATHNDHI	Volume	2.5	4.65	1.16	
CONVY	Volume	5.0	4.65	1.16	
FUGVOL	Volume	2.5	4.65	1.16	

a. Meters
b. Kelvin
c. Meters per second

3.4 Results for NAAQS Impact Analyses

Results from site-specific analyses submitted with the application, assuming a 150-meter setback between emissions sources and ambient air, are listed in the Table 8. Modeled impacts easily demonstrated compliance with applicable NAAQS.

DEQ generated required setback distances from the modeling results for PM_{10} 24-hour impacts. Compliance with the 24-hour PM_{10} standard is the governing scenario for determining the setback distance. To assure compliance, a minimum setback of 79 meters (259 feet) must be maintained between pollutant emissions points and the property boundary.

Table 8. RESULTS FOR CUMULATIVE IMPACT ANALYSES						
Pollutant	**Averaging Period**	**Maximum Modeled Concentration ($\mu g/m^3$)[a]**	**Background Concentration ($\mu g/m^3$)**	**Total Ambient Impact ($\mu g/m^3$)**	**NAAQS[b] ($\mu g/m^3$)**	**Percent of NAAQS**
PM_{10}[c]	24-hour	34.7[d]	73	108	150	72
	Annual	9.0	26	35	50	70
Carbon monoxide (CO)	1-hour	266[e]	NA	NA	40,000	NA
	8-hour	212[e]	NA	NA	10,000	NA
Sulfur dioxide (SO_2)	3-hour	105	34	139	1,300	11
	24-hour	68.7	26	95	365	26
	Annual	13.0	8	21	80	26
Nitrogen dioxide (NO_2)	Annual	37.1	17	54	100	54
Lead	Quarterly	0.070[f]	0.03	0.10	1.5	7

a. Micrograms per cubic meter.
b. National ambient air quality standards.
c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
d. Modeled design values are the maximum of 2nd highest modeled value from a 5-year meteorological data set.
e. Modeled value is below the significant contribution level. Therefore, a cumulative impact analysis was not necessary for demonstrating compliance with the standard.
f. Modeled value is a maximum monthly average.

3.5 Results for TAPs Analyses

The submitted analyses demonstrated compliance with TAP increments for a 150-meter setback distance. Table 9 provides results for TAP modeling analyses.

Table 9. RESULTS FOR TAP IMPACT ANALYSES			
Pollutant	**Averaging Period**	**Modeled Impact ($\mu g/m^3$)[a]**	**AAC/AACC[b] ($\mu g/m^3$)**
Dioxin/Furans	Annual	3.79E-11	2.20E-8
Acetaldehyde	Annual	1.61E-2	4.50E-1
Benzene	Annual	5.63E-3	1.20E-1
Formaldehyde	Annual	4.19E-2	7.70E-2
propionaldehyde	24-hour	1.15E-1	21.5
Quinone	24-hour	1.50E-1	20
Benzo(a)pyrene	Annual	1.99E-6	3.00E-4
Polycyclic Organic Matter	Annual	2.63E-4	3.00E-4
Arsenic	Annual	7.83E-6	2.30E-4
Cadmium	Annual	5.33E-6	5.60E-4
Chromium 6+	Annual	5.73E-6	8.30E-5
Nickel	Annual	8.37E-4	4.20E-3

a. Micrograms per cubic meter.
b. Defined in Idaho Air Rules Section 585 and 586

DEQ modeling of naphthalene as PAH indicated a setback of 142 meters would be required to assure compliance with the AACC. The setback is reduced to 25 meters when the T-RACT allowabnce of ten times the AACC is considered.

DEQ also checked setback distances for formaldehyde, POM, and nickel. The setback distances were as follows: formaldehyde = 268 meters, 47 meters for T-RACT; POM = 175 meters, 29 meters for T-RACT; nickel = 36 meters, 4.2 meters for T-RACT. T-RACT setbacks are appropriate because DEQ has determined that an HMA utilizing a baghouse for emissions control is T-RACT for TAPs.

4.0 Conclusions

The ambient air impact analyses demonstrated to DEQ's satisfaction that emissions from the facility will not cause or significantly contribute to a violation of any air quality standard.

ATTACHMENT 1

EMISSIONS CALCULATIONS AND MODELING PARAMETERS FOR

DEQ'S SUPPLEMENTAL ANALYSES

HMA Plant Modeled Emissions Rates for DEQ Analyses

The applicant indicated maximum hourly throughput would be 240 ton HMA/hr.

Daily production: 5,760 ton/day

Annual production: 250,000 ton/year

Drum Dryer Emissions

Source test data and the DEQ HMA emissions calculation spreadsheet was used to generate emissions quantities for applicable averaging periods.

Asphalt Loadout

The DEQ HMA emissions calculation spreadsheet was used to generate emissions quantities for applicable averaging periods.

Asphalt Silo Filling

The DEQ HMA emissions calculation spreadsheet was used to generate emissions quantities for applicable averaging periods.

Asphalt Tank Heater Emissions

The DEQ HMA emissions calculation spreadsheet was used to generate emissions quantities for applicable averaging periods.

Generator Emissions

The DEQ HMA emissions calculation spreadsheet was used to generate emissions quantities for applicable averaging periods. DEQ assumed an engine of up to 560 kW power could be used.

Aggregate Handling by Loader Emissions

Emissions from aggregate handling by frontend loaders were calculated for the following transfers: 1) aggregate to a storage pile; 2) aggregate from a pile to a hopper.

PM_{10} emissions associated with the handling of aggregate materials should be calculated using emissions factors from AP42 Section 13.2.4.

Emissions are calculated using the following emissions equation:

$$E = k(0.0032)\left[\frac{(U/5)^{1.3}}{(M/2)^{1.4}}\right] \quad \text{lb/ton}$$

Where:

k	=	0.35 for PM_{10}
M	=	5% for aggregate
U	=	wind speed (mph)

A moisture content of 3% to 7% was estimated as a typical moisture content of aggregate entering the dryer, per STAPPA-ALAPCO-EPA, Emission Inventory Improvement Program, Volume II, Chapter 3, Preferred and Alternative Methods for Estimating Air Emissions from Hot Mix Asphalt Plants, Final Report, July 1996.

In the model, emissions are varied as a function of windspeed, with the base emissions entered for a windspeed of 10 mph.

upper windspeeds for 6 categories: 1.54, 3.09, 5.14, 8.23, 10.8 m/sec

Median windspeed for each category (1 m/sec = 2.237 mph)

Cat 1: (0 + 1.54)/2 = 0.77 m/sec ➢ 1.72 mph
Cat 2: (1.54 + 3.09)/2 = 2.32 m/sec ➢ 5.18 mph
Cat 3: (3.09 + 5.14)/2 = 4.12 m/sec ➢ 9.20 mph
Cat 4: (5.14 + 8.23)/2 = 6.69 m/sec ➢ 14.95 mph
Cat 5: (8.23 + 10.8)/2 = 9.52 m/sec ➢ 21.28 mph
Cat 6: (10.8 + 14)/2 = 12.4 m/sec ➢ 27.74 mph

Base factor – use 10 mph wind: $0.35(0.0032)\frac{(10/5)^{1.3}}{(5/2)^{1.4}} = 7.646\text{ E}-4$ lb/ton

Adjustment factors to put in the model:

Cat 1: $(1.72/5)^{1.3}$ (3.105 E-4) = 7.756 E-5 lb/ton
Factor = 7.756 E-5/7.646 E-4 = 0.1014

Cat 2: $(5.18/5)^{1.3}$ (3.105 E-4) = 3.251 E-4 lb/ton
Factor = 3.251 E-4/ 7.646 E-4 = 0.4253

Cat 3: $(9.20/5)^{1.3}$ (3.105 E-4) = 6.861 E-4 lb/ton
Factor = 6.861 E-4/7.646 E-4 = 0.8974

Cat 4: $(14.95/5)^{1.3}$ (3.105 E-4) = 1.290 E-3 lb/ton
Factor = 1.290 E-3/7.646 E-4 = 1.687

Cat 5: $(21.28/5)^{1.3}$ (3.105 E-4) = 2.041 E-3 lb/ton
Factor = 2.041 E-3/7.646 E-4 = 2.669

Cat 6: $(27.74/5)^{1.3}$ (3.105 E-4) = 2.881 E-3 lb/ton
Factor = 2.881 E-3/7.646 E-4 = 3.768

Daily PM_{10}:

7.646 E-4 lb PM_{10}	5,530 ton	day	2 transfers	0.3523 lb
ton	Day	24 hr		hr

Annual PM_{10}:

7.646 E-4 lb PM_{10}	250,000 ton	yr	2 transfers	0.04190 lb
ton	yr	8,760 hour		hr

Daily and annual throughputs were based on aggregate being 96% of the total HMA production.

These sources were modeled as a single volume source with a 20-meter square area, 5.0 meters thick, with a release height of 2.5 meters. The initial dispersion coefficients were calculated as follows:

σ_{yo} = 20 m / 4.3 = 4.65 m

σ_{zo} = 5 m / 4.3 = 1.16 m

Conveyors and Screens Emissions

These sources include the scalping screen and conveyor transfers. Controlled emissions factors for the conveyor transfers and the scalping screen were used, and the issued permit should include requirements to implement appropriate measures to assure emissions are minimized and are not greater than those used in the DEQ impact analyses.

Daily and annual throughputs were based on aggregate being 96% of the total HMA production.

Scalping Screen (controlled emissions):

Daily PM_{10}:

0.00074 lb PM_{10}	5,530 ton	day		0.1705 lb
ton	day	24 hour		hr

Annual PM_{10}:

0.00074 lb PM_{10}	250,000 ton	yr		0.02027 lb
ton	yr	8,760 hour		hr

Conveyor Transfers (controlled emissions):

Daily PM_{10}:

4.60 E-5 lb PM_{10}	5,530 ton	day	3 transfers		0.03180 lb
ton	day	24 hour			hr

Annual PM_{10}:

4.60 E-5 lb PM_{10}	250,000 ton	yr	3 transfers		0.003780 lb
ton	yr	8,760 hour			hr

Total Daily Emissions (unloading, screening, conveyors) = 0.2023 lb/hr

Total Annual Emissions (unloading, screening, conveyors) = 0.02405 lb/hr

These sources were modeled as a single volume source with a 20-meter square area, 5.0 meters thick, with a release height of 5.0 meters. The initial dispersion coefficients are calculated as follows:

σ_{yo} = 20 m / 4.3 = 4.65 m

σ_{zo} = 5 m / 4.3 = 1.16 m

HMA Plant Modeling Parameters

Dryer Baghouse Stack

Release height = 7.32 meters; effective diameter of release area = 1.30 meters; typical stack gas temperature = 386 K; typical flow velocity = 16.4 meters/second

Asphalt Silo Filling

DEQ modeled this source as a point source.
- release height of 9 meters (equal to height of silo)
- stack diameter of 3 meters, corresponding to the approximate diameter of the silo
- gas temperature was estimated at half the AP42 default asphalt temperature: 325^{o} F / 2 = 163^{o} F
- stack velocity of 0.1 m/sec to account for convective air flow.

Asphalt Loadout

DEQ modeled this source as a point source.
- release height of 5 meters (equal to estimated truck bed height)
- stack diameter of 3 meters, corresponding to the approximate diameter of the silo
- gas temperature was estimated at half the AP42 default asphalt temperature: 325^{o} F / 2 = 163^{o} F
- stack velocity of 0.1 m/sec to account for convective air flow.

Aggregate to and from Storage

Release emissions in model from a 20 m X 20 m area 5 m high, released at 2.5 m

Initial dispersion coefficients:

σ_{y0} = 20 m / 4.3 = 4.65 m

σ_{z0} = 5 m / 4.3 = 1.16 m

Sources include: 1) frontend loader transfers from unloading to pile; 2) frontend loader transfer from pile to hopper.

Conveyor Transfers

Release emissions in model from a 20 m X 20 m area 5 m high, released at 5 m

Initial dispersion coefficients:

σ_{y0} = 20 m / 4.3 = 4.65 m

σ_{z0} = 5 m / 4.3 = 1.16 m

Sources include: all conveyor transfers associated with HMA operations

ATTACHMENT 2

SETBACK DISTANCES FOR SPECIFIC MODELING RUNS

Setback Distance Calculations from Critical Receptors Identified

Short-Term Modeling Results for 5,760 ton/day throughput 500 kW Gen,

	Critical Receptor x coodinate meters	**y coordinate meters**	**setback meters**	setback of design value
PM10 24-hour				
Boise Met				
1st	-60	45	79.2022727	79.2022727
2nd	-60	45	79.2022727	

TAPs Modeling Results for 250000 ton/yr throughput 560 kW Engine,

	Critical Receptor			**TRACT setback**		
	x coordinate meters	**y coordinate meters**	**setback meters**	**x coodinate meters**	**y coordinate meters**	**setback meters**
POM - AACC=3.00E-4						
Boise Met	-130	110	174.522205	-20	15	29.20616
PAH - AACC= 1.4E-2						
Boise Met	-105	90	142.523682	-15	15	25.45584
Nickel - AACC= 4.2E-3						
Boise Met	-25	20	36.2353419	0	0	4.242641
formaldehyde - AACC= 7.7E-2						
Boise Met	-210	160	268.212602	-30	30	46.66905