Air Quality Permitting Statement of Basis

January 16, 2007

Permit No. P-060440

DEBCO Construction, Portable

Facility ID No. 777-00389

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AIR QUALITY DIVISION

FINAL

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Acronyms, Units, and Chemical Nomenclatures

AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
HAPs	hazardous air pollutants
HMA	hot-mix asphalt
hp	horsepower
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
kW	kilowatt
lb/hr	pound per hour
$\mu g/m^3$	micrograms per cubic meter
mg/m^3	milligrams per cubic meter
MMBtu/hr	million British thermal units per hour
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_x	nitrogen oxides
NSPS	New Source Performance Standards
PAH	polyaromatic hydrocarbon
PCB	polychlorinated biphenyl
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
POM	poly organic matter
PSD	Prevention of Significant Deterioration
PTC	permit to construct
PTE	potential to emit
PWR	process weight rate
RAP	recycled asphalt pavement
RCRA	Resource Conservation and Recovery Act
SIC	Standard Industrial Classification
SM	synthetic minor
SO_2	sulfur dioxide
TAP	toxic air pollutant
T/yr	tons per year
UTM	Universal Transverse Mercator
VOC	volatile organic compound

1. PURPOSE

The purpose of this permit to construct (PTC) is to satisfy the requirements of IDAPA 58.01.01.200, Rules for the Control of Air Pollution in Idaho, Procedures and Requirements for Permits to Construct. This PTC is the facility's initial permit.

2. FACILITY DESCRIPTION

The facility is a portable, hot-mix asphalt plant. Stockpiled aggregate is transferred to feed bins, then conveyed to the 120 MMBtu per hour oil-fired (used oil or No. 2 fuel oil), parallel flow, drum mix dryer. Heated asphalt oil from a 25,000 gallon storage tank is then introduced to the middle of the drum unit, and mixed with the aggregate. Reclaimed asphalt pavement (RAP) is transferred from the RAP bin and conveyor to the drum dryer using a recycle ring installed on the drum dryer. RAP introduced to the mixture will typically range from 5 to 10 %. The resulting asphalt product is then transferred to an 80 ton storage silo via conveyor, and held until it is later loaded into to trucks and hauled offsite.

Electrical power for the asphalt tank heater and plant is provided by the local power grid. A 650 kW generator will supply power when line power is not available.

Drum mix asphalt plants may be of either parallel flow design or the counterflow design. In either design, aggregate (gravel) is dried in the drum and mixed with liquid asphalt cement to produce hot-mix asphalt which is used primarily for road and parking lot construction. The production of hot-mix asphalt includes aggregate handling operations which may include front end loaders, storage bins, conveyance systems, stock piles and haul trucks.

3. FACILITY / AREA CLASSIFICATION

The Debco Construction, Inc. facility is defined as a Synthetic Minor (SM) facility because some criteria pollutant emissions could exceed 100 T/yr, without limits on the facility's potential to emit. The facility is not a Prevention of Significant Deterioration (PSD) major source because emissions do not exceed the PSD threshold of 250 T/yr. The SIC code defining the facility is 2951 (Asphalt Paving Mixtures and Blocks). The AIRS classification is for the facility is "SM".

The AIRS information provided in Appendix A defines the classification for each regulated air pollutant for the Debco Construction, Inc. portable HMA facility. This information is entered into the EPA AIRS database.

4. APPLICATION SCOPE

This PTC is to allow Debco Construction, Inc. to operate a portable HMA parallel flow drum-mix asphalt plant (Aesco/Madsen Model GB 400 PB) with a heat input of 120 million British thermal units per hour (MMBtu/hr), and a maximum rated output of 400 tons of HMA per hour, with a maximum of 1,000 hours per year (400,000 tons of produced asphalt per year), fired using distillate fuel oil (ASTM Grades 1 or 2) or used oil. Particulate matter (PM) and other emissions from the drum dryer are vented to a baghouse (Model HRB-816P), with an air flow rate of 65,000 scfm and an exhaust temperature of 275 degrees Fahrenheit (^{o}F). Electrical power will be provided by a 650 kW generator when line power is not available.

4.1 Application Chronology

July 25, 2006	DEQ received the PTC application.
August 10, 2006	PTC application fee received.
August 30, 2006	PTC application determined complete.
September 8, 2006	Public opportunity to comment period published.
October 9, 2006	Public opportunity to comment period closed. A public comment period was not requested.
October 24, 2006	Draft permit was sent to Twin Falls Regional Office for review and comments.
October 24, 2006	Draft permit sent to facility for review and comments.
November 14, 2006	PTC Processing fee received.
November 27, 2006	Determination by DEQ modeling staff through verification of submitted modeling that modeled values for POM and PAH emissions exceeded the AACC. Determination by DEQ that Toxic Air Pollutant-Reasonably available Control Technology (T-RACT) was necessary. In accordance with IDAPA 58.01.01.210.3.b, DEQ revoked the initial completeness determination for the application.
January 2, 2007	Additional information received: submittal of a T-RACT analysis for POM and PAH emissions. Application complete with the additional T-RACT submittal.
January 11, 2007	Draft permit with changes was sent to Twin Falls Regional Office for review and comments.

5. PERMIT ANALYSIS

This section of the Statement of Basis describes the regulatory requirements for this PTC action.

5.1 Equipment Listing

HMA Plant:

Manufacturer:	Aesco/Madsen
Model:	GB 400 PB
Type of HMA plant:	Parallel flow
Rated heat input capacity:	120 MMBtu/hr drum dryer
Fuel:	Distillate or used oil

Baghouse:

Manufacturer:	Aesco/Madsen
Model:	HRB-816P

Generator:

Manufacturer:	Catepillar
Model:	650 kW Generator
Fuel:	ASTM Grade 2 fuel oil

5.2 Emissions Inventory

Emissions estimates were provided by Spidell and Associates. The facility's consultant has provided an emissions inventory for criteria pollutants, hazardous air pollutants (HAPs) and state-only toxic air pollutants (TAPs). Emission estimates for the drum dryer, load-out and silo filling operations were based on emission factors from AP-42 Section 11.1, Hot Mix Asphalt Plants, March 2004. AP-42 emissions factors for drum mix asphalt plants are not dependent on whether the drum mix plant is a parallel flow or counterflow design. Consequently, emissions estimates developed for the drum mix plant would be applicable for either parallel flow drum mix plants or for counter flow drum mix plants.

The facility also has a 650 kW generator which will be fueled by distillate fuel oil. Emission estimates were provided by Spidell and Associates for the facility generator, based on emission factors from AP-42 Section 3.3, Gasoline and Diesel Industrial Engines, up to 600 hp, October 1996. At 650 kW, the generator is greater than 600 hp (650kW equates to 871 hp). Therefore, emission factors from AP-42 Section 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines, October 1996, would have been more appropriate to use. However, when emissions using Section 3.3 are compared with emissions using Section 3.4, Section 3.3 emission factors are more conservative. Since calculated emissions are higher using emission factors from Section 3.3, which conservatively represents emissions for the facility generator, the emission factors used were not changed.

The facility wide emissions inventory prepared by the facility's consultant is included in Appendix B. The annual tons per year criteria pollutant emissions for the drum dryer are based on 2,000 hours per year, and should have been based on 1,000 hours per year. It was confirmed with a discussion with Ron Spidell (Spidell and Associates) that the asphalt plant drum dryer emissions should be based on 1,000 hours per year or an annual throughput of 400,000 tons per year. Therefore, annual criteria pollutant emissions for the drum dryer included in Appendix B should actually be half of the amount originally shown. Furthermore, the total annual emissions for criteria pollutants will be less, as corrected and shown in Appendix B.

Facility Design and Operational Limits

Emission estimates from the HMA plant were based on the operational limits shown in Table 5.1.

Table 5.1 OPERATIONAL CONSTRAINTS USED FOR EMISSION ESTIMATES

Emission Unit	Capacity	Operational limits
Drum Dryer	Hourly Throughput: 400 T/hr	400/000 T/yr
650 kW Generator	Heat Input: 6.10 MMBtu/hr	5,723 hrs/yr

T/hr = tons per hour
T/yr = tons per year

Emissions for Multiple Fuel Types

The emission units and fuels evaluated for this PTC are summarized in Table 5.2. Emissions estimates were calculated separately for each fuel evaluated for use in the HMA. An emission estimate for each emission source was then developed by selecting the maximum value for each pollutant for any fuel type evaluated for that source. This represents a worst-case approach for conservatively evaluating the maximum potential emissions from each source regardless of which fuel type(s) the facility chooses to use.

Table 5.2 EMISSION SOURCES, FUEL TYPES, AND EMISSION FACTORS

Emission Source	Fuel Type(s) Evaluated	Emission Factor Source
HMA Drum Dryer with Fabric Filter (Baghouse)	Distillate Fuel Oil	AP-42, Section 11.1
	Used Oil (max 0.5% S)	AP-42, Section 11.1

The detailed emission estimates are included in Appendix B. The emissions for used oil are the same as distillate fuel oil, except for SO_2 and 13 additional pollutants as discussed in the following section. Therefore, the emissions inventory using the emission factors for used oil will be the worst-case scenario.

Additional Pollutants for Used Oil

Used oil burned for energy recovery must meet specifications as listed in Permit Condition 3.6. Permit Condition 3.17 requires a used oil certification to demonstrate compliance with the specifications. The used oil specifications and certification requirements ensure that only the pollutants accounted for in the emissions inventory are actually emitted.

Based on AP-42 Section 11.1 emission factors, emissions of non-criteria pollutants in pounds per hour from the drum dryer are expected to be the same whether using distillate fuel oil or used oil, except that 13 additional pollutants are emitted when using used oil. Four of these additional pollutants—benzaldehyde, butyraldehyde, hexanal, and isovaleraldehyde—represent additional emissions of organic compounds, but are neither federally regulated HAPS nor Idaho TAPS. The emissions of the remaining nine new pollutants—all of which are regulated as Idaho TAPS, five of which are also federally regulated HAPs—are shown in Table 5.3. Additionally, AP-42 has a different emission factor for SO_2 when combusting used oil in the drum dryer (0.058 is the EF for SO_2 for used oil; 0.011 is the EF for SO_2 for No. 2 fuel oil). Therefore, SO_2 emissions are different when burning used oil. Facility wide emissions submitted with the application materials conservatively include the used oil emission factor for SO_2.

A copy of the facility wide emissions submitted by the applicant's consultant is included in Appendix B.

Table 5.3 ADDITIONAL REGULATED EMISSIONS FROM COMBUSTING USED OIL

Pollutant	Drum Dryer Used Oil (lb/hr)
SO_2 [a]	23.20
Hydrogen chloride (HCl)	0.08
Non-Polycyclic Aromatic Hydrocarbon Hazardous Air Pollutants (non-PAH HAPs)	
Acetaldehyde	0.5
Acrolein	0.01
Methyl Ethyl Ketone	0.008
Propionaldehyde	0.05
Quinone	0.06
Non-HAP Organic Compounds	
Acetone	0.3
Crotonaldehyde	0.03
Valeraldehyde	0.02

[a] SO_2 was included in the table because the emission factor is different (higher emission) for used oil than for distillate fuel oil.

5.3 Modeling

The air dispersion modeling prepared by Spidell and Associates and submitted with the application was reviewed by DEQ. The submitted modeling did not include silo filling and loadout, fugitive emissions. Additionally, TAPs were modeled individually by source rather than combined as required.

The DEQ verification and refined modeling results (which included fugitive emissions) showed that POMs and PAHs exceeded the AACCs for those TAPs.

The verification modeling analysis demonstrated to DEQ's satisfaction that emissions from the facility will not cause or significantly contribute to a violation of any air quality standard, provided the following conditions are met:

- Aggressive fugitive emissions controls are used for PM_{10} associated with material handling.
- T-RACT is used to control emissions of POM and total PAHs.

The conclusions of DEQ's modeling verification and the T-RACT analysis later submitted by the facility's consultant resulted in additional permit requirements to ensure emissions will not contribute to a violation of any air quality standard. These additional requirements included best management practices for fugitive emissions, as well as inspection, maintenance and calibration of the drum dryer for good combustion and the baghouse for adequate emissions control.

The modeling analysis is included in Appendix C.

5.4 Regulatory Review

This section describes the regulatory analysis of the applicable air quality rules with respect to this PTC.

IDAPA 58.01.01.201 .... Permit to Construct Required

The portable hot-mix asphalt facility owned by Debco Construction, Inc. does not meet the permit to construct exemption criteria contained in sections 220 through 223 of the Rules. Therefore, a PTC is required.

IDAPA 58.01.01.203 .... Permit Requirements for New Stationary Sources

This facility has demonstrated to DEQ's satisfaction that its emissions will not cause or contribute to a violation of any ambient air quality standard. As long as Debco Construction complies with the terms and conditions of the permit, all applicable air quality standards will be met.

40 CFR 60, Subpart I .... New Source Performance Standards

Debco Construction's portable hot-mix asphalt plant is an affected facility in accordance with 40 CFR 60.90.

40 CFR 279 .... Standards for the Management of Used Oil

Part 279.11 contains specifications for used oil which include allowable levels for arsenic, cadmium, chromium, lead, the flash point, and total halogens. The limit for total halogens is listed at 4,000 ppm maximum. However, used oil containing more than 1,000 ppm total halogens is presumed to be a hazardous waste under the rebuttable presumption provided under § 279.10(b)(1). Such used oil is subject to subpart H of part 266 of this chapter rather than this part when burned for energy recovery unless the presumption of mixing can be successfully rebutted. Therefore, the permit limits the total halogens to 1,000 ppm. This permit condition is consistent with previous permits issued for hot-mix asphalt plants[1].

Permit Condition 3.6 states that, in accordance with 40 CFR 279.11, used oil burned for energy recovery shall not exceed any of the allowable levels of the constituents and property listed in Table 5.4. These permit conditions are considered reasonable permit conditions, because they inherently limit air pollution emissions.

TABLE 5.4 USED OIL SPECIFICATIONS[1]

Constituent/property	Allowable Level for On Specification Used Oil
Arsenic	5 ppm[2] maximum
Cadmium	2 ppm maximum
Chromium	10 ppm maximum
Lead	100 ppm maximum
Flash point	100°F minimum
Total halogens	1,000 ppm maximum
PCBs[3]	< 2 ppm

[1] The specification does not apply to mixtures of used oil and hazardous waste that continue to be regulated as hazardous waste (see 40 CFR 279.10(b)).
[2] Parts per million
[3] Applicable standards for the burning of used oil containing PCBs are imposed by 40 CFR 761.20(e)

This table is based on Table 1 from 40 CFR 279.11, incorporating the 1,000 ppm limit for total halogens as explained above.

DEQ's Waste Program has reviewed and approved the above discussions regarding regulating used oil.

IDAPA 58.01.01.210.............Demonstration of Preconstruction Compliance with Toxic Standards

Modeling was based on maximum HMA production rates of 400 tons per hour and not more than 1,000 hours per year(for an annual HMA production of not more than 400,000 tons per year), and operation of the generator at no more than 5,723 hours per year. Emission rates for TAPs were compared to the screening emission rates specified in IDAPA 58.01.01.585 and 586. Those TAPs which exceeded the screening emission rates were modeled.

The facility's estimated TAP emissions from the HMA facility are included in the emissions inventory in Appendix B. Modeling showed the facility could potentially exceed the AACC for POM and PAH emissions as listed in IDAPA 58.01.01.586, so T-RACT was necessary.

In accordance with IDAPA 58.01.01.210.12, the applicant submitted information to demonstrate preconstruction compliance for POMs and PAHs using T-RACT. The submitted T-RACT analysis demonstrates to DEQ's satisfaction that the proposed standard of good operation and maintenance of the drum dryer and the baghouse constitutes T-RACT for this case. In accordance with IDAPA 58.01.01.210.12.c, the air cancer risk probability is less than one to one hundred thousand for POMs and PAHs, so no further procedures for preconstruction compliance is required for POMs and PAHs as part of the application process. The T-RACT analysis is included in Appendix D.

[1] PTC-030138 Interstate Concrete, Hayden Lake, 2/18/05 & PTC-040101 Interstate Concrete, Rathdrum, 2/18/05

5.5 Permit Conditions Review

Permit Condition 1.1 states the purpose for this permit action.

Permit Condition 1.2 lists the regulated sources at the facility.

Permit Conditions 2.1 and 2.2 provide the plant process description and the emissions control description.

Permit Condition 3.1 provides drum dryer emission limits. Compliance will be demonstrated by following operating requirements in Permit Conditions 3.3 through 3.9.

Permit Condition 3.2 is a visible emissions requirement in accordance with IDAPA 58.01.01.625.

Permit Condition 3.3 requires reasonable control of fugitive emissions in accordance with IDAPA 58.01.01.650-651. Reasonable precautions for compliance are also listed.

Permit Condition 3.4 lists best management practices for fugitive dust. This was incorporated as a result of DEQ's modeling verification analysis to control PM_{10} emissions.

Permit Condition 3.5 lists the allowable fuel types to be used in the drum dryer and generator. The emissions inventory was developed in part on emission factors of the specified fuels to be used.

Permit Condition 3.6 lists used fuel oil specification in accordance with 40 CFR 279.11.

Permit Condition 3.7 lists the allowable fuel sulfur content of fuel oils to be used at the facility. The emissions inventory was developed in part on the sulfur content listed in this permit condition.

Permit Condition 3.8 limits production of asphalt to 400 T/hr and 400,000 tons per any consecutive 12-month period. The emissions inventory was based in part on production limits. These limits are necessary to prevent a violation of any air quality standard.

Permit Condition 3.9 limits hours of operation for asphalt production to 1,000 hours per any 12-month period and generator operation to 5,723 hours per any 12-month period. The emissions inventory and was developed in part on operating hours.

Permit Condition 3.10 requires the facility to develop an operations and maintenance manual for the baghouse. This condition will ensure that control equipment is operating properly to adequately control emissions.

Permit Condition 3.11 requires the baghouse to be operated at any time the drum dryer is operated. This condition will help to control emissions from the drum dryer.

Permit Condition 3.12 requires annual inspection, maintenance and calibration of the drum dryer and baghouse. This condition was added as a result of the modeling and T-RACT analysis to ensure good combustion and emissions control.

Permit Condition 3.13 prohibits collocation with any other HMA facility. Collocation was not requested in the PTC application and this PTC was developed for the HMA facility operating without collocation with another other HMA facility.

Permit Condition 3.14 requires the permittee to monitor and record baghouse pressure drop, HMA production, hours of operation for the HMA plant and generator and fuel oil receipts which identify ASTM grade for distillate fuel oil used in drum dryer and generator, and to maintain records of inspection, calibration and maintenance of the drum dryer and baghouse. These parameters will demonstrate compliance with operating requirements in the permit.

Permit Condition 3.15 requires the permittee to conduct and record a facility-wide inspection for fugitive emissions sources. This will assist the facility through awareness of fugitive emissions conditions if they are present and to demonstrate compliance with Permit Condition 3.3.

Permit Condition 3.16 requires performance testing of the HMA initially and once every five years thereafter, to demonstrate compliance with Permit Conditions 3.1 and 3.2.

Permit Condition 3.17 requires the permittee to maintain used fuel oil certifications with required information for each purchase. This condition will show compliance with Permit Condition 3.6.

Permit Condition 3.18 requires the permittee to maintain purchase records which indicate sulfur content for fuel oil purchased on an as-received basis. This condition will demonstrate compliance with Permit Condition 3.7.

Permit Condition 3.19 requires equipment registration and relocation notice submittals for portable facilities in accordance with IDAPA 58.01.01.500. This condition will demonstrate compliance with Permit Condition 4. It should also confirm equipment listed in Permit Condition 1.2.

Permit Condition 4 prohibits the facility's operations in any PM_{10} nonattainment areas. The permittee did not request authorization to operate in PM_{10} nonattainment areas, and the emissions of PM_{10} associated with this PTC would result in a significant contribution (defined in IDAPA 58.01.01.006 as an increase greater than 5$\mu g/m^3$) to a violation of the PM_{10} NAAQS.

6. PERMIT FEES

Debco Construction paid the $1,000 permit to construct application fee as required in IDAPA 58.01.01.224 on August 10, 2006.

A permit to construct processing fee of $7,500 is due as required in accordance with IDAPA 58.01.01.225, because the increase in emissions (not including fugitive emissions) associated with this PTC is greater than one hundred tons per year. Debco construction paid the $7,500 processing fee on November 14, 2006.

Table 6.1 PTC PROCESSING FEE TABLE

Emissions Inventory			
Pollutant	**Annual Emissions Increase (T/yr)**	**Annual Emissions Reduction (T/yr)**	**Annual Emissions Change (T/yr)**
NO_X	87.99	0	87.99
SO_2	16.66	0	16.66
CO	42.59	0	42.59
PM_{10}	10.01	0	10.01
VOC	12.80	0	12.80
TAPS/HAPS	4.28	0	4.28
Total:	174.33	0	174.33
Fee Due	**$ 7,500.00**		

7. PERMIT REVIEW

7.1 Regional Review of Draft Permit

On October 23, 2006, the Twin Falls Regional Office was provided a draft of the permit and statement of basis for review. Minor comments were incorporated into the permit. During the modeling verification analysis, it was determined that T-RACT was necessary. Changes to the permit were incorporated after receipt of the T-RACT analysis. On January 11, 2006, the Twin Falls Regional Office was provided a revised draft of the permit and statement of basis for review of subsequent changes. One additional comment was received and incorporated into the permit.

7.2 Facility Review of Draft Permit

The facility was provided the draft permit for review (prior to completion of the modeling verification analysis) on October 23, 2006. No comments were received. The facility was later notified that there were modeling issues that required T-RACT for pre-construction compliance. The facility indicated that they did not wish to review the permit again and requested issuance of the final permit after changes were incorporated.

7.3 Public Comment

An opportunity for public comment period on the PTC application was provided from September 8, 2006, through October 9, 2006, in accordance with IDAPA 58.01.01.209.01.c. During this time, no comments were received, nor was a public comment period on the PTC requested.

8. RECOMMENDATION

Based on review of application materials, and all applicable state and federal rules and regulations, DEQ recommends that Debco be issued draft permit to construct, No. P-060440 for a portable HMA facility to be initially located near Hollister, Idaho. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD requirements.

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APPENDIX A

AIRS INFORMATION

P-060440

AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

Facility Name: Debco Construction
Facility Location: Portable
AIRS Number: 777-00389

AIR PROGRAM POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	SM80	TITLE V	AREA CLASSIFICATION A-Attainment U-Unclassified N- Nonattainment
SO_2	SM							U
NO_x	SM							U
CO	SM							U
PM_{10}	SM							U
PT (Particulate)	SM		SM					U
VOC	B							U
THAP (Total HAPs)	SM							
			APPLICABLE SUBPART					
			I					

[a] Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

[b] <u>AIRS/AFS Classification Codes</u>:

A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For HAPs only, class "A" is applied to each pollutant which is at or above the 10 T/yr threshold, **or** each pollutant that is below the 10 T/yr threshold, but contributes to a plant total in excess of 25 T/yr of all HAPs.

SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.

B = Actual and potential emissions below all applicable major source thresholds.

C = Class is unknown.

ND = Major source thresholds are not defined (e.g., radionuclides).

APPENDIX B

EMISSIONS INVENTORY

P-060440

Facility-Wide Emissions
Debco Construction

Criteria Pollutant	Dryer Emissions (lb/hr)	Dryer Emissions (tons/yr)	Generator Emissions (lb/hr)	Generator Emissions (tons/yr)	Fugitive Emissions (lb/hr)	Fugitive Emissions (tons/yr)	Total Emissions (lb/hr)	Total Emissions (tons/yr)	
PM10	9.20	9.20	1.891	5.412	8.399	8.012	19.491	22.624	→ 18.024
SO2	23.20	23.20	1.769	5.063			24.969	28.263	→ 16.663
NOx	22.00	22.00	26.908	76.997			48.908	98.997	→ 87.997
CO	52.00	52.00	5.796	16.587	1.391	0.506	59.188	69.092	→ 43.093
VOC	12.80	12.80	2.136	6.111	8.990	3.269	23.926	22.180	→ 19.78
Lead	6.00E-03	6.00E-03					6.00E-03	6.00E-03	→ 3.00E-03
Toxic Air Pollutant Non-Carcinogenic	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)	
Acetone	3.32E-01	1.66E-01			3.446E-03	3.446E-03	3.35E-01	1.69E-01	
Acrolein	1.04E-02	5.20E-03	5.64E-04	1.50E-03			1.10E-02	6.70E-03	
Antimony	7.20E-05	3.60E-05					7.20E-05	3.60E-05	
Barium	2.32E-03	1.16E-03					2.32E-03	1.16E-03	
Carbon Disulfide					9.962E-04	9.962E-04	9.96E-04	9.96E-04	
Chromium	2.20E-03	1.10E-03					2.20E-03	1.10E-03	
Cobalt	1.04E-05	5.20E-06					1.04E-05	5.20E-06	
Copper	1.24E-03	6.20E-04					1.24E-03	6.20E-04	
Crotonaldehyde	3.44E-02	1.72E-02					3.44E-02	1.72E-02	
Cumene					1.830E-03	1.830E-03	1.83E-03	1.83E-03	
Ethylbenzene	9.60E-02	4.80E-02			6.510E-03	6.510E-03	1.03E-01	5.45E-02	
Fluorene	4.40E-03	2.20E-03	1.78E-04	4.73E-04			4.58E-03	2.67E-03	
Heptane	3.76E+00	1.88E+00					3.76E+00	1.88E+00	
Hexane	3.68E-01	1.84E-01			7.370E-03	7.370E-03	3.75E-01	1.91E-01	
Hydrogen Chloride (CL)	8.40E-02	4.20E-02					8.40E-02	4.20E-02	
Manganese	3.08E-03	1.54E-03					3.08E-03	1.54E-03	
Mercury	1.04E-03	5.20E-04					1.04E-03	5.20E-04	
Methyl Chloroform	1.92E-02	9.60E-03					1.92E-02	9.60E-03	
Methyl ethyl ketone	8.00E-03	4.00E-03			2.716E-03	2.716E-03	1.07E-02	6.72E-03	
Naphthalene	2.60E-01	1.30E-01	5.17E-04	1.37E-03	3.553E-03	3.553E-03	2.64E-01	1.35E-01	
Pentane	8.40E-02	4.20E-02					8.40E-02	4.20E-02	
Phenol					1.609E-03	1.609E-03	1.61E-03	1.61E-03	
Phosphorous	1.12E-02	5.60E-03					1.12E-02	5.60E-03	
Propionaldehyde	5.20E-02	2.60E-02					5.20E-02	2.60E-02	
Quinone	6.40E-02	3.20E-02					6.40E-02	3.20E-02	
Selenium	1.40E-04	7.00E-05					1.40E-04	7.00E-05	
Silver	1.92E-04	9.60E-05					1.92E-04	9.60E-05	
Styrene					3.847E-04	3.847E-04	3.85E-04	3.85E-04	
Thallium	1.64E-06	8.20E-07					1.64E-06	8.20E-07	
Toluene	1.16E+00	5.80E-01	2.50E-03	6.63E-03	6.516E-03	6.516E-03	1.17E+00	5.93E-01	
2,2,4-Trimethyl-pentane (Iso	1.60E-02	8.00E-03					1.60E-02	8.00E-03	
Valeraldehyde	2.68E-02	1.34E-02					2.68E-02	1.34E-02	
o-Xylene	8.00E-02	4.00E-02	1.74E-03	4.62E-03	1.657E-02	1.657E-02	9.83E-02	6.12E-02	
Zinc	2.44E-02	1.22E-02					2.44E-02	1.22E-02	
Carcinogenic									
Acetaldehyde	5.20E-01	2.60E-01	4.680E-03	1.243E-02			5.25E-01	2.72E-01	
Arsenic	2.24E-04	1.12E-04					2.24E-04	1.12E-04	
Benzene	1.56E-01	7.80E-02	5.693E-03	1.513E-02	2.425E-03	2.425E-03	1.64E-01	9.56E-02	
Benzo(a)pyrene	3.92E-06	1.96E-06	1.147E-06	3.048E-06	3.137E-06	3.137E-06	8.20E-06	8.14E-06	
Cadmium	1.64E-04	8.20E-05					1.64E-04	8.20E-05	
Chromium, Hexavalent	1.80E-04	9.00E-05					1.80E-04	9.00E-05	
Dioxin and Furans (TEQ)	2.29E-08	1.14E-08					2.29E-08	1.14E-08	
Formaldehyde	1.240E+00	6.20E-01	7.200E-03	1.913E-02	3.510E-02	3.510E-02	1.28E+00	6.74E-01	
Nickel	2.52E-02	1.26E-02					2.52E-02	1.26E-02	
Polyaromatic Hydrocarbons	2.19E-04	1.10E-04	2.093E-05	5.561E-05	4.542E-04	4.542E-04	6.94E-04	6.19E-04	
Methylene Chloride					1.316E-05	1.316E-05	1.32E-05	1.32E-05	
Tetrachloroethene					1.281E-04	1.281E-04	1.28E-04	1.28E-04	

APPENDIX C

AIR DISPERSION MODEL

P-060440

MEMORANDUM

DATE: January 11, 2007

TO: Tracy Drouin, Air Quality Permitting Analyst, Air Program

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

PROJECT NUMBER: P-060440

SUBJECT: Modeling Review for the Valley DEBCO Construction Permit to Construct Application for their Portable Hot Mix Asphalt Plant

1.0 Summary

DEBCO Construction (DEBCO), submitted a Permit to Construct (PTC) application for their portable hot mix asphalt plant (HMA). Air quality analyses involving atmospheric dispersion modeling of emissions associated with the modification in operations of the plant were submitted to demonstrate that the modification would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02). Spidell and Associates (Spidell), DEBCO's consultant, conducted the ambient air quality analyses.

A technical review of the submitted air quality analyses was conducted by DEQ. DEQ also performed an independent, more refined dispersion modeling analyses to evaluate potential impacts of the facility. The submitted modeling analyses in combination with DEQ's staff 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 proposed facility were below significant contribution levels (SCLs); 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 receptor locations. Table 1 presents key assumptions and results that should be considered in the development of the permit.

Table 1. KEY ASSUMPTIONS USED IN MODELING ANALYSES

Criteria/Assumption/Result	Explanation/Consideration
Impacts for the facility, as evaluated by Spidell, were based on SCREEN3 modeling analyses and did not account for impacts from fugitive emissions.	DEQ conducted independent, more refined modeling analyses that included impacts from fugitive emissions. DEQ's analyses used a generic, hypothetical plant layout along with equipment-specific emissions and emissions release parameters.
A 100-meter set back of all emissions sources from the ambient air boundary was needed to demonstrate compliance with PM_{10} standards.	Compliance with PM_{10} standards could not be reasonably demonstrated with the ambient air boundary located at distances closer than 100 meters.
Aggressive control of fugitive emissions associated with material handling were needed to enable facility-wide compliance with PM_{10} standards.	Without using the emission factor for wet suppression, there were numerous modeled concentrations exceeding the 24-hour PM_{10} standard.
Modeled concentrations of POM and total PAHs exceed the AACCs for those TAPs.	If T-RACT is used to control POM and total PAH emissions, impacts would be within acceptable levels (AACC x 10).

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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 DEBCO facility will only be located in areas designated as an attainment or unclassifiable for all criteria pollutants.

2.1.2 *Significant and Full Impact Analyses*

If estimated maximum pollutant impacts to ambient air from the emissions sources associated with the proposed modification exceed the significant contribution levels (SCLs) of IDAPA 58.01.01.006.90, then a full impact analysis is necessary to demonstrate compliance with IDAPA 58.01.01.203.02. A full impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions 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 National Ambient Air Quality Standards (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	1.0	50[f]	Maximum 1st highest[g]
	24-hour	5.0	150[h]	Maximum 6th highest[i]
Carbon monoxide (CO)	8-hour	500	10,000[j]	Maximum 2nd highest[g]
	1-hour	2,000	40,000[j]	Maximum 2nd highest[g]
Sulfur Dioxide (SO_2)	Annual	1.0	80[f]	Maximum 1st highest[g]
	24-hour	5	365[j]	Maximum 2nd highest[g]
	3-hour	25	1,300[j]	Maximum 2nd highest[g]
Nitrogen Dioxide (NO_2)	Annual	1.0	100[f]	Maximum 1st highest[g]
Lead (Pb)	Quarterly	NA	1.5[h]	Maximum 1st highest[g]

[a] IDAPA 58.01.01.006.90
[b] Micrograms per cubic meter
[c] IDAPA 58.01.01.577 for criteria pollutants
[d] The maximum 1st highest modeled value is always used for significant impact analysis
[e] Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
[f] Never expected to be exceeded in any calendar year
[g] Concentration at any modeled receptor
[h] Never expected to be exceeded more than once in any calendar year
[i] Concentration at any modeled receptor when using five years of meteorological data
[j] Not to be exceeded more than once per year

2.1.3 *Toxic Air Pollutant Analyses*

Toxic Air Pollutant (TAP) requirements for PTCs are specified in IDAPA 58.01.01.210. If the emissions increase associated with a new source or modification exceeds screening emission levels (ELs) of IDAPA 58.01.01.585 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

IDAPA 58.01.01.585 and Acceptable Ambient Concentrations for Carcinogens (AACCs) of IDAPA 58.01.01.586, then compliance with TAP requirements has been demonstrated.

2.2 Background Concentrations

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. Default rural/agricultural background concentrations were used because HMA plants are typically located outside of urban areas. Table 3 lists applicable background concentrations.

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

Spidell used SCREEN3 to assess air quality impacts for facility operations; however, fugitive emissions from asphalt loadout, silo filling, and miscellaneous aggregate handling were not assessed. DEQ's analyses used ISCST3-PRIME and accounted for these fugitive emissions.

A generic facility layout was used for DEQ's analyses since the HMA plant is portable. Table 4 lists the modeling parameters used in DEQ's analyses.

Table 4. REFINED MODELING PARAMETERS		
Parameter	**Description/Values**	**Documentation/Addition Description**
Model	ISCST3-PRIME	ISCST3 with the PRIME downwash algorithm, version 04269
Meteorological data	1987-1991	Boise surface and upper air data
Terrain	Flat	Flat terrain used since maximum impacts are very near the facility
Building downwash	Considered	The building profile input program (BPIP) was used
Receptor Grid	Grid 1	25-meter spacing along boundary out to 100 meters
	Grid 2	50-meter spacing out to 500 meters

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 Modeling protocol and Methodology

The submitted air impact analyses were conducted by Spidell. A modeling protocol was not submitted to DEQ prior to the application. Modeling was generally conducted using methods and data presented in the *State of Idaho Air Quality Modeling Guideline*.

3.1.2 Model Selection

ISCST3 with the PRIME downwash algorithm was used for DEQ's refined modeling analyses. ISCST3 uses actual monitored meteorological data and uses actual locations of emissions units in the evaluation of air pollutant impacts.

3.1.3 Meteorological Data

Surface and upper air meteorological data monitored from Boise, Idaho, were used for the refined modeling analyses. Boise National Weather Service data were used because previous DEQ analyses for HMAs has shown that highest impacts are predicted with these data.

3.1.4 Terrain Effects

Terrain effects on dispersion were not considered in the analyses. Because maximum impacts from the near ground-level sources at the facility are within several hundred meters, terrain effects on maximum modeled impacts are minimal in most instances.

3.1.5 Facility Layout

A generic facility layout was used for the DEQ analyses. Emissions units were located within 20 meters of each other.

3.1.6 Building Downwash

The structure of the generator was simulated as a 10 ft by 10 ft building, 5 ft high.

3.1.7 Ambient Air Boundary

The facility ambient air boundary was defined as a circular area with a 100-meter radius, with the emissions units near the center.

3.1.8 Receptor Network

The receptor grid met the minimum recommendations specified in the *State of Idaho Air Quality Modeling Guideline*. DEQ determined the receptor grid was adequate to reasonably resolve maximum modeled concentrations.

3.2 Emission Rates

Emissions rates used in the generic HMA plant dispersion modeling analyses were based on emissions factors from EPA's AP-42 Section 11.1 (March 2004), *Hot Mix Asphalt Plants*.

3.2.1 Criteria Pollutant Emissions Rates

For those emissions that cause a maximum ambient impact exceeding the SCLs, a full impact analysis was necessary. Facility-wide allowable emissions for the HMA plant were used for the full impact analyses, based on 400 tons per hour and 400,000 tons per year production.

The aggregate material handling equation from AP-42 13.2.4 was used to estimate fugitive emissions from truck unloading, loader-to-pile, and pile-to-cold bin transfers. Emissions are dependent on material moisture content and wind speed. A default moisture content of 1.77 percent and a base wind speed of 10 miles per hour were used for estimating emissions. ISCST-3 can vary emissions by wind speed, and six wind speed factors were developed corresponding to the six wind speed categories used within ISCST-3. Table 5 shows the base factor and categorical wind speed factors.

Table 5. WIND SPEED ADJUSTMENT FACTORS FOR AGGREGATE HANDLING EMISSIONS

Category	Upper Wind Speed for Category (m/sec)	Mean Wind for Category (m/sec mph[a])	Emissions Rate for Category (lb/ton)	Adjustment Factor for Category[b]
Base factor	None	4.47 (10)	3.27E-3	1.0
1	1.54	0.77[c] (1.72)	3.32E-4	0.101
2	3.09	2.32[d] (5.18)	1.39E-3	0.425
3	5.14	4.12[d] (9.20)	2.94E-3	0.897
4	8.23	6.69[d] (14.95)	5.52E-3	1.69
5	10.8	9.52[d] (21.28)	8.73E-3	2.67
6	No limit	12.4[e] (27.74)	1.23E-2	3.77

a. Miles per hour wind speed listed in parentheses
b. Calculated by dividing the emissions rate for the category by the base factor
c. Calculated as the average between 0 m/sec and the upper wind speed for this category
d. Calculated as the average between the upper wind speed for the previous category and the upper wind for this category
e. Calculated as the average between the upper wind speed for the previous category and a value of 14 m/sec (representative of a reasonable upper wind expected)

Fugitive emissions from aggregate handling had to be reduced by 95 percent to enable compliance with PM_{10} standards. The wind speed adjustment factors are not altered by a change in the base emissions rate.

Fugitive emissions also occur from conveyor transfers and potentially from a scalping screen, if one is used at the site. Emissions factors from AP-42 11.19.2 Crushed Stone Processing, were used to calculate fugitive emissions from the following sources:

- Feeder to conveyor
- Scalping screen
- Conveyor to conveyor
- Conveyor to dryer

Factors for controlled emissions, representing good control by shielding or application of suppressents, were used for the modeling analyses.

Table 6 shows the emissions at the HMA plant that are associated with operations.

Table 6. EMISSIONS RATES USED FOR AIR IMPACT MODELING

Emissions Point	Description	Emissions Rates[a] (lb/hr)			
		PM_{10}[b]	SO_2[c]	CO[d]	NOx[e]
DRYER	HMA main stack	9.2 (1.05)	23.2 (2.65)	52	(5.94)
LOAD	HMA asphalt loadout	0.29 (0.033)	0.0	0.74	0.0
SILO	HMA silo filling	0.32 (0.037)	0.0	0.65	0.0
GEN	HMA generator	1.89 (1.24)	1.77 (1.16)	5.80	(17.58)
CONVEY	HMA converyors/misc handling aggregate	0.088 (0.010)	0.0	0.0	0.0
MATHAND	Material handling dump/loaders[f]	0.196 (0.022)	0.0	0.0	0.0

a. Long term rates (annual emissions divided by 8760 hr/yr) are listed in parentheses
b. Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
c. Sulfur dioxide
d. Carbon monoxide
e. Nitrogen dioxide
f. The base emissions rate at a wind speed of 10 mph is listed in the table. In the model, emissions for a given hour are a function of wind speed

3.2.2 *TAP Emissions Rates*

Table 7 lists applicable TAP emissions associated with the HMA plant that were in excess of the screening emissions level (EL). All TAPs with emissions over the EL were carcinogenic TAPs, requiring modeling to demonstrate compliance with long term AACCs. The pound/hour value required for comparison to the EL is an annualized emissions rate for carcinogenic TAPs rather than the maximum short-term pound/hour rate. Emissions of all other TAPs were below applicable screening emissions levels (ELs) and modeling was not required.

Table 7. MODELED TAP EMISSIONS RATES

Pollutant	Averaging Period	Source-Specific Emissions Rates[a] (lb/hr)[b]					
		DRYER	LOAD	SILO	GEN	TOTAL	EL
Acetaldehyde	Annual	0.0594	NA	NA	1.15E-4	0.0295	3.0E-3
Benzene	Annual	0.0178	9.88E-5	1.78E-4	3.54E-3	0.0216	8.0E-4
Formaldehyde	Annual	0.142	1.67E-4	3.84E-3	3.58E-4	0.146	5.1E-4
POM	Annual	2.50E-5	2.10E-5	3.08E-5	1.89E-5	9.57E-5	2.0E-6
Total PAHs[c]	Annual	0.0404	9.23E-4	1.32E-3	9.63E-4	0.0436	9.1E-5
Dioxins/Furans[d]	Annual	1.40E-10	NA	NA	NA	1.40E-10	1.5E-10
Arsenic	Annual	2.56E-5	NA	NA	NA	2.56E-5	1.5E-6
Cadmium	Annual	1.87E-5	NA	NA	NA	1.87E-5	3.7E-6
Chromium 6+	Annual	2.06E-5	NA	NA	NA	2.06E-5	5.6E-7
Nickel	Annual	2.88E-3	NA	NA	NA	2.88E-3	2.7E-5

a. Values for TAPs with an annual averaging period are annual values divided by 8760 hour/year
b. Pounds per hour
c. Summation of all PAH HAPs
d. Accounts for toxicity equivalency factors

3.3 Emission Release Parameters

Table 8 provides emissions release parameters for the DEQ refined analyses including stack height, stack diameter, exhaust temperature, and exhaust velocity. The generator was modeled by Spidel using a stack gas temperature of 787 K (957° F) and a flow velocity of 92 m/sec. DEQ modeling staff were suspect of the high temperature and flow rates used, and no documentation was submitted to verify the values used. Applicants frequently use temperatures that are measured at the exhaust manifold during full load, rather than end-of-the-stack measurements at typical loads. Over estimation of the temperature then results in over estimation of flows from combustion evaluations, and unrealistically high stack exit velocities. DEQ's analyses used a more typical stack temperature of 500 K (440° F) and a flow velocity of 50 m/sec.

Table 8. EMISSIONS AND STACK 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	7.4	1.0	408	39
GEN	Point	4.2	0.2	500	50
Volume Sources					
Release Point /Location	**Source Type**	**Release Height (m)**	**Initial Horizontal Dispersion Coefficient σ_{y0} (m)**	**Initial Vertical Dispersion Coefficient σ_{z0} (m)**	
LOAD	Volume	5.0	0.70	4.65	
SILO	Volume	7.5	0.70	4.65	
CONVEY	Volume	2.5	7.0	1.2	
MATHAND	Volume	2.5	7.0	1.2	

[a] Meters
[b] Kelvin
[c] Meters per second

3.4 Results for Significant and Full Impact Analyses

Results from DEQ's significant impact analyses are shown in Table 9. Full impact analyses were required for all pollutants except CO.

Table 9. SIGNIFICANT IMPACT ANALYSES				
Pollutant	**Averaging Period**	**Maximum Modeled Concentration (μg/m³)[a]**	**Significant Impact Level (μg/m³)**	**Full Impact Analysis Required**
PM_{10}[b]	24-hour	80.5	5.0	Yes
	Annual	3.4	1.0	Yes
Sulfur Dioxide (SO_2)	3-hour	45.6	25	Yes
	24-hour	26.6	5	Yes
	Annual	2.1	1.0	Yes
Carbon Monoxide (CO)	1-hour	1158	2,000	No
	8-hour	266	500	No
Nitrogen Dioxide (NO_2)	Annual	32.5	1.0	Yes

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

Table 10 provides a summary of the full impact analyses. To demonstrate compliance with the 24-hour PM_{10} standard, emissions factors representing wet dust suppression were needed on fugitive emissions from conveyor transfers of aggregate and any screening that may be used. Also, a 95 percent control efficiency of emissions associated with aggregate handling from truck dumping and loader transfers was used. Aggressive emissions controls of these sources will assure PM_{10} concentrations remain at levels below applicable standards at all locations.

Table 10. FULL IMPACT ANALYSES						
Pollutant	**Averaging**	**Modeled**	**Background**	**Total**	**NAAQS[b]**	**Percent of**

	Period	Design Concentration (μg/m³)[a]	Concentration (μg/m³)	Impact (μg/m³)	(μg/m³)	NAAQS
PM_{10}[b]	24-hour	61.7[c]	73	134.7	150	90
	Annual	3.4[d]	26	29.4	50	59
Sulfur Dioxide (SO_2)	3-hour	43.9[e]	34	77.9	1,300	6
	24-hour	23.2[e]	26	49.2	365	13
	Annual	2.1[d]	8	10.1	80	13
Nitrogen Dioxide (NO_2)	Annual	32.5[d]	17	49.5	100	50

a. Micrograms per cubic meter
b. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
c. Maximum 6th highest modeled concentration using a five-year data set
d. Maximum modeled concentration from modeling five separate years
e. Maximum 2nd highest modeled concentration using a five-year data set

3.5 Results for TAPs Analyses

Compliance with TAP increments were demonstrated by modeling uncontrolled TAP emissions increases (those TAPs with emissions exceeding the ELs) resulting from operation of the HMA plant. Table 11 summarizes the ambient TAP analyses. Modeled concentrations of POM and total PAHs exceeded the AACC. These impacts would be acceptable if T-RACT emissions controls for POM and total PAHs are used on the sources, as IDAPA 58.01.01.210.12 allows concentrations at 10 times the AACC if T-RACT is utilized.

Table 11. RESULTS OF TAP ANALYSES

TAP	Averaging Period	Maximum Modeled Concentration (μg/m³)[a]	AACC[b] (μg/m³)	Percent of AACC
Acetaldehyde	Annual	0.00359	0.45	0.8
Benzene	Annual	0.00846	0.12	7
Formaldehyde	Annual	0.050	0.077	65
POM	Annual	7.37E-4	3.0E-4	246
Total PAHs[c]	Annual	0.032	0.014	229
Dioxins/Furans[d]	Annual	<1.0E-8	2.2E-8	<45
Arsenic	Annual	1.53E-6	2.3E-4	0.7
Cadmium	Annual	1.12E-6	5.6E-4	0.2
Chromium 6+	Annual	1.23E-6	8.3E-5	1.5
Nickel	Annual	1.72E-4	4.2E-3	4

a. Micrograms per cubic meter
b. Acceptable Ambient Concentration or Acceptable Ambient Concentration for a Carcinogen
c. Summation of all PAH HAPs
d. Accounts for toxicity equivalency factors

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, provided the following conditions are met:

- Aggressive fugitive emissions controls are used for PM_{10} associated with material handling.
- T-RACT is used to control emissions of POM and total PAHs.

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APPENDIX D

T-RACT ANALYSIS

P-060440

T-RACT Determination
Total PAH and POM Emissions
DEBCO Construction, Drum Mix Asphalt Plant

1.0 Introduction

DEBCO Construction must perform a T-RACT determination for total PAH and POM emissions because dispersion modeling indicates that the annual ambient impact from the hot mix asphalt (HMA) plant exceed the Acceptable Ambient Concentration for Carcinogens (AACCs). TAP emissions come from the asphalt plant, the silo loadout, the silo filling, and the generator.

This T-RACT determination will discuss the applicable regulations, the technically feasible control options, the capital costs, and the cost effectiveness. The last section discusses our reasons for the selection of a baghouse as T-RACT control.

2.0 Applicable Regulations

IDAPA 58.01.01.210.14 states that T-RACT shall be determined on a case-by-case basis by the Department as follows:

a. The applicant shall submit information to the Department identifying and documenting which control technologies or other requirements the applicant believes to be T-RACT.

b. The Department shall review the information submitted by the applicant and determine whether the applicant has proposed T-RACT.

c. The technological feasibility of a control technology or other requirements for a particular source shall be determined considering several factors including, but not limited to:

- i. Process and operating procedures, raw materials and physical plant layout.
- ii. The environmental impacts caused by the control technology that cannot be mitigated, including, but not limited to, water pollution and the production of solid wastes.
- iii. The energy requirements of the control technology.

d. The economic feasibility of a control technology or other requirement, including the costs of necessary mitigation measures, for a particular source shall be determined considering several factors including, but not limited to:

- i. Capital costs.
- ii. Cost effectiveness, which is the annualized cost of the control technology divided by the amount of emission reduction.
- iii. The difference in costs between the particular source and other similar sources, if any, that have implemented emissions reductions.

e. If the Department determines that the applicant has proposed T-RACT, the Department shall determine which of the options, or combination of options, will result in the lowest emission of toxic air pollutants, develop the emission standards constituting T-RACT and incorporate the emission standards into the permit to construct.

f. If the Department determines that the applicant has not proposed T-RACT, the Department shall disapprove the submittal. If the submittal is disapproved, the applicant may supplement its submittal or demonstrate preconstruction compliance through a different method provided in Section 210. If the applicant does not supplement its submittal or demonstrate preconstruction compliance through a different method provided in Section 210, the Department shall deny the permit.

3.0 Identification of Control Technologies (IDAPA 58.01.01.210.14.c.)

This T-RACT analysis will focus on controlling the hot mix plant dryer emissions only. As will be demonstrated in this analysis, control of the plant dryer emissions will demonstrate compliance with T-RACT, based on a plant-wide cancer risk of 1/100,000 or less.

For HMA plants, one means of reducing total PAH and POM emissions is indirectly through controlling particulate emissions (see Emissions of Polycyclic Aromatic Hydrocarbons from Batch Hot Mix Asphalt Plants, by Wen-Jhy Lee, et. al., Environmental Science Technology, 38(20), 5724-5280, 2004). Hence, the control strategies discussed here are better known for particulate control.

Hot mix asphalt plants are typically equipped with two particulate control technologies:

- baghouses
- scrubbers

One other particulate aftertreatment control strategy that could be applied for total PAH and POM control includes:

- electrostatic precipitators (ESP)

A control option that may directly control total PAH and POM emissions that is not aftertreatment control is:

- good combustion practice

Some technologies that might be used for total PAH and POM control in general are not considered further here.

4.0 Technological Feasibility Including Energy and Environmental Considerations (IDAPA 58.01.01.210.14.c.i., IDAPA 58.01.01.210.14.c.ii., IDAPA 58.01.01.210.14.c.iii.)

4.1 Baghouse

Fabric filters remove particles by passing them through woven or felted fabric. As particles are removed from the gas stream by the fabric filter, a porous layer referred to as the filter cake, develops on the bag. It is the filter cake that results in the high collection efficiencies.

The principal advantage of fabric filters over ESPs in terms of total PAH and POM control is that they are much more efficient at removing particulate matter in the submicron range. Additionally, fabric filters are able to deal with upset process conditions that may result in flue gas flow and compositional changes more effectively than ESPs.

AP-42 Table 11.1-10 shows that HMAs with baghouses emit 0.00088 lb/ton PAH and 5.48×10^{-7} lb/ton POM.[1] In general baghouses control 99% or better for particulate emissions, and the same is applicable here for the particulate portion of POM and PAH. There are no significant energy requirements or environmental impacts with a baghouse, and PM/PM-10 are controlled as well as total PAH and POM.

4.2 Scrubber

Scrubbers are a common emission control for HMAs. Wet scrubbing can be used to control particulate emissions, as well as acid gas and SO_2 emissions. The control efficiency for total PAH and POMs is difficult to estimate, as there is no EPA data specifically for scrubber control of PAH and POM. It is estimated at 0% - 70% (70% is from the lowest value of the range taken from EPA Fact Sheet EPA-452/F-03-017).

When scrubbers are used for particulate control, the collection occurs via three principal mechanisms. The first and most dominant mechanism involves 'impaction' of the particle directly into a droplet. 'Interception' of the particle by a droplet, as the particle comes close to the droplet is the second mechanism. The final mechanism involves 'diffusion' of the particle through the surrounding gas, until the particle is close enough to the droplet to be captured.

One disadvantage of scrubbers is the additional energy requirements and the environmental impact from wastewater treatment of the sludge formed. These are not significant

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[1] The POM emission factor is the sum of the following emission factors from AP-42 table 11.1-10:
Benzo(a)anthracene, 2.1×10^{-9} lb/ton
Benzo(a)pyrene, 9.8×10^{-9} lb/ton
Benzo(k)fluoranthene, 1×10^{-7} lb/ton
Chrysene, 1.8×10^{-7} lb/ton
Dibenz(a,h)anthracene, Not Available in AP-42
Indeno(1,2,3-cd)pyrene, 7×10^{-9} lb/ton

disadvantages but do require additional maintenance and cost.

4.3 ESP

An ESP operates using discharge electrodes that are placed between ground parallel plates, resulting in simultaneous charging and collection. Applying a high voltage to the discharge electrodes creates a corona discharge, resulting in the production of negatively ionized gas molecules. The electric field between the discharge electrodes and collection plates causes the ions to migrate towards the plates, subsequently intercepting particles present in the space. These ions are deposited on the particles, which then become charged and migrate towards the collection plate through electrostatic forces. ESP control for PAH and POM was not found in any literature but it is probably safe top assume it controls these emissions similarly as a baghouse.

The two types of ESPs are 'dry' and 'wet'. Wet are used more frequently but do have wastewater considerations. A dry ESP is used less frequently, usually where there are wastewater concerns or high temperature streams.

ESPs have greater energy requirements compared to other control technologies. Wet ESPs have wastewater considerations and may produce ozone only (see EPA Fact Sheet EPA 452/F-03-030). Like a scrubber and baghouse, ESPs control PM/PM-10 as an additional environmental benefit.

Some disadvantages for ESPs include the risk of total PAH and POM generation if operating at incorrect temperatures. Another disadvantage of ESPs is that they have high capital costs.

4.4 Good Combustion Practice (GCP)

In general good combustion practice can maximize the destruction of organics and minimize the downstream formation of total PAH and POMs by controlling the amounts of particulate carried out of the furnace with the flue gas. Furnace destruction of organics must include destruction of both gas- and condensed-phase organics. Emission reduction can vary, and there is no known study on the emission reduction for total PAH and POM from HMAs. For this T-RACT determination, a nominal reduction of 5% is assumed.

There are no negative energy or environmental impacts associated with GCP.

5.0 Economic Considerations (IDAPA 58.01.01.210.14.d.)

The capital costs, annualized costs, and cost effectiveness will be examined for the control strategies outlined above.

5.1 Capital Costs

5.1.1 Baghouse

From EPA Fact Sheet, EPA 453/F-03-025:[2]

The capital cost for a baghouse ranges from $6 - $28/scfm; the average is $17/scfm. Based on an exhaust flow of 46,000 scfm (calculated from 65,000 acfm and adjusted to 60 °F from 275 °F), the capital cost is $782,000.

5.1.2 Scrubber

From EPA Fact Sheet, EPA 453/F-03-017:

The capital cost for a venturi scrubber ranges from $3 - $23/scfm; the average is $13/scfm. Based on an exhaust flow of 46,000 scfm (calculated from 65,000 acfm and adjusted to 60 °F from 275 °F), the capital cost is $597,000.

5.1.3 ESP

From EPA Fact Sheet, EPA 453/F-03-030:

The capital cost for an ESP ranges from $22 - $43/scfm; the average is $33/scfm. Based on an exhaust flow of 46,000 scfm (calculated from 65,000 acfm and adjusted to 60 °F from 275 °F), the capital cost is $2,116,000.

5.1.4 GCP

No capital costs are associated with GCP.

5.2 Annualized Costs

This section looks at annualized costs, which include the annualized capital costs and the annual operating and maintenance costs.

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[2] Fact Sheet is in 2002 dollars. Annual inflation is estimated to be 2.5% on average, or 10% total for four years, since that time.

5.2.1 Baghouse

From EPA Fact Sheet, EPA 453/F-03-025:

The annualized cost for a baghouse ranges from $6 - $43/scfm. We believe the low end or $6/scfm applies as HMA manufacturers have equipped plants to operate economically with baghouses. Based on an exhaust flow of 46,000 scfm (calculated from 65,000 acfm and adjusted to 60°F from 275°F), the annualized capital cost is $276,000/year.

5.2.2 Scrubber

From EPA Fact Sheet, EPA 453/F-03-017, the annualized cost for a venturi scrubber ranges from $6 - $212/scfm. We believe the low end applies as HMA manufacturers have equipped plants to operate economically with scrubbers. An annualized cost of $6/scfm or $276,000 will be used in this analysis, based on an exhaust flow of 46,000 scfm.

The total annualized cost is estimated to be $276,000/year.

5.2.3 ESP

From EPA Fact Sheet, EPA 453/F-03-030:

The annualized cost for an ESP ranges from $9 - $51/scfm; the average is $30/scfm. Based on an exhaust flow of 46,000 scfm (calculated from 65,000 acfm and adjusted to 60°F from 275°F), the annualized cost is $1,380,000/year.

5.2.4 GCP

The additional annualized costs are associated with GCP are insignificant. DEBCO attempts to employ GCP at all times.

5.3 Cost Effectiveness

Cost effectiveness is based on an assumption that a baghouse will control PAH and POM emissions similarly as dioxin/furan emissions. This is based on the assumption that PAH or POM emissions are controlled roughly the same as dioxin/furan emissions, as these TAPs have complex hydrocarbon structures. Dioxin/furan emissions were calculation in the T-RACT submittal to DEQ for American Paving.

Note that emissions below include all emission sources, though emission control occurs for the dryer only. Also, it is assumed the plant operates 8,760 hr/yr.

The cost effectiveness is given below in table 1:

Table 1

Total PAH and POM Cost Effectiveness								
Control Alternative	**% Control**	**Plant-wide Emissions, ton/year**		**Emissions Reduction, tons/year**		**Average Annualized Cost Increase Over Baseline**	**Average Cost Effectiveness, $/ton**	**Incremental Cost Effectivenes s, $/ton**
Baghouse	96%	1.91E-01	tpy	2.53E-01	tpy	$276,000	$1,091,794	$8,461,252
Scrubber	70%	4.44E-01	tpy	1.29E-01	tpy	$276,000	$2,138,961	$(1,624,262)
ESP	38%	5.73E-01	tpy	5.03E-01	tpy	$1,380,000	$2,745,728	$5,703,619
GCP	5%	1.08E+00	tpy	9.84E-01	tpy	$0	$ -	$ -
Baseline	0%	2.06E+00	tpy	0.00E+00	tpy	$0		$ -

The most cost-effective aftertreatment control based on average cost effectiveness is the baghouse. GCP is essentially no cost but it will not reduce emissions to the level a baghouse does.

6.0 Conclusion

This analysis reviewed the following aftertreatment control options for total PAH and POM emissions: baghouse, ESP, and scrubber. Good combustion practice was also discussed.

We believe the baghouse control option should be considered T-RACT. It is the aftertreatment option with the greatest degree of control and has the most favorable average cost effectiveness.

Furthermore, the modeled ambient concentrations of PAH and POM, when compared to the AACC, demonstrate a cancer risk less than 1/100,000 (or 0.00001), as shown in Table 2:

Table 2. RESULTS OF TAP ANALYSES						
TAP		**Averaging Period**	**Maximum Modeled Concentration (µg/m³)[a]**	**AACC[b] (µg/m³)**	**Percent of AACC**	**Cancer Risk**
POM		Annual	7.37E-4	3.0E-4	246	0.0000025
Total PAHs		Annual	0.032	0.014	229	0.000002

The modeled annual ambient concentration for PAH and POM meet the T-RACT cancer risk of 1/100,000 (IDAPA 58.01.01.210.12.c.).

In conclusion, with the baghouse on the dryer, DEBCO has demonstrated compliance with T-RACT.