Statement of Basis

Permit to Construct No. P-2014.0004
Project ID 61334

Knife River, Inc.
Boise, Idaho

Facility ID 777-00533

Final

July 24, 2014
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Permit Writer

The purpose of this Statement of Basis is to satisfy the requirements of IDAPA 58.01.01.et seq, Rules for the Control of Air Pollution in Idaho, for issuing air permits.

ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURE

AAC	acceptable ambient concentrations
AACC	acceptable ambient concentrations for carcinogens
acfm	actual cubic feet per minute
Btu	British thermal units
CAA	Clean Air Act
CFR	Code of Federal Regulations
CI	compression ignition
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent emissions
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EL	screening emission levels
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gases
gr	grains (1 lb = 7,000 grains)
HAP	hazardous air pollutants
HMA	hot mix asphalt
hp	horsepower
hr/yr	hours per consecutive 12 calendar month period
ICE	internal combustion engines
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
km	kilometers
lb/hr	pounds per hour
MMBtu	million British thermal units
NAAQS	National Ambient Air Quality Standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NSPS	New Source Performance Standards
O&M	operation and maintenance
PAH	polyaromatic hydrocarbons
PC	permit condition
PERF	Portable Equipment Relocation Form
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
POM	polycyclic organic matter
PSD	Prevention of Significant Deterioration
PTC	permit to construct
PTE	potential to emit
PW	process weight rate
RAP	recycled asphalt pavement
RICE	reciprocating internal combustion engines
Rules	*Rules for the Control of Air Pollution in Idaho*
SIP	State Implementation Plan
SM	synthetic minor
SM80	synthetic minor facility with emissions greater than or equal to 80% of a major source threshold
SO_2	sulfur dioxide
SO_x	sulfur oxides

T/day	tons per calendar day
T/hr	tons per hour
T/yr	tons per consecutive 12 calendar month period
TAP	toxic air pollutants
TEQ	toxicity equivalent
T-RACT	Toxic Air Pollutant Reasonably Available Control Technology
ULSD	ultra-low sulfur diesel
U.S.C.	United States Code
VOC	volatile organic compounds
$\mu g/m^3$	micrograms per cubic meter

FACILITY INFORMATION

Description

Knife River, Inc. has proposed a new portable drum-mix asphalt plant. The asphalt plant consists of a counter-flow asphalt drum mixer equipped with a with a bag house to control particulate matter, an asphaltic oil storage tank with a heater, and materials transfer equipment. Materials transfer equipment at the facility will include front end loaders, feed bins, storage silos, conveyors, stock piles, and haul trucks.

Asphalt is made at the facility as follows. First, stockpiled aggregate is transferred to feed bins. Recycled asphalt pavement (RAP) may be used in the aggregate (up to 50% can be allowed). Aggregate is then dispensed from the feed bins onto feeder conveyors, which transfer the aggregate to the asphalt drum mixer. The Applicant has requested that the asphalt drum mixer be fired on natural gas and LPG/propane. Next, aggregate travels through the rotating drum mixer, and when dried and heated, it is mixed with hot liquid asphaltic oil. The asphaltic oil is heated by the asphalt tank heater to allow it to flow and be mixed with the hot, dry aggregate. The resulting asphalt is conveyed to hot storage bins until it can be loaded into trucks for transport off-site or transferred to silos for temporary storage prior to transport off-site.

The Applicant has proposed that line power and portable electrical generators will be used at the facility. Therefore, IC engines powering electrical generators were included in the application.

Permitting History

This is the initial PTC for a new facility thus there is no permitting history.

Application Scope

This is the initial PTC for a new facility.

The process begins with materials being fed via front end loader to a compartment bin feeder system and then dispensed in metered proportions to a collecting conveyor. The material will pass over a scalping screen before being conveyed into the drum mixer via a scalping screen.

Inside the drum mixer the aggregates will be heated to specification temperature and then asphaltic oil is added. In some instances up to 50% RAP may be substituted for virgin aggregate.

The mixed asphalt is dispensed to a slat conveyor and then lifted up to a hot storage silo for intermediate storage. Trucks are then loaded by driving under the hot storage silo.

The silo loading process will be enclosed and vented back to the drum via suction induced either through the conveyor or via a separate duct line. The unloading process will be uncontrolled.

All particulate emissions from the asphalt drum mixer will be collected and vented to a high efficiency baghouse as proposed by the Applicant.

The asphalt plant will include a hot oil heating system designed to keep asphaltic oil at specification temperature. Heat will be provided via a natural gas/LPG-fired external combustion burner. This burner will operate intermittently during 24-hours per day much the way a hot water heater cycles. Typical burner operation during any 24-hour period is less than 8 hours.

The Applicant has also proposed asphalt production rate throughput limits of 400 tons per hour, 5,000 tons per day, and 325,000 tons per year.

The Applicant has also proposed that two compression ignition IC engines powering electrical generators, a primary and a secondary, will be used to provide electricity for the facility when line power is not available.

Application Chronology

March 7, 2014	DEQ received an application and processing fee.

March 21 – April 7, 2014	DEQ provided an opportunity to request a public comment period on the application and proposed permitting action.
April 1, 2014	DEQ determined that the application was complete.
May 21, 2014	DEQ made available the draft permit and statement of basis for peer and regional office review.
May 30, 2014	DEQ made available the draft permit and statement of basis for applicant review.

TECHNICAL ANALYSIS

The asphalt production facility utilizes a baghouse for control of particulate matter emissions from the asphalt drum mixer.

Emissions Units and Control Equipment

Table 1 EMISSIONS UNIT AND CONTROL EQUIPMENT INFORMATION

Source ID No.	Sources	Control Equipment
Materials Handling	Material Transfer Points: Materials handling Asphalt aggregate transfers Truck unloading of aggregate Aggregate conveyor transfers Aggregate handling	Reasonable Control
Hot Mix Asphalt Drum Mixer	Asphalt Drum Mixer: Asphalt Drum Mixer: Manufacturer: Gencor Model: 400 ultradrum Type: Counter-flow Manufacture Date: 2014 Max. production: 400 T/hr, 5,000 T/hr, and 325,000 T/yr Fuel(s): Natural gas, LPG/propane	Asphalt Drum Mixer Baghouse: Manufacturer: Gencor/CMI Model: APM 810 Flow rate: 32,258 dscf
Asphaltic Oil Tank Heater	Asphaltic Oil Tank Heater: Heat input rating: 0.6 MMBtu/hr Fuel(s): Natural gas, LPG/propane	N/A
Primary IC Engine	Primary IC Engine: Manufacturer: CAT Model: C32 Manufacture Date: 2013 Max. power rating: 1,340 bhp Fuel: ULSD diesel Sulfur content: 0.0015% by weight Daily operational limit: 13 hrs/day Annual operational limit: 1,161 hrs/yr	N/A
Secondary IC Engine	Secondary IC Engine: Manufacturer: IVECO Model: N67 (or Equivalent) Manufacture Date: 2013 Max. power rating: ~268 bhp Fuel: ULSD diesel Sulfur content: 0.0015% by weight Daily operational limit: 13 hrs/day Annual use limit: 2,322 hrs/yr	N/A

Emissions Inventories

Potential to Emit

IDAPA 58.01.01 defines Potential to Emit as the maximum capacity of a facility or stationary source to emit an air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the facility or source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is state or federally enforceable. Secondary emissions do not count in determining the potential to emit of a facility or stationary source.

Using this definition of Potential to Emit an emission inventory was developed for the asphalt production operations at the facility associated with this proposed project using the DEQ developed HMA EI spreadsheet (see Appendix A). Emissions estimates were based on the following assumptions:

- Maximum asphalt throughput does not exceed 400 ton HMA/hour, 5,000 ton HMA/day, and 325,000 ton HMA/year (per the Applicant).
- Emissions from the drum mixer are controlled by a baghouse
- Emissions from silo filling and silo are enclosed and routed to the combustion zone of the drum mixer.
- Emissions from the asphalt drum dryer were based on the maximum emissions from using any of the proposed fuels for combustion in the drum dryer.
- The primary IC engine powering a generator has a maximum brake-horsepower rating of less than less than or equal to 1,340 bhp, and proposed operation of up to 13 hour/day and 1,161 hour/year (per the Applicant).
- The secondary IC engine powering a generator has a maximum brake-horsepower rating of less than less than or equal to 268 bhp and proposed operation of up to 13 hour/day and 2,322 hour/year (per the Applicant).

Table 2 AS PERMITTED POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS

Emissions Unit	$PM_{10}/PM_{2.5}$	SO_2	NO_X	CO	VOC	CO_2e
	T/yr[a]	T/yr[a]	T/yr[a]	T/yr[a]	T/yr[a]	T/yr[a]
Asphalt drum mixer	3.74/3.62	0.55	6.34	21.13	5.2	7,507
Asphaltic oil tank heater	8.94E-3	7.1E-4	0.12	9.9E-2	6.5E-3	
Primary IC engine and Secondary IC engine	0.46	8.3E-3	10.2	6.27	2.36	
Silo Load-out	8.5E-2	-	-	0.22	0.64	
Post Project Totals	**4.29/4.17**	**0.56**	**16.66**	**27.72**	**8.21**	**7,507**

a) Controlled average emission rate in tons per year is an annual average, based on the proposed annual operating schedule and annual limits.

As demonstrated in Tables 2 this facility has an as permitted potential to emit for criteria pollutants less than 250 tons per year and less than 100,000 T/yr CO_2e. Therefore, this facility is designated as a Minor facility.

TAP Emissions

A summary of toxic air pollutants (TAPs) that exceed the screening emissions levels is provided in the following table.

Table 3 POTENTIAL TO EMIT FOR TOXIC AIR POLLUTANTS THAT EXCEED SCREENING LEVELS

Toxic Air Pollutants	Post Project 24-hour Average Emissions Rates for Units at the Facility (lb/hr)	Screening Emission Level (lb/hr)	Exceeds Screening Level? (Y/N)
Benzene	1.45E-02	8.00E-04	Yes
Formaldehyde	1.15E-01	5.10E-04	Yes
2-Methylnaphthalene	3.05E-03	9.10E-05	Yes
Acenaphthylene	3.23E-04	9.10E-05	Yes
Fluorene	2.38E-04	9.10E-05	Yes
Naphthalene	3.50E-03	9.10E-05	Yes
Phenanthrene	3.84E-04	9.10E-05	Yes
Polycyclic Organic Matter	3.74E-05	2.00E-06	Yes
Arsenic	2.08E-05	1.50E-06	Yes
Cadmium	1.55E-05	3.70E-06	Yes
Hexavalent Chromium	1.67E-05	5.60E-07	Yes
Nickel	2.34E-03	2.70E-05	Yes

HAP Emissions

The estimated PTE for all federally listed HAPs combined is less than 2.2 tons per year which less than the HAP major source threshold of 25 T/yr., also no single HAP exceeds 10 T/yr. Therefore, this facility is not a Major Source for HAPs.

Ambient Air Quality Impact Analyses

The applicant has demonstrated pre-construction compliance to DEQ's satisfaction that emissions from this facility will not cause or significantly contribute to a violation of any ambient air quality standard. The applicant has also demonstrated pre-construction compliance to DEQ's satisfaction that the emissions increase due to this permitting action will not exceed any acceptable ambient concentration (AAC) or acceptable ambient concentration for carcinogens (AACC) for toxic air pollutants (TAP). A summary of the Ambient Air Impact Analysis for TAP is provided in Appendix B.

T-RACT Analysis

For the TAPs that exceed the ELs in Section 586 of IDAPA 58.01.01, preconstruction compliance was demonstrated under the rules for toxic air pollutant reasonably available control technology (T-RACT) as specified in Sections 210.12-14 of IDAPA 58.01.01.

In accordance with IDAPA 58.01.01.210.12, the proposed T-RACT ambient concentrations at the point of compliance for each applicable TAP are less than, or equal to, the T-RACT ambient concentration (i.e., less than 10 times the applicable AACC listed in IDAPA 58.01.01.586).

In accordance with IDAPA 58.01.01.210.14, this T-RACT analysis included consideration of available control technologies and/or "The application of a design, equipment, work practice or operational requirement, or combination thereof", for compliance with the T-RACT requirements. This included a search of EPA's RACT, BACT, LAER Clearinghouse to identify available control technologies. To meet the T-RACT requirements, the permit requires the control measures determined to meet T-RACT as summarized in the following table. These control measure were selected based upon consideration of the technological feasibility for this process/operation, the economic feasibility, energy requirements, and environmental impacts.

For control technologies, the TAPs from this operation are categorized as follows:

- Metals: Arsenic; Cadmium, Chromium VI, and Nickel
- Organics and acids: PAHs, POM, dioxins/furans, hydrochloric acid, quinone, and acetaldehyde

Table 4 T-RACT CONTROL MEASURES

TAP	Proposed T-RACT Control Measures
Organics	Good maintenance practices for the control equipment (the baghouse)
Metals	Fuel specifications Baghouse control of HMA drum mixer emissions Recycling of collected particulate back to the asphalt drum mixer
Formaldehyde	Use of a covered conveyor from the HMA drum mixer to the silo/load out to minimize off-gassing emissions

In accordance with IDAPA 58.01.01.210.12.d and 58.01.01.210.14.e, emission limits and other permit conditions for each T-RACT pollutant have been incorporated into the permit as summarized in the table above to assure that the facility will be operated in the manner described in the preconstruction compliance demonstration. A detailed T-RACT analysis is provided in Appendix C.

REGULATORY ANALYSIS

Attainment Designation (40 CFR 81.313)

This modeling analysis for this portable facility demonstrates compliance with applicable standards in attainment areas. However, because a separate modeling analysis was not provided to demonstrate compliance with applicable standards in non-attainment areas, this portable facility is not permitted for operation in non-attainment areas.

Facility Classification

The AIRS/AFS facility classification codes are as follows:

A Actual or potential emissions of a pollutant are greater than or equal to the applicable major source threshold.

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

SM80 Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations and permitted emissions are 80% of the major source threshold.

B Uncontrolled potential to emit is less than major facility thresholds.

C Class is unknown.

Table 5 REGULATED AIR POLLUTANT FACILITY CLASSIFICATION

Pollutant	Uncontrolled PTE (T/yr)	PTE (T/yr)	Major Source Thresholds (T/yr)	AIRS/AFS Classification
PM	> 100	6.02	100	SM
$PM_{10}/PM_{2.5}$	> 100	4.2/4.09	100	SM
SO_2	<100	0.56	100	B
NO_x	<100	16.7	100	B
CO	<100	27.5	100	B
VOC	<100	7.57	100	B
CO_2e	<100,000	7,507	100,000	B
HAP (single)	<10	<2.2	10	B
HAP (Total)	<25	<2.2	25	B

Permit to Construct (IDAPA 58.01.01.201)

IDAPA 58.01.01.201 Permit to Construct Required

The permittee has requested that a PTC be issued to the facility for the proposed new emissions source. Therefore, a permit to construct is required to be issued in accordance with IDAPA 58.01.01.220. This permitting action was processed in accordance with the procedures of IDAPA 58.01.01.200-228.

Visible Emissions (IDAPA 58.01.01.625)

IDAPA 58.01.01.625 Visible Emissions

The sources of regulated visible emissions at this facility are subject to the State of Idaho visible emissions standard of 20% opacity.

Fugitive Emissions (IDAPA 58.01.01.650)

IDAPA 58.01.01.650 Rules for the Control of Fugitive Emissions

The sources of fugitive emissions at this facility are subject to the State of Idaho fugitive emissions standards.

Particulate Matter – New Equipment Process Weight Limitations (IDAPA 58.01.01.701)

IDAPA 58.01.01.701 Particulate Matter – New Equipment Process Weight Limitations

IDAPA 58.01.01.700 through 703 set PM emission limits for process equipment based on when the piece of equipment commenced operation and the piece of equipment's process weight (PW) in pounds per hour (lb/hr). IDAPA 58.01.01.701 and IDAPA 58.01.01.702 establish PM emission limits for equipment that commenced operation on or after October 1, 1979 and for equipment operating prior to October 1, 1979, respectively.

For equipment that commenced operation on or after October 1, 1979, the PM allowable emission rate (E) is based on one of the following four equations:

IDAPA 58.01.01.701.01.a: If PW is < 9,250 lb/hr; $E = 0.045 (PW)^{0.60}$

IDAPA 58.01.01.701.01.b: If PW is ≥ 9,250 lb/hr; $E = 1.10 (PW)^{0.25}$

For the new asphalt drum mixer emissions unit proposed to be installed as a result of this project with a proposed throughput of 400 T/hr, E is calculated as follows:

Proposed throughput = 400 T/hr x 2,000 lb/1 T = 800,000 lb/hr

Therefore, E is calculated as:

$E = 1.10 \times PW^{0.25} = 1.10 \times (800{,}000)^{0.25} = 32.9$ lb-PM/hr

The total calculated PM emissions from this facility are much less than 32.9 pounds per hour, conservatively demonstrating compliance with process weight rate emission limits. This is conservative because each process would be subject to the allowable emission rate instead of all of them being considered as one process.

Rules for Control of Odors (IDAPA 58.01.01.775)

IDAPA 58.01.01.750 Rules for Control of Odors

Section 776.01 states that no person shall allow, suffer, cause, or permit the emission of odorous gases, liquids, or solids into the atmosphere in such quantities as to cause air pollution.

Rules for Control of Hot-Mix Asphalt Plants (IDAPA 58.01.01.805)

IDAPA 58.01.01.805 Rules for Control of Hot-Mix Asphalt Plants

The purpose of Sections 805 through 808 is to establish for hot-mix asphalt plants restrictions on the emission of particulate matter.

Section 806 states that no person shall cause, allow or permit a hot-mix asphalt plant to have particulate emissions which exceed the limits specified in Sections 700 through 703. As demonstrated previously, these requirements have been met.

Section 807 states that in the case of more than one stack to a hot-mix asphalt plant, the emission limitation will be based on the total emission from all stacks. The proposed facility only has one stack for emissions from the asphalt drum dryer so there is no need to combine emissions limits from multiple stacks into one stack as required.

Section 808.01 requires fugitive emission controls as follows: No person shall cause, allow or permit a plant to operate that is not equipped with an efficient fugitive dust control system. The system shall be operated and maintained in such a manner as to satisfactorily control the emission of particulate material from any point other than the stack outlet.

Section 808.02 requires plant property dust controls as follows: The owner or operator of the plant shall maintain fugitive dust control of the plant premises and plant owned, leased or controlled access roads by paving, oil treatment or other suitable measures. Good operating practices, including water spraying or other suitable measures, shall be employed to prevent dust generation and atmospheric entrainment during operations such as stockpiling, screen changing and general maintenance.

Title V Classification (IDAPA 58.01.01.300, 40 CFR Part 70)

IDAPA 58.01.01.301 Requirement to Obtain Tier I Operating Permit

Post project facility-wide emissions from this facility do not have a potential to emit greater than 100 tons per year of a regulated air pollutant or 10 tons per year for any one HAP or 25 tons per year for all HAP combined. Therefore, the facility is not a Tier I source in accordance with IDAPA 58.01.01.006 and the requirements of IDAPA 58.01.01.301 do not apply.

PSD Classification (40 CFR 52.21)

40 CFR 52.21 — Prevention of Significant Deterioration of Air Quality

The facility is not a major stationary source as defined in 40 CFR 52.21(b)(1). Therefore in accordance with 40 CFR 52.21(a)(2), PSD requirements are not applicable to this permitting action. The facility is not a designated facility as defined in 40 CFR 52.21(b)(1)(i)(a), and does not have facility-wide emissions of any regulated air pollutant that exceed 250 T/yr.

NSPS Applicability (40 CFR 60)

Because the facility produces asphalt and has two compression ignition IC engines the following NSPS Subparts are applicable:

- 40 CFR 60, Subpart I - National Standards of Performance for Hot Mix Asphalt Plants
- 40 CFR 60, Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Those sections that are applicable are highlighted.

40 CFR 60, Subpart I — National Standards of Performance for Hot Mix Asphalt Plants

This permitting action is for a new asphalt plant. Therefore, the requirements of this subpart may apply.

§ 60.90 — Applicability and designation of affected facility

In accordance with §60.90(a), each hot mix asphalt facility is an affected facility. In accordance with §60.90(b), any hot mix asphalt facility that commences construction or modification after June 11, 1973 is subject to the requirements of Subpart I.

The affected facility includes: the dryer; systems for screening, handling, storing, and weighing hot aggregate; systems for loading, transferring, and storing mineral filler; systems for mixing hot mix asphalt; and the loading, transfer, and storage systems associated with emission control systems.

§ 60.91 — Definitions

This section contains the definitions of this subpart.

§ 60.92 — Standard for particulate matter

In accordance with §60.92, no owner or operator shall discharge or cause the discharge into the atmosphere from any affected facility any gases which contain particulate matter in excess of 0.04 gr/dscf or exhibit 20% opacity or greater.

§ 60.93 — Test methods and procedures

In accordance with §60.93(a), performance tests shall use as reference methods and procedures the test methods in Appendix A of 40 CFR 60.

Per the information submitted by the Applicant (see the application, Source Emission Evaluation Report Knife River, Inc., July 14, 2010.), the initial Subpart I source test has been performed on this asphalt plant. Therefore, no initial Subpart I source test is required of this asphalt plant. This test was reviewed and approved by DEQ staff.

40 CFR 60, Subpart IIII — Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

This permitting action is for a new asphalt plant. Included in the proposed permitted equipment are two diesel-fired IC engines, the Primary IC Engine and the Secondary IC Engine. Therefore, the requirements of this subpart may apply.

§ 60.4200 — Am I subject to this subpart?

(a) The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines (ICE) as specified in paragraphs (a)(1) through (3) of this section. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator.

(1) Manufacturers of stationary CI ICE with a displacement of less than 30 liters per cylinder where the model year is:

(i) 2007 or later, for engines that are not fire pump engines,

(ii) The model year listed in table 3 to this subpart or later model year, for fire pump engines.

(2) Owners and operators of stationary CI ICE that commence construction after July 11, 2005 where the stationary CI ICE are:

(i) Manufactured after April 1, 2006 and are not fire pump engines, or

(ii) Manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006.

(3) Owners and operators of stationary CI ICE that modify or reconstruct their stationary CI ICE after July 11, 2005.

(4) The provisions of §60.4208 of this subpart are applicable to all owners and operators of stationary CI ICE that commence construction after July 11, 2005.

(b) The provisions of this subpart are not applicable to stationary CI ICE being tested at a stationary CI ICE test cell/stand.

(c) If you are an owner or operator of an area source subject to this subpart, you are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided you are not required to obtain a permit under 40 CFR 70.3(a) or 40 CFR 71.3(a) for a reason other than your status as an area source under this subpart. Notwithstanding the previous sentence, you must continue to comply with the provisions of this subpart applicable to area sources.

(d) Stationary CI ICE may be eligible for exemption from the requirements of this subpart as described in 40 CFR part 1068, subpart C (or the exemptions described in 40 CFR part 89, subpart J and 40 CFR part 94, subpart J, for engines that would need to be certified to standards in those parts), except that owners and operators, as well as manufacturers, may be eligible to request an exemption for national security.

(e) Owners and operators of facilities with CI ICE that are acting as temporary replacement units and that are located at a stationary source for less than 1 year and that have been properly certified as meeting the standards that would be applicable to such engine under the appropriate nonroad engine provisions, are not required to meet any other provisions under this subpart with regard to such engines.

This facility includes the installation of two CI stationary at a facility that will be constructed after July 11, 2005, that were manufactured after April 1, 2006, and that are not fire pump engines.

§ 60.4201 Emissions Standards for Manufacturers

This Section of the Subpart applies to manufacturers of IC engines. However, the Applicant is not a manufacturer of the IC engines proposed for this project. Therefore, the requirements of this Section of the Subpart are not applicable.

§ 60.4202 What emission standards must I meet for emergency engines if I am a stationary CI internal combustion engine manufacturer?

This Section of the Subpart applies to manufacturers of IC engines. However, as discussed previously, the Applicant is not a manufacturer of the IC engines proposed for this project. Therefore, the requirements of this Section of the Subpart are not applicable.

§ 60.4203 How long must my engines meet the emission standards if I am a manufacturer of stationary CI internal combustion engines?

Engines manufactured by stationary CI internal combustion engine manufacturers must meet the emission standards as required in §§60.4201 and 60.4202 during the certified emissions life of the engines.

This Section of the Subpart applies to manufacturers of IC engines. However, as discussed previously, the Applicant is not a manufacturer of the IC engines proposed for this project. Therefore, the requirements of this Section of the Subpart are not applicable.

§ 60.4204 What emission standards must I meet for non-emergency engines if I am an owner or operator of a stationary CI internal combustion engine?

(a) Owners and operators of pre-2007 model year non-emergency stationary CI ICE with a displacement of less than 10 liters per cylinder must comply with the emission standards in table 1 to this subpart. Owners and operators of pre-2007 model year non-emergency stationary CI ICE with a displacement of greater than or equal to 10 liters per cylinder and less than 30 liters per cylinder must comply with the emission standards in 40 CFR 94.8(a)(1).

(b) Owners and operators of 2007 model year and later non-emergency stationary CI ICE with a displacement of less than 30 liters per cylinder must comply with the emission standards for new CI engines in §60.4201 for their 2007 model year and later stationary CI ICE, as applicable.

The Subpart requires that the Permittee comply with Table 1 of IIII if the engine is pre-2007 and has a displacement of less than 10 liters/cylinder. By installing Tier certified 2007 or later model year IC engines, as proposed by the Applicant, the emissions requirements of this Section of the Subpart have been met.

§ 60.4205 What emission standards must I meet for emergency engines if I am an owner or operator of a stationary CI internal combustion engine?

Emergency stationary CI internal combustion engines must meet the emission standards as required in §§60.4205.

This Section of the Subpart applies to emergency IC engines. However, this application if for full-time IC engines, not emergency IC engines. Therefore, the requirements of this Section of the Subpart are not applicable.

§ 60.4206 How long must my engines meet the emission standards if I am an owner or operator of a stationary CI internal combustion engine?

Owners and operators of stationary CI ICE must operate and maintain stationary CI ICE that achieve the emission standards as required in §§60.4204 and 60.4205 over the entire life of the engine.

§ 60.4207 What fuel requirements must I meet if I am an owner or operator of a stationary CI internal combustion engine subject to this subpart?

(a) Beginning October 1, 2007, owners and operators of stationary CI ICE subject to this subpart that use diesel fuel must use diesel fuel that meets the requirements of 40 CFR 80.510(a).

(b) Beginning October 1, 2010, owners and operators of stationary CI ICE subject to this subpart with a displacement of less than 30 liters per cylinder that use diesel fuel must purchase diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel.

(c) [Reserved]

(d) Beginning June 1, 2012, owners and operators of stationary CI ICE subject to this subpart with a displacement of greater than or equal to 30 liters per cylinder are no longer subject to the requirements of paragraph (a) of this section, and must use fuel that meets a maximum per-gallon sulfur content of 1,000 parts per million (ppm).

(e) Stationary CI ICE that have a national security exemption under §60.4200(d) are also exempt from the fuel requirements in this section.

The Applicant has stated that they will fuel the IC engines with diesel fuel with a maximum sulfur content of 15 ppm or 0.0015% by weight which meets the requirements of this Section of the Subpart.

§ 60.4208 What is the deadline for importing or installing stationary CI ICE produced in previous model years?

(a) After December 31, 2008, owners and operators may not install stationary CI ICE (excluding fire pump engines) that do not meet the applicable requirements for 2007 model year engines.

(b) After December 31, 2009, owners and operators may not install stationary CI ICE with a maximum engine power of less than 19 KW (25 HP) (excluding fire pump engines) that do not meet the applicable requirements for 2008 model year engines.

(c) After December 31, 2014, owners and operators may not install non-emergency stationary CI ICE with a maximum engine power of greater than or equal to 19 KW (25 HP) and less than 56 KW (75 HP) that do not meet the applicable requirements for 2013 model year non-emergency engines.

(d) After December 31, 2013, owners and operators may not install non-emergency stationary CI ICE with a maximum engine power of greater than or equal to 56 KW (75 HP) and less than 130 KW (175 HP) that do not meet the applicable requirements for 2012 model year non-emergency engines.

(e) After December 31, 2012, owners and operators may not install non-emergency stationary CI ICE with a maximum engine power of greater than or equal to 130 KW (175 HP), including those above 560 KW (750 HP), that do not meet the applicable requirements for 2011 model year non-emergency engines.

(f) After December 31, 2016, owners and operators may not install non-emergency stationary CI ICE with a maximum engine power of greater than or equal to 560 KW (750 HP) that do not meet the applicable requirements for 2015 model year non-emergency engines.

(g) After December 31, 2018, owners and operators may not install non-emergency stationary CI ICE with a maximum engine power greater than or equal to 600 KW (804 HP) and less than 2,000 KW (2,680 HP) and a displacement of greater than or equal to 10 liters per cylinder and less than 30 liters per cylinder that do not meet the applicable requirements for 2017 model year non-emergency engines.

(h) In addition to the requirements specified in §§60.4201, 60.4202, 60.4204, and 60.4205, it is prohibited to import stationary CI ICE with a displacement of less than 30 liters per cylinder that do not meet the applicable requirements specified in paragraphs (a) through (g) of this section after the dates specified in paragraphs (a) through (g) of this section.

(i) The requirements of this section do not apply to owners or operators of stationary CI ICE that have been modified, reconstructed, and do not apply to engines that were removed from one existing location and reinstalled at a new location.

For the Primary IC Engine the Applicant has proposed to install a 2013 model Tier certified 2 engine that meets the applicable requirements of this Section of the Subpart for that model year IC engine. In addition, for the Secondary IC Engine the Applicant has proposed to install a 2013 model Tier certified 3 engine that meets the applicable requirements of this Section of the Subpart for that model year IC engine.

§ 60.4209 What are the monitoring requirements if I am an owner or operator of a stationary CI internal combustion engine?

If you are an owner or operator, you must meet the monitoring requirements of this section. In addition, you must also meet the monitoring requirements specified in §60.4211.

(a) If you are an owner or operator of an emergency stationary CI internal combustion engine that does not meet the standards applicable to non-emergency engines, you must install a non-resettable hour meter prior to startup of the engine.

(b) If you are an owner or operator of a stationary CI internal combustion engine equipped with a diesel particulate filter to comply with the emission standards in §60.4204, the diesel particulate filter must be installed with a backpressure monitor that notifies the owner or operator when the high backpressure limit of the engine is approached.

The Applicant has not proposed an emergency IC engine. Therefore, the hour meter is not required. In addition, the Applicant has not proposed to install an IC engine with a diesel particulate filter. Therefore, the back pressure monitor is not required.

§ 60.4210 What are my compliance requirements if I am a stationary CI internal combustion engine manufacturer?

This Section of the Subpart applies to manufacturers of IC engines. However, as discussed previously, the Applicant is not a manufacturer of the IC engines proposed for this project. Therefore, the requirements of this Section of the Subpart are not applicable.

§ 60.4211 What are my compliance requirements if I am an owner or operator of a stationary CI internal combustion engine?

(a) If you are an owner or operator and must comply with the emission standards specified in this subpart, you must do all of the following, except as permitted under paragraph (g) of this section:

(1) Operate and maintain the stationary CI internal combustion engine and control device according to the manufacturer's emission-related written instructions;

(2) Change only those emission-related settings that are permitted by the manufacturer; and

(3) Meet the requirements of 40 CFR parts 89, 94 and/or 1068, as they apply to you.

(b) If you are an owner or operator of a pre-2007 model year stationary CI internal combustion engine and must comply with the emission standards specified in §§60.4204(a) or 60.4205(a), or if you are an owner or operator of a CI fire pump engine that is manufactured prior to the model years in table 3 to this subpart and must comply with the emission standards specified in §60.4205(c), you must demonstrate compliance according to one of the methods specified in paragraphs (b)(1) through (5) of this section.

(1) Purchasing an engine certified according to 40 CFR part 89 or 40 CFR part 94, as applicable, for the same model year and maximum engine power. The engine must be installed and configured according to the manufacturer's specifications.

(2) Keeping records of performance test results for each pollutant for a test conducted on a similar engine. The test must have been conducted using the same methods specified in this subpart and these methods must have been followed correctly.

(3) Keeping records of engine manufacturer data indicating compliance with the standards.

(4) Keeping records of control device vendor data indicating compliance with the standards.

(5) Conducting an initial performance test to demonstrate compliance with the emission standards according to the requirements specified in §60.4212, as applicable.

(c) If you are an owner or operator of a 2007 model year and later stationary CI internal combustion engine and must comply with the emission standards specified in §60.4204(b) or §60.4205(b), or if you are an owner or operator of a CI fire pump engine that is manufactured during or after the model year that applies to your fire pump engine power rating in table 3 to this subpart and must comply with the emission standards specified in §60.4205(c), you must comply by purchasing an engine certified to the emission standards in §60.4204(b), or §60.4205(b) or (c), as applicable, for the same model year and maximum (or in the case of fire pumps, NFPA nameplate) engine power. The engine must be installed and configured according to the manufacturer's emission-related specifications, except as permitted in paragraph (g) of this section.

(d) If you are an owner or operator and must comply with the emission standards specified in §60.4204(c) or §60.4205(d), you must demonstrate compliance according to the requirements specified in paragraphs (d)(1) through (3) of this section.

(1) Conducting an initial performance test to demonstrate initial compliance with the emission standards as specified in §60.4213.

(2) Establishing operating parameters to be monitored continuously to ensure the stationary internal combustion engine continues to meet the emission standards. The owner or operator must petition the Administrator for approval of operating parameters to be monitored continuously. The petition must include the information described in paragraphs (d)(2)(i) through (v) of this section.

(i) Identification of the specific parameters you propose to monitor continuously;

(ii) A discussion of the relationship between these parameters and NO_X and PM emissions, identifying how the emissions of these pollutants change with changes in these parameters, and how limitations on these parameters will serve to limit NO_X and PM emissions;

(iii) A discussion of how you will establish the upper and/or lower values for these parameters which will establish the limits on these parameters in the operating limitations;

(iv) A discussion identifying the methods and the instruments you will use to monitor these parameters, as well as the relative accuracy and precision of these methods and instruments; and

(v) A discussion identifying the frequency and methods for recalibrating the instruments you will use for monitoring these parameters.

(3) For non-emergency engines with a displacement of greater than or equal to 30 liters per cylinder, conducting annual performance tests to demonstrate continuous compliance with the emission standards as specified in §60.4213.

(e) If you are an owner or operator of a modified or reconstructed stationary CI internal combustion engine and must comply with the emission standards specified in §60.4204(e) or §60.4205(f), you must demonstrate compliance according to one of the methods specified in paragraphs (e)(1) or (2) of this section.

(1) Purchasing, or otherwise owning or operating, an engine certified to the emission standards in §60.4204(e) or §60.4205(f), as applicable.

(2) Conducting a performance test to demonstrate initial compliance with the emission standards according to the requirements specified in §60.4212 or §60.4213, as appropriate. The test must be conducted within 60 days after the engine commences operation after the modification or reconstruction.

(f) Emergency stationary ICE may be operated for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by Federal, State or local government, the manufacturer, the vendor, or the insurance company associated with the engine. Maintenance checks and readiness testing of such units is limited to 100 hours per year. There is no time limit on the use of emergency stationary ICE in emergency situations. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency ICE beyond 100 hours per year. Emergency stationary ICE may operate up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply non-emergency power as part of a financial arrangement with another entity. For owners and operators of emergency engines, any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as permitted in this section, is prohibited.

(g) If you do not install, configure, operate, and maintain your engine and control device according to the manufacturer's emission-related written instructions, or you change emission-related settings in a way that is not permitted by the manufacturer, you must demonstrate compliance as follows:

(1) If you are an owner or operator of a stationary CI internal combustion engine with maximum engine power less than 100 HP, you must keep a maintenance plan and records of conducted maintenance to demonstrate compliance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, if you do not install and configure the engine and control device according to the manufacturer's emission-related written instructions, or you change the emission-related settings in a way that is not permitted by the manufacturer, you must conduct an initial performance test to demonstrate compliance with the applicable emission standards within 1 year of such action.

(2) If you are an owner or operator of a stationary CI internal combustion engine greater than or equal to 100 HP and less than or equal to 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test to demonstrate compliance with the applicable emission standards within 1 year of startup, or within 1 year after an engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after you change emission-related settings in a way that is not permitted by the manufacturer.

(3) If you are an owner or operator of a stationary CI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test to demonstrate compliance with the applicable emission standards within 1 year of startup, or within 1 year after an engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after you change emission-related settings in a way that is not permitted by the manufacturer. You must conduct subsequent performance testing every 8,760 hours of engine operation or 3 years, whichever comes first, thereafter to demonstrate compliance with the applicable emission standards.

By installing Tier certified 2007 or later model year IC engines, as proposed by the Applicant, the emissions requirements of this Section of the Subpart have been met.

§ 60.4212 What test methods and other procedures must I use if I am an owner or operator of a stationary CI internal combustion engine with a displacement of less than 30 liters per cylinder?

Owners and operators of stationary CI ICE with a displacement of less than 30 liters per cylinder who conduct performance tests pursuant to this subpart must do so according to paragraphs (a) through (e) of this section.

However, the Applicant is not required to source test the IC engines proposed for this project because they are Tier certified. Therefore, the requirements of this Section of the Subpart are not applicable.

§ 60.4213 What test methods and other procedures must I use if I am an owner or operator of a stationary CI internal combustion engine with a displacement of greater than or equal to 30 liters per cylinder?

Owners and operators of stationary CI ICE with a displacement of greater than or equal to 30 liters per cylinder must conduct performance tests according to paragraphs (a) through (f) of this section.

However, as discussed previously the Applicant is not required to source test the IC engines proposed for this project because they are Tier certified. Therefore, the requirements of this Section of the Subpart are not applicable.

§ 60.4214 What are my notification, reporting, and recordkeeping requirements if I am an owner or operator of a stationary CI internal combustion engine?

(a) Owners and operators of non-emergency stationary CI ICE that are greater than 2,237 KW (3,000 HP), or have a displacement of greater than or equal to 10 liters per cylinder, or are pre-2007 model year engines that are greater than 130 KW (175 HP) and not certified, must meet the requirements of paragraphs (a)(1) and (2) of this section.

(1) Submit an initial notification as required in §60.7(a)(1). The notification must include the information in paragraphs (a)(1)(i) through (v) of this section.

(i) Name and address of the owner or operator;

(ii) The address of the affected source;

(iii) Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement;

(iv) Emission control equipment; and

(v) Fuel used.

(2) Keep records of the information in paragraphs (a)(2)(i) through (iv) of this section.

(i) All notifications submitted to comply with this subpart and all documentation supporting any notification.

(ii) Maintenance conducted on the engine.

(iii) If the stationary CI internal combustion is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards.

(iv) If the stationary CI internal combustion is not a certified engine, documentation that the engine meets the emission standards.

(b) If the stationary CI internal combustion engine is an emergency stationary internal combustion engine, the owner or operator is not required to submit an initial notification. Starting with the model years in table 5 to this subpart, if the emergency engine does not meet the standards applicable to non-emergency engines in the applicable model year, the owner or operator must keep records of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. The owner must record the time of operation of the engine and the reason the engine was in operation during that time.

(c) If the stationary CI internal combustion engine is equipped with a diesel particulate filter, the owner or operator must keep records of any corrective action taken after the backpressure monitor has notified the owner or operator that the high backpressure limit of the engine is approached

The IC engines proposed to be installed by the Applicant are Tier certified 2007 or later model year IC engines. Therefore, the requirements of this Section of the Subpart are not applicable.

§ 60.4218 What parts of the General Provisions apply to me?

Table 8 to this subpart shows which parts of the General Provisions in §§60.1 through 60.19 apply to you.

NESHAP Applicability (40 CFR 61)

The facility is not subject to any NESHAP requirements in 40 CFR 61.

MACT Applicability (40 CFR 63)

Because the facility has two compression ignition IC engines the following NESHAP Subpart may be applicable:

- 40 CFR 63, Subpart ZZZZ - National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

However, as discussed previously in the NSPS Applicability (40 CFR 60) section, 40 CFR 60 subpart IIII applies to the two proposed Tier certified IC engines. Therefore, the source must comply with the requirements of 40 CFR 63subpart ZZZZ by complying with 40 CFR Part 60 subpart IIII. See 40 CFR Part 63 subpart ZZZZ §63.6590(c).

Permit Conditions Review

This section describes the permit conditions for this initial permit or only those permit conditions that have been added, revised, modified or deleted as a result of this permitting action.

Permit Condition 1.1 establishes the permit to construct scope.

Permit Condition Table 1.1, provides a description of the regulated sources and the control devices used at the facility.

Facility-Wide Conditions

Permit condition 1.2 establishes that the permittee shall take all reasonable precautions to prevent fugitive particulate matter (PM) from becoming airborne and provides examples of the controls in accordance with IDAPA 58.01.01.650-651.

Permit Condition 1.3 establishes that the asphalt plant shall employ efficient fugitive dust controls and provides examples of the controls in accordance with IDAPA 58.01.01.808.01 and 808.02.

Permit Condition 1.4 establishes that:

> This asphalt plant shall not locate within 1,000 feet (± 6 feet) any other asphalt plant or a concrete batch plan.
>
> This asphalt plant shall not locate within1, 000 feet (± 6 feet) of a rock crushing plant when producing asphalt at maximum permitted daily capacity.
>
> The asphalt plant may locate within 1,000 feet (± 6 feet) of a single rock crushing plant provided the daily production is half the maximum permitted daily capacity.

Permit Condition 1.6 establishes a restriction on locating the portable asphalt plant to non-attainment areas. The location restrictions are based upon parameters used during the ambient air quality modeling analysis performed for this project.

Permit Condition 1.7 establishes that there are to be no emissions of odorous gases, liquids, or solids from the permit equipment into the atmosphere in such quantities that cause air pollution.

Permit Condition 1.8 establishes that the permittee shall monitor fugitive dust emissions on a daily basis to demonstrate compliance with the facility-wide permit requirements.

Permit Condition 1.9 establishes that the permittee record the date and location of the HMA plant each time it is relocated to demonstrate compliance with the Relocation Restriction permit condition.

Permit Condition 1.10 establishes that the permittee monitor and record odor complaints to demonstrate compliance with the facility-wide permit requirements.

Permit Condition 1.11 establishes that the permittee shall maintain records as required by the Recordkeeping General Provision.

Permit Condition 1.12 establishes that the permittee measure and record the distances to equipment that will be collocated with the asphalt plant to demonstrate compliance with the Collocation Restrictions permit condition.

Asphalt Production Equipment

Permit Condition 2.1 provides a process description of the asphalt production process at this facility.

Permit Condition 2.2 provides a description of the control devices used on the asphalt production equipment at this facility.

Permit Condition 2.3 establishes hourly and annual emissions limits for $PM_{2.5}$, SO_2, NO_X, CO, and VOC emissions from the asphalt production operation at this facility.

Permit Condition 2.4 incorporates the particulate matter and opacity standards of 40 CFR 60, Subpart I – Standards of Performance for Hot Mix Asphalt Plants.

Permit Condition 2.5 establishes a 20% opacity limit for the asphalt drum mixer baghouse stack, the asphaltic oil tank heater stack, the load-out station stack(s), and the silo filling slat conveyor stacks or functionally equivalent openings associated with the asphalt production operation.

Permit Condition 2.6 establishes an hourly, a daily, and an annual asphalt production limit for the asphalt production operation as proposed by the Applicant.

Permit Condition 2.7 establishes limits for the raw materials used in the asphalt production operation as proposed by the Applicant.

Permit Condition 2.8 establishes setback distance restrictions for the asphalt production operation when the IC engines are operating and not operating. The setback distance restrictions are based upon the results of the Ambient Air Quality Modeling Analysis performed for this project.

Permit Condition 2.9 establishes that a baghouse be used to control emissions from the asphalt drum mixer as proposed by the Applicant.

Permit Condition 2.10 establishes that the HMA plant will not be operated December 1st through March 31st of the following year. This requirement was requested by the Applicant because this is how the plant will normally be operated and because it allowed the set-back distances, required through the Ambient Air Quality Analysis, to be less than what would be required if year-round operation was requested.

Permit Condition 2.11 requires the asphalt silo and asphalt filing operating shall be enclosed and emissions routed to the combustion zone of the drum as proposed by the Applicant

Permit Condition 2.12 establishes fuel use restrictions for combustion in the asphalt drum mixer. These fuel use restrictions were based on the fuels proposed by the Applicant to be combusted in the asphalt drum mixer.

Permit Condition 2.13 establishes fuel use restrictions for combustion in the asphaltic oil tank heater. These fuel use restrictions were based on the fuels proposed by the Applicant to be combusted in the asphaltic oil tank heater.

Permit Condition 2.14 establishes $PM_{2.5}$ performance testing requirements required by DEQ on asphalt plants located in the state of Idaho.

Permit Condition 2.15 establishes $PM_{2.5}$ performance testing methods and procedures required by DEQ on asphalt plants located in the state of Idaho.

Permit Condition 2.16 establishes that the permittee monitor asphalt production, visible emissions, RAP percentage usage, and the fuel combusted in the asphalt drum mixer during the performance tests to establish the validity of the performance tests.

Permit Condition 2.17 establishes that the Permittee monitor and record hourly and daily asphalt production to demonstrate compliance with the Asphalt Production Limits permit condition.

Permit Condition 2.18 establishes that the Permittee calculate and record RAP use to demonstrate compliance with the Allowable Raw Materials permit condition.

Permit Condition 2.19 establishes that the Permittee measure and record asphalt production equipment setback distances to demonstrate compliance with operating permit requirements.

Permit Condition 2.20 establishes that the Permittee shall establish procedures for operating the baghouse. This is a DEQ imposed standard requirement for operations using baghouses to control particulate emissions.

Permit Condition 2.21 establishes that the permittee monitor distillate fuel oil shipments to demonstrate compliance with operating permit requirements.

Permit Condition 2.22 establishes that the permittee shall record daily operation of the HMA plant to demonstrate compliance with the Seasonal Operation permit requirement.

Permit Condition 2.23 establishes that the permittee shall maintain records as required by the Recordkeeping General Provision.

Permit Condition 2.24 establishes that the permittee shall submit the results of the performance tests to the appropriate DEQ office.

Permit Condition 2.25 establishes that the federal requirements of 40 CFR Part 60, Subpart I – Standards of Performance for Hot Mix Asphalt Plants, are incorporated by reference into the requirements of this permit per current DEQ guidance.

Permit Condition 2.26 incorporates 40 CFR 60, Subpart A – General Provisions.

Internal Combustion Engines

Permit Condition 3.1 provides a process description of the IC engines process at this facility.

Permit condition 3.2 provides a description of the control devices used on the IC engines at this facility.

Permit Condition 3.3 establishes hourly and annual emissions limits for $PM_{10}/PM_{2.5}$, SO_2, NO_X, CO, and VOC emissions from the IC engines at this facility.

Permit Condition 3.4 establishes a 20% opacity limit for the Primary IC Engine and the Secondary IC Engine exhaust stacks or functionally equivalent openings associated with the asphalt production operation.

Permit Condition 3.5 establishes that the Primary IC engine shall be EPA Tier certified to the certification proposed by the Applicant.

Permit Condition 3.6 establishes that the Secondary IC engine shall be EPA Tier certified to the certification proposed by the Applicant.

Permit Condition 3.7 establishes a daily and an annual operation limit for the Primary IC Engine as proposed by the Applicant.

Permit Condition 3.8 establishes a daily and an annual operation limit for the Secondary IC Engine as proposed by the Applicant.

Permit Condition 3.9 establishes fuel use restrictions for combustion in the Primary IC Engine and the Secondary IC Engine. These fuel use restrictions were based on the fuel proposed by the Applicant to be combusted in the Primary IC Engine and the Secondary IC Engine.

Permit Condition 3.10 establishes operation and maintenance requirements for the Primary and Secondary IC engines as required by 40 CFR 60, Subpart IIII for Stationary Compression Ignition Internal Combustion Engines.

Permit Condition 3.11 establishes where the notifications for the Primary and Secondary IC engines as required by 40 CFR 60, Subpart IIII for Stationary Compression Ignition Internal Combustion Engines should be sent.

Permit Condition 3.12 establishes that the federal requirements of 40 CFR Part 60, Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines are incorporated by reference into the requirements of this permit per current DEQ guidance.

Permit Condition 3.13 incorporates 40 CFR 60, Subpart A – General Provisions as required by 40 CFR Part 60, Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.

Permit Condition 3.14 establishes that the permittee monitor and record daily operation of the Primary IC Engine to demonstrate compliance with the Primary IC Engine Operating Limits permit condition.

Permit Condition 3.15 establishes that the permittee monitor and record daily operation of the Secondary IC Engine to demonstrate compliance with the Secondary IC Engine Operating Limits permit condition.

Permit Condition 3.16 establishes that the permittee monitor distillate fuel oil shipments to demonstrate compliance with the distillate fuel oil requirements of the permit.

Permit Condition 3.17 establishes that the permittee shall maintain records as required by the Recordkeeping General Provision.

PUBLIC REVIEW

Public Comment Opportunity

An opportunity for public comment period on the application was provided in accordance with IDAPA 58.01.01.209.01.c or IDAPA 58.01.01.404.01.c. During this time, there were no comments on the application and there was a request for a public comment period on DEQ's proposed action. Refer to the chronology for public comment opportunity dates.

Public Comment Period

A public comment period was made available to the public in accordance with IDAPA 58.01.01.209.01.c between June 20, 2014 and July 21, 2014. No comments were received during the comment period.

APPENDIX A – EMISSIONS INVENTORIES

Hot Mix Asphalt EI Spreadsheet

Idaho Department of Environmental Quality, Air Quality Division, Boise, Idaho **Version 02/27/201**

Information shown in bold blue on any worksheet indicates user input for that cell. Black or blue text (normal or bold) is calculated or hard-wired – do not type over formulas in these cells.

These worksheets were developed to expedite processing of PTC permits for Hot Mix Asphalt (HMA) facilities that are collocated with only one rock crushing plant and no other sources of emissions within 1,000 feet.

User Input:

Facility Data Input worksheet: Input facility-specific data including contact information, equipment ratings, proposed HMA production levels, and tank heater and generator hours of operation. Select fuel types and generator options as noted below.

Short term source factor for carcinogens is set to "N", i.e., No. Do not change this to Y. Do not delete cells related to this as this will zero out carcinogenic emissions.

Using T-RACT for carcinogens is set to "N", i.e., No. Do not change this to Y. If appropriate, apply T-RACT factor of 10 to the carcinogenic ambient impact results from the modeling analysis.

Asphalt Drum Mixer/Dryer with Fabric Filter (Baghouse), either counterflow or parallel flow, fired by the following fuels:

For distallate fuel oil the default is 0.5% sulfur content by weight. User input is required in "Facility Data Input" for any other sulfur content.
For used Oil/RFO4 the default is 0.5% sulfur content by weight. User input required in "Facility Data Input" for any other sulfur content.
Natural gas
LPG/propane
Note: For Facility Data Input., input "1" (use this fuel) or "0" (don't use this fuel).
Note: The EI summary sheets will use the highest emission for any selected fuel for each pollutant.

Asphaltic Oil Tank Heater, either fired by #2 fuel oil or natural gas

Note: For Facility Data Input., input "1" (use this fuel) or "0" (don't use this fuel).
Note: If line power is **ALWAYS** used to power the Asphaltic oil tank heater, input "0" for each fuel.
For distallate fuel oil the default is 0.5% sulfur content by weight. User input is required in "Facility Data Input" for any other sulfur content.
Note: The EI summary sheets will use the highest emission for any selected fuel for each pollutant.

For IC Engines Powering Electrical Generators (with a maximum of one small, less than 600 bhp, and/or one large IC engine, greater than 600 bhp'

Facility Data Input: Input "1" (include IC engine) or "0" (omit IC engine).
For distallate fuel oil the default is 0.5% sulfur content by weight. User input is required in "Facility Data Input" for any other sulfur content.
Engine Certification: Input whether or not the IC engine is certified, or is certfied to meet EPA Tier 1, Tier 2, Tier 3, or Blue Sky standards.
The EI will use the appropriate EFs for either a large or small diesel-fueled generator. EI summary sheets combine contributions from just one small (< 600 bhp) and/or one large (> 600 bhp) generator.

General Assumptions (see the next tab sheet for specific assumptions for each tab sheet):

This emissions evaluation is based on IDAPA regulatory requirements current as of spreadsheet version date.
EFs are drawn from AP-42 factors available as of spreadsheet version date.
Average brake-specific fuel consumption of 7,000 Btu/hp-hr was assumed to convert from lb/MMBtu to lb/hp-hr.
Average diesel heating value is based on 19,300 Btu/lb with a density of 7.1 lb/gal.
AP-42 EFs for natural gas combustion (Tables 1.4-xx) are based on heat value of 1,020 Btu/scf.
Natural Gas Fuel Heating Value assumed to be 137,030 Btu/gal.
"Reasonable" AP-42 factors are used. Where factors were available in more than one AP-42 section, the estimates are based on the highest of the available factors. For example, AP-42 11.1 EFs for a tank heater burning #2 oil include no information for emissions of PM, NOx, SOx, VOCs, or lead, which is not reasonable. Criteria pollutant EFs from AP-42 1.3, Fuel Oil Combustion, are used instead, and are considered reasonable.
Fugitive Emissions: Fugitive PM emissions from storage piles are typically caused by front-end loader operations that transport the aggregate to the cold feed unit hoppers. Piles of RAP, because RAP is coated with asphalt cement, are not likely to cause significant fugitive dust problems. Aggregate moisture content prior to entry into the dryer is typically 3 percent to 7 percent. This moisture content, along with aggregate size classification, tend to minimize emissions from these sources, which contribute little to total facility PM emissions. PM10 emissions from these sources are reported to account for about 19 percent of their total PM emissions. *Source: STAPPA-ALAPCO-EPA, Preferred and Alternative Methods for Estimating Air Emissions from Hot-Mix Asphalt Plants, Final Report, July 1996. DEQ* CONCLUSION: Negligible fine PM emissions from RAP. Worst-case fugitive emissions from material handling are for 0% RAP.

Worksheet Tabs: Letter-Number reflect Location and Order in Statement of Basis

Facility Data Input (primary worksheet for user input of facility-specific parameters)
EmissionInventory lb/hr - Drum dryer baghouse, tank heater, generator, silo filling, and load-out
EmissionInventory TPY - Drum dryer baghouse, tank heater, generator, silo filling, and load-out
Values in Emission Inventories reflect the maximum emissions ONLY from fuel types selected.
FACWIDE TAPs ELs. Used for TAPs EL screening. Includes silo/loadout fugitives.
Lb/hr emissions shown are 24-hr averages for noncarcinogens and annual averages for carcinogens.

Modeling - Criteria Pollutants	1-, 3-, 8-, 24-hour, and annual lb/hr emission rates
Modeling - TAPs	24-hour and annual lb/hr emission rates

Worksheets for Emissions based on Source and Fuel Type:

Drum Dryer Used Oil FabricFilter	Drum Dryer, fired on used oil or RF04 oil
Drum Dryer #2 Oil FabricFilter	Drum Dryer, fired on #2 fuel oil
Drum Dryer NG Fabric Filter	Drum Dryer, natural gas fired
Drum Dryer LPG or Propane FabricFilter	Drum Dryer, LPG or propane-fired
Tank Heater #2 Oil AP-42 1.3, 11.1	Asphalt Tank Heater, fired on #2 fuel oil
Tank Heater NG-AP42 11.1	Asphalt Tank Heater, natural gas fired
Tank Heater NG-AP42 1.4	Asphalt Tank Heater, natural gas fired
Silo Fill Operations	Fugitive emissions based on HMA throughput
Load-out Operations	Fugitive emissions based on HMA throughput

Scalping Screen & Transfer Points (Front-end Loader and Conveyors) - **Input # transfer pts, wind speeds & moisture**
IC1 Emission Factors (Selects appropriate EFs for non-certified engines and EPA Tier 1, 2, 3, and Blue Sky engines)

IC ENGINE 1< 600 bhp (< 447kW)	#2 Fuel oil fired

IC2 Emission Factors (Selects appropriate EFs for non-certified engines and EPA Tier 1, 2, 3, and Blue Sky engines)

IC ENGINE 2 > 600 bhp (> 447kW)	#2 Fuel oil fired

DEQ ASSUMPTIONS

DEQ assumptions for the "Drum Dryer UsedOil FabricFilter" Calculations
1. Drum Dryer may be either counter-flow or parallel flow (AP-42 specifies no difference in emissions from either type).
2. SO2 emissions are based on the sulfur content and the Scavenging Factor (varies from 50 to 97%). DEQ used a scavenging factor of 63%. The sulfur content of the three waste oil source tests averaged 0.44 % by weight.

DEQ assumptions for the "Drum Dryer NG FabricFilter" Calculations

DEQ assumptions for the "Drum Dryer #2 Oil FabricFilter" Calculations
1. SO2 emissions are based on the sulfur content and the Scavenging Factor (varies from 50 to 97%). DEQ used a scavenging factor of 63%. The sulfur content of the three waste oil source tests averaged 0.44 % by weight.

DEQ assumptions for the "Drum Dryer LPGProp FabricFilter" Calculations

DEQ assumptions for the "TankHtr #2 Oil-AP42 1.3,11.1" Calculations
1. VOC and TAPs emissions from the asphaltic oil storage tank were determined using Tanks 4.0.9d and the Working and Breathing losses were negligible (less than 1% of total VOC emissions).

DEQ assumptions for the "Tank Heater NG-AP42 11.1" Calculations
1. VOC and TAPs emissions from the asphaltic oil storage tank were determined using Tanks 4.0.9d and the Working and Breathing losses were negligible (less than 1% of total VOC emissions).

DEQ assumptions for the "Tank Heater NG-AP42 1.4" Calculations
1. VOC and TAPs emissions from the asphaltic oil storage tank were determined using Tanks 4.0.9d and the Working and Breathing losses were negligible (less than 1% of total VOC emissions).

DEQ assumptions for the "SiloFill Criteria&TAPs" Calculations
1. All PM10 is assumed to be PM2.5.

CURRENT PTC APPLICATION VALUES

DEQ Verification Worksheets: Hot Mix Asphalt (HMA) Drum Mix Facility Data

Facility ID/AIRS No.	777-00533	Spreadsheet Date	7/22/2014 14:08
Permit No.	P-2014.0004	DEQ Version Date	7/20/2011
Facility Owner/Company Name:	Knife River, Inc		
Address:	5450 West Gowen Road		
City, State, Zip:	Boise, ID 83709		
Facility Contact:	Josh Smith		
Contact Number/ e-mail:	208-407-8918		
		Include Silo Fill Emissions? [1]	N
Use Short Term Source Factor on 586 ELs? Y/N	N	Use T-RACT on 586 AACC? Y/N	N
Hot Mix Plant AP-42 Section 11.1	**Input (Bold Color) or Calculated Value (Black)**	**Fuel Type(s)**	**Fuel Type Toggle ("0" or "1")**
Drum Dryer Make/Model	Gencor - Hauck Burner, SJ750	Distallate (#2) Fuel Oil	0
Rated heat input capacity, MMBtu/hr	150	Used Oil or RFO4 Oil	0
Drum Dryer Hourly HMA Production, Tons/hour	400	Natural Gas	1
Max Production Per day, Tons per day	5,000	LPG or Propane	1
Max Annual HMA Production, Tons/year	325,000	Default #2 fuel oil and used oil sulfur content percentage by weight	0.0015% and 0.5%
Min Hours of operation per year (annual/max hourly production)	813	#2 Fuel Oil Max Sulfur Content	0.0015%
		Used Oil/RFO4 Oil Max Sulfur Content	0.5000%

1) Indicate "N" if emissions are routed to drum burner

Asphaltic Oil Tank Heater AP-42, Section 11.1 (oil or natural gas fuel), or Section 1.4 (natural gas fuel)			
Rated heat input capacity, MMBtu/hr	0.600	**Fuel Type(s)**	**Fuel Toggle**
Hours of operation per day	24	#2 Fuel Oil	0
Operation, days per year (DEQ Assumption)	166.67	Fuel oil sulfur content	0.0015%
Max Hours of operation per year (DEQ Assumption)	4,000	Natural Gas	1

Asphaltic Oil Tank Heater Fuel Consumption Calculations	**#2 Fuel Oil**	**Natural Gas**
Heat Input Rating, MMBtu/hr	0.600	0.600
Fuel Heating Value, Btu/gal (oil) or Btu/scf (gas)	137,030	1,020
Heating Value Correction for Natural Gas EFs, see Note	n/a	1.000
Theoretical Max Fuel Use Rate gal/hr [oil] or scf/hr [gas]	4.38	588
Max Operational Hours per Year	4,000	4,000
Note: AP-42 EFs for natural gas and diesel combustion are based on heat value of 1,020 Btu/scf and 137,030 Btu/gal		

IC Engine EI Conversion Factors			
1 hp = 0.7456999 kW	0.7457	1 lb = (g)	453.59
Avg brake-specific fuel consumption (BSFC) = 7000 Btu/hp-hr	7000	Fuel Heating Value, Btu/gal	137,030
Note: AP-42 Tables 3.3-x,3.4-x: avg. diesel heating value is based on 19,300 Btu/lb with density equal 7.1 lb/gal=> Btu/gal =			137,030

NOTE: THE HMA EI SUMMARY WORKSHEETS ONLY ALLOWS ONE SMALL AND/OR ONE LARGE IC ENGINE.

IC Engine 1 < 600 bhp (447 kW) AP-42 Section 3.3 (diesel fueled)			
IC Engine Make/Model	IVECO/N67	**Fuel Type(s)**	**IC Engine Toggle**
IC Engine Max Rated Power (bhp)	268	#2 Fuel Oil (Diesel)	1
IC Engine Max Rated Capacity (kW)	200	Max Sulfur weight percentage	0.0015%
		Max Operational Hours/Day	13
IC Engine 1 EPA Certification:	3	Max Operational Hours/Year	2,322
Not EPA-certified: Enter "0" (zero)		Calculated Max Fuel Use Rate, gal/hr	13.69
Certified Tier I, Tier 2, or Tier 3: Enter 1, 2, or 3		Calculated MMBtu/hr	1.88
Certified "BLUE SKY" engine: Enter 4			

IC Engine 2 > 600 bhp (447 kW) AP-42 Section 3.4 (diesel fueled)			
IC Engine Make/Model	CAT/ C32	**Fuel Type(s)**	**IC Engine Toggle**
IC Engine Rated Capacity (bhp)	1,340	#2 Fuel Oil (Diesel)	1
IC Engine Max Rated Capacity (kW)	999	Max Sulfur weight percentage	0.0015%
		Max Operational Hours per Day	13
IC Engine 2 EPA Certification:	2	Max Operational Hours per Year	1,161
Not EPA-certified: Enter "0" (zero)		Calculated Max Fuel Use Rate, gal/hr	68.45
Certified Tier I, Tier 2, or Tier 3: Enter 1, 2, or 3		Calculated MMBtu/hr	9.38
Certified "BLUE SKY" engine: Enter 5			

Aggregate Handling - Fugitive Emissions		
U = mean wind speed (miles per hour)	10	
Moisture/Control % Considerations:		
AP-42 Table 11.19.2-2, Note b. Moisture content of uncontrolled sources ranged from 0.21 to 1.3%		
AP-42 Table 11.19.2-2, Note b. Moisture content of controlled (water spray) sources ranged from 0.55 to 2.88% -->		
		--> ~91.3% control for screening, ~95% control for conveyo
M = moisture content (%)	3	Bulk aggregate for HMAstypically stabilizes at 3 to 5% by weight.
If higher moisture is maintained, apply additional % control:	90.00%	M=5% add 15% control. 90% control
Number of front-end loader drop points (aggregate and RAP) (DEQ Assumption)	2	Drops to storage pile(s) and drop(s) to bins
Aggregate weigh conveyor transfer points (DEQ Assumption)	2	Transfer from bins to conveyor & from conveyor to scalping screen
Number of scalping screens (DEQ Assumption)	1	Includes all aggregate and RAP tonnage.
Aggregate conveyor transfer to drum (DEQ Assumption)	1	Includes all aggregate and RAP tonnage.

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

Used Oil Fired Drum Mix Asphalt Plant With Fabric Filter AP-42 Section 11.1

Fuel Type Toggle = 0
Max Hourly Production 400 T/hr
Max Daily Production 5,000 Tons/day
Max Annual Production 325,000 Tons/yr

User Input Weight % Sulfur = 0.5000%
AP-42 EF of 0.058 lb SO2/ton presumed based on #2 oil, max 0.5% sulfur content
SO2 emissions are multiplied by a factor: User Input Value/0.5% = 1.00

Pollutant	Emission Factor[a] (lb/ton)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PM (total) [b]	0.033	0.00	0.00	
PM-10 (total) [b]	0.023	0.00	0.00	
PM-2.5 [b1]	0.0223	0.00	0.00	
CO [c]	0.13	0.00	0.00	
NOx [c]	0.055	0.00	0.00	
SO_2 [c]	0.089	0.00	0.00	
VOC [d]	0.032	0.00	0.00	
Lead	1.50E-05	0.00E+00	0.00E+00	
HCl [d,e]	0.00021	0	0.00E+00	
Dioxins[e,f]				
2,3,7,8-TCDD	2.10E-13	0.00E+00	0.00E+00	**0.00E+00**
Total TCDD	9.30E-13	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,7,8-PeCDD	3.10E-13	0.00E+00	0.00E+00	**0.00E+00**
Total PeCDD	2.20E-11	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,4,7,8-HxCDD	4.20E-13	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,6,7,8-HxCDD	1.30E-12	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,7,8,9-HxCDD	9.80E-13	0.00E+00	0.00E+00	**0.00E+00**
Total HxCDD	1.20E-11	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,4,6,7,8-Hp-CDD	4.80E-12	0.00E+00	0.00E+00	**0.00E+00**
Total HpCDD	1.90E-11	0.00E+00	0.00E+00	**0.00E+00**
Octa CDD	2.50E-11	0.00E+00	0.00E+00	**0.00E+00**
Total PCDD[h]	7.90E-11	0.00E+00	0.00E+00	**0.00E+00**
Furans[e,f]				
2,3,7,8-TCDF	9.70E-13	0.00E+00	0.00E+00	**0.00E+00**
Total TCDF	3.70E-12	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,7,8-PeCDF	4.30E-12	0.00E+00	0.00E+00	**0.00E+00**
2,3,4,7,8-PeCDF	8.40E-13	0.00E+00	0.00E+00	**0.00E+00**
Total PeCDF	8.40E-11	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,4,7,8-HxCDF	4.00E-12	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,6,7,8-HxCDF	1.20E-12	0.00E+00	0.00E+00	**0.00E+00**
2,3,4,6,7,8-HxCDF	1.90E-12	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,7,8,9-HxCDF	8.40E-12	0.00E+00	0.00E+00	**0.00E+00**
Total HxCDF	1.30E-11	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,4,6,7,8-HpCDF	6.50E-12	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,4,7,8,9-HpCDF	2.70E-12	0.00E+00	0.00E+00	**0.00E+00**
Total HpCDF	1.00E-11	0.00E+00	0.00E+00	**0.00E+00**
Octa CDF	4.80E-12	0.00E+00	0.00E+00	**0.00E+00**
Total PCDF[h]	4.00E-11	0.00E+00	0.00E+00	**0.00E+00**
Total PCDD/PCDF[h]	1.20E-10	0.00E+00	0.00E+00	**0.00E+00**
Non-PAH HAPs[f]				
Acetaldehyde[e]	1.30E-03	0.00E+00	0.00E+00	**0.00E+00**
Acrolein[e]	2.60E-05	0.00E+00	0.00E+00	0.00E+00
Benzene[e]	3.90E-04	0.00E+00	0.00E+00	**0.00E+00**
1,3-Butadiene[e]				
Ethylbenzene[e]	2.40E-04	0.00E+00	0.00E+00	0.00E+00
Formaldehyde[e]	3.10E-03	0.00E+00	0.00E+00	**0.00E+00**
Hexane[e]	9.20E-04	0.00E+00	0.00E+00	0.00E+00
Isooctane	4.00E-05	0.00E+00	0.00E+00	0.00E+00
Methyl Ethyl Ketone[e]	2.00E-05	0.00E+00	0.00E+00	0.00E+00
Pentane[e]				
Propionaldehyde[e]	1.30E-04	0.00E+00	0.00E+00	0.00E+00
Quinone[e]	1.60E-04	0.00E+00	0.00E+00	0.00E+00
Methyl chloroform[e]	4.80E-05	0.00E+00	0.00E+00	0.00E+00
Toluene[e]	2.90E-03	0.00E+00	0.00E+00	0.00E+00
Xylene[e]	2.00E-04	0.00E+00	0.00E+00	0.00E+00
POM (7-PAH Group)		0.00E+00		**0.00E+00**

Pollutant	Emission Factor[a] (lb/ton)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PAH HAPs[f]				
2-Methylnaphthalene	1.70E-04	0.00E+00	0.00E+00	**0.00E+00**
3-Methylchloranthrene[e]				
Acenaphthene	1.40E-06	0.00E+00	0.00E+00	**0.00E+00**
Acenaphthylene	2.20E-05	0.00E+00	0.00E+00	**0.00E+00**
Anthracene	3.10E-06	0.00E+00	0.00E+00	**0.00E+00**
Benzo(a)anthracene	2.10E-07	0.00E+00	0.00E+00	**0.00E+00**
Benzo(a)pyrene[e]	9.80E-09	0.00E+00	0.00E+00	**0.00E+00**
Benzo(b)fluoranthene	1.00E-07	0.00E+00	0.00E+00	**0.00E+00**
Benzo(e)pyrene	1.10E-07	0.00E+00	0.00E+00	**0.00E+00**
Benzo(g,h,i)perylene	4.00E-08	0.00E+00	0.00E+00	**0.00E+00**
Benzo(k)fluoranthene	4.10E-08	0.00E+00	0.00E+00	**0.00E+00**
Chrysene	1.80E-07	0.00E+00	0.00E+00	**0.00E+00**
Dibenzo(a,h)anthracene				
Dichlorobenzene				
Fluoranthene	6.10E-07	0.00E+00	0.00E+00	**0.00E+00**
Fluorene	1.10E-05	0.00E+00	0.00E+00	**0.00E+00**
Indeno(1,2,3-cd)pyrene	7.00E-09	0.00E+00	0.00E+00	**0.00E+00**
Naphthalene[e]	6.50E-04	0.00E+00	0.00E+00	**0.00E+00**
Perylene	8.80E-09	0.00E+00	0.00E+00	**0.00E+00**
Phenanthrene	2.30E-05	0.00E+00	0.00E+00	**0.00E+00**
Pyrene	3.00E-06	0.00E+00	0.00E+00	**0.00E+00**
Non-HAP Organic Compounds[f]				
Acetone[e]	8.30E-04	0.00E+00	0.00E+00	0.00E+00
Benzaldehyde	1.10E-04	0.00E+00	0.00E+00	0.00E+00
Butane	6.70E-04	0.00E+00	0.00E+00	0.00E+00
Butyraldehyde	1.60E-04	0.00E+00	0.00E+00	0.00E+00
Crotonaldehyde[e]	8.60E-05	0.00E+00	0.00E+00	0.00E+00
Ethylene	7.00E-03	0.00E+00	0.00E+00	0.00E+00
Heptane	9.40E-03	0.00E+00	0.00E+00	0.00E+00
Hexanal	1.10E-04	0.00E+00	0.00E+00	0.00E+00
Isovaleraldehyde	3.20E-05	0.00E+00	0.00E+00	0.00E+00
2-Methyl-1-pentene	4.00E-03	0.00E+00	0.00E+00	0.00E+00
2-Methyl-2-butene	5.80E-04	0.00E+00	0.00E+00	0.00E+00
3-Methylpentane	1.90E-04	0.00E+00	0.00E+00	0.00E+00
1-Pentene	2.20E-03	0.00E+00	0.00E+00	0.00E+00
n-Pentane	2.10E-04	0.00E+00	0.00E+00	0.00E+00
Valeraldehyde[e]	6.70E-05	0.00E+00	0.00E+00	0.00E+00
Metals[g]				
Antimony[e]	1.80E-07	0.00E+00	0.00E+00	0.00E+00
Arsenic[e]	5.60E-07	0.00E+00	0.00E+00	**0.00E+00**
Barium[e]	5.80E-06	0.00E+00	0.00E+00	0.00E+00
Beryllium[e]				
Cadmium[e]	4.10E-07	0.00E+00	0.00E+00	**0.00E+00**
Chromium[e]	5.50E-06	0.00E+00	0.00E+00	0.00E+00
Cobalt[e]	2.60E-08	0.00E+00	0.00E+00	0.00E+00
Copper[e]	3.10E-06	0.00E+00	0.00E+00	0.00E+00
Hexavalent Chromium[e]	4.50E-07	0.00E+00	0.00E+00	**0.00E+00**
Manganese[e]	7.70E-06	0.00E+00	0.00E+00	0.00E+00
Mercury[e]	2.60E-06	0.00E+00	0.00E+00	0.00E+00
Molybdenum[e]				
Nickel[e]	6.30E-05	0.00E+00	0.00E+00	**0.00E+00**
Phosphorus[e]	2.80E-05	0.00E+00	0.00E+00	0.00E+00
Silver[e]	4.80E-07	0.00E+00	0.00E+00	0.00E+00
Selenium[e]	3.50E-07	0.00E+00	0.00E+00	0.00E+00
Thallium[e]	4.10E-09	0.00E+00	0.00E+00	0.00E+00
Vanadium[e]				
Zinc[e]	6.10E-05	0.00E+00	0.00E+00	0.00E+00

a) Emission factors are from AP-42 11.1, Hot Mix Asphalt Plants, 3/04
b) AP-42, Table 11.1-3, Particulate Matter Emission Factors for Drum Mix Hot Asphalt Plants, 3/04
b1) AP-42, Table 11.1-4, Summary of Particle Size Distribution for Drum Mix Dryers **(Emission Rating Factor E - "Poor")**
c) AP-42, Table 11.1-7, Emission Factors for CO. CO2, NOx, and SO2 from Drum Mix Hot Asphalt Plants, 3/04
In addition, for SO2 emissions the AP-42 EF of 0.058 lb/ton was adjusted twice. First, to account for the average sulfur content of the fuel used during the source test (0.44% by weight, three tests on waste oil), 0.058 to 0.066. Second, to account for the average scavenging factor of 63% down to 50%, 0.062 to 0.089.
d) AP-42, Table 11.1-8, Emission Factors for TOC, Methane, VOC, and HCl from Drum Mix Hot Asphalt Plants, 3/04
e) IDAPA Toxic Air Pollutant
f) AP-42, Table 11.1-10, Emission Factors for Organic Pollutant Emissions from Drum Mix Hot Asphalt Plants, 3/04
g) AP-42, Table 11.1-12, Emission Factors for Metal Emissions from Drum Mix Hot Mix Asphalt Plants, 3/04
h) Compound is classified as polycyclic organic matter, as defined in the 1990 CAAA. Total PCDD is the sum of the total tetra through octa dioxins; total PCDF is sum of the total tetra through octa furans; and total PCDD/PCDF is the sum of total PCDD and total PCDF.
Pollutants shown in bold/blue text are emitted when using Used Oil but not when using #2 Fuel Oil or Natural Gas.
Pollutants shown in magenta are emitted when using Used Oil or #2 Fuel Oil, but not when using Natural Gas

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.
Pollutants shown in blue text are emitted only when burning Used Oil, but not when burning #2 Fuel Oil or Natural Gas

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/ Facility ID:** P-2014.0004 777-00533

Natural Gas Fired Drum Mix Asphalt Plant With Fabric Filter AP-42 Section 11.1

Fuel Type Toggle =	1	
Max Hourly Production	400	Tons/hr
Max Daily Production	5,000	Tons/day
Max Annual Production	325,000	Tons/yr (Proposed Throughput Limit)

Pollutant	Emission Factor[a] (lb/ton)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PM (total)[b]	0.033	13.20	5.36	
PM-10 (total)[b]	0.023	9.20	3.74	
PM-2.5 [b1]	0.0223	8.92	3.62	
CO [c]	0.13	52.00	21.13	
NOx [c]	0.026	10.40	4.23	
SO_2 [c]	0.0034	1.36	0.55	
VOC [d]	0.032	12.80	5.20	
Lead	6.20E-07	2.48E-04	1.01E-04	
HCl [d,e]	No Data			
Dioxins[e]				
-- No EFs for Natural Gas Fuel --				
Furans[e]				
-- No EFs for Natural Gas Fuel --				
Non-PAH HAPs[f]				
Acetaldehyde[e]				
Acrolein[e]				
Benzene[e]	3.90E-04	1.56E-01	6.34E-02	**1.45E-02**
1,3-Butadiene[e]				
Ethylbenzene[e]	2.40E-04	9.60E-02	3.90E-02	5.00E-02
Formaldehyde[e]	3.10E-03	1.24E+00	5.04E-01	**1.15E-01**
Hexane[e]	9.20E-04	3.68E-01	1.50E-01	1.92E-01
Isooctane	4.00E-05	1.60E-02	6.50E-03	8.33E-03
Methyl Ethyl Ketone[e]				
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]	4.80E-05	1.92E-02	7.80E-03	1.00E-02
Toluene[e]	1.50E-04	6.00E-02	2.44E-02	3.13E-02
Xylene[e]	2.00E-04	8.00E-02	3.25E-02	4.17E-02
POM (7-PAH Group)		4.54E-02		**4.21E-03**

Pollutant	Emission Factor[a] (lb/ton)	Emissions (lb/hr)	Emissions (T/yr)	TAPS Emissions (lb/hr) Annual or 24-hr Average
PAH HAPs[f]				
2-Methylnaphthalene	7.40E-05	2.96E-02	1.20E-02	**2.75E-03**
3-Methylchloranthrene[e]				
Acenaphthene	1.40E-06	5.60E-04	2.28E-04	**5.19E-05**
Acenaphthylene	8.60E-06	3.44E-03	1.40E-03	**3.19E-04**
Anthracene	2.20E-07	8.80E-05	3.56E-05	**8.16E-06**
Benzo(a)anthracene	2.10E-07	8.40E-05	3.41E-05	**7.79E-06**
Benzo(a)pyrene[e]	9.80E-09	3.92E-06	1.59E-06	**3.64E-07**
Benzo(b)fluoranthene	1.00E-07	4.00E-05	1.63E-05	**3.71E-06**
Benzo(e)pyrene	1.10E-07	4.40E-05	1.79E-05	**4.08E-06**
Benzo(g,h,I)perylene	4.00E-08	1.60E-05	6.50E-06	**1.48E-06**
Benzo(k)fluoranthene	4.10E-08	1.64E-05	6.66E-06	**1.52E-06**
Chrysene	1.80E-07	7.20E-05	2.93E-05	**6.68E-06**
Dibenzo(a,h)anthracene				
Dichlorobenzene				
Fluoranthene	6.10E-07	2.44E-04	9.91E-05	**2.26E-05**
Fluorene	3.80E-06	1.52E-03	6.18E-04	**1.41E-04**
Indeno(1,2,3-cd)pyrene	7.00E-09	2.80E-06	1.14E-06	**2.60E-07**
Naphthalene[e]	9.00E-05	3.60E-02	1.46E-02	**3.34E-03**
Perylene	8.80E-09	3.52E-06	1.43E-06	**3.26E-07**
Phenanthrene	7.60E-06	3.04E-03	1.24E-03	**2.82E-04**
Pyrene	5.40E-07	2.16E-04	8.78E-05	**2.00E-05**
Non-HAPs Organic Compounds[f]				
Acetone[e]				
Benzaldehyde				
Butane	6.70E-04	2.68E-01	1.09E-01	1.40E-01
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene	7.00E-03	2.80E+00	1.14E+00	1.46E+00
Heptane	9.40E-03	3.76E+00	1.53E+00	1.96E+00
Hexanal				
Isovaleraldehyde				
2-Methyl-1-pentene	4.00E-03	1.60E+00	6.50E-01	8.33E-01
2-Methyl-2-butene	5.80E-04	2.32E-01	9.43E-02	1.21E-01
3-Methylpentane	1.90E-04	7.60E-02	3.09E-02	3.96E-02
1-Pentene	2.20E-03	8.80E-01	3.58E-01	4.58E-01
n-Pentane	2.10E-04	8.40E-02	3.41E-02	4.38E-02
Valeraldehyde				
Metals[g]				
Antimony[e]	1.80E-07	7.20E-05	2.93E-05	3.75E-05
Arsenic[e]	5.60E-07	2.24E-04	9.10E-05	**2.08E-05**
Barium[e]	5.80E-06	2.32E-03	9.43E-04	1.21E-03
Beryllium[e]				
Cadmium[e]	4.10E-07	1.64E-04	6.66E-05	**1.52E-05**
Chromium[e]	5.50E-06	2.20E-03	8.94E-04	1.15E-03
Cobalt[e]	2.60E-08	1.04E-05	4.23E-06	5.42E-06
Copper[e]	3.10E-06	1.24E-03	5.04E-04	6.46E-04
Hexavalent Chromium[e]	4.50E-07	1.80E-04	7.31E-05	**1.67E-05**
Manganese[e]	7.70E-06	3.08E-03	1.25E-03	1.60E-03
Mercury[e]	2.40E-07	9.60E-05	3.90E-05	5.00E-05
Molybdenum[e]				
Nickel[e]	6.30E-05	2.52E-02	1.02E-02	**2.34E-03**
Phosphorus[e]	2.80E-05	1.12E-02	4.55E-03	5.83E-03
Silver[e]	4.80E-07	1.92E-04	7.80E-05	1.00E-04
Selenium[e]	3.50E-07	1.40E-04	5.69E-05	7.29E-05
Thallium[e]	4.10E-09	1.64E-06	6.66E-07	8.54E-07
Vanadium[e]				
Zinc[e]	6.10E-05	2.44E-02	9.91E-03	1.27E-02

a) Emission factors are from AP-42 11.1, Hot Mix Asphalt Plants, 3/04
b) AP-42, Table 11.1-3, Particulate Matter Emission Factors for Drum Mix Hot Asphalt Plants, 3/04
b1) AP-42, Table 11.1-4, Summary of Particle Size Distribution for Drum Mix Dryers **(Emission Rating Factor E - "Poor")**
c) AP-42, Table 11.1-7, Emission Factors for CO. CO2, NOx, and SO2 from Drum Mix Hot Asphalt Plants, 3/04
d) AP-42, Table 11.1-8, Emission Factors for TOC, Methane, VOC, and HCl from Drum Mix Hot Asphalt Plants, 3/04
e) IDAPA Toxic Air Pollutant
f) AP-42, Table 11.1-10, Emission Factors for Organic Pollutant Emissions from Drum Mix Hot Asphalt Plants, 3/04
g) AP-42, Table 11.1-12, Emission Factors for Metal Emissions from Drum Mix Hot Mix Asphalt Plants, 3/04

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

#2 Fuel Oil Fired Drum Mix Asphalt Plant With Fabric Filter AP-42 Section 11.1

Fuel Type Toggle =	0	
Hourly Production	400	T/hr
Daily Production	5,000	Tons/day
Max Annual Production	325,000	Tons/yr

User Input Weight % Sulfur = 0.0015%
AP-42 EF of 0.058 lb SO2/ton presumed based on #2 oil, max 0.5% sulfur content
SO2 emissions are multiplied by a factor: User Input Value/0.5% = 0.003

Pollutant	Emission Factor[a] (lb/ton)	Emissions (lb/hr) Maximum	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PM (total) [b]	0.033	0.00	0.00	
PM-10 (total) [b]	0.023	0.00	0.00	
PM-2.5 [b1]	0.0223	0.00	0.00	
CO [c]	0.13	0.00	0.00	
NOx [c]	0.055	0.00	0.00	
SO_2 [c]	0.089	0.00	0.00	
VOC [d]	0.032	0.00	0.00	
Lead	1.50E-05	0.00E+00	0.00E+00	
HCl [d,e]	No Data			
Dioxins[e]				
2,3,7,8-TCDD	2.10E-13	0	0.00E+00	0.00E+00
Total TCDD	9.30E-13	0	0.00E+00	0.00E+00
1,2,3,7,8-PeCDD	3.10E-13	0	0.00E+00	0.00E+00
Total PeCDD	2.20E-11	0	0.00E+00	0.00E+00
1,2,3,4,7,8-HxCDD	4.20E-13	0	0.00E+00	0.00E+00
1,2,3,6,7,8-HxCDD	1.30E-12	0	0.00E+00	0.00E+00
1,2,3,7,8,9-HxCDD	9.80E-13	0	0.00E+00	0.00E+00
Total HxCDD	1.20E-11	0	0.00E+00	0.00E+00
1,2,3,4,6,7,8-Hp-CDD	4.80E-12	0	0.00E+00	0.00E+00
Total HpCDD	1.90E-11	0	0.00E+00	0.00E+00
Octa CDD	2.50E-11	0	0.00E+00	0.00E+00
Total PCDD[h]	7.90E-11	0	0.00E+00	0.00E+00
Furans[e]				
2,3,7,8-TCDF	9.70E-13	0	0.00E+00	0.00E+00
Total TCDF	3.70E-12	0	0.00E+00	0.00E+00
1,2,3,7,8-PeCDF	4.30E-12	0	0.00E+00	0.00E+00
2,3,4,7,8-PeCDF	8.40E-13	0	0.00E+00	0.00E+00
Total PeCDF	8.40E-11	0	0.00E+00	0.00E+00
1,2,3,4,7,8-HxCDF	4.00E-12	0	0.00E+00	0.00E+00
1,2,3,6,7,8-HxCDF	1.20E-12	0	0.00E+00	0.00E+00
2,3,4,6,7,8-HxCDF	1.90E-12	0	0.00E+00	0.00E+00
1,2,3,7,8,9-HxCDF	8.40E-12	0	0.00E+00	0.00E+00
Total HxCDF	1.30E-11	0	0.00E+00	0.00E+00
1,2,3,4,6,7,8-HpCDF	6.50E-12	0	0.00E+00	0.00E+00
1,2,3,4,7,8,9-HpCDF	2.70E-12	0	0.00E+00	0.00E+00
Total HpCDF	1.00E-11	0	0.00E+00	0.00E+00
Octa CDF	4.80E-12	0	0.00E+00	0.00E+00
Total PCDF[h]	4.00E-11	0	0.00E+00	0.00E+00
Total PCDD/PCDF[h]	1.20E-10	0	0.00E+00	0.00E+00
Non-PAH HAPs[f]				
Acetaldehyde[e]				
Acrolein[e]				
Benzene[e]	3.90E-04	0.00E+00	0.00E+00	0.00E+00
1,3-Butadiene[e]				
Ethylbenzene[e]	2.40E-04	0.00E+00	0.00E+00	0.00E+00
Formaldehyde[e]	3.10E-03	0.00E+00	0.00E+00	0.00E+00
Hexane[e]	9.20E-04	0.00E+00	0.00E+00	0.00E+00
Isooctane	4.00E-05	0.00E+00	0.00E+00	0.00E+00
Methyl Ethyl Ketone[e]				
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]	4.80E-05	0.00E+00	0.00E+00	0.00E+00
Toluene[e]	2.90E-03	0.00E+00	0.00E+00	0.00E+00
Xylene[e]	2.00E-04	0.00E+00	0.00E+00	0.00E+00
POM (7-PAH Group)		0.00E+00		0.00E+00

Pollutant	Emission Factor[a] (lb/ton)	Emissions (lb/hr) Maximum	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PAH HAPs[f]				
2-Methylnaphthalene	0.00017	0.00E+00	0.00E+00	0.00E+00
3-Methylchloranthrene[e]				
Acenaphthene	1.40E-06	0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	2.20E-05	0.00E+00	0.00E+00	0.00E+00
Anthracene	3.10E-06	0.00E+00	0.00E+00	0.00E+00
Benzo(a)anthracene	2.10E-07	0.00E+00	0.00E+00	0.00E+00
Benzo(a)pyrene[e]	9.80E-09	0.00E+00	0.00E+00	0.00E+00
Benzo(b)fluoranthene	1.00E-07	0.00E+00	0.00E+00	0.00E+00
Benzo(e)pyrene	1.10E-07	0.00E+00	0.00E+00	0.00E+00
Benzo(g,h,i)perylene	4.00E-08	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	4.10E-08	0.00E+00	0.00E+00	0.00E+00
Chrysene	1.80E-07	0.00E+00	0.00E+00	0.00E+00
Dibenzo(a,h)anthracene				
Dichlorobenzene				
Fluoranthene	6.10E-07	0.00E+00	0.00E+00	0.00E+00
Fluorene	1.10E-05	0.00E+00	0.00E+00	0.00E+00
Indeno(1,2,3-cd)pyrene	7.00E-09	0.00E+00	0.00E+00	0.00E+00
Naphthalene[e]	0.00065	0.00E+00	0.00E+00	0.00E+00
Perylene	8.80E-09	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	2.30E-05	0.00E+00	0.00E+00	0.00E+00
Pyrene	3.00E-06	0.00E+00	0.00E+00	0.00E+00
Non-HAP Organic Compounds[f]				
Acetone[e]				
Benzaldehyde				
Butane	6.70E-04	0.00E+00	0.00E+00	0.00E+00
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene	7.00E-03	0.00E+00	0.00E+00	0.00E+00
Heptane	9.40E-03	0.00E+00	0.00E+00	0.00E+00
Hexanal				
Isovaleraldehyde				
2-Methyl-1-pentene	4.00E-03	0.00E+00	0.00E+00	0.00E+00
2-Methyl-2-butene	5.80E-04	0.00E+00	0.00E+00	0.00E+00
3-Methylpentane	1.90E-04	0.00E+00	0.00E+00	0.00E+00
1-Pentene	2.20E-03	0.00E+00	0.00E+00	0.00E+00
n-Pentane	2.10E-04	0.00E+00	0.00E+00	0.00E+00
Valeraldehyde				
Metals[g]				
Antimony[e]	1.80E-07	0.00E+00	0.00E+00	0.00E+00
Arsenic[e]	5.60E-07	0.00E+00	0.00E+00	0.00E+00
Barium[e]	5.80E-06	0.00E+00	0.00E+00	0.00E+00
Beryllium[e]				
Cadmium[e]	4.10E-07	0.00E+00	0.00E+00	0.00E+00
Chromium[e]	5.50E-06	0.00E+00	0.00E+00	0.00E+00
Cobalt[e]	2.60E-08	0.00E+00	0.00E+00	0.00E+00
Copper[e]	3.10E-06	0.00E+00	0.00E+00	0.00E+00
Hexavalent Chromium[e]	4.50E-07	0.00E+00	0.00E+00	0.00E+00
Manganese[e]	7.70E-06	0.00E+00	0.00E+00	0.00E+00
Mercury[e]	2.60E-06	0.00E+00	0.00E+00	0.00E+00
Molybdenum[e]				
Nickel[e]	6.30E-05	0.00E+00	0.00E+00	0.00E+00
Phosphorus[e]	2.80E-05	0.00E+00	0.00E+00	0.00E+00
Silver[e]	4.80E-07	0.00E+00	0.00E+00	0.00E+00
Selenium[e]	3.50E-07	0.00E+00	0.00E+00	0.00E+00
Thallium[e]	4.10E-09	0.00E+00	0.00E+00	0.00E+00
Vanadium[e]				
Zinc[e]	6.10E-05	0.00E+00	0.00E+00	0.00E+00

a) Emission factors are from AP-42 11.1, Hot Mix Asphalt Plants, 3/04
b) AP-42, Table 11.1-3, Particulate Matter Emission Factors for Drum Mix Hot Asphalt Plants, 3/04
b1) AP-42, Table 11.1-4, Summary of Particle Size Distribution for Drum Mix Dryers **(Emission Rating Factor E - "Poor")**
c) AP-42, Table 11.1-7, Emission Factors for CO, CO2, NOx, and SO2 from Drum Mix Hot Asphalt Plants, 3/04
In addition, for SO2 emissions the AP-42 EF of 0.058 lb/ton was adjusted twice. First, to account for the average sulfur content of the fuel used during the source test (0.44% by weight, three tests on waste oil), 0.058 to 0.066. Second, to account for the average scavenging factor of 63% down to 50%, 0.062 to 0.089.
d) AP-42, Table 11.1-8, Emission Factors for TOC, Methane, VOC, and HCl from Drum Mix Hot Asphalt Plants, 3/04
e) IDAPA Toxic Air Pollutant
f) AP-42, Table 11.1-10, Emission Factors for Organic Pollutant Emissions from Drum Mix Hot Asphalt Plants, 3/04
g) AP-42, Table 11.1-12, Emission Factors for Metal Emissions from Drum Mix Hot Mix Asphalt Plants, 3/04
h) Compound is classified as polycyclic organic matter, as defined in the 1990 CAAA. Total PCDD is the sum of the total tetra through octa dioxins; total PCDF is sum of the total tetra through octa furans; and total PCDD/PCDF is the sum of total PCDD and total PCDF.

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/ Facility ID:** P-2014.0004 777-00533

LPG or Propane Fired Drum Mix Asphalt Plant With Fabric Filter

Fuel Type Toggle =	1
Max Hourly Production	400 Tons/hr
Max Daily Production	5,000 Tons/day
Max Annual Production	325,000 Tons/yr

Note: Presumes same emissions as natural gas except for NOx
(see AP-42, Section 1.5, Liquefied Petroleum Gas Combustion)
SO2 emissions from natural gas are ~70% lower than with #2 Fuel Oil, and ~94% lower than with Used Oil or #6 Fuel Oil (minimal impact on emissions, used Nat Gas EF)

Pollutant	Emission Factor[a] (lb/ton)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PM (total)[b]	0.033	13.20	5.36	
PM-10 (total)[b]	0.023	9.20	3.74	
PM-2.5 [b1]	0.0223	8.92	3.62	
CO [c]	0.13	52.00	21.13	
NOx [c1] (Natural Gas EF x 1.5)	0.039	15.60	6.34	
SO_2 [c]	0.0034	1.36	0.55	
VOC [d]	0.032	12.80	5.20	
Lead	6.20E-07	0.000248	1.01E-04	
HCl [d,e]	No Data			
Dioxins[e]				
-- No EFs for LP Gas or Propane Fuel --				
Furans[e]				
-- No EFs for LP Gas or Propane Fuel --				
Non-PAH HAPs[f]				
Acetaldehyde[e]				
Acrolein[e]				
Benzene[e]	3.90E-04	1.56E-01	6.34E-02	**1.45E-02**
1,3-Butadiene[e]				
Ethylbenzene[e]	2.40E-04	9.60E-02	3.90E-02	5.00E-02
Formaldehyde[e]	3.10E-03	1.24E+00	5.04E-01	**1.15E-01**
Hexane[e]	9.20E-04	3.68E-01	1.50E-01	1.92E-01
Isooctane	4.00E-05	1.60E-02	6.50E-03	8.33E-03
Methyl Ethyl Ketone[e]				
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]	4.80E-05	1.92E-02	7.80E-03	1.00E-02
Toluene[e]	1.50E-04	6.00E-02	2.44E-02	3.13E-02
Xylene[e]	2.00E-04	8.00E-02	3.25E-02	4.17E-02
POM (7-PAH Group)		2.19E-04		**2.03E-05**

Pollutant	Emission Factor[a] (lb/ton)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PAH HAPs[f]				
2-Methylnaphthalene	7.40E-05	2.96E-02	1.20E-02	**2.75E-03**
3-Methylchloranthrene[e]				
Acenaphthene	1.40E-06	5.60E-04	2.28E-04	**5.19E-05**
Acenaphthylene	8.60E-06	3.44E-03	1.40E-03	**3.19E-04**
Anthracene	2.20E-07	8.80E-05	3.58E-05	**8.16E-06**
Benzo(a)anthracene	2.10E-07	8.40E-05	3.41E-05	**7.79E-06**
Benzo(a)pyrene[e]	9.80E-09	3.92E-06	1.59E-06	**3.64E-07**
Benzo(b)fluoranthene	1.00E-07	4.00E-05	1.63E-05	**3.71E-06**
Benzo(e)pyrene	1.10E-07	4.40E-05	1.79E-05	**4.08E-06**
Benzo(g,h,i)perylene	4.00E-08	1.60E-05	6.50E-06	**1.48E-06**
Benzo(k)fluoranthene	4.10E-08	1.64E-05	6.66E-06	**1.52E-06**
Chrysene	1.80E-07	7.20E-05	2.93E-05	**6.68E-06**
Dibenzo(a,h)anthracene				
Dichlorobenzene				
Fluoranthene	6.10E-07	2.44E-04	9.91E-05	**2.26E-05**
Fluorene	3.80E-06	1.52E-03	6.18E-04	**1.41E-04**
Indeno(1,2,3-cd)pyrene	7.00E-09	2.80E-06	1.14E-06	**2.60E-07**
Naphthalene[e]	9.00E-05	3.60E-02	1.46E-02	**3.34E-03**
Perylene	8.80E-09	3.52E-06	1.43E-06	**3.26E-07**
Phenanthrene	7.60E-06	3.04E-03	1.24E-03	**2.82E-04**
Pyrene	5.40E-07	2.16E-04	8.78E-05	**2.00E-05**
Non-HAPs Organic Compounds[f]				
Acetone[e]				
Benzaldehyde				
Butane	6.70E-04	2.68E-01	1.09E-01	1.40E-01
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene	7.00E-03	2.80E+00	1.14E+00	1.46E+00
Heptane	9.40E-03	3.76E+00	1.53E+00	1.96E+00
Hexanal				
Isovaleraldehyde				
2-Methyl-1-pentene	4.00E-03	1.60E+00	6.50E-01	8.33E-01
2-Methyl-2-butene	5.80E-04	2.32E-01	9.43E-02	1.21E-01
3-Methylpentane	1.90E-04	7.60E-02	3.09E-02	3.96E-02
1-Pentene	2.20E-03	8.80E-01	3.58E-01	4.58E-01
n-Pentane	2.10E-04	8.40E-02	3.41E-02	4.38E-02
Valeraldehyde				
Metals[g]				
Antimony[e]	1.80E-07	7.20E-05	2.93E-05	3.75E-05
Arsenic[e]	5.60E-07	2.24E-04	9.10E-05	**2.08E-05**
Barium[e]	5.80E-06	2.32E-03	9.43E-04	1.21E-03
Beryllium[e]				
Cadmium[e]	4.10E-07	1.64E-04	6.66E-05	**1.52E-05**
Chromium[e]	5.50E-06	2.20E-03	8.94E-04	1.15E-03
Cobalt[e]	2.60E-08	1.04E-05	4.23E-06	5.42E-06
Copper[e]	3.10E-06	1.24E-03	5.04E-04	6.46E-04
Hexavalent Chromium[e]	4.50E-07	1.80E-04	7.31E-05	**1.67E-05**
Manganese[e]	7.70E-06	3.08E-03	1.25E-03	1.60E-03
Mercury[e]	2.40E-07	9.60E-05	3.90E-05	5.00E-05
Molybdenum[e]				
Nickel[e]	6.30E-05	2.52E-02	1.02E-02	**2.34E-03**
Phosphorus[e]	2.80E-05	1.12E-02	4.55E-03	5.83E-03
Silver[e]	4.80E-07	1.92E-04	7.80E-05	1.00E-04
Selenium[e]	3.50E-07	1.40E-04	5.69E-05	7.29E-05
Thallium[e]	4.10E-09	1.64E-06	6.66E-07	8.54E-07
Vanadium[e]				
Zinc[e]	6.10E-05	2.44E-02	9.91E-03	1.27E-02

a) Emission factors are from AP-42 11.1, Hot Mix Asphalt Plants, 3/04
b) AP-42, Table 11.1-3, Particulate Matter Emission Factors for Drum Mix Hot Asphalt Plants, 3/04
b1) AP-42, Table 11.1-4, Summary of Particle Size Distribution for Drum Mix Dryers **(Emission Rating Factor E - "Poor")**
c) AP-42, Table 11.1-7, Emission Factors for CO. CO2, NOx, and SO2 from Drum Mix Hot Asphalt Plants, 3/04
c1) AP-42, Table 1.5-1, Emission Factors for LPG Combustion, note (a): "Assumes emissions (except SOx and NOx) are the same, on a heat input basis, as for natural gas combustion. The NOx emission factors have been multiplied by a factor of 1.5, which is the approximate ration of propane/butane NOx emissions to natural gas NOx emissions.
d) AP-42, Table 11.1-8, Emission Factors for TOC, Methane, VOC, and HCl from Drum Mix Hot Asphalt Plants, 3/04
e) IDAPA Toxic Air Pollutant
f) AP-42, Table 11.1-10, Emission Factors for Organic Pollutant Emissions from Drum Mix Hot Asphalt Plants, 3/04
g) AP-42, Table 11.1-12, Emission Factors for Metal Emissions from Drum Mix Hot Mix Asphalt Plants, 3/04

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Asphalt Tank Heater - #2 Oil Fired, Estimated Emissions Using AP-42 Sections 11.1 (HMA Plants) & 1.3 (Fuel Oil Combustion)

Fuel Type Toggle =	0
Fuel Consumption Rate	4.38 gal/hr
Max Daily Operation	24 hr/day
Max Annual Operation	4,000 hrs/yr

User Input Weight % Sulfur = 0.0015%
AP-42 1.3-1 EF is 0.142S lb SO2 per gallon of fuel oil

Pollutant	Emission Factor[a] (lb/gal)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PM (total) [b] (filterable+cond)	0.0033	0.00E+00	0.00	
PM-10 (total) [b] (filterable+cond)	0.0023	0.00E+00	0.00	
PM-2.5 (total) [b] (filterable+cond)	0.00154	0.000	0.00	
CO [b] ("C" EF Rating Factor)	0.005	0.00E+00	0.00	
NOx [b]	0.024	0.00E+00	0.00	
SO_2 [b]	0.000213	0.00	0.00	
VOC [d] (NMTOC EF)	5.56E-04	0.00E+00	0.00E+00	
Lead[f]	1.51E-06	0.00E+00	0.00E+00	
HCl [e]				
Dioxins[e]				
2,3,7,8-TCDD				
Total TCDD				
1,2,3,7,8-PeCDD				
Total PeCDD				
1,2,3,4,7,8-HxCDD[c]	6.90E-13	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,6,7,8-HxCDD				
1,2,3,7,8,9-HxCDD[c]	7.60E-13	0.00E+00	0.00E+00	**0.00E+00**
Total HxCDD				
1,2,3,4,6,7,8-Hp-CDD[c]	1.50E-11	0.00E+00	0.00E+00	**0.00E+00**
Total HpCDD[c]	2.00E-11	0.00E+00	0.00E+00	**0.00E+00**
Octa CDD[c]	1.60E-10	0.00E+00	0.00E+00	**0.00E+00**
Total PCDD[c]	2.00E-10	0.00E+00	0.00E+00	**0.00E+00**
Furans[e]				
2,3,7,8-TCDF				
Total TCDF[c]	3.30E-12	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,7,8-PeCDF				
2,3,4,7,8-PeCDF				
Total PeCDF[c]	4.80E-13	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,4,7,8-HxCDF				
1,2,3,6,7,8-HxCDF				
2,3,4,6,7,8-HxCDF				
1,2,3,7,8,9-HxCDF				
Total HxCDF[c]	2.00E-12	0.00E+00	0.00E+00	**0.00E+00**
1,2,3,4,6,7,8-HpCDF				
1,2,3,4,7,8,9-HpCDF				
Total HpCDF[c]	9.70E-12	0.00E+00	0.00E+00	**0.00E+00**
Octa CDF[c]	1.20E-11	0.00E+00	0.00E+00	**0.00E+00**
Total PCDF[c]	3.10E-11	0.00E+00	0.00E+00	**0.00E+00**
Total PCDD/PCDF[c]	2.30E-10	0.00E+00	0.00E+00	**0.00E+00**
Non-PAH HAPs				
Acetaldehyde[e]				
Acrolein[e]				
Benzene[e]				
1,3-Butadiene[e]				
Ethylbenzene[e]				
Formaldehyde[c,e]	3.50E-06	0.00E+00	0.00E+00	**0.00E+00**
Hexane[e]				
Isooctane				
Methyl Ethyl Ketone[e]				
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]				
Toluene[e]				
Xylene[e]				
POM (7-PAH Group)		0.00E+00		**0.00E+00**

Pollutant	Emission Factor[a] (lb/gal)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PAH HAPs				
2-Methylnaphthalene				
3-Methylchloranthrene[e]				
Acenaphthene[c]	5.30E-07	0.00E+00	0.00E+00	**0.00E+00**
Acenaphthylene[c]	2.00E-07	0.00E+00	0.00E+00	**0.00E+00**
Anthracene[c]	1.80E-07	0.00E+00	0.00E+00	**0.00E+00**
Benzo(a)anthracene				
Benzo(a)pyrene[e]				
Benzo(b)fluoranthene[c]	1.00E-07	0.00E+00	0.00E+00	**0.00E+00**
Benzo(e)pyrene				
Benzo(g,h,i)perylene				
Benzo(k)fluoranthene				
Chrysene				
Dibenzo(a,h)anthracene				
Dichlorobenzene				
Fluoranthene[c]	4.40E-08	0.00E+00	0.00E+00	**0.00E+00**
Fluorene[c]	3.20E-08	0.00E+00	0.00E+00	**0.00E+00**
Indeno(1,2,3-cd)pyrene				
Naphthalene[c,e]	1.70E-05	0.00E+00	0.00E+00	**0.00E+00**
Perylene				
Phenanthrene[c]	4.90E-06	0.00E+00	0.00E+00	**0.00E+00**
Pyrene[c]	3.20E-08	0.00E+00	0.00E+00	**0.00E+00**
Non-HAP Organic Compounds				
Acetone[e]				
Benzaldehyde				
Butane				
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene				
Heptane				
Hexanal				
Isovaleraldehyde				
2-Methyl-1-pentene				
2-Methyl-2-butene				
3-Methylpentane				
1-Pentene				
n-Pentane				
Valeraldehyde				
Metals[f]				
Antimony[e]	5.25E-06	0.00E+00	0.00E+00	0.00E+00
Arsenic[e]	1.32E-06	0.00E+00	0.00E+00	**0.00E+00**
Barium[e]	2.57E-06	0.00E+00	0.00E+00	0.00E+00
Beryllium[e]	2.78E-08	0.00E+00	0.00E+00	**0.00E+00**
Cadmium[e]	3.98E-07	0.00E+00	0.00E+00	**0.00E+00**
Chromium[e]	8.45E-07	0.00E+00	0.00E+00	0.00E+00
Cobalt[e]	6.02E-06	0.00E+00	0.00E+00	0.00E+00
Copper[e]	1.76E-06	0.00E+00	0.00E+00	0.00E+00
Hexavalent Chromium[e]	2.48E-07	0.00E+00	0.00E+00	**0.00E+00**
Manganese[e]	3.00E-06	0.00E+00	0.00E+00	0.00E+00
Mercury[e]	1.13E-07	0.00E+00	0.00E+00	0.00E+00
Molybdenum[e]	7.87E-07	0.00E+00	0.00E+00	0.00E+00
Nickel[e]	8.45E-05	0.00E+00	0.00E+00	**0.00E+00**
Phosphorus[e]	9.46E-06	0.00E+00	0.00E+00	0.00E+00
Silver[e]				
Selenium[e]	6.83E-07	0.00E+00	0.00E+00	0.00E+00
Thallium[e]				
Vanadium[e]	3.18E-05	0.00E+00	0.00E+00	0.00E+00
Zinc[e]	2.91E-05	0.00E+00	0.00E+00	0.00E+00

a) Emission factors for criteria pollutants are from AP-42, 1.3, Fuel Oil Combustion, 9/98; all other factors are from AP-42 11.1, Hot Mix Asphalt Plants, 3/04
b) AP-42, Table 1.3-1, Criteria Pollutant Emission Factors for Fuel Oil Combustion, 9/98, Boilers < 100 MMBtu, SOx based on max fuel sulfur content, PM10 is 1.3 lb/1,000 gal + 50% of 2.0 lb/1,000 gal
c) AP-42, Table 11.1-13, Emission Factors for Hot Mix Asphalt Hot Oil Systems, 3/04
d) AP-42, Table 1.3-3, Emission Factors for Total Organic Compounds (TOC), Methane, and Nonmethane TOC (NMTOC) from Uncontrolled Distillate Fuel Oil Combustion; Commercial Boiler
e) IDAPA Toxic Air Pollutant
f) AP-42, Table 1.3-11, Emission Factors for Metals from Uncontrolled No. 6 Fuel Oil Combustion

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

Asphalt Tank Heater - Natural Gas Fired, Estimated Emissions Using AP-42 Section 11.1 (Hot Mix Asphalt Plants)

Fuel Type Toggle =	1
Fuel Consumption Rate	588 scf/hr
Max Daily Operation	24 hr/day
Max Annual Operation	4,000 hrs/yr

Note: CO EF per AP-42 Table 1.4.1 for natural gas combustion in boilers is 84 lb/MMscf, a factor of 10 higher than the factor shown in Table 11.1-13
Tank heater CO emissions are based on using 84 lb/MMscf

Pollutant	Emission Factor[a] (lb/scf)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PM (total)				
PM-10 (total)				
PM-2.5				
CO[c]	8.90E-06	5.24E-03	1.05E-02	
NOx				
SO_2				
VOC				
Lead				
HCl[e]				
Dioxins[e]				
-- No EFs for Natural Gas Fuel --				
Furans[e]				
-- No EFs for Natural Gas Fuel --				
Non-PAH HAPs				
Acetaldehyde[e]				
Acrolein[e]				
Benzene[e]				
1,3-Butadiene[e]				
Ethylbenzene[e]				
Formaldehyde[c,e]	2.60E-08	1.53E-05	3.06E-05	6.98E-06
Hexane[e]				
Isooctane				
Methyl Ethyl Ketone[e]				
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]				
Toluene[e]				
Xylene[e]				
POM (7-PAH Group)		0.00E+00		0.00E+00

Pollutant	Emission Factor[a] (lb/scf)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PAH HAPs				
2-Methylnaphthalene				
3-Methylchloranthrene[e]				
Acenaphthene				
Acenaphthylene				
Anthracene				
Benzo(a)anthracene				
Benzo(a)pyrene[e]				
Benzo(b)fluoranthene				
Benzo(e)pyrene				
Benzo(g,h,i)perylene				
Benzo(k)fluoranthene				
Chrysene				
Dibenzo(a,h)anthracene				
Dichlorobenzene				
Fluoranthene				
Fluorene				
Indeno(1,2,3-cd)pyrene				
Naphthalene[e]				
Perylene				
Phenanthrene				
Pyrene				
Non-HAPs Organic Compounds				
Acetone[e]				
Benzaldehyde				
Butane				
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene				
Heptane				
Hexanal				
Isovaleraldehyde				
2-Methyl-1-pentene				
2-Methyl-2-butene				
3-Methylpentane				
1-Pentene				
n-Pentane				
Valeraldehyde				
Metals				
Antimony[e]				
Arsenic[e]				
Barium[e]				
Beryllium[e]				
Cadmium[e]				
Chromium[e]				
Cobalt[e]				
Copper[e]				
Hexavalent Chromium[e]				
Manganese[e]				
Mercury[e]				
Molybdenum[e]				
Nickel[e]				
Phosphorus[e]				
Silver[e]				
Selenium[e]				
Thallium[e]				
Vanadium[e]				
Zinc[e]				

a) Emission factors are from AP-42
b) (reserved)
c) AP-42, Table 11.1-13, Emission Factors for Hot Mix Asphalt Hot Oil Systems, 3/04
d) (reserved)
e) IDAPA Toxic Air Pollutant

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Facility: **Knife River, Inc**
7/22/2014 14:08 **Permit/Facility ID: P-2014.0004 777-00533**

Asphalt Tank Heater - Natural Gas Fired, Estimated Emissions Using AP-42 Section 1.4 (Natural Gas Combustion)

Fuel Type Toggle = 1
Fuel Consumption Rate 588 scf/hr
Max Daily Operation 24 hr/day
Max Annual Operation 4,000 hrs/yr
Heating Value Correction: 1.000 applied to Emissions (lb/hr, T/yr) calculations

Note: CO EF per AP-42 Table 1.4.1 for natural gas combustion in boilers is 84 lb/MMscf, a factor of 10 higher than the factor shown in Table 11.1-13
Tank heater CO emissions are based on using 84 lb/MMscf

Pollutant	Emission Factor[a] (lb/MMscf)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PM (total)[c]	7.6	4.47E-03	8.94E-03	
PM-10 (total)[c]	7.6	4.47E-03	8.94E-03	
PM-2.5	7.6	4.47E-03	8.94E-03	
CO[b]	84	4.94E-02	9.88E-02	
NOx[b]	100	5.88E-02	1.18E-01	
SO_2[c]	0.6	3.53E-04	7.06E-04	
VOC[c]	5.5	3.24E-03	6.47E-03	
Lead[c]	5.00E-04	2.94E-07	5.88E-07	
HCl[a]				
Dioxins[e]				
-- No EFs for Natural Gas Fuel --				
Furans[e]				
-- No EFs for Natural Gas Fuel --				
Non-PAH HAPs[f]				
Acetaldehyde[e]				
Acrolein[e]				
Benzene[c1, e]	2.10E-03	1.24E-06	2.47E-06	**5.64E-07**
1,3-Butadiene[e]				
Ethylbenzene[e]				
Formaldehyde[e]	7.50E-02	4.41E-05	8.82E-05	**2.01E-05**
Hexane[e]	1.80E+00	1.06E-03	2.12E-03	1.06E-03
Isooctane				
Methyl Ethyl Ketone[e]				
Pentane[c1, e]	2.60E+00	1.53E-03	3.06E-03	1.53E-03
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]				
Toluene[c1, e]	3.40E-03	2.00E-06	4.00E-06	2.00E-06
Xylene[e]				
POM (7-PAH Group)		6.71E-09		**3.06E-09**

Pollutant	Emission Factor[a] (lb/MMscf)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PAH HAPs[f]				
2-Methylnaphthalene[c1]	2.40E-05	1.41E-08	2.82E-08	**6.45E-09**
3-Methylchloranthrene[c1, e]	1.80E-06	1.06E-09	2.12E-09	**4.83E-10**
Acenaphthene[c1]	1.80E-06	1.06E-09	2.12E-09	**4.83E-10**
Acenaphthylene[c1]	1.80E-06	1.06E-09	2.12E-09	**4.83E-10**
Anthracene[c1]	2.40E-06	1.41E-09	2.82E-09	**6.45E-10**
Benzo(a)anthracene[c1]	1.80E-06	1.06E-09	2.12E-09	**4.83E-10**
Benzo(a)pyrene[c1, e]	1.20E-06	7.06E-10	1.41E-09	**3.22E-10**
Benzo(b)fluoranthenec[1]	1.80E-06	1.06E-09	2.12E-09	**4.83E-10**
Benzo(e)pyrene				
Benzo(g,h,I)perylene[c1]	1.20E-06	7.06E-10	1.41E-09	**3.22E-10**
Benzo(k)fluoranthene[c1]	1.80E-06	1.06E-09	2.12E-09	**4.83E-10**
Chrysene[c1]	1.80E-06	1.06E-09	2.12E-09	**4.83E-10**
Dibenzo(a,h)anthracene[c1]	1.20E-06	7.06E-10	1.41E-09	**3.22E-10**
Dichlorobenzene[c1]	1.20E-03	7.06E-07	1.41E-06	**3.22E-07**
Fluoranthene[c1]	3.00E-06	1.76E-09	3.53E-09	**8.06E-10**
Fluorene[c1]	2.80E-06	1.65E-09	3.29E-09	**7.52E-10**
Indeno(1,2,3-cd)pyrene[c1]	1.80E-06	1.06E-09	2.12E-09	**4.83E-10**
Naphthalene[c1, e]	6.10E-04	3.59E-07	7.18E-07	**1.64E-07**
Perylene				
Phenanthrene[c1]	1.70E-05	1.00E-08	2.00E-08	**4.57E-09**
Pyrene[c1]	5.00E-06	2.94E-09	5.88E-09	**1.34E-09**
Non-HAPs Organic Compounds[f]				
Acetone[e]				
Benzaldehyde				
Butane[c1]	2.10E+00	1.24E-03	2.47E-03	1.24E-03
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene				
Heptane				
Hexanal				
Isovaleraldehyde				
2-Methyl-1-pentene				
2-Methyl-2-butene				
3-Methylpentane				
1-Pentene				
n-Pentane				
Valeraldehyde				
Metals[d]				
Antimony[e]				
Arsenic[d,e]	2.00E-04	1.18E-07	2.35E-07	**5.37E-08**
Barium[d,e]	4.40E-03	2.59E-06	5.18E-06	2.59E-06
Beryllium[e]	1.20E-05	7.06E-09	1.41E-08	**3.22E-09**
Cadmium[d,e]	1.10E-03	6.47E-07	1.29E-06	**2.95E-07**
Chromium[d,e]	1.40E-03	8.24E-07	1.65E-06	8.24E-07
Cobalt[d,e]	8.40E-05	4.94E-08	9.88E-08	4.94E-08
Copper[d,e]	8.50E-04	5.00E-07	1.00E-06	5.00E-07
Hexavalent Chromium[e]				
Manganese[d,e]				
Mercury[d,e]				
Molybdenum[d,e]	1.10E-03	6.47E-07	1.29E-06	6.47E-07
Nickel[d,e]				
Phosphorus[e]				
Silver[e]				
Selenium[d,e]				
Thallium[e]				
Vanadium[d,e]	2.30E-03	1.35E-06	2.71E-06	1.35E-06
Zinc[d,e]				

a) Emission factors are from AP-42
b) AP-42, Table 1.4-1, Emission Factors for NOx and CO from Natural Gas Combustion, 7/98
c) AP-42, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion, 7/98
c1) AP-42, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion, 7/98
d) AP-42, Table 1.4-4, Emission Factors for Metals from Natural Gas Combustion, 7/98
e) IDAPA Toxic Air Pollutant

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

Silo Filling Operations AP-42 Section 11.1

Emissions Toggle =	0	
Max Hourly Production	400	T/hr
Max Daily Production	5,000	Tons/day
Max Annual Production	325,000	Tons/yr

Pollutant	Emission Factor[a] Silo Fill (lb/ton)	Emissions (lb/hr) 1-hr Average	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PM (total) [b]	5.86E-04	0.0000	0.0000	
PM-10 (total) [b]	5.86E-04	0.0000	0.0000	
PM-2.5 [b]	5.86E-04	0.0000	0.0000	
CO [b]	1.18E-03	0.0000	0.0000	
NOx				
SO_2				
VOC [d,g]	1.22E-04	0.00E+00	0.0000	
Lead				
HCl [d,e]	No Data			
Dioxins[e]				
2,3,7,8-TCDD				
Total TCDD				
1,2,3,7,8-PeCDD				
Total PeCDD				
1,2,3,4,7,8-HxCDD				
1,2,3,6,7,8-HxCDD				
1,2,3,7,8,9-HxCDD				
Total HxCDD				
1,2,3,4,6,7,8-Hp-CDD				
Total HpCDD				
Octa CDD				
Total PCDD[h]				
Furans[e]				
2,3,7,8-TCDF				
Total TCDF				
1,2,3,7,8-PeCDF				
2,3,4,7,8-PeCDF				
Total PeCDF				
1,2,3,4,7,8-HxCDF				
1,2,3,6,7,8-HxCDF				
2,3,4,6,7,8-HxCDF				
1,2,3,7,8,9-HxCDF				
Total HxCDF				
1,2,3,4,6,7,8-HpCDF				
1,2,3,4,7,8,9-HpCDF				
Total HpCDF				
Octa CDF				
Total PCDF[h]				
Total PCDD/PCDF[h]				
Non-PAH HAPs				
Acetaldehyde[e]				
Acrolein[e]				
Benzene[e]	3.90E-06	0.00E+00	0.0000	0.0000
1,3-Butadiene[e]				
Ethylbenzene[e]	4.63E-06	0.00E+00	0.0000	0.00E+00
Formaldehyde[e]	8.41E-05	0.00E+00	0.0000	0.0000
Hexane[e]	1.22E-05	0.00E+00	0.0000	0.0000
Isooctane	3.78E-08	0.00E+00	0.0000	0.0000
Methyl Ethyl Ketone[e]	4.75E-06	0.00E+00	0.0000	0.0000
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]		0.00E+00	0.0000	
Toluene[e]	7.56E-06	0.00E+00	0.0000	0.0000
Xylene[e]	3.13E-05	0.00E+00	0.0000	0.0000
POM (7-PAH Group)		0.00E+00		0.00E+00

Pollutant	Emission Factor[a] Silo Fill (lb/ton)	Emissions (lb/hr) 1-hr Average	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PAH HAPs[f]				
2-Methylnaphthalene	1.34E-05	0.00E+00	0.00E+00	0.00E+00
3-Methylchloranthrene[e]				
Acenaphthene	1.19E-06	0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	3.55E-08	0.00E+00	0.00E+00	0.00E+00
Anthracene	3.30E-07	0.00E+00	0.00E+00	0.00E+00
Benzo(a)anthracene	1.42E-07	0.00E+00	0.00E+00	0.00E+00
Benzo(a)pyrene[e]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(e)pyrene	2.41E-08	0.00E+00	0.00E+00	0.00E+00
Benzo(g,h,i)perylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chrysene	5.33E-07	0.00E+00	0.00E+00	0.00E+00
Dibenzo(a,h)anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dichlorobenzene				
Fluoranthene	3.81E-07	0.00E+00	0.00E+00	0.00E+00
Fluorene	2.56E-06	0.00E+00	0.00E+00	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene[e]	4.62E-06	0.00E+00	0.00E+00	0.00E+00
Perylene	7.62E-08	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	4.57E-06	0.00E+00	0.00E+00	0.00E+00
Pyrene	1.12E-06	0.00E+00	0.00E+00	0.00E+00
Non-HAP Organic Compounds				
Acetone[e]	6.70E-06	0.00E+00	0.00E+00	0.00E+00
Benzaldehyde				
Butane				
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene	1.34E-04	0.00E+00	0.00E+00	0.00E+00
Heptane				
Hexanal				
Isovaleraldehyde				
2-Methyl-1-pentene				
2-Methyl-2-butene				
3-Methylpentane				
1-Pentene				
n-Pentane				
Valeraldehyde				
Metals				
Antimony[e]				
Arsenic[e]				
Barium[e]				
Beryllium[e]				
Cadmium[e]				
Chromium[e]				
Cobalt[e]				
Copper[e]				
Hexavalent Chromium[e]				
Manganese[e]				
Mercury[e]				
Molybdenum[e]				
Nickel[e]				
Phosphorus[e]				
Silver[e]				
Selenium[e]				
Thallium[e]				
Vanadium[e]				
Zinc[e]				

a) Emission factors are from AP-42 11.1, Hot Mix Asphalt Plants, 3/04

b) AP-42, Table 11.1-14, Predictive Emission Factor Equations for Load-Out and Silo Filling Operations, 3/04

Defaults: (-V) = 0.5 T (°F) = 325

Equation		LOADOUT	SILO FILL
Total PM $EF = 0.000181+0.00141(-V)e^{((0.0251)(T+460)-20.43)} + 000332+ 0.00105(-V)e^{((0.0251)(T+460)-20.43)}$	=	5.219E-04	5.859E-04 (split addends)
Organic PM $EF = 0.00141(-V)e^{((0.0251)(T+460)-20.43)} + 0.00105(-V)e^{((0.0251)(T+460)-20.43)}$	=	3.409E-04	2.539E-04 (split addends)
TOC PM $EF = 0.0172(-V)e^{((0.0251)(T+460)-20.43)} + 0.0504(-V)e^{((0.0251)(T+460)-20.43)}$	=	4.159E-03	1.219E-02 (split addends)
CO PM $EF = 0.00558(-V)e^{((0.0251)(T+460)-20.43)} + 0.00488(-V)e^{((0.0251)(T+460)-20.43)}$	=	1.349E-03	1.180E-03 (split addends)

e) IDAPA Toxic Air Pollutant

f) AP-42, Table 11.1-15, Speciation Profiles for Load-out, Silo Filling, & Asphalt Storage--Organic Particulate-Based Compounds, 3/04 (EF=Spec% * Organic PM EF)

g) AP-42, Table 11.1-16, Speciation Profiles for Load-out, Silo Filling, &Asphalt Storage--Organic Volatile-Based Compounds, 3/04, (EF=Spec% * TOC PM EF)

Pollutants shown in bold text are carcinogens subject to an annual standard. These lb/hr values are annual averages.

Pollutants shown in blue text are organic volatile-based compounds, EF = Spec% x TOC PM EF.

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

Silo Filling Operations AP-42 Section 11.1, Page 2

Fuel Type Toggle =	0	
Max Hourly Production	400	T/hr
Max Daily Production	5,000	Tons/day
Max Annual Production	325,000	Tons/yr

Pollutant	Emission Factor[e] Silo Fill (lb/ton)	Emissions (lb/hr) 1-hr Average	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
non-PAH HAPs[g]				
Bromomethane[e]	5.97E-07	0.00E+00	0.0000	0.00E+00
2-Butanone (see Methyl Ethyl Ketone)				
Carbon disulfide[e]	1.95E-06	0.00E+00	0.0000	0.00E+00
Chloroethane (Ethyl chloride[e])	4.87E-07	0.00E+00	0.0000	0.00E+00
Chloromethane (Methyl chloride[e])	2.80E-06	0.00E+00	0.0000	0.00E+00
Cumene[e]				
n-Hexane (see Hexane[e])				
Methylene chloride (Dichloromethane[e])	3.29E-08	0.00E+00	0.0000	0.00E+00
MTBE				
Styrene[e]	6.58E-07	0.00E+00	0.0000	0.00E+00
Tetrachloroethene (Tetrachloroethylene[e])	0.00E+00	0.00E+00	0.0000	0.00E+00
1,1,1-Trichloroethane (Methyl chloroform[e])	0.00E+00	0.00E+00	0.0000	0.00E+00
Trichloroethene (Trichloroethylene[e])				
Trichlorofluoromethane				
m-/p-Xylene[e] (added into Xylene[e])	2.44E-05	0.00E+00	0.0000	0.00E+00
o-Xylene[e] (added into Xylene[e])	6.95E-06	0.00E+00	0.0000	0.00E+00
Phenol[e,f]				
Non-HAP Organic Compounds				
Methane	3.17E-03	0.00E+00	0.0000	0.00E+00

Pollutants shown in blue text are organic volatile-based compounds, EF = Spec% x TOC PM EF.

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

Load-out Operations AP-42 Section 11.1

Emissions Toggle =	1	
Max Hourly Production	400	T/hr
Max Daily Production	5,000	Tons/day
Max Annual Production	325,000	Tons/yr

Pollutant	Emission Factor[a] Loadout (lb/ton)	Emissions (lb/hr) 1-hr Average	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PM (total)[b]	5.22E-04	0.209	0.08	
PM-10 (total)[b]	5.22E-04	0.209	0.08	
PM-2.5[b]	5.22E-04	0.209	0.08	
CO[b]	1.35E-03	0.540	0.22	
NOx				
SO_2				
VOC[d,g]	3.91E-03	1.564	0.64	
Lead				
HCl[d,e]	No Data			
Dioxins[e]				
2,3,7,8-TCDD				
Total TCDD				
1,2,3,7,8-PeCDD				
Total PeCDD				
1,2,3,4,7,8-HxCDD				
1,2,3,6,7,8-HxCDD				
1,2,3,7,8,9-HxCDD				
Total HxCDD				
1,2,3,4,6,7,8-Hp-CDD				
Total HpCDD				
Octa CDD				
Total PCDD[h]				
Furans[e]				
2,3,7,8-TCDF				
Total TCDF				
1,2,3,7,8-PeCDF				
2,3,4,7,8-PeCDF				
Total PeCDF				
1,2,3,4,7,8-HxCDF				
1,2,3,6,7,8-HxCDF				
2,3,4,6,7,8-HxCDF				
1,2,3,7,8,9-HxCDF				
Total HxCDF				
1,2,3,4,6,7,8-HpCDF				
1,2,3,4,7,8,9-HpCDF				
Total HpCDF				
Octa CDF				
Total PCDF[h]				
Total PCDD/PCDF[h]				
Non-PAH HAPs				
Acetaldehyde[e]				
Acrolein[e]				
Benzene[e]	2.16E-06	8.65E-04	3.51E-04	**8.02E-05**
1,3-Butadiene[e]				
Ethylbenzene[e]	1.16E-05	4.66E-03	1.89E-03	2.43E-03
Formaldehyde[e]	3.66E-06	1.46E-03	5.95E-04	**1.36E-04**
Hexane[e]	6.24E-06	2.50E-03	1.01E-03	1.30E-03
Isooctane	7.49E-08	2.99E-05	1.22E-05	1.56E-05
Methyl Ethyl Ketone[e]	2.04E-06	8.15E-04	3.31E-04	4.25E-04
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]				
Toluene[e]	8.73E-06	3.49E-03	1.42E-03	1.82E-03
Xylene[e]	5.03E-05	2.01E-02	8.18E-03	1.05E-02
POM (7-PAH Group)		1.84E-04		**1.71E-05**

Pollutant	Emission Factor[a] Loadout (lb/ton)	Emissions (lb/hr) 1-hr Average	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PAH HAPs[f]				
2-Methylnaphthalene	8.11E-06	3.25E-03	1.32E-03	**3.01E-04**
3-Methylchloranthrene[e]				
Acenaphthene	8.86E-07	3.55E-04	1.44E-04	**3.29E-05**
Acenaphthylene	9.55E-08	3.82E-05	1.55E-05	**3.54E-06**
Anthracene	2.39E-07	9.55E-05	3.88E-05	**8.85E-06**
Benzo(a)anthracene	6.48E-08	2.59E-05	1.05E-05	**2.40E-06**
Benzo(a)pyrene[e]	7.84E-09	3.14E-06	1.27E-06	**2.91E-07**
Benzo(b)fluoranthene	2.59E-08	1.04E-05	4.21E-06	**9.61E-07**
Benzo(e)pyrene	2.66E-08	1.06E-05	4.32E-06	**9.87E-07**
Benzo(g,h,i)perylene	6.48E-09	2.59E-06	1.05E-06	**2.40E-07**
Benzo(k)fluoranthene	7.50E-09	3.00E-06	1.22E-06	**2.78E-07**
Chrysene	3.51E-07	1.40E-04	5.71E-05	**1.30E-05**
Dibenzo(a,h)anthracene	1.26E-09	5.05E-07	2.05E-07	**4.68E-08**
Dichlorobenzene				
Fluoranthene	1.70E-07	6.82E-05	2.77E-05	**6.32E-06**
Fluorene	2.63E-06	1.05E-03	4.27E-04	**9.74E-05**
Indeno(1,2,3-cd)pyrene	1.60E-09	6.41E-07	2.60E-07	**5.94E-08**
Naphthalene[e]	4.26E-06	1.70E-03	6.93E-04	**1.58E-04**
Perylene	7.50E-08	3.00E-05	1.22E-05	**2.78E-06**
Phenanthrene	2.76E-06	1.10E-03	4.49E-04	**1.02E-04**
Pyrene	5.11E-07	2.05E-04	8.31E-05	**1.90E-05**
Non-HAP Organic Compounds				
Acetone[e]	1.95E-06	7.79E-04	3.16E-04	4.05E-04
Benzaldehyde				
Butane				
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene	2.95E-05	1.18E-02	4.80E-03	6.15E-03
Heptane				
Hexanal				
Isovaleraldehyde				
2-Methyl-1-pentene				
2-Methyl-2-butene				
3-Methylpentane				
1-Pentene				
n-Pentane				
Valeraldehyde				
Metals				
Antimony[e]				
Arsenic[e]				
Barium[e]				
Beryllium[e]				
Cadmium[e]				
Chromium[e]				
Cobalt[e]				
Copper[e]				
Hexavalent Chromium[e]				
Manganese[e]				
Mercury[e]				
Molybdenum[e]				
Nickel[e]				
Phosphorus[e]				
Silver[e]				
Selenium[e]				
Thallium[e]				
Vanadium[e]				
Zinc[e]				

a) Emission factors are from AP-42 11.1, Hot Mix Asphalt Plants, 3/04

b) AP-42, Table 11.1-14, Predictive Emission Factor Equations for Load-Out and Silo Filling Operations, 3/04

Defaults: (-V) = 0.5 T (°F) = 325

Equation		LOADOUT	SILO FILL
Total PM $EF = 0.000181+0.00141(-V)e^{((0.0251)(T+460)-20.43)}$ + $000332+0.00105(-V)e^{((0.0251)(T+460)-20.43)}$	=	5.219E-04	5.859E-04 (split addends)
Organic PM $EF = 0.00141(-V)e^{((0.0251)(T+460)-20.43)}$ + $0.00105(-V)e^{((0.0251)(T+460)-20.43)}$	=	3.409E-04	2.539E-04 (split addends)
TOC PM $EF = 0.0172(-V)e^{((0.0251)(T+460)-20.43)}$ + $0.0504(-V)e^{((0.0251)(T+460)-20.43)}$	=	4.159E-03	1.219E-02 (split addends)
CO PM $EF = 0.00558(-V)e^{((0.0251)(T+460)-20.43)}$ + $0.00488(-V)e^{((0.0251)(T+460)-20.43)}$	=	1.349E-03	1.180E-03 (split addends)

e) IDAPA Toxic Air Pollutant

f) AP-42, Table 11.1-15, Speciation Profiles for Load-out, Silo Filling, & Asphalt Storage--Organic Particulate-Based Compounds, 3/04 (EF=Spec% * Organic PM EF)

g) AP-42, Table 11.1-16, Speciation Profiles for Load-out, Silo Filling, &Asphalt Storage--Organic Volatile-Based Compounds, 3/04, (EF=Spec% * TOC PM EF)

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Pollutants shown in blue text are organic volatile-based compounds, EF = Spec% x TOC PM EF.

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

Load-out Operations AP-42 Section 11.1, Page 2

Fuel Type Toggle =	0	
Max Hourly Production	400	T/hr
Max Daily Production	5,000	Tons/day
Max Annual Production	325,000	Tons/yr

Pollutant	Emission Factor[a] Loadout (lb/ton)	Emissions (lb/hr) 1-hr Average	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
non-PAH HAPs[g]				
Bromomethane[e]	3.99E-07	1.60E-04	6.49E-05	8.32E-05
2-Butanone (see Methyl Ethyl Ketone)				
Carbon disulfide[e]	5.41E-07	2.16E-04	8.79E-05	1.13E-04
Chloroethane (Ethyl chloride[e])	8.73E-09	3.49E-06	1.42E-06	1.82E-06
Chloromethane (Methyl chloride[e])	6.24E-07	2.50E-04	1.01E-04	1.30E-04
Cumene[e]	4.57E-06	1.83E-03	7.43E-04	9.53E-04
n-Hexane (see Hexane[e])				
Methylene chloride (Dichloromethane[e])				
MTBE				
Styrene[e]	3.04E-07	1.21E-04	4.93E-05	6.33E-05
Tetrachloroethene (Tetrachloroethylene[e])	3.20E-07	1.28E-04	5.20E-05	6.67E-05
1,1,1-Trichloroethane (Methyl chloroform[e])				
Trichloroethene (Trichloroethylene[e])				
Trichlorofluoromethane	5.41E-08	2.16E-05	8.79E-06	1.13E-05
m-/p-Xylene[e] (added into Xylene[e])	1.71E-05	6.82E-03	2.77E-03	3.55E-03
o-Xylene[e] (added into Xylene[e])	3.33E-05	1.33E-02	5.41E-03	6.93E-03
Phenol[e,f]	4.02E-06	1.61E-03	6.54E-04	8.38E-04
Non-HAP Organic Compounds				
Methane	2.70E-04	1.08E-01	4.39E-02	5.63E-02

Pollutants shown in blue text are organic volatile-based compounds, EF = Spec% x TOC PM EF.

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Facility: Knife River, Inc
7/22/2014 14:08 Permit P-2014.0004 **Facility ID:** 777-00533

G1 Electrical Generator < 600 hp (447 kW)

Fuel Type Toggle =	1	
Fuel Consumption Rate	13.69	gal/hr
Calculated MMBtu/hr	1.876	MMBtu/hr
Max Daily Operation	13	hr/day
Max Annual Operation	2,322	hrs/yr

Rated Power (kW): 200

Not EPA Certified:	No
Certified EPA Tier 1:	No
Certified EPA Tier 2:	No
Certified EPA Tier 3:	Yes
Blue Sky Engine:	No

Conversion Factors:

Avg brake-specific fuel consumption (BSFC) =	7000	Btu/hp-hr
1 hp =	0.746	kW
1 lb =	453.592	g

g/kW-hr x (lb/453g) x (hp-hr/7000 Btu) x (0.746 kW/hp) x 10^6 Btu/MMBtu = lb/MMBtu
g/kW-hr x 0.23485 = lb/MMBtu

Pollutant:	NOx	VOC (total TOC--> VOCs)		CO	PM = PM10
EMISSION FACTORS USED FOR G1 (lb/MMBtu):	**0.94**	**0.31**		**0.82**	**0.047**

AP-42, Ch 3.3 (10/96) EMISSION FACTORS (diesel fueled)

Pollutant:	NOx	VOC (total TOC--> VOCs)		CO	PM = PM10
Emission Factor (lb/MMBtu)	4.41	0.36		0.95	0.31
Emission Factor (g/kW-hr))	18.78	1.53		4.05	1.32

40 CFR 89 and 1039 (updated for <37 kW only), EPA CERTIFIED GENERATOR EMISSION FACTORS (g/kW-hr converted to lb/MMBtu)

Rated Power (kW)	Tier	Applicable?	Model Year[1]	NOx	HC	NMHC + NOx	CO	PM = PM10
kW< 8	1	0	2000	—	*0.36*	2.47	1.88	0.23
kW< 8	2	0	2005	—	*0.36*	1.76	1.88	0.19
kW < 8	4	0	2008	—	—	1.76	1.88	0.09
kW< 8	BlueSky	0	n/a	—	*0.36*	1.08	*1.88*	0.11
8 ≤ kW < 19	1	0	2000	—	*0.36*	2.23	1.55	0.19
8 ≤ kW < 19	2	0	2005	—	*0.36*	1.76	1.55	0.19
8 ≤ kW < 19	4	0	2008	—	—	1.76	1.55	0.19
8 ≤ kW < 19	BlueSky	0	n/a	—	*0.36*	1.06	*1.55*	0.11
19 ≤ kW < 37	1	0	1999	—	*0.36*	2.23	1.29	0.19
19 ≤ kW < 37	2	0	2004	—	*0.36*	1.76	1.29	0.14
19 ≤ kW < 37	4	0	2008	—	—	1.76	1.29	0.07
19 ≤ kW < 37	BlueSky	0	n/a	—	*0.36*	1.06	*1.29*	0.08
37 ≤ kW < 75	1	0	1998	2.16	*0.36*	—	*1.17*	*0.31*
37 ≤ kW < 75	2	0	2004	—	*0.36*	1.76	1.17	0.09
37 ≤ kW < 75	3	0	2008	—	*0.36*	1.10	1.17	0.09
37 ≤ kW < 75	BlueSky	0	n/a	—	*0.36*	1.10	*1.17*	0.06
75 ≤ kW < 130	1	0	1997	2.16	*0.36*	—	*1.17*	*0.31*
75 ≤ kW < 130	2	0	2003	—	*0.36*	1.55	1.17	0.07
75 ≤ kW < 130	3	0	2007	—	*0.36*	0.94	1.17	0.07
75 ≤ kW < 130	BlueSky	0	n/a	—	*0.36*	0.94	*1.17*	0.04
130 ≤ kW < 225	1	0	1996	2.16	0.31	—	2.68	0.13
130 ≤ kW < 225	2	0	2003	—	*0.31*	1.55	0.82	0.05
130 ≤ kW < 225	3	1	2006	—	*0.31*	0.94	0.82	0.05
130 ≤ kW ≤ 560	BlueSky	0	n/a	—	*0.31*	0.94	*0.82*	0.03
225 ≤ kW < 450	1	0	1996	2.16	0.31	—	2.68	0.13
225 ≤ kW < 450	2	0	2001	—	*0.31*	1.50	0.82	0.05
225 ≤ kW < 450	3	0	2006	—	*0.31*	0.94	0.82	0.05
450 ≤ kW < 560	1	0	1996	2.16	0.31	—	2.68	0.13
450 ≤ kW < 560	2	0	2002	—	*0.31*	1.50	0.82	0.05
450 ≤ kW < 560	3	0	2006	—	*0.31*	0.94	0.82	0.05
kW > 560	1	0	2000	2.16	0.31	—	2.68	0.13
kW > 560	2	0	2006	—	*0.31*	1.50	0.82	0.05
kW > 560	BlueSky	0	n/a	—	*0.31*	0.89	*0.82*	0.03

40 CFR 89 and 1039 (updated for <37 kW only), EPA CERTIFIED GENERATOR EMISSION FACTORS (g/kW-hr converted to lb/MMBtu)

Rated Power (kW)	Tier	Applicable?	Model Year[1]	NOx	HC	NMHC + NOx	CO	PM (= PM10)
kW< 8	1	0	2000	0.00	0.00	0.00	0.00	0.00
kW< 8	2	0	2005	0.00	0.00	0.00	0.00	0.00
kW< 8	4	0	2008	0.00	—	0.00	0.00	0.00
kW< 8	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
8 ≤ kW < 19	1	0	2000	0.00	0.00	0.00	0.00	0.00
8 ≤ kW < 19	2	0	2005	0.00	0.00	0.00	0.00	0.00
8 ≤ kW < 19	4	0	2008	0.00	0.00	0.00	0.00	0.00
8 ≤ kW < 19	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
19 ≤ kW < 37	1	0	1999	0.00	0.00	0.00	0.00	0.00
19 ≤ kW < 37	2	0	2004	0.00	0.00	0.00	0.00	0.00
19 ≤ kW < 37	4	0	2008	0.00	—	0.00	0.00	0.00
19 ≤ kW < 37	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	1	0	1998	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	2	0	2004	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	3	0	2008	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	1	0	1997	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	2	0	2003	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	3	0	2007	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
130 ≤ kW < 225	1	0	1996	0.00	0.00	0.00	0.00	0.00
130 ≤ kW < 225	2	0	2003	0.00	0.00	0.00	0.00	0.00
130 ≤ kW < 225	3	1	2006	0.00	0.31	0.94	0.82	0.05
130 ≤ kW ≤ 560	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
225 ≤ kW < 450	1	0	1996	0.00	0.00	0.00	0.00	0.00
225 ≤ kW < 450	2	0	2001	0.00	0.00	0.00	0.00	0.00
225 ≤ kW < 450	3	0	2006	0.00	0.00	0.00	0.00	0.00
450 ≤ kW < 560	1	0	1996	0.00	0.00	0.00	0.00	0.00
450 ≤ kW < 560	2	0	2002	0.00	0.00	0.00	0.00	0.00
450 ≤ kW < 560	3	0	2006	0.00	0.00	0.00	0.00	0.00
kW > 560	1	0	2000	0.00	0.00	0.00	0.00	0.00
kW > 560	2	0	2006	0.00	0.00	0.00	0.00	0.00
kW > 560	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
EMISSION FACTORS FOR GENERATOR G1 (lb/MMBTU):				**0.00**	**0.31**	**0.94**	**0.82**	**0.047**

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

IC Engine 1 Powering an Electrical Generator < 600 hp (447 kW) AP-42 Section 3.3 (diesel fueled)

Fuel Type Toggle =	1	200 kw
Fuel Consumption Rate	13.69 gal/hr	
Calculated MMBtu/hr	1.876 MMBtu/hr	
Max Daily Operation	13 hr/day	
Max Annual Operation	2,322 hrs/yr	

User Input Weight % Sulfur = 0.0015%
AP-42 3.3 SO2 EF = 0.29 for #2 fuel oil, presumed max 0.5%
SO2 emissions are multiplied by a factor: User Input Value/0.5% = 0.00
EPA Certified Generator (Tier 1, 2, 3, or Blue Sky)

Pollutant	Emission Factor[a] (lb/MMBtu)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PM (total) [b]	0.05	0.088	1.02E-01	
PM-10 (total) [b]	0.05	0.131	1.52E-01	
PM-2.5	0.07	0.131	1.52E-01	
CO [b]	0.82	1.542	1.79E+00	
NOx[b]	0.94	1.762	2.05E+00	
SO_2 [b] (total SOx presumed SO2)	0.29	1.63E-03	5.68E-06	
VOC [b] (total TOC--> VOCs)	0.31	0.582	6.75E-01	
Lead				
HCl [e]				
Dioxins[e]				
2,3,7,8-TCDD				
Total TCDD				
1,2,3,7,8-PeCDD				
Total PeCDD				
1,2,3,4,7,8-HxCDD[c]				
1,2,3,6,7,8-HxCDD				
1,2,3,7,8,9-HxCDD[c]				
Total HxCDD				
1,2,3,4,6,7,8-Hp-CDD[c]				
Total HpCDD[c]				
Octa CDD[c]				
Total PCDD[c]				
Furans[e]				
2,3,7,8-TCDF				
Total TCDF[c]				
1,2,3,7,8-PeCDF				
2,3,4,7,8-PeCDF				
Total PeCDF[c]				
1,2,3,4,7,8-HxCDF				
1,2,3,6,7,8-HxCDF				
2,3,4,6,7,8-HxCDF				
1,2,3,7,8,9-HxCDF				
Total HxCDF[c]				
1,2,3,4,6,7,8-HpCDF				
1,2,3,4,7,8,9-HpCDF				
Total HpCDF[c]				
Octa CDF[c]				
Total PCDF[c]				
Total PCDD/PCDF[c]				
Non-PAH HAPs				
Acetaldehyde[c] (NESHAP HAP, TAP set to zero)	7.67E-04	1.44E-03	1.67E-03	0.00E+00
Acrolein[c] (NESHAP HAP, TAP set to zero)	9.25E-05	1.74E-04	2.01E-04	0.00E+00
Benzene[c,e] (NESHAP HAP, TAP set to zero)	9.33E-04	1.75E-03	2.03E-03	0.00E+00
1,3-Butadiene[c,e] (NESHAP HAP, T	3.91E-05	7.34E-05	8.52E-05	0.00E+00
Ethylbenzene[e]				
Formaldehyde[c,e] (NESHAP HAP, TAP set to zero)	1.18E-03	2.21E-03	2.57E-03	0.00E+00
Hexane[e]				
Isooctane				
Methyl Ethyl Ketone[e]				
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]				
Toluene[c,e] (NESHAP HAP, TAP set to zero)	4.09E-04	7.67E-04	8.91E-04	0.00E+00
Xylene[c,e] (NESHAP HAP, TAP set to zero)	2.85E-04	5.35E-04	6.21E-04	0.00E+00
POM (7-PAH Group)(NESHAP HAP, TAP set to zero)		6.44E-06		0.00E+00

Pollutant	Emission Factor[a] (lb/MMBtu)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PAH HAPs (NESHAP HAP, TAP set to zero)				
2-Methylnaphthalene				
3-Methylchloranthrene[e]				
Acenaphthene[c]	1.42E-06	2.66E-06	3.09E-06	0.00E+00
Acenaphthylene[c]	5.06E-06	9.49E-06	1.10E-05	0.00E+00
Anthracene[c]	1.87E-06	3.51E-06	4.07E-06	0.00E+00
Benzo(a)anthracene[c]	1.68E-06	3.15E-06	3.66E-06	0.00E+00
Benzo(a)pyrene[c,e]	1.88E-07	3.53E-07	4.09E-07	0.00E+00
Benzo(b)fluoranthene[c]	9.91E-08	1.86E-07	2.16E-07	0.00E+00
Benzo(e)pyrene				0.00E+00
Benzo(g,h,i)perylene[c]	4.89E-07	9.17E-07	1.07E-06	0.00E+00
Benzo(k)fluoranthene[c]	1.55E-07	2.91E-07	3.38E-07	0.00E+00
Chrysene[c]	3.53E-07	6.62E-07	7.69E-07	0.00E+00
Dibenzo(a,h)anthracene[c]	5.83E-07	1.09E-06	1.27E-06	0.00E+00
Dichlorobenzene				0.00E+00
Fluoranthene[c]	7.61E-06	1.43E-05	1.66E-05	0.00E+00
Fluorene[c]	2.92E-05	5.48E-05	6.36E-05	0.00E+00
Indeno(1,2,3-cd)pyrene[c]	3.75E-07	7.04E-07	8.17E-07	0.00E+00
Naphthalene[c,e]	8.48E-05	1.59E-04	1.85E-04	0.00E+00
Perylene				0.00E+00
Phenanthrene[c]	2.94E-05	5.52E-05	6.40E-05	0.00E+00
Pyrene[c]	4.78E-06	8.97E-06	1.04E-05	0.00E+00
Non-HAP Organic Compounds				
Acetone[e]				
Benzaldehyde				
Butane				
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene				
Heptane				
Hexanal				
Isovaleraldehyde				
2-Methyl-1-pentene				
2-Methyl-2-butene				
3-Methylpentane				
1-Pentene				
n-Pentane				
Valeraldehyde				
Metals				
Antimony[e]				
Arsenic[e]				
Barium[e]				
Beryllium[e]				
Cadmium[e]				
Chromium[e]				
Cobalt[e]				
Copper[e]				
Hexavalent Chromium[e]				
Manganese[e]				
Mercury[e]				
Molybdenum[e]				
Nickel[e]				
Phosphorus[e]				
Silver[e]				
Selenium[e]				
Thallium[e]				
Vanadium[e]				
Zinc[e]				

a) Emission factors are from AP-42
b) AP-42, Table 3.3-1, Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines, 10/96
c) AP-42, Table 3.3-2, Speciated Organic Compoun Emission Factors for Uncontrolled Diesel Engine, Emission Factor Rating E, 10/96
d) (reserved)
e) IDAPA Toxic Air Pollutant - per discussions with Dr. Carl Brown of DEQ all TAPs are inherently regulated by NESHAP. Therefore TAPs from egnines are not include in the analysis per Section 210.2

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Facility: Knife River, Inc
7/22/2014 14:08 Permit P-2014.0004 **Facility ID: 777-00533**

G2 Electrical Generator > 600 hp (447 kW)

Fuel Type Toggle =	1	
Fuel Consumption Rate	68.45	gal/hr
Calculated MMBtu/hr	9.38	MMBtu/hr
Max Daily Operation	13	hr/day
Max Annual Operation	1,161	hrs/yr

Rated Power (kW):	999
Not EPA Certified:	No
Certified EPA Tier 1:	No
Certified EPA Tier 2:	Yes
Certified EPA Tier 3:	No
Blue Sky Engine:	No

Conversion Factors:

Avg brake-specific fuel consumption (BSFC) =	7000	Btu/hp-hr
1 hp =	0.746	kW
1 lb =	453.592	g

g/kW-hr x (lb/453g) x (hp-hr/7000 Btu) x (0.746 kW/hp) x 10^6 Btu/MMBtu = lb/MMBtu
g/kW-hr x 0.23486 = lb/MMBtu

Pollutant:	NOx	VOC (total TOC--> VOCs)		CO	PM=PM10
EMISSION FACTORS USED FOR G2 (lb/MMBtu):	1.50	0.31		0.82	0.047

AP-42, Ch 3.4 (10/96) EMISSION FACTORS (diesel fueled, uncontrolled)

Pollutant:	NOx	VOC (total TOC--> VOCs)		CO	PM10
Emission Factor (lb/MMBtu)	3.2	0.09		0.85	0.13
Emission Factor (g/kW-hr))	13.63	0.38		3.62	0.55

Note: Rating for AP-42 PM10 EF of 0.0573 is "E" or Poor. Used Tier 1 PM EF and presumed PM = PM10

40 CFR 89, EPA CERTIFIED GENERATOR EMISSION FACTORS (g/kW-hr converted to lb/MMBtu)

Rated Power (kW)	Tier	Applicable?	Model Year[1]	NOx	HC	NMHC + NOx	CO	PM = PM10
kW< 8	1	0	2000	—	0.36	2.47	1.88	0.23
kW< 8	2	0	2005	—	0.36	1.76	1.88	0.19
kW< 8	BlueSky	0	n/a	—	0.36	1.08	1.88	0.11
8 ≤ kW < 19	1	0	2000	—	0.36	2.23	1.55	0.19
8 ≤ kW < 19	2	0	2005	—	0.36	1.76	1.55	0.19
8 ≤ kW < 19	BlueSky	0	n/a	—	0.36	1.06	1.55	0.11
19 ≤ kW < 37	1	0	1999	—	0.36	2.23	1.29	0.19
19 ≤ kW < 37	2	0	2004	—	0.36	1.76	1.29	0.14
19 ≤ kW < 37	BlueSky	0	n/a	—	0.36	1.06	1.29	0.085
37 ≤ kW < 75	1	0	1998	2.16	0.36	—	0.95	0.31
37 ≤ kW < 75	2	0	2004	—	0.36	1.76	1.17	0.09
37 ≤ kW < 75	3	0	2008	—	0.36	1.10	1.17	0.09
37 ≤ kW < 75	BlueSky	0	n/a	—	0.36	1.10	1.17	0.056
75 ≤ kW < 130	1	0	1997	2.16	0.36	—	0.95	0.31
75 ≤ kW < 130	2	0	2003	—	0.36	1.55	1.17	0.07
75 ≤ kW < 130	3	0	2007	—	0.36	0.94	1.17	0.07
75 ≤ kW < 130	BlueSky	0	n/a	—	0.36	0.94		0.042
130 ≤ kW < 225	1	0	1996	2.16	0.31	—	2.68	0.13
130 ≤ kW < 225	2	0	2003	—	0.31	1.55	0.82	0.05
130 ≤ kW < 225	3	0	2006	—	0.31	0.94	0.82	0.05
130 ≤ kW ≤ 560	BlueSky	0	n/a	—	0.31	0.94	0.82	0.028
225 ≤ kW < 450	1	0	1996	2.16	0.31	—	2.68	0.13
225 ≤ kW < 450	2	0	2001	—	0.31	1.50	0.82	0.05
225 ≤ kW < 450	3	0	2006	—	0.31	0.94	0.82	0.05
450 ≤ kW ≤ 560	1	0	1996	2.16	0.31	—	2.68	0.13
450 ≤ kW ≤ 560	2	0	2002	—	0.31	1.50	0.82	0.05
450 ≤ kW ≤ 560	3	0	2006	—	0.31	0.94	0.82	0.05
kW > 560	1	0	2000	2.16	0.31	—	2.68	0.13
kW > 560	2	1	2006	—	0.31	1.50	0.82	0.05
kW > 560	BlueSky	0	n/a	—	0.31	0.89	0.82	0.028

40 CFR 89, EPA CERTIFIED GENERATOR EMISSION FACTORS FOR GENERATOR G1 (lb/MMBtu)

Rated Power (kW)	Tier	Applicable?	Model Year[1]	NOx	HC	NMHC + NOx	CO	PM10
kW< 8	1	0	2000	0.00	0.00	0.00	0.00	0.00
kW< 8	2	0	2005	0.00	0.00	0.00	0.00	0.00
kW< 8	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
8 ≤ kW < 19	1	0	2000	0.00	0.00	0.00	0.00	0.00
8 ≤ kW < 19	2	0	2005	0.00	0.00	0.00	0.00	0.00
8 ≤ kW < 19	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
19 ≤ kW < 37	1	0	1999	0.00	0.00	0.00	0.00	0.00
19 ≤ kW < 37	2	0	2004	0.00	0.00	0.00	0.00	0.00
19 ≤ kW < 37	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	1	0	1998	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	2	0	2004	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	3	0	2008	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	1	0	1997	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	2	0	2003	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	3	0	2007	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
130 ≤ kW < 225	1	0	1996	0.00	0.00	0.00	0.00	0.00
130 ≤ kW < 225	2	0	2003	0.00	0.00	0.00	0.00	0.00
130 ≤ kW < 225	3	0	2006	0.00	0.00	0.00	0.00	0.00
130 ≤ kW ≤ 560	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
225 ≤ kW < 450	1	0	1996	0.00	0.00	0.00	0.00	0.00
225 ≤ kW < 450	2	0	2001	0.00	0.00	0.00	0.00	0.00
225 ≤ kW < 450	3	0	2006	0.00	0.00	0.00	0.00	0.00
450 ≤ kW ≤ 560	1	0	1996	0.00	0.00	0.00	0.00	0.00
450 ≤ kW ≤ 560	2	0	2002	0.00	0.00	0.00	0.00	0.00
450 ≤ kW ≤ 560	3	0	2006	0.00	0.00	0.00	0.00	0.00
kW > 560	1	0	2000	0.00	0.00	0.00	0.00	0.00
kW > 560	2	1	2006	0.00	0.31	1.50	0.82	0.05
kW > 560	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
EMISSION FACTORS FOR GENERATOR G2 (lb/MMBTU):				**0.00**	**0.31**	**1.50**	**0.82**	**0.047**

Facility: Knife River, Inc
7/22/2014 14:08 Permit/Facility ID: P-2014.0004 777-00533

IC Engine 2 Powering an Electrical Generator > 600 hp (447 kW) AP-42 Section 3.4 (diesel fueled, uncontrolled)

Fuel Type Toggle =	1	999 kw	User Input Weight % Sulfur = 0.0015%
Fuel Consumption Rate	68.45 gal/hr		AP-42 3.4-1 SO2 EF = 1.01 x S
Calculated MMBtu/hr	9.38 MMBtu/hr		
Max Daily Operation	13 hr/day		EPA Certified Generator (Tier 1, 2, 3, or Blue Sky)
Max Annual Operation	1,161 hrs/yr		

Pollutant	Emission Factor[a] (lb/MMBtu)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PM [b]	0.1	0.938	5.45E-01	1.24E-01
PM-10 (total) [d]	0.05	0.522	3.03E-01	6.91E-02
PM-2.5	0.0556	0.522	3.03E-01	6.91E-02
CO [b]	0.82	7.710	4.48E+00	
NOx[b]	1.50	14.099	8.18E+00	1.87E+00
SO_2 [b] (total SOx presumed SO2)	0.001515	0.014	0.008	1.88E-03
VOC [b] (total TOC--> VOCs)	0.31	2.908	1.688	
Lead				
HCl [e]				
Dioxins[e]				
2,3,7,8-TCDD				
Total TCDD				
1,2,3,7,8-PeCDD				
Total PeCDD				
1,2,3,4,7,8-HxCDD[c]				
1,2,3,6,7,8-HxCDD				
1,2,3,7,8,9-HxCDD[c]				
Total HxCDD				
1,2,3,4,6,7,8-Hp-CDD[c]				
Total HpCDD[c]				
Octa CDD[c]				
Total PCDD[c]				
Furans[e]				
2,3,7,8-TCDF				
Total TCDF[c]				
1,2,3,7,8-PeCDF				
2,3,4,7,8-PeCDF				
Total PeCDF[c]				
1,2,3,4,7,8-HxCDF				
1,2,3,6,7,8-HxCDF				
2,3,4,6,7,8-HxCDF				
1,2,3,7,8,9-HxCDF				
Total HxCDF[c]				
1,2,3,4,6,7,8-HpCDF				
1,2,3,4,7,8,9-HpCDF				
Total HpCDF[c]				
Octa CDF[c]				
Total PCDF[c]				
Total PCDD/PCDF[c]				
Non-PAH HAPs				
Acetaldehyde[c] (NESHAP HAP, TAP set to zero)	2.52E-05	2.36E-04	1.37E-04	0.00E+00
Acrolein[c] (NESHAP HAP, TAP set to zero)	7.88E-06	7.39E-05	4.29E-05	0.00E+00
Benzene[c,e] (NESHAP HAP, TAP set to zero)	7.76E-04	7.28E-03	4.23E-03	0.00E+00
1,3-Butadiene[c,e] (NESHAP HAP, TAP set to zero)				
Ethylbenzene[e]				
Formaldehyde[c,e] (NESHAP HAP, TAP set to zero)	7.89E-05	7.40E-04	4.30E-04	0.00E+00
Hexane[e]				
Isooctane				
Methyl Ethyl Ketone[e]				
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]				
Toluene[c,e] (NESHAP HAP, TAP set to zero)	2.81E-04	2.64E-03	1.53E-03	0.00E+00
Xylene[c,e] (NESHAP HAP, TAP set to zero)	1.93E-04	1.81E-03	1.05E-03	0.00E+00
POM (7-PAH Group)(NESHAP HAP, TAP set to zero)		4.22E-05		0.00E+00

Pollutant	Emission Factor[a] (lb/MMBtu)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr Average
PAH HAPs (NESHAP HAP, TAP set to zero)				
2-Methylnaphthalene				
3-Methylchloranthrene[e]				
Acenaphthene[c1]	4.68E-06	4.39E-05	2.55E-05	0.00E+00
Acenaphthylene[c1]	9.23E-06	8.66E-05	5.03E-05	0.00E+00
Anthracene[c1]	1.23E-06	1.15E-05	6.70E-06	0.00E+00
Benzo(a)anthracene[c1]	6.22E-07	5.83E-06	3.39E-06	0.00E+00
Benzo(a)pyrene[c1,e]	2.57E-07	2.41E-06	1.40E-06	0.00E+00
Benzo(b)fluoranthene[c1]	1.11E-06	1.04E-05	6.04E-06	0.00E+00
Benzo(e)pyrene				0.00E+00
Benzo(g,h,i)perylene[c1]	5.56E-07	5.22E-06	3.03E-06	0.00E+00
Benzo(k)fluoranthene[c1]	2.18E-07	2.04E-06	1.19E-06	0.00E+00
Chrysene[c1]	1.53E-06	1.44E-05	8.33E-06	0.00E+00
Dibenzo(a,h)anthracene[c1]	3.46E-07	3.25E-06	1.88E-06	0.00E+00
Dichlorobenzene				0.00E+00
Fluoranthene[c1]	4.03E-06	3.78E-05	2.19E-05	0.00E+00
Fluorene[c1]	1.28E-05	1.20E-04	6.97E-05	0.00E+00
Indeno(1,2,3-cd)pyrene[c1]	4.14E-07	3.88E-06	2.25E-06	0.00E+00
Naphthalene[c1,e]	1.30E-04	1.22E-03	7.08E-04	0.00E+00
Perylene				0.00E+00
Phenanthrene[c1]	4.08E-05	3.83E-04	2.22E-04	0.00E+00
Pyrene[c1]	3.71E-06	3.48E-05	2.02E-05	0.00E+00
Non-HAP Organic Compounds				
Acetone[e]				
Benzaldehyde				
Butane				
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene				
Heptane				
Hexanal				
Isovaleraldehyde				
2-Methyl-1-pentene				
2-Methyl-2-butene				
3-Methylpentane				
1-Pentene				
n-Pentane				
Valeraldehyde				
Metals				
Antimony[e]				
Arsenic[e]				
Barium[e]				
Beryllium[e]				
Cadmium[e]				
Chromium[e]				
Cobalt[e]				
Copper[e]				
Hexavalent Chromium[e]				
Manganese[e]				
Mercury[e]				
Molybdenum[e]				
Nickel[e]				
Phosphorus[e]				
Silver[e]				
Selenium[e]				
Thallium[e]				
Vanadium[e]				
Zinc[e]				

a) Emission factors are from AP-42
b) AP-42, Table 3.4-1, Gaseous Emission Factors for Large Stationary Diesel and All Stationary Dual Fuel Engines, 10/96
c) AP-42, Table 3.4-3, Speciated Organic Compound Emission Factors for Large Uncontrolled Stationary Diesel Engines Emission Factor Rating E, 10/96
c1) AP-42, Table 3.4-4, PAH Emission Factors for Large Uncontrolled Stationary Diesel Engines, Emission Factor Rating E, 10/96
d) AP-42, Table 3.4-2, Particulate and Particle-Sizing Emission Factors for Large Uncontrolled Stationary Diesel Engines Emission Factor Rating E, 10/96
e) IDAPA Toxic Air Pollutant - per discussions with Dr. Carl Brown of DEQ all TAPs are inherently regulated by NESHAP. Therefore TAPs from egnines are not include in the analysis per Section 210.20

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Facility: **Knife River, Inc**
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Max Hourly Production	400 T/hr	96% T/hr is Aggregate & RAP =	384 T/hr
Max Daily Production	5,000 Tons/day	96% T/day is Aggregate & RAP =	4,800 T/day
Max Annual Production	325,000 Tons/yr	96% T/yr is Aggregate & RAP =	312,000 T/yr

Fine PM emitted from RAP use is negligible (see assumptions on page 1 of this spreadsheet). Worst case emissions are for 0% RAP

Aggregate Front-end Loader Drop Points, AP-42 13.2.4 (11/06)

$E = k (0.0032) \times (U/5)^{1.3} / (M/2)^{1.4}$ = 3.31E-03 for PM 1.56E-03 lb/ton for PM10 2.37E-04 lb/ton for PM2.5

k = particle size multiplier 0.74 for PM 0.35 for PM10 0.053 for PM2.5
U = mean wind speed = 10 mph Wind speed range for source conditions for Equation 1: 1.3 to 15 mph. Select 10 mph as base case wind speed.
M = moisture content = 3 %

Moisture Content 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: Aggregate moisture content into dryer typically 3 to 7 %
BAAQMD, Hot Mixing Asphalt Facilities, Engineering Evaluation Template, www.baaqmd.gov/pmt/handbook/s11c02ev.htm: Bulk aggregate moisture content typically stabilizes between 3 and 5% by weight.

Windspeed Variation Factors for AERMOD modeling:				PM10		PM2.5	
Wind Category	Upper windspeed (m/sec)	Avg windspeed (m/sec)	Avg windspeed (mph)	E @ avg mph	F = Eavg mph/ E@10mph	E @ avg mph	F = Eavg mph/ E@10mph
Cat 1:	1.54	0.77	1.72	1.59E-04	0.1016	2.41E-05	0.1016
Cat 2:	3.09	2.32	5.18	6.65E-04	0.4251	1.01E-04	0.4251
Cat 3:	5.14	4.12	9.20	1.40E-03	0.8979	2.13E-04	0.8979
Cat 4:	8.23	6.69	14.95	2.64E-03	1.687	3.99E-04	1.687
Cat 5:	10.80	9.52	21.28	4.17E-03	2.670	6.32E-04	2.670
Cat 6:	14.00	12.40	27.74	5.89E-03	3.767	8.92E-04	3.767

Aggregate Front End Loader Drop Points

Drop to storage pile and drop to bins: 384 T/hr 2 Transfer Points

Pollutant	Calculated Emission Factor from AP-42 13.2.4 (lb/ton)	Emissions Per Transfer Point				Total Emissions			
		Emissions (lb/hr) 1-hr Average	Emissions (lb/hr) 24-hr Average	Emissions (T/yr)	Emissions (lb/hr) Annual Average	Emissions (lb/hr) 1-hr Average	Emissions (lb/hr) 24-hr Average	Emissions (T/yr)	Emissions (lb/hr) Annual Average
PM (total)	3.31E-03	1.27	0.66	0.52	0.12	2.54	1.32	1.03	0.24
PM-10 (total)	1.56E-03	0.60	0.31	0.24	0.06	1.20	0.63	0.49	0.11
PM-2.5	2.37E-04	0.09	0.05	0.04	0.01	0.18	0.09	0.07	0.02

Conveyor and Scalping Screen Emission Points

Moisture/Control %:
AP-42 Table 11.19.2-2, Note b. Moisture content of uncontrolled sources ranged from 0.21 to 1.3%
AP-42 Table 11.19.2-2, Note b. Moisture content of controlled (water spray) sources ranged from 0.55 to 2.88% --> ~91.3% control for screening, ~95% control for conveyor transfer
Bulk aggregate for HMA plants typically stabilizes between 3 and 5% by weight--> Apply additional 90% control to lb/hr, etc. for the higher moisture.

Aggregate Weigh Conveyor

Transfer from bins to conveyor and from conveyor to scalping screen: 384 T/hr 2 Transfer Points

Pollutant	Calculated Emission Factor from AP-42 13.2.4 (lb/ton)	Emissions Per Transfer Point				Total Emissions			
		Emissions (lb/hr) 1-hr Average	Emissions (lb/hr) 24-hr Average	Emissions (T/yr)	Emissions (lb/hr) Annual Average	Emissions (lb/hr) 1-hr Average	Emissions (lb/hr) 24-hr Average	Emissions (T/yr)	Emissions (lb/hr) Annual Average
PM (total)	3.31E-03	1.27E-01	6.61E-02	5.16E-02	1.18E-02	2.54E-01	1.32E-01	1.03E-01	2.35E-02
PM-10 (total)	1.56E-03	6.00E-02	3.13E-02	2.44E-02	5.57E-03	1.20E-01	6.25E-02	4.88E-02	1.11E-02
PM-2.5	2.37E-04	9.09E-03	4.73E-03	3.69E-03	8.43E-04	1.82E-02	9.47E-03	7.39E-03	1.69E-03

Aggregate Scalping Screen, AP-42 11.19 (8/04)

Aggregate flow across scalping screen onto conveyor: 384 T/hr

Pollutant	Emission Factor Table 11.19.2-2 SCREENING UNCONTROLLED (lb/ton)	Emissions (lb/hr) 1-hr Average	Emissions (lb/hr) 24-hr Average	Emissions (T/yr)	Emissions (lb/hr) Annual Average
PM (total)	0.025	0.960	5.00E-01	3.90E-01	8.90E-02
PM-10 (total)	0.0087	0.334	1.74E-01	1.36E-01	3.10E-02
PM-2.5	1.30E-04	0.005	2.60E-03	2.03E-03	4.63E-04

Aggregate Conveyor to Drum (~top end of the drum)

Aggregate transfer from conveyor to drum dryer (1 transfer point): 384 T/hr

Pollutant	Calculated Emission Factor from AP-42 13.2.4 (lb/ton)	Emissions Per Transfer Point			
		Emissions (lb/hr) 1-hr Average	Emissions (lb/hr) 24-hr Average	Emissions (T/yr)	Emissions (lb/hr) Annual Average
PM (total)	3.31E-03	1.27E-01	6.61E-02	5.16E-02	1.18E-02
PM-10 (total)	1.56E-03	6.00E-02	3.13E-02	2.44E-02	5.57E-03
PM-2.5	2.37E-04	9.09E-03	4.73E-03	3.69E-03	8.43E-04

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

Asphalt Tank Heater - #2 Oil Fired, Estimated GHG Emissions Using AP-42 Sections 11.1 (HMA Plants) & 1.3 (Fuel Oil Combustion)

Hot Mix Plant Fuel Type Toggle (#2) =	0
Hot Mix Plant Fuel Type Toggle (Used Oil) =	0
Hot Mix Plant Fuel Type Toggle (NG) =	1
Hot Mix Plant Fuel Type Toggle (LPG) =	1
Tank Heater Fuel Type Toggle (NG) =	0
Tank Heater Fuel Type Toggle (#2) =	1

Note: CO2e emissions from the silo, loadout operation, and the tanks were assumed to be negligible (less than 1 ton per year).

Green House Gas Emissions When Combusting #2 Fuel Oil

Asphalt Plant Emissions	Emission Factor (EF)	EF Units	EF Source	Emissions (T/yr)	Global Warming Potential	CO_2e (T/yr)
CO_2	33.00	lb/T	AP-42 Table 11.1-7	0.00	1.00	0.00
Methane	0.012	lb/T	AP-42 Table 11.1-8	0.00	21.00	0.00
N_2O	0.26	lb/10^3 gal	AP-42 Table 1.3-8	0.000000	310.00	0.00

Tank Heater	Emission Factor (EF)	EF Units	EF Source	T/yr	Global Warming Potential	CO_2e T/yr
CO_2	Assumes all carbon is converted to CO_2			231.19	1	231.19
Methane	0.216	lb/10^3 gal	AP-42 Table 1.3-3	1.89E-03	21	0.04
N_2O	0.26	lb/10^3 gal	AP-42 Table 1.3-8	1.85E+00	310	573.49

Green House Gas Emissions When Combusting Used Oil

Asphalt Plant Emissions	Emission Factor (EF)	EF Units	EF Source	Emissions (T/yr)	Global Warming Potential	CO_2e (T/yr)
CO_2	33.00	lb/T	AP-42 Table 11.1-7	0.00	1.00	0.00
Methane	0.012	lb/T	AP-42 Table 11.1-8	0.00	21.00	0.00
N_2O	0.53	lb/10^3 gal	AP-42 Table 1.3-8	0.000000	310.00	0.00

Green House Gas Emissions When Combusting Natural Gas

Asphalt Plant Emissions	Emission Factor (EF)	EF Units	EF Source	Emissions (T/yr)	Global Warming Potential	CO_2e (T/yr)
CO_2	33.00	lb/T	AP-42 Table 11.1-7	5,362.50	1.00	5,362.50
Methane	0.012	lb/T	AP-42 Table 11.1-8	1.95	21.00	40.95
N_2O	0.26	lb/10^3 gal	AP-42 Table 1.3-8	0.115622	310.00	35.84

Tank Heater	Emission Factor (EF)	EF Units	EF Source	T/yr	Global Warming Potential	CO_2e T/yr
CO_2	0.12	lb/scf	AP-42 Table 1.4-2	0.00	1	0.00
Methane	0.0000023	lb/scf	AP-42 Table 1.4-2	0.00E+00	21	0.00
N_2O	0.0000022	lb/scf	AP-42 Table 1.4-2	0.00E+00	310	0.00

Green House Gas Emissions When Combusting LPG

Asphalt Plant Emissions	Emission Factor (EF)	EF Units	EF Source	Emissions (T/yr)	Global Warming Potential	CO_2e (T/yr)
CO_2	33.00	lb/T	AP-42 Table 11.1-7	5,362.50	1.00	5,362.50
Methane	0.012	lb/T	AP-42 Table 11.1-8	1.95	21.00	40.95
N_2O	0.26	lb/10^3 gal	AP-42 Table 1.3-8	0.115622	310.00	35.84

Green House Gas Emissions When Combusting Diesel Fuel

IC Engine 1 < 600 bhp	Emission Factor (EF)	EF Units	EF Source	Emissions (T/yr)	Global Warming Potential	CO_2e (T/yr)
CO_2	1.16	lb/bhp-hr	AP-42 Table 3.4-1	360.93	1.00	360.93

IC Engine 2 > 600 bhp	Emission Factor (EF)	EF Units	EF Source	Emissions (T/yr)	Global Warming Potential	CO_2e (T/yr)
CO_2	1.16	lb/bhp-hr	AP-42 Table 3.4-1	902.33	1.00	902.33

Total Green House Gas Emissions

Total Emissions	CO_2e (T/yr)
CO_2	6,856.95
Methane	40.99
N_2O	609.33
Grand Total	**7,507.27**

Facility:	**Knife River, Inc**			**EMISSION INVENTORY**
7/22/2014 14:08	**Permit/Facility ID:**	**P-2014.0004**	**777-00533**	**POUNDS PER HOUR**

Max Controlled Emissions of Any Pollutant from Drum Mix HMA Plant Fabric Filter, Tank Heater, Generator, Silo Fill/Load-out

A. Drum Mix Plant: 400 Tons/hour 813 Hours/year 325,000 Tons/year 5,000 Tons/day

Maximum emission for each pollutant from any fuel-burning options selected on "Facility Data" worksheet. Fuels Selected = Natural Gas LPG/Propane

B. Tank Heater: 0.6000 MMBtu/hr 4,000 Hours/year 24 hrs/day

Maximum emission for each pollutant for heater burning any fuel selected on "Facility Data" worksheet. Fuels Selected = Natural Gas

C1. IC Engine 1: 13.69 gal/hour 2322 Hours/year IC Engine < 600hp #2 Fuel Oil 13 hrs/day

C2. IC Engine 2: 68.45 gal/hour 1161 Hours/year IC Engine > 600hp #2 Fuel Oil 13 hrs/day

Pollutant	A Drum Mix Max Emission Rate for Pollutant (lb/hr)	B Asphalt Tank Heater Max Emission Rate for Pollutant (lb/hr)	C IC Engine 1 + IC Engine 2 Max Emission Rate for Pollutant (lb/hr)	D Load-out & Silo Filling Emission Rate for Pollutant (lb/hr)	E TOTAL of Max Emission Rates from A, B, C & D (lb/hr)
PM (total)	13.20	4.47E-03	1.03E+00	2.09E-01	14.44
PM-10 (total)	9.20	4.47E-03	6.53E-01	2.09E-01	10.07
PM-2.5	8.92	4.47E-03	6.53E-01	2.09E-01	9.79
CO	52.00	4.94E-02	9.25E+00	5.40E-01	61.84
NOx	15.60	5.88E-02	1.59E+01		31.52
SO_2	1.36	3.53E-04	1.58E-02		1.38
VOC	12.80	3.24E-03	3.49E+00	1.56E+00	17.86
Lead	2.48E-04	2.94E-07	0.00E+00		2.48E-04
HCl [e]	0.00E+00	0.00E+00	0.00E+00		0.00E+00
Dioxins [e]					
2,3,7,8-TCDD	0.00E+00				0.00E+00
Total TCDD	0.00E+00				0.00E+00
1,2,3,7,8-PeCDD	0.00E+00				0.00E+00
Total PeCDD	0.00E+00				0.00E+00
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00			0.00E+00
1,2,3,6,7,8-HxCDD	0.00E+00				0.00E+00
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00			0.00E+00
Total HxCDD	0.00E+00				0.00E+00
1,2,3,4,6,7,8-Hp-CDD	0.00E+00	0.00E+00			0.00E+00
Total HpCDD	0.00E+00	0.00E+00			0.00E+00
Octa CDD	0.00E+00	0.00E+00			0.00E+00
Total PCDD [h]	0.00E+00	0.00E+00			0.00E+00
Furans [e]					
2,3,7,8-TCDF	0.00E+00				0.00E+00
Total TCDF	0.00E+00	0.00E+00			0.00E+00
1,2,3,7,8-PeCDF	0.00E+00				0.00E+00
2,3,4,7,8-PeCDF	0.00E+00				0.00E+00
Total PeCDF	0.00E+00	0.00E+00			0.00E+00
1,2,3,4,7,8-HxCDF	0.00E+00				0.00E+00
1,2,3,6,7,8-HxCDF	0.00E+00				0.00E+00
2,3,4,6,7,8-HxCDF	0.00E+00				0.00E+00
1,2,3,7,8,9-HxCDF	0.00E+00				0.00E+00
Total HxCDF	0.00E+00	0.00E+00			0.00E+00
1,2,3,4,6,7,8-HpCDF	0.00E+00				0.00E+00
1,2,3,4,7,8,9-HpCDF	0.00E+00				0.00E+00
Total HpCDF	0.00E+00	0.00E+00			0.00E+00
Octa CDF	0.00E+00	0.00E+00			0.00E+00
Total PCDF [h]	0.00E+00	0.00E+00			0.00E+00
Total PCDD/PCDF [h]	0.00E+00	0.00E+00	0.00E+00		0.00E+00
Non-PAH HAPs					
Acetaldehyde [e]	0.00E+00		0.00E+00		0.00E+00
Acrolein [e]	0.00E+00		0.00E+00		0.00E+00
Benzene [e]	1.45E-02	5.64E-07	0.00E+00	8.02E-05	1.45E-02
1,3-Butadiene [e]			0.00E+00		0.00E+00
Ethylbenzene [e]	5.00E-02			2.43E-03	5.24E-02
Formaldehyde [e]	1.15E-01	2.01E-05	0.00E+00	1.36E-04	1.15E-01
Hexane [e]	1.92E-01	1.06E-03		1.30E-03	1.94E-01
Isooctane	8.33E-03			1.56E-05	8.35E-03
Methyl Ethyl Ketone [e]	0.00E+00			4.25E-04	4.25E-04
Pentane [e]		1.53E-03			1.53E-03
Propionaldehyde [e]	0.00E+00				0.00E+00
Quinone [e]	0.00E+00				0.00E+00
Methyl chloroform [e]	1.00E-02				1.00E-02
Toluene [e]	3.13E-02	2.00E-06	0.00E+00	1.82E-03	3.31E-02
Xylene [e]	4.17E-02		0.00E+00	1.05E-02	5.22E-02
POM (7-PAH Group) [e]	2.03E-05	3.06E-09	0.00E+00	1.71E-05	**3.74E-05**
TOTAL PAH HAPs	6.96E-03	5.06E-07	0.00E+00	7.51E-04	7.71E-03

Pollutant	A Drum Mix Max Emission Rate for Pollutant (lb/hr)	B Asphalt Tank Heater Max Emission Rate for Pollutant (lb/hr)	C IC Engine IC1 + IC2 Max Emission Rate for Pollutant (lb/hr)	D Load-out & Silo Filling Emission Rate for Pollutant (lb/hr)	E TOTAL of Max Emission Rates from A, B, C & D (lb/hr)
PAH HAPs					
2-Methylnaphthalene	2.75E-03	6.45E-09		3.01E-04	**3.05E-03**
3-Methylchloranthrene [e]	0.00E+00	4.83E-10			**4.83E-10**
Acenaphthene	5.19E-05	4.83E-10	0.00E+00	3.29E-05	**8.48E-05**
Acenaphthylene	3.19E-04	4.83E-10	0.00E+00	3.54E-06	**3.23E-04**
Anthracene	8.16E-06	6.45E-10	0.00E+00	8.85E-06	**1.70E-05**
Benzo(a)anthracene [e]	7.79E-06	4.83E-10	0.00E+00	2.40E-06	**1.02E-05**
Benzo(a)pyrene [e]	3.64E-07	3.22E-10	0.00E+00	2.91E-07	**6.55E-07**
Benzo(b)fluoranthene [e]	3.71E-06	4.83E-10	0.00E+00	9.61E-07	**4.67E-06**
Benzo(e)pyrene	4.08E-06	0.00E+00		9.87E-07	**5.07E-06**
Benzo(g,h,i)perylene	1.48E-06	3.22E-10	0.00E+00	2.40E-07	**1.72E-06**
Benzo(k)fluoranthene [e]	1.52E-06	4.83E-10	0.00E+00	2.78E-07	**1.80E-06**
Chrysene [e]	6.68E-06	4.83E-10	0.00E+00	1.30E-05	**1.97E-05**
Dibenzo(a,h)anthracene [e]	0.00E+00	3.22E-10	0.00E+00	4.68E-08	**4.71E-08**
Dichlorobenzene	0.00E+00	3.22E-07			**3.22E-07**
Fluoranthene	2.26E-05	8.06E-10	0.00E+00	6.32E-06	**2.90E-05**
Fluorene	1.41E-04	7.52E-10	0.00E+00	9.74E-05	**2.38E-04**
Indeno(1,2,3-cd)pyrene [e]	2.60E-07	4.83E-10	0.00E+00	5.94E-08	**3.20E-07**
Naphthalene [e]	3.34E-03	1.64E-07	0.00E+00	1.58E-04	**3.50E-03**
Perylene	3.26E-07	0.00E+00		2.78E-06	**3.11E-06**
Phenanthrene	2.82E-04	4.57E-09	0.00E+00	1.02E-04	**3.84E-04**
Pyrene	2.00E-05	1.34E-09	0.00E+00	1.90E-05	**3.90E-05**
Non-HAP Organic Compounds					
Acetone [e]	0.00E+00	0.00E+00		4.05E-04	4.05E-04
Benzaldehyde	0.00E+00	0.00E+00			0.00E+00
Butane	1.40E-01	1.24E-03			1.41E-01
Butyraldehyde	0.00E+00	0.00E+00			0.00E+00
Crotonaldehyde [e]	0.00E+00	0.00E+00			0.00E+00
Ethylene	1.46E+00	0.00E+00		6.15E-03	1.46E+00
Heptane	1.96E+00	0.00E+00			1.96E+00
Hexanal	0.00E+00	0.00E+00			0.00E+00
Isovaleraldehyde	0.00E+00	0.00E+00			0.00E+00
2-Methyl-1-pentene	8.33E-01	0.00E+00			8.33E-01
2-Methyl-2-butene	1.21E-01	0.00E+00			1.21E-01
3-Methylpentane	3.96E-02	0.00E+00			3.96E-02
1-Pentene	4.58E-01	0.00E+00			4.58E-01
n-Pentane	4.38E-02	0.00E+00			4.38E-02
Valeraldehyde [e]	0.00E+00	0.00E+00			0.00E+00
Metals					
Antimony [e]	3.75E-05	0.00E+00			3.75E-05
Arsenic [e]	2.08E-05	5.37E-08			**2.08E-05**
Barium [e]	1.21E-03	2.59E-06			1.21E-03
Beryllium [e]	0.00E+00	3.22E-09			**3.22E-09**
Cadmium [e]	1.52E-05	2.95E-07			**1.55E-05**
Chromium [e]	1.15E-03	8.24E-07			1.15E-03
Cobalt [e]	5.42E-06	4.94E-08			5.47E-06
Copper [e]	6.46E-04	5.00E-07			6.46E-04
Hexavalent Chromium [e]	1.67E-05	0.00E+00			**1.67E-05**
Manganese [e]	1.60E-03	0.00E+00			1.60E-03
Mercury [e]	5.00E-05	0.00E+00			5.00E-05
Molybdenum [e]	0.00E+00	6.47E-07			6.47E-07
Nickel [e]	2.34E-03	0.00E+00			**2.34E-03**
Phosphorus [e]	5.83E-03	0.00E+00			5.83E-03
Silver [e]	1.00E-04	0.00E+00			1.00E-04
Selenium [e]	7.29E-05	0.00E+00			7.29E-05
Thallium [e]	8.54E-07	0.00E+00			8.54E-07
Vanadium [e]	0.00E+00	1.35E-06			1.35E-06
Zinc [e]	1.27E-02	0.00E+00			1.27E-02

e) IDAPA Toxic Air Pollutant

Criteria Pollutant lb/hr emissions are maximum 1-hr averages

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Pollutants shown in blue text are emitted only when burning Used Oil, but not when burning #2 Fuel Oil or Natural Gas

Facility: Knife River, Inc
7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

EMISSION INVENTORY
POUNDS PER HOUR

Max Controlled Emissions of Any Pollutant from Drum Mix HMA Plant Fabric Filter, Tank Heater, Generator, Silo Fill/Load-out

A. Drum Mix Plant: 400 Tons/hour 813 Hours/year 325,000 Tons/year HMA throughput 5,000 hrs/day
Maximum emission for each pollutant from any fuel-burning option selected. Fuels Selected = Natural Gas LPG/Propane
B. Tank Heater: 0.6000 MMBtu/hr 4,000 Hours/year 24 hrs/day
Maximum emission for each pollutant from any fuel-burning option selected. Fuels Selected = Natural Gas
C1. IC Engine 1: 13.69 gal/hour 2322 Hours/year #2 Fuel Oil Generator < 600hp 13 hrs/day
C2. IC Engine 2: 68.45 gal/hour 1161 Hours/year #2 Fuel Oil Generator > 600hp 13 hrs/day

Pollutant	A Drum Mix Max Emission Rate for Pollutant (lb/hr)	B Asphalt Tank Heater Max Emission Rate for Pollutant (lb/hr)	C IC Engine Max Emission Rate for Pollutant (lb/hr)	D Load-out & Silo Filling Emission Rate for Pollutant (lb/hr)	E TOTAL of Max Emission Rates from A, B, C & D (lb/hr)
non-PAH HAPs[e]					
Bromomethane[e]				8.32E-05	8.32E-05
2-Butanone (see Methyl Ethyl Ketone)					
Carbon disulfide[e]				1.13E-04	1.13E-04
Chloroethane (Ethyl chloride[e])				1.82E-06	1.82E-06
Chloromethane (Methyl chloride[e])				1.30E-04	1.30E-04
Cumene				9.53E-04	9.53E-04
n-Hexane					
Methylene chloride (Dichloromethane[e])				0.00E+00	0.00E+00
MTBE					
Styrene[e]				6.33E-05	6.33E-05
Tetrachloroethene (Tetrachloroethylene[e])				6.67E-05	6.67E-05
1,1,1-Trichloroethane (Methyl chloroform[e])					
Trichloroethene (Trichloroethylene[e])					
Trichlorofluoromethane				1.13E-05	1.13E-05
m-/p-Xylene[e]				3.55E-03	3.55E-03
o-Xylene[e]				6.93E-03	6.93E-03
Phenol[e,f]				8.38E-04	8.38E-04
Non-HAP Organic Compounds					
Methane				5.63E-02	5.63E-02

e) IDAPA Toxic Air Pollutant

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Facility: Knife River, Inc

7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

EMISSION INVENTORY

TONS PER YEAR

Max Controlled Emissions of Any Pollutant from Drum Mix HMA Plant Fabric Filter, Tank Heater, Generator, Silo Fill/Load-out

A. Drum Mix Plant: 400 Tons/hour 813 Hours/year 325,000 Tons/year HMA throughput 5,000 hrs/day

Maximum emission for each pollutant from any fuel-burning options selected on "Facility Data" worksheet. Fuels Selected = Natural Gas LPG/Propane

B. Tank Heater: 0.6000 MMBtu/hr 4,000 Hours/year 24 hrs/day

Maximum emission for each pollutant for heater burning any fuel selected on "Facility Data" worksheet. Fuels Selected = Natural Gas

C1. IC Engine 1: 13.69 gal/hour 2322 Hours/year IC Engine <600hp #2 Fuel Oil 13 hrs/day

C2. IC Engine 2: 68.45 gal/hour 1161 Hours/year IC Engine > 600hp #2 Fuel Oil 13 hrs/day

Pollutant	A Drum Mix Max Emission Rate for Pollutant (T/yr)	B Asphalt Tank Heater Max Emission Rate for Pollutant (T/yr)	C IC Engine IC1 + IC2 Max Emission Rate for Pollutant (T/yr)	D Load-out & Silo Filling, Emission Rate for Pollutant (T/yr)	E POINT SOURCE TOTAL of Max Emission Rates from A, B, & C (T/yr) Exclude Fugitves (D)
PM (total)	5.36	8.94E-03	6.47E-01	8.48E-02	6.02
PM-10 (total)	3.74	8.94E-03	4.55E-01	8.48E-02	4.20
PM-2.5	3.62	8.94E-03	4.55E-01	8.48E-02	4.09
CO	21.13	9.88E-02	6.27E+00	2.19E-01	27.49
NOx	6.34	1.18E-01	1.02E+01		16.69
SO_2	0.55	7.06E-04	8.25E-03		0.56
VOC	5.20	6.47E-03	2.36E+00	6.35E-01	7.57
Lead	1.01E-04	5.88E-07	0.00E+00		1.01E-04
HCl [e]	0.00E+00	0.00E+00	0.00E+00		0.00E+00
Dioxins[e]					
2,3,7,8-TCDD	0.00E+00				0.00E+00
Total TCDD	0.00E+00				0.00E+00
1,2,3,7,8-PeCDD	0.00E+00				0.00E+00
Total PeCDD	0.00E+00				0.00E+00
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00			0.00E+00
1,2,3,6,7,8-HxCDD	0.00E+00				0.00E+00
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00			0.00E+00
Total HxCDD	0.00E+00				0.00E+00
1,2,3,4,6,7,8-Hp-CDD	0.00E+00	0.00E+00			0.00E+00
Total HpCDD	0.00E+00	0.00E+00			0.00E+00
Octa CDD	0.00E+00	0.00E+00			0.00E+00
Total PCDD[h]	0.00E+00	0.00E+00			0.00E+00
Furans[e]					
2,3,7,8-TCDF	0.00E+00				0.00E+00
Total TCDF	0.00E+00	0.00E+00			0.00E+00
1,2,3,7,8-PeCDF	0.00E+00				0.00E+00
2,3,4,7,8-PeCDF	0.00E+00				0.00E+00
Total PeCDF	0.00E+00	0.00E+00			0.00E+00
1,2,3,4,7,8-HxCDF	0.00E+00				0.00E+00
1,2,3,6,7,8-HxCDF	0.00E+00				0.00E+00
2,3,4,6,7,8-HxCDF	0.00E+00				0.00E+00
1,2,3,7,8,9-HxCDF	0.00E+00				0.00E+00
Total HxCDF	0.00E+00	0.00E+00			0.00E+00
1,2,3,4,6,7,8-HpCDF	0.00E+00				0.00E+00
1,2,3,4,7,8,9-HpCDF	0.00E+00				0.00E+00
Total HpCDF	0.00E+00	0.00E+00			0.00E+00
Octa CDF	0.00E+00	0.00E+00			0.00E+00
Total PCDF[h]	0.00E+00	0.00E+00			0.00E+00
Total PCDD/PCDF[h]	0.00E+00	0.00E+00			0.00E+00
Non-PAH HAPs					
Acetaldehyde[e]	0.00E+00		1.81E-03		1.81E-03
Acrolein[e]	0.00E+00		2.44E-04		2.44E-04
Benzene[e]	6.34E-02	2.47E-06	6.26E-03	3.51E-04	6.96E-02
1,3-Butadiene[e]	0.00E+00		8.52E-05		8.52E-05
Ethylbenzene[e]	3.90E-02			1.89E-03	3.90E-02
Formaldehyde[e]	5.04E-01	8.82E-05	3.00E-03	5.95E-04	5.07E-01
Hexane[e]	1.50E-01	2.12E-03		1.01E-03	1.52E-01
Isooctane	6.50E-03			1.22E-05	6.50E-03
Methyl Ethyl Ketone[e]	0.00E+00			3.31E-04	0.00E+00
Pentane[e]	0.00E+00	3.06E-03			3.06E-03
Propionaldehyde[e]	0.00E+00				0.00E+00
Quinone[e]	0.00E+00				0.00E+00
Methyl chloroform[e]	7.80E-03				7.80E-03
Toluene[e]	2.44E-02	4.00E-06	2.42E-03	1.42E-03	2.68E-02
Xylene[e]	3.25E-02	0.00E+00	1.67E-03	8.18E-03	3.42E-02
TOTAL Federal HAPs (T/yr)=					**9.08E-01**

Pollutant	A Drum Mix Max Emission Rate for Pollutant (T/yr)	B Asphalt Tank Heater Max Emission Rate for Pollutant (T/yr)	C IC Engine IC1 + IC2 Max Emission Rate for Pollutant (T/yr)	D Load-out & Silo Filling Emission Rate for Pollutant (T/yr)	E POINT SOURCE TOTAL of Max Emission Rates from A, B, & C (T/yr) Exclude Fugitives (D)
PAH HAPs					
2-Methylnaphthalene	1.20E-02	2.82E-08		1.32E-03	1.20E-02
3-Methylchloranthrene[e]	0.00E+00	2.12E-09			2.12E-09
Acenaphthene	2.28E-04	2.12E-09	2.86E-05	1.44E-04	2.56E-04
Acenaphthylene	1.40E-03	2.12E-09	6.13E-05	1.55E-05	1.46E-03
Anthracene	3.58E-05	2.82E-09	1.08E-05	3.88E-05	4.65E-05
Benzo(a)anthracene[e]	3.41E-05	2.12E-09	7.05E-06	1.05E-05	4.12E-05
Benzo(a)pyrene[e]	1.59E-06	1.41E-09	1.81E-06	1.27E-06	3.40E-06
Benzo(b)fluoranthene[e]	1.63E-05	2.12E-09	6.26E-06	4.21E-06	2.25E-05
Benzo(e)pyrene	1.79E-05	0.00E+00		4.32E-06	1.79E-05
Benzo(g,h,l)perylene	6.50E-06	1.41E-09	4.09E-06	1.05E-06	1.06E-05
Benzo(k)fluoranthene[e]	6.66E-06	2.12E-09	1.52E-06	1.22E-06	8.19E-06
Chrysene[e]	2.93E-05	2.12E-09	9.10E-06	5.71E-05	3.84E-05
Dibenzo(a,h)anthracene[e]	0.00E+00	1.41E-09	3.15E-06	2.05E-07	3.16E-06
Dichlorobenzene	0.00E+00	1.41E-06			1.41E-06
Fluoranthene	9.91E-05	3.53E-09	3.85E-05	2.77E-05	1.38E-04
Fluorene	6.18E-04	3.29E-09	1.33E-04	4.27E-04	7.51E-04
Indeno(1,2,3-cd)pyrene[e]	1.14E-06	2.12E-09	3.07E-06	2.60E-07	4.21E-06
Naphthalene[e]	1.46E-02	7.18E-07	8.93E-04	6.93E-04	1.55E-02
Perylene	1.43E-06	0.00E+00		1.22E-05	1.43E-06
Phenanthrene	1.24E-03	2.00E-08	2.86E-04	4.49E-04	1.52E-03
Pyrene	8.78E-05	5.88E-09	3.06E-05	8.31E-05	1.18E-04
Non-HAP Organic Compounds					
Acetone[e]	0.00E+00	0.00E+00		3.16E-04	0.00E+00
Benzaldehyde	0.00E+00	0.00E+00			0.00E+00
Butane	1.09E-01	2.47E-03			1.11E-01
Butyraldehyde	0.00E+00	0.00E+00			0.00E+00
Crotonaldehyde[e]	0.00E+00	0.00E+00			0.00E+00
Ethylene	1.14E+00	0.00E+00		4.80E-03	1.14E+00
Heptane	1.53E+00	0.00E+00			1.53E+00
Hexanal	0.00E+00	0.00E+00			0.00E+00
Isovaleraldehyde	0.00E+00	0.00E+00			0.00E+00
2-Methyl-1-pentene	6.50E-01	0.00E+00			6.50E-01
2-Methyl-2-butene	9.43E-02	0.00E+00			9.43E-02
3-Methylpentane	3.09E-02	0.00E+00			3.09E-02
1-Pentene	3.58E-01	0.00E+00			3.58E-01
n-Pentane[e]	3.41E-02	0.00E+00			3.41E-02
Valeraldehyde[e]	0.00E+00	0.00E+00			0.00E+00
Metals					
Antimony[e]	2.93E-05	0.00E+00			2.93E-05
Arsenic[e]	9.10E-05	2.35E-07			9.12E-05
Barium[e]	9.43E-04	5.18E-06			9.48E-04
Beryllium[e]	0.00E+00	1.41E-08			1.41E-08
Cadmium[e]	6.66E-05	1.29E-06			6.79E-05
Chromium[e]	8.94E-04	1.65E-06			8.95E-04
Cobalt[e]	4.23E-06	9.88E-08			4.32E-06
Copper[e]	5.04E-04	1.00E-06			5.05E-04
Hexavalent Chromium[e]	7.31E-05	0.00E+00			7.31E-05
Manganese[e]	1.25E-03	0.00E+00			1.25E-03
Mercury[e]	3.90E-05	0.00E+00			3.90E-05
Molybdenum[e]	0.00E+00	1.29E-06			1.29E-06
Nickel[e]	1.02E-02	0.00E+00			1.02E-02
Phosphorus[e]	4.55E-03	0.00E+00			4.55E-03
Silver[e]	7.80E-05	0.00E+00			7.80E-05
Selenium[e]	5.69E-05	0.00E+00			5.69E-05
Thallium[e]	6.66E-07				6.66E-07
Vanadium[e]	0.00E+00	2.71E-06			2.71E-06
Zinc[e]	9.91E-03	0.00E+00			9.91E-03

Max Controlled Emissions of Any Pollutant from Drum Mix HMA Plant Fabric Filter, Tank Heater, Generator, Silo Fill/Load-out

A. Drum Mix Plant: 400 Tons/hour 813 Hours/year 325,000 Tons/year 5,000 Tons/day
Maximum emission for each pollutant from any fuel-burning option selected. Fuels Selected = Natural Gas LPG/Propane
B. Tank Heater: 0.6000 MMBtu/hr 4,000 Hours/year 24 hrs/day
Maximum emission for each pollutant from any fuel-burning option selected. Fuels Selected = Natural Gas
C1. Generator G1: 13.69 gal/hour 2322 Hours/year #2 Fuel Oil IC Engine <600hp 13 hrs/day
C2. Generator G2: 68.45 gal/hour 1161 Hours/year #2 Fuel Oil IC Engine > 600hp 13 hrs/day

Pollutant	A Drum Mix Max Emission Rate for Pollutant (T/yr)	B Asphalt Tank Heater Max Emission Rate for Pollutant (T/yr)	C Generator Max Emission Rate for Pollutant (T/yr)	D Load-out, Silo Filling, & Tank Storage Emission Rate for Pollutant (T/yr)	E POINT SOURCE TOTAL of Max Emission Rates from A, B, & C (T/yr) Exclude Fugitives (D)
non-PAH HAPs[a]					
Bromomethane[e]				6.49E-05	0.00E+00
2-Butanone (see Methyl Ethyl Ketone)					0.00E+00
Carbon disulfide[e]				8.79E-05	0.00E+00
Chloroethane (Ethyl chloride[e])				1.42E-06	0.00E+00
Chloromethane (Methyl chloride[e])				1.01E-04	0.00E+00
Cumene				7.43E-04	0.00E+00
n-Hexane				0.00E+00	0.00E+00
Methylene chloride (Dichloromethane[e])				0.00E+00	0.00E+00
MTBE					0.00E+00
Styrene[e]				4.93E-05	0.00E+00
Tetrachloroethene (Tetrachloroethylene[e])				5.20E-05	0.00E+00
1,1,1-Trichloroethane (Methyl chloroform[e])				0.00E+00	0.00E+00
Trichloroethene (Trichloroethylene[e])				0.00E+00	0.00E+00
Trichlorofluoromethane				8.79E-06	0.00E+00
m-/p-Xylene[e]				2.77E-03	0.00E+00
o-Xylene[e]				5.41E-03	0.00E+00
Phenol[e,f]				6.54E-04	0.00E+00
Non-HAP Organic Compounds					
Methane				4.39E-02	0.00E+00

e) IDAPA Toxic Air Pollutant

Facility:	**Knife River, Inc**		
7/22/2014 14:08	**Permit/Facility ID:**	**P-2014.0004**	**777-00533**

CRITERIA POLLUTANT MODELING
POUNDS PER HOUR - POINT AND PSEUDO-STACK SOURCES

Maximum Controlled Emissions of Any Pollutant from Drum Mix HMA Plant with Fabric Filter, Tank Heater, Generator, Silo Fill/Load-out

A. Drum Mix Plant: 400 Tons/hour 813 Hours/year 325,000 Tons/year — 5,000 Tons/day 12.5 hr/day 813 hr/yr
Maximum emission for each pollutant from any fuel-burning options selected on "Facility Data" worksheet. Fuels Selected = 0.0015% S | 0.5000% S | Natural Gas | LPG/Propane
B. Tank Heater: 0.6000 MMBtu Rate 4,000 Hours/year — 24 hrs/day
Maximum emission for each pollutant for heater burning any fuel selected on "Facility Data" worksheet. Fuels Selected = 0.0015% S | Natural Gas
C1. IC Engine 1: 13.69 gal/hour 2322 Hours/year IC Engine < 600hp — 0.0015% S | #2 Fuel Oil — 13 hrs/day
C2. IC Engine 2: 68.45 gal/hour 1161 Hours/year IC Engine > 600hp — 0.0015% S | #2 Fuel Oil — 13 hrs/day

Max 1-hour, 3-hour, and 8-hour averages

Pollutant	A Drum Mix Max Emission Rate for Pollutant (lb/hr)	B Asphaltic Oil Tank Heater Max Emission Rate for Pollutant (lb/hr)	C1 IC1< 600 bhp Generator Max Emission Rate for Pollutant (lb/hr)	C2 IC2 > 600 bhp Generator Max Emission Rate for Pollutant (lb/hr)	D1 Silo Filling Emission Rate for Pollutant (lb/hr)	D2 Load-out Emission Rate for Pollutant (lb/hr)	See Scalping Scrn & Transfer Points" worksheet for 1-hour, 24-hour, and annual PM10 emission rates from those sources.
PM (total)							
PM-10 (total)	9.20	4.47E-03	1.31E-01	5.22E-01	0.00E+00	2.09E-01	
PM-2.5	8.92	4.47E-03	1.31E-01	5.22E-01	0.00E+00	2.09E-01	
CO	52.00	4.94E-02	1.54E+00	7.71E+00	0.00E+00	5.40E-01	
NOx	15.60	5.88E-02	1.76E+00	1.41E+01			
SO_2	1.36	3.53E-04	1.63E-03	1.42E-02			
VOC	12.80	3.24E-03	5.82E-01	2.91E+00	0.00E+00	1.56E+00	
Lead	2.48E-04	2.94E-07					

Max 24-hour averages

Pollutant	A Drum Mix Max Emission Rate for Pollutant (lb/hr)	B Asphalt Tank Heater Max Emission Rate for Pollutant (lb/hr)	C1 G1 < 600 hp Generator Max Emission Rate for Pollutant (lb/hr)	C2 G2 > 600hp Generator Max Emission Rate for Pollutant (lb/hr)	D1 Silo Filling Emission Rate for Pollutant (lb/hr)	D2 . Load-out Emission Rate for Pollutant (lb/hr)	See Scalping Scrn & Transfer Points" worksheet for 1-hour, 24-hour, and annual PM10 emission rates from those sources.
PM (total)							
PM-10 (total)	4.79	4.47E-03	7.11E-02	2.82E-01	0.00E+00	1.09E-01	
PM-2.5	4.65	4.47E-03	7.11E-02	0.282494333	0.00E+00	1.09E-01	
CO							
NOx							
SO_2	0.71	3.53E-04	6.84E-04	7.70E-03			
VOC							
Lead							

Max Annual averages

Pollutant	A Drum Mix Max Emission Rate for Pollutant (lb/hr)	B Asphalt Tank Heater Max Emission Rate for Pollutant (lb/hr)	C1 G1< 600 hp Generator Max Emission Rate for Pollutant (lb/hr)	C2 G2 > 600hp Generator Max Emission Rate for Pollutant (lb/hr)	D1 Silo Filling Emission Rate for Pollutant (lb/hr)	D2 Load-out Emission Rate for Pollutant (lb/hr)	See Scalping Scrn & Transfer Points" worksheet for 1-hour, 24-hour, and annual PM10 emission rates from those sources.
PM (total)							
PM-10 (total)	0.85	2.04E-03	3.46E-02	6.91E-02	0.00E+00	1.94E-02	
PM-2.5	0.83	2.04E-03					
CO							
NOx	1.45	2.69E-02	0.47	1.87			
SO_2	0.13	0.00	4.33E-04	0.00			
VOC							
Lead							

Facility: Knife River, Inc

7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

Max Emissions of Any Pollutant from Drum Mix HMA Plant Fabric Filter, Tank Heater, Generator, Silo Fill/Load-out

A. Drum Mix Plant: 400 Tons/hour 813 Hours/year 325,000 Tons/year 5,000 Tons/day
Maximum emission for each pollutant from any fuel-burning option selected on "Facility Data" worksheet

B. Tank Heater: 0.6000 MMBtu Rated 4,000 Hours/year
Maximum emission for each pollutant for heater burning any fuel selected on "Facility Data" worksheet

D. Include all emissions from Load-out/Silo Filling? No

Short Term Source Factor 586 ELs? 1

C1. IC Engine G1: 13.69 gal/hour 2322 Hours/year IC Engine <600hp #2 Fuel Oil 13 hrs/day
C2. IC Engine G2: 68.45 gal/hour 1161 Hours/year IC Engine > 600hp #2 Fuel Oil 13 hrs/day

Pollutant	TOTAL of Max Emission Rates from A, B, C & D (lb/hr)	TAPs Screening Emission Limit (EL) Increment[b] (lb/hr)	TAPs Emissions Exceed EL Increment?	Modeled? Meets AAC or AACC?
HCl [e]	0.000	0.05	No	
Dioxins		**Toxic Equivalency Factor[c]**	**Adjusted Emission Rate (lb/hr)**	
2,3,7,8-TCDD	0.00E+00	1.0	0.00E+00	
Total TCDD	0.00E+00	n/a		
1,2,3,7,8-PeCDD	0.00E+00	1.0	0.00E+00	
Total PeCDD	0.00E+00	n/a		
1,2,3,4,7,8-HxCDD	0.00E+00	0.1	0.00E+00	
1,2,3,6,7,8-HxCDD	0.00E+00	0.1	0.00E+00	
1,2,3,7,8,9-HxCDD	0.00E+00	0.1	0.00E+00	
Total HxCDD	0.00E+00	n/a		
1,2,3,4,6,7,8-Hp-CDD	0.00E+00	0.01	0.00E+00	
Total HpCDD	0.00E+00	n/a		
Octa CDD	0.00E+00	0.0003	0.00E+00	
Total PCDD	0.00E+00	n/a		
Furans				
2,3,7,8-TCDF	0.00E+00	0.1	0.00E+00	
Total TCDF	0.00E+00	n/a		
1,2,3,7,8-PeCDF	0.00E+00	0.03	0.00E+00	
2,3,4,7,8-PeCDF	0.00E+00	0.3	0.00E+00	
Total PeCDF	0.00E+00	n/a		
1,2,3,4,7,8-HxCDF	0.00E+00	0.1	0.00E+00	
1,2,3,6,7,8-HxCDF	0.00E+00	0.1	0.00E+00	
2,3,4,6,7,8-HxCDF	0.00E+00	0.1	0.00E+00	
1,2,3,7,8,9-HxCDF	0.00E+00	0.1	0.00E+00	
Total HxCDF	0.00E+00	n/a		
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.01	0.00E+00	
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.01	0.00E+00	
Total HpCDF	0.00E+00	n/a		
Octa CDF	0.00E+00	0.0003	0.00E+00	
Total PCDF	0.00E+00	n/a		
Total PCDD/PCDF	0.00E+00	n/a		
TOTAL	Adjusted lb/hr	TAPs EL for 2,3,7,8 TCDD	**Exceeds TAPs EL?**	**Modeled?**
Dioxin/Furans[c]	0.00E+00	1.50E-10	No	
Non-PAH HAPs				
Acetaldehyde	0.00E+00	3.00E-03	No	
Acrolein	0.00E+00	0.017	No	
Benzene	1.45E-02	8.00E-04	Exceeds	
1,3-Butadiene				
Ethylbenzene	5.24E-02	29	No	
Formaldehyde	1.15E-01	5.10E-04	Exceeds	
Hexane	1.94E-01	12	No	
Isooctane	8.35E-03			
Methyl Ethyl Ketone	4.25E-04	39.3	No	
Pentane	1.53E-03	118	No	
Propionaldehyde	0.00E+00	0.0287	No	
Quinone	0.00E+00	0.027	No	
Methyl chloroform	1.00E-02	127	No	
Toluene	3.31E-02	25	No	
Xylene	5.22E-02	29	No	

Pollutant	TOTAL of Max Emission Rates from A, B, C & D (lb/hr)	TAPs Screening Emission Limit (EL) Increment[b] (lb/hr)	TAPs Emissions Exceed EL Increment?	Modeled? Meets AAC or AACC?
PAH HAPs				
2-Methylnaphthalene	3.05E-03	9.10E-05	Exceeds	
3-Methylchloranthrene	4.83E-10	2.50E-06	No	
Acenaphthene	8.48E-05	9.10E-05	No	
Acenaphthylene	3.23E-04	9.10E-05	Exceeds	
Anthracene	1.70E-05	9.10E-05	No	
Benzo(a)anthracene	1.02E-05			see POM
Benzo(a)pyrene	6.55E-07	2.00E-06	No	see POM
Benzo(b)fluoranthene	4.67E-06			see POM
Benzo(e)pyrene	5.07E-06	9.10E-05	No	
Benzo(g,h,i)perylene	1.72E-06	9.10E-05	No	
Benzo(k)fluoranthene	1.80E-06			see POM
Chrysene	1.97E-05			see POM
Dibenzo(a,h)anthracene	4.71E-08			see POM
Dichlorobenzene	3.22E-07	9.10E-05	No	
Fluoranthene	2.90E-05	9.10E-05	No	
Fluorene	2.38E-04	9.10E-05	Exceeds	
Indeno(1,2,3-cd)pyrene	3.20E-07			see POM
Naphthalene[e]	3.50E-03	9.10E-05	Exceeds	
Perylene	3.11E-06	9.10E-05	No	
Phenanthrene	3.84E-04	9.10E-05	Exceeds	
Pyrene	3.90E-05	9.10E-05	No	
PolycyclicOrganicMatter[d]	3.74E-05	2.00E-06	Exceeds	
Non-HAP Organic Compounds				
Acetone	4.05E-04	119	No	
Benzaldehyde	0.00E+00			
Butane	1.41E-01			
Butyraldehyde	0.00E+00			
Crotonaldehyde	0.00E+00	0.36	No	
Ethylene	1.46E+00			
Heptane	1.96E+00	109	No	
Hexanal	0.00E+00			
Isovaleraldehyde	0.00E+00			
2-Methyl-1-pentene	8.33E-01			
2-Methyl-2-butene	1.21E-01			
3-Methylpentane	3.96E-02			
1-Pentene	4.58E-01			
n-Pentane[e]	4.38E-02	118	No	
Valeraldehyde (n-Valeraldehyde)	0.00E+00	11.7	No	
Metals				
Antimony[e]	3.75E-05	0.033	No	
Arsenic	2.08E-05	1.50E-06	Exceeds	
Barium	1.21E-03	0.033	No	
Beryllium	3.22E-09	2.80E-05	No	
Cadmium	1.55E-05	3.70E-06	Exceeds	
Chromium	1.15E-03	0.033	No	
Cobalt	5.47E-06	0.0033	No	
Copper	6.46E-04	0.013	No	
Hexavalent Chromium	1.67E-05	5.60E-07	Exceeds	
Manganese	1.60E-03	0.067	No	
Mercury	5.00E-05	0.003	No	
Molybdenum	6.47E-07	0.333	No	
Nickel	2.34E-03	2.70E-05	Exceeds	
Phosphorus	5.83E-03	0.007	No	
Silver	1.00E-04	0.007	No	
Selenium	7.29E-05	0.013	No	
Thallium	8.54E-07	0.007	No	
Vanadium	1.35E-06	0.003	No	
Zinc	1.27E-02	0.667	No	

a) Reserved.
b) Toxic Air Pollutants, IDAPA 58.01.01.585 and .586, levels in effect as of February 25, 2009
c) 2005, Van den Berg, et al, The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds, *Toxicological Sciences* 93(2), 223-241 (2006). Accessible at http://toxsci.oxfordjournals.org/cgi/reprint/93/2/223.
Use of the 2005 WHO toxic equivalency factors (TEFs) is consistent with current EPA recommendations for TRI reporting (72 FR 26544, May 10, 2007)
n/a = not available. IDAPA 58.01.01.586, TAPs Carcinogenic Increments: Total of adjusted emission rates are treated as a single TAP (2,3,7,8 TCDD)
d) IDAPA 58.01.01.586, Polycyclic Organic Matter: Emissions of highlighted PAHs h shall be considered together as one TAP equivalent in potency to benzo(a)pyrene.
e) Naphthalene is listed as a noncarcinogenic TAP in IDAPA 58.01.01.585 (EL = 3.33 lb/hr), but must also be considered as a carcinogenic PAH (EL = 9.10E-05 lb/hr)

TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.

Pollutants shown in blue text are emitted only when burning Used Oil, but not when burning #2 Fuel Oil or Natural Gas

Facility: Knife River, Inc

7/22/2014 14:08 Permit/Facility ID: P-2014.0004 777-00533

TAPs EL Screen - ALL SOURCES

Max Emissions of Any Pollutant from Drum Mix HMA Plant Fabric Filter, Tank Heater, Generator, Silo Fill/Load-out

A. Drum Mix Plant: 400 Tons/hour 813 Hours/year 325,000 Tons/year 5,000 Tons/day

Maximum emission for each pollutant from any fuel-burning option selected in "Facility Data" worksheet.

B. Tank Heater: 0.6000 MMBtu Rated 4,000 Hours/year

Maximum emission for each pollutant for heater burning any fuel selected in "Facility Data" worksheet.

D. Include all emissions from Load-out/Silo Filling? No

C1. IC Engine G1: 13.69 gal/hour 2322 Hours/year #2 Fuel Oil 13 hrs/day

C2. IC Engine G2: 68.45 gal/hour 1161 Hours/year #2 Fuel Oil 13 hrs/day

Pollutant	TOTAL of Max Emission Rates from A, B, C & D (lb/hr)	TAPs Screening Emission Limit (EL) Increment[b] (lb/hr)	TAPs Emissions Exceed EL Increment?	Modeled?
non-PAH HAPs[a]				
Bromomethane (Methyl bromide[e])	8.32E-05	1.27	No	
2-Butanone (see Methyl Ethyl Ketone)				
Carbon disulfide[e]	1.13E-04	2	No	
Chloroethane (Ethyl chloride[e])	1.82E-06	176	No	
Chloromethane (Methyl chloride[e])	1.30E-04	6.867	No	
Cumene[e]	9.53E-04	16.3	No	
n-Hexane[e] (see Hexane[e])				
Methylene chloride (Dichloromethane[e])	0.00E+00	1.60E-03	No	
MTBE	0.00E+00			
Styrene[e]	6.33E-05	6.67	No	
Tetrachloroethene (Tetrachloroethylene[e])	6.67E-05	1.30E-02	No	
1,1,1-Trichloroethane (see Methyl chloroform[e])				
Trichloroethene (Trichloroethylene[e])	0.00E+00	17.93	No	
Trichlorofluoromethane	1.13E-05			
m-/p-Xylene[e] (added into Xylene[e])				
o-Xylene[e] (added into Xylene[e])				
Phenol[e,j]	8.38E-04	1.27	No	
Non-HAP Organic Compounds				
Methane	5.63E-02			

a) For HMA facilities subject to NSPS (40 CFR 60, Subpart I), PTE includes fugitive emissions of PM from load-out, silo filling & storage tank operations.
e) IDAPA Toxic Air Pollutant, 58.01.01.585 or .586

Facility: Knife River, Inc

7/22/2014 14:08 **Permit/Facility ID:** P-2014.0004 777-00533

TAPs MODELING

POUNDS PER HOUR - POINT AND PSEUDO-STACK SOURCES

Maximum Controlled Emissions of Any Pollutant from Drum Mix HMA Plant with Fabric Filter, Tank Heater, Generator, Silo Fill/Load-out

A. Drum Mix Plant: 400 Tons/hour 813 Hours/year 325,000 Tons/year 5,000 Tons/day
Maximum emission for each pollutant from any fuel-burning options selected on "Facility Data" worksheet. Fuels Selected = Natural Gas LPG/Propane
B. Tank Heater: 0.6000 MMBtu Rated 4,000 Hours/year 24 hrs/day
Maximum emission for each pollutant for heater burning any fuel selected on "Facility Data" worksheet. Fuels Selected = Natural Gas
C1. IC Engine: 13.69 gal/hour 2322 Hours/year IC Engine < 600hp #2 Fuel Oil 13 hrs/day
C2. IC Engine: 68.45 gal/hour 1161 Hours/year IC Engine > 600hp #2 Fuel Oil 13 hrs/day

Pollutant	A Drum Dryer Max Emission Rate for Pollutant (lb/hr)	B Asphaltic Oil Tank Heater Max Emission Rate for Pollutant (lb/hr)	C1 IC1< 600 bhp Generator Max Emission Rate for Pollutant (lb/hr)	C2 IC2 > 600 bhp Generator Max Emission Rate for Pollutant (lb/hr)	D1 Silo Filling Emission Rate for Pollutant (lb/hr)	D2 Load-out Emission Rate for Pollutant (lb/hr)
PM (total)						
PM-10 (total)						
PM-2.5						
CO						
NOx						
SO_2						
VOC						
Lead						
HCl [e]	0.00E+00	0.00E+00				
Dioxins[e]						
2,3,7,8-TCDD	0.00E+00					
Total TCDD	0.00E+00					
1,2,3,7,8-PeCDD	0.00E+00					
Total PeCDD	0.00E+00					
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00					
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00				
Total HxCDD	0.00E+00					
1,2,3,4,6,7,8-Hp-CDD	0.00E+00	0.00E+00				
Total HpCDD	0.00E+00	0.00E+00				
Octa CDD	0.00E+00	0.00E+00				
Total PCDD[n]	0.00E+00	0.00E+00				
Furans[e]						
2,3,7,8-TCDF	0.00E+00					
Total TCDF	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00					
2,3,4,7,8-PeCDF	0.00E+00					
Total PeCDF	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00					
1,2,3,6,7,8-HxCDF	0.00E+00					
2,3,4,6,7,8-HxCDF	0.00E+00					
1,2,3,7,8,9-HxCDF	0.00E+00					
Total HxCDF	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00					
1,2,3,4,7,8,9-HpCDF	0.00E+00					
Total HpCDF	0.00E+00	0.00E+00				
Octa CDF	0.00E+00	0.00E+00				
Total PCDF[n]	0.00E+00	0.00E+00				
Total PCDD/PCDF[n]	0.00E+00	0.00E+00				
Non-PAH HAPs						
Acetaldehyde[e]	0.00E+00		0.00E+00	0.00E+00		
Acrolein[e]	0.00E+00		0.00E+00	0.00E+00		
Benzene[e]	**1.45E-02**	**5.64E-07**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**8.02E-05**
1,3-Butadiene[e]			0.00E+00			
Ethylbenzene[e]	5.00E-02				0.00E+00	2.43E-03
Formaldehyde[e]	**1.15E-01**	**2.01E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.36E-04**
Hexane[e]	1.92E-01	1.06E-03			0.00E+00	1.30E-03
Isooctane	8.33E-03				0.00E+00	1.56E-05
Methyl Ethyl Ketone[e]	0.00E+00				0.00E+00	4.25E-04
Pentane[e]		1.53E-03				
Propionaldehyde[e]	0.00E+00					
Quinone[e]	0.00E+00					
Methyl chloroform[e]	1.00E-02					
Toluene[e]	3.13E-02	2.00E-06	0.00E+00	0.00E+00	0.00E+00	1.82E-03
Xylene[e]	4.17E-02		0.00E+00	0.00E+00	0.00E+00	1.05E-02
POM (7-PAH Group)	**2.03E-05**	**3.06E-09**		**0.00E+00**	**0.00E+00**	**1.71E-05**

e) IDAPA Toxic Air Pollutant

Pollutant	A Drum Dryer Max Emission Rate for Pollutant (lb/hr)	B Asphaltic Oil Tank Heater Max Emission Rate for Pollutant (lb/hr)	C1 IC1< 600 bhp Generator Max Emission Rate for Pollutant (lb/hr)	C2 IC2 > 600 bhp Generator Max Emission Rate for Pollutant (lb/hr)	D Silo Filling Emission Rate for Pollutant (lb/hr)	D2 Load-out Emission Rate for Pollutant (lb/hr)
PAH HAPs						
2-Methylnaphthalene	2.75E-03	6.45E-09			0.00E+00	3.01E-04
3-Methylchloranthrene[e]	0.00E+00	4.83E-10				
Acenaphthene	5.19E-05	4.83E-10	0.00E+00	0.00E+00	0.00E+00	3.29E-05
Acenaphthylene	3.19E-04	4.83E-10	0.00E+00	0.00E+00	0.00E+00	3.54E-06
Anthracene	8.16E-06	6.45E-10	0.00E+00	0.00E+00	0.00E+00	8.85E-06
Benzo(a)anthracene[e]	7.79E-06	4.83E-10	0.00E+00	0.00E+00	0.00E+00	2.40E-06
Benzo(a)pyrene[e]	3.64E-07	3.22E-10	0.00E+00	0.00E+00	0.00E+00	2.91E-07
Benzo(b)fluoranthene[e]	3.71E-06	4.83E-10	0.00E+00	0.00E+00	0.00E+00	9.61E-07
Benzo(e)pyrene	4.08E-06	0.00E+00		0.00E+00	0.00E+00	9.87E-07
Benzo(g,h,i)perylene	1.48E-06	3.22E-10	0.00E+00	0.00E+00	0.00E+00	2.40E-07
Benzo(k)fluoranthene[e]	1.52E-06	4.83E-10	0.00E+00	0.00E+00	0.00E+00	2.78E-07
Chrysene[e]	6.68E-06	4.83E-10	0.00E+00	0.00E+00	0.00E+00	1.30E-05
Dibenzo(a,h)anthracene[e]	0.00E+00	3.22E-10	0.00E+00	0.00E+00	0.00E+00	4.68E-08
Dichlorobenzene	0.00E+00	3.22E-07		0.00E+00		
Fluoranthene	2.26E-05	8.06E-10	0.00E+00	0.00E+00	0.00E+00	6.32E-06
Fluorene	1.41E-04	7.52E-10	0.00E+00	0.00E+00	0.00E+00	9.74E-05
Indeno(1,2,3-cd)pyrene[e]	2.60E-07	4.83E-10	0.00E+00	0.00E+00	0.00E+00	5.94E-08
Naphthalene[e]	3.34E-03	1.64E-07	0.00E+00	0.00E+00	0.00E+00	1.58E-04
Perylene	3.26E-07	0.00E+00			0.00E+00	2.78E-06
Phenanthrene	2.82E-04	4.57E-09	0.00E+00	0.00E+00	0.00E+00	1.02E-04
Pyrene	2.00E-05	1.34E-09	0.00E+00	0.00E+00	0.00E+00	1.90E-05
Non-HAP Organic Compounds						
Acetone[e]	0.00E+00	0.00E+00			0.00E+00	4.05E-04
Benzaldehyde	0.00E+00	0.00E+00				
Butane	1.40E-01	1.24E-03				
Butyraldehyde	0.00E+00	0.00E+00				
Crotonaldehyde[e]	0.00E+00	0.00E+00				
Ethylene	1.46E+00	0.00E+00			0.00E+00	6.15E-03
Heptane	1.96E+00	0.00E+00				
Hexanal	0.00E+00	0.00E+00				
Isovaleraldehyde	0.00E+00	0.00E+00				
2-Methyl-1-pentene	8.33E-01	0.00E+00				
2-Methyl-2-butene	1.21E-01	0.00E+00				
3-Methylpentane	3.96E-02	0.00E+00				
1-Pentene	4.58E-01	0.00E+00				
n-Pentane	4.38E-02	0.00E+00				
Valeraldehyde[e]	0.00E+00	0.00E+00				
Metals						
Antimony[e]	3.75E-05	0.00E+00				
Arsenic[e]	**2.08E-05**	**5.37E-08**				
Barium[e]	1.21E-03	2.59E-06				
Beryllium[e]	**0.00E+00**	**3.22E-09**				
Cadmium[e]	**1.52E-05**	**2.95E-07**				
Chromium[e]	1.15E-03	8.24E-07				
Cobalt[e]	5.42E-06	4.94E-08				
Copper[e]	6.46E-04	5.00E-07				
Hexavalent Chromium[e]	**1.67E-05**	**0.00E+00**				
Manganese[e]	1.60E-03	0.00E+00				
Mercury[e]	5.00E-05	0.00E+00				
Molybdenum[e]	0.00E+00	6.47E-07				
Nickel[e]	**2.34E-03**	**0.00E+00**				
Phosphorus[e]	5.83E-03	0.00E+00				
Silver[e]	1.00E-04	0.00E+00				
Selenium[e]	7.29E-05	0.00E+00				
Thallium[e]	8.54E-07	0.00E+00				
Vanadium[e]	0.00E+00	1.35E-06				
Zinc[e]	1.27E-02	0.00E+00				

Criteria Pollutant lb/hr emissions are maximum 1-hr averages
TAPs lb/hr rates are 24-hr averages except for those in bold text. Lb/hr rates for bold TAPs (carcinogens) are annual averages.
Pollutants shown in blue text are emitted only when burning Used Oil, but not when burning #2 Fuel Oil or Natural Gas

APPENDIX B – AMBIENT AIR QUALITY IMPACT ANALYSIS

MEMORANDUM

DATE: July 23, 2014

TO: Dan Pitman, Permit Writer, Air Program

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

PROJECT: P-2014.0004 PROJ61334 PTC Application for the Knife River, Inc. Hot Mix Asphalt Plant

SUBJECT: Demonstration of Compliance with IDAPA 58.01.01.203.02 (NAAQS) and 203.03 (TAPs)

1.0 Summary

Knife River, Inc. (Knife River) submitted a Permit to Construct (PTC) application for a portable hot mix asphalt (HMA) plant to be operated in Idaho. Non-site-specific air quality impact analyses involving atmospheric dispersion modeling of emissions associated with the HMA plant were performed by DEQ to demonstrate that the facility would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02 and 203.03 [Idaho Air Rules Section 203.02 and 203.03]). CH2M Hill (CH2M), Knife River's consultant, submitted applicable information and data enabling DEQ to perform non-site-specific ambient air impact analyses.

DEQ performed non-site-specific air quality impact analyses to assure compliance with air quality standards for the proposed HMA plant. Results from DEQ's atmospheric dispersion modeling analyses were used to establish minimum setback distances between emissions points and the property boundary of any 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 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 emissions points to the property boundary). Table 1 presents key assumptions and results to be considered in the development of the permit.

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 information, 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 key conditions in Table 1 are representative of facility design capacity or operations as limited by a federally enforceable permit condition.

Table 1. KEY CONDITIONS USED IN MODELING ANALYSES	
Criteria/Assumption/Result	**Explanation/Consideration**
Maximum HMA throughput does not exceed 400 ton/hour, 5,000 ton/day, and 325,000 ton/year.	Short-term and annual modeling was performed assuming these rates.
Maintain the following minimum setback distances between the nearest property boundary and the stacks of the drum dryer and the IC engines powering generators: 1) 738 feet (225 meters) when operating with IC engines; 2) 492 feet (150 meters) when operating without IC engines.	This setback distance is necessary to assure compliance with applicable air quality standards at ambient air locations.
If the HMA plant does not remain at any single location for more than one year, then the following minimum setback distances will apply: 1) 492 feet (150 meters) when operating with IC engines; 2) 492 feet (150 meters) when operating without IC engines.	1-hour NO_2, 24-hour PM_{10}, and 24-hour $PM_{2.5}$ NAAQS compliance are the governing analyses for setback determination. Design values for NO_2 and $PM_{2.5}$ are based on 3-year averages. If the plant only operates in one location for a maximum of less than one year, then the design value impacts and resulting setbacks are substantially reduced.
The plant will not operate during the winter season (December 1 through March 31).	Substantially greater setback distances would be needed if production was assumed for the winter season.
Co-contributing emissions sources such as other HMA plants, concrete batch plants, or rock crushing plants will not locate on the plant property and within 1,000 feet of the drum dryer stack of the HMA plant, except as noted below for a rock crushing plant. However, NAAQS compliance is assured for the HMA plant with a co-contributing rock crushing plant, provided it is not operated during any day when the HMA plant is operated and the annual actual throughput of the rock crushing plant is less than 500,000 ton/year.	Emissions are considered co-contributing if they occur within 1,000 feet (305 meters) of each other. Once the HMA plant is established at a specific site, that facility is not responsible for controlling other facilities from moving in nearby, provided they are not on the same property. Neighboring facilities would be required to account for the HMA impacts for their permitting analyses.
The HMA plant will not relocated to a site where there are co-contributing stationary emissions sources within 1,000 feet of the drum dryer stack except as noted for a rock crushing plant above.	After the HMA plant is established at a location, the permittee is not responsible for ensuring neighboring facilities do not move in.
DEQ Modeling staff contend that NAAQS compliance is assured for an HMA plant operating simultaneously (both within a given day) with a crushing plant, provided HMA daily throughput for that day is limited to half that normally allowed.	Decreased HMA throughput will offset potential impacts of a nearby crushing plant.
Fugitive emissions from vehicle traffic are controlled to a high degree.	Emissions from vehicle traffic on unpaved surfaces was assumed to be minimal and accounted for in the background concentrations used in the analyses.
Large diesel IC engine powering HMA operations generator: powered by an engine rated at >600 brake horsepower (bhp), having a power rating of equal or less than 1340 bhp, having an EPA Tier 2 certification, and operating less than 13 hour/day.	Different combinations can be used if it is demonstrated that total emissions from generators are less than those modeled for these sources.
Small diesel IC engine powering a generator: powered by an engine having a combined power rating of less than 268 bhp, have an EPA Tier 3 certification, and not operate simultaneously with the large operations generator.	Different combinations can be used if it is demonstrated that total emissions from generators are less than those modeled for these sources.
Emissions rates for applicable averaging periods are not greater than those used in the modeling analyses, as listed in this memorandum.	Compliance has not been demonstrated for emissions rates greater than those used in the modeling analyses.
Stack heights for the drum dryer and engines are as listed in this memorandum or higher.	NAAQS compliance is still assured if actual stack heights are greater than those listed in this memo.
NAAQS compliance is assured provided stack parameters of exhaust temperatures and flow rates are not less than about 75 percent of values listed in this memorandum.	Higher temperatures and flow rates increase plume rise, allowing the plume to disperse to a larger degree before impacting ground level.
The HMA plant will not locate in an area classified as non-attainment for any pollutants, or an area of concern identified by DEQ.	Compliance with NAAQS has not been demonstrated for operation of the plant in a non-attainment area or area where background concentrations are effectively above or very near the NAAQS.

2.0 Background Information

2.1 Proposed Location and Area Classification

The HMA plant will be a portable facility. The HMA plant will also only locate in areas designated as attainment or unclassifiable for all criteria pollutants. The plant will not locate in areas of air quality concern, as identified by DEQ. Areas of concern are areas where background concentrations are effectively above or very near the applicable NAAQS.

2.2 Air Impact Analyses Required for All Permits to Construct

Idaho Air Rules Sections 203.02 and 203.03 state:

> *No permit to construct shall be granted for a new or modified stationary source unless the applicant shows to the satisfaction of the Department all of the following:*
>
> ***02. NAAQS.** The stationary source or modification would not cause or significantly contribute to a violation of any ambient air quality standard.*
>
> ***03. Toxic Air Pollutants.** 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.*

Atmospheric dispersion modeling, using computerized simulations, is used to demonstrate compliance with both NAAQS and TAPs. Idaho Air Rules Section 202.02 states:

> ***02. Estimates of Ambient Concentrations.** All estimates of ambient concentrations shall be based on the applicable air quality models, data bases, and other requirements specified in 40 CFR 51, Appendix W (Guideline on Air Quality Models).*

2.3 Significant Impact Level and Cumulative NAAQS Impact Analyses

The Significant Impact Level (SIL) analysis for a facility involves modeling allowable criteria air pollutant emissions from the facility to determine the potential impacts to ambient air. 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.

A facility is considered to have a significant impact on air quality if maximum modeled impacts to ambient air exceed the established SIL listed in Idaho Air Rules Section 006 (referred to as a significant contribution in Idaho Air Rules) or as incorporated by reference as per Idaho Air Rules Section 107.03.b. Table 2 lists the applicable SILs.

If modeled maximum pollutant impacts to ambient air from the emissions sources associated with a new facility exceed the SILs, then a cumulative NAAQS impact analysis is necessary to demonstrate compliance with NAAQS and Idaho Air Rules Section 203.02.

Table 2. APPLICABLE REGULATORY LIMITS				
Pollutant	**Averaging Period**	**Significant Impact Levels[a] (μg/m³)[b]**	**Regulatory Limit[c] (μg/m³)**	**Modeled Design Value Used[d]**
PM_{10}[e]	24-hour	5.0	150[f]	Maximum 6th highest[g]
$PM_{2.5}$[h]	24-hour	1.2	35[i]	Mean of maximum 8th highest[j]
	Annual	0.3	12[k]	Mean of maximum 1st highest[l]
Carbon monoxide (CO)	1-hour	2,000	40,000[m]	Maximum 2nd highest[n]
	8-hour	500	10,000[m]	Maximum 2nd highest[n]
Sulfur Dioxide (SO_2)	1-hour	3 ppb[o] (7.8 μg/m³)	75 ppb[p] (196 μg/m³)	Mean of maximum 4th highest[q]
	3-hour	25	1,300[m]	Maximum 2nd highest[n]
	24-hour	5	365[m]	Maximum 2nd highest[n]
	Annual	1.0	80[r]	Maximum 1st highest[n]
Nitrogen Dioxide (NO_2)	1-hour	4 ppb (7.5 μg/m³)	100 ppb[s] (188 μg/m³)	Mean of maximum 8th highest[t]
	Annual	1.0	100[r]	Maximum 1st highest[n]
Lead (Pb)	3-month[u]	NA	0.15[r]	Maximum 1st highest[n]
	Quarterly	NA	1.5[r]	Maximum 1st highest[n]
Ozone (O_3)	8-hour	40 TPY VOC[v]	75 ppb[w]	Not typically modeled

a. Idaho Air Rules Section 006 (definition for significant contribution) or as incorporated by reference as per Idaho Air Rules Section 107.03.b.
b. Micrograms per cubic meter.
c. Incorporated into Idaho Air Rules by reference, as per Idaho Air Rules Section 107.
d. The maximum 1st highest modeled value is always used for the significant impact analysis unless indicated otherwise. Modeled design values are calculated for each ambient air receptor.
e. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
f. Not to be exceeded more than once per year on average over 3 years.
g. Concentration at any modeled receptor when using five years of meteorological data.
h. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
i. 3-year mean of the upper 98th percentile of the annual distribution of 24-hour concentrations.
j. 5-year mean of the 8th highest modeled 24-hour concentrations at the modeled receptor for each year of meteorological data modeled. For the SIL analysis, the 5-year mean of the 1st highest modeled 24-hour impacts at the modeled receptor for each year.
k. 3-year mean of annual concentration. The NAAQS was revised from 15 μg/m³ to12 μg/m³ on December 14, 2012. This standard was applicable for permitting purposes in Idaho when it was incorporated by reference *sine die* into Idaho Air Rules (Spring 2014).
l. 5-year mean of annual averages at the modeled receptor.
m. Not to be exceeded more than once per year.
n. Concentration at any modeled receptor.
o. Interim SIL established by EPA policy memorandum.
p. 3-year mean of the upper 99th percentile of the annual distribution of maximum daily 1-hour concentrations.
q. 5-year mean of the 4th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of 1st highest modeled 1-hour impacts for each year is used.
r. Not to be exceeded in any calendar year.
s. 3-year mean of the upper 98th percentile of the annual distribution of maximum daily 1-hour concentrations.
t. 5-year mean of the 8th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of maximum modeled 1-hour impacts for each year is used.
u. 3-month rolling average.
v. An annual emissions rate of 40 ton/year of VOCs is considered significant for O_3.
w. Annual 4th highest daily maximum 8-hour concentration averaged over three years.

A cumulative NAAQS impact analysis for attainment area pollutants involves assessing ambient impacts (typically the design values consistent with the form of the standard) from facility-wide emissions, and emissions from any nearby co-contributing sources, and then adding a DEQ-approved background concentration value to the modeled result that is appropriate for the criteria pollutant/averaging-period at the facility location and the area of significant impact. The resulting pollutant concentrations in ambient air are then compared to the NAAQS listed in Table 2. Table 2 also lists SILs and specifies the modeled design value that must be used for comparison to the NAAQS. NAAQS compliance is evaluated on a receptor-by-receptor basis for the modeling domain.

If the cumulative NAAQS impact analysis indicates a violation of the standard, the permit may not be issued if the proposed project has a significant contribution (exceeding the SIL) to the modeled violation. This evaluation is made specific to both time and space. If the SIL analysis indicates the facility/modification has an impact exceeding the SIL, the facility might not have a significant contribution to a violation if impacts are below the SIL at the specific receptor showing the violation during the time periods when a modeled violation occurred.

Compliance with Idaho Air Rules Section 203.02 is generally demonstrated if: a) all modeled impacts of the SIL analysis are below the applicable SIL or other level determined to be inconsequential to NAAQS compliance; or b) modeled design values of the cumulative NAAQS impact analysis (modeling all emissions from the facility and co-contributing sources, and adding a background concentration) are less than applicable NAAQS at receptors where impacts from the proposed facility/modification exceeded the SIL or other identified level of consequence; or c) the cumulative NAAQS analysis showed NAAQS violations and the impact of proposed facility/modification to any modeled violation was inconsequential (typically assumed to be less than the established SIL) for that specific receptor and for the specific modeled time when the violation occurred.

The $PM_{2.5}$ annual standard was changed from 15 $\mu g/m^3$ to 12 $\mu g/m^3$ on December 14, 2012. The revised standard was not applicable for permitting purposes until it was incorporated *sine die* into Idaho Air Rules (Spring 2014).

2.4 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.*

Permitting 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 the total project-wide emissions increase of any TAP 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.

Idaho Air Rules Section 210.20 states that if TAP emissions from a specific source are regulated by the Department or EPA under 40 CFR 60, 61, or 63, then a TAP impact analysis under Section 210 is not required for that TAP.

3.0 Analytical Methods and Data

This section describes the methods and data used in analyses to demonstrate compliance with applicable air quality impact requirements.

3.1 Emission Rates

Emissions rates of criteria pollutants and TAPs were calculated using DEQ's HMA spreadsheet for the requested plant production rate and operational configuration for various applicable averaging periods.

3.1.1 Criteria Pollutant Emissions Rates

Table 3 lists criteria pollutant emissions rates used in the DEQ non-site-specific modeling analyses for the proposed HMA plant production rate, proposed operational configuration, and for all applicable averaging periods. Attachment 1 provides additional details of DEQ emissions calculations used in the modeling analyses.

Emissions of CO, SO_2, and Pb were not modeled to evaluate impacts to ambient air because facility-wide emissions were below the DEQ Level II Modeling Thresholds of 175 pounds/hour for CO, 2.5 pounds/hour for 1-hour SO_2, 14 ton/year for annual SO_2, and 14 pounds/month for 3-month rolling average Pb.

Modeling thresholds, for criteria pollutants other than Pb, were developed to ensure modeled impacts are less than the SIL for sources with good dispersion characteristics. The modeling threshold for Pb was set to assure compliance with the NAAQS, since there is no SIL for Pb.

Annual NOx estimated emissions of 17 ton/year exceeded the 14 ton/year Level II modeling threshold, but annual NO_2 was not modeled because DEQ determined that 1-hour NO_2 modeling results would be far more restrictive because of the increased relative stringency of the 1-hour NO_2 standard as compared to the annual standard and the reduced annual hours of operation.

Annual $PM_{2.5}$ pound/hour emissions were calculated in the spreadsheet by dividing annual emissions over 8,760 hours. However, the plant will only operate between April 1 and November 30, and emissions will only be included in the model for this time period. To properly model emissions, the annual emissions should be divided over 5,856 hours rather than 8,760 hours. To adjust the annual $PM_{2.5}$ pound/hour emissions rate in spreadsheet to what will be modeled, an adjustment factor of 8,760/5,856 can be applied to the rate. Since the model was set up to only process the time period of April 1 through November 30, the results for each annual average are an average concentration during that time period without averaging in non-operational hours of December 1 through March 31. To adjust the model output to a true annual average, the annual average model output (actually an average for April 1 through November 30) can be multiplied by a factor of 5,856/8,760. Model results vary linearly with emissions rates, so the emissions adjustment factor for annual emissions only modeled between April 1 through November 30 can be combined with the results adjustment factor to account for non-operational hours between December 1 through March 31, resulting in a combined factor of 1.0.

Table 3. EMISSIONS USED IN DEQ ANALYSES

Emissions Point in Model	Pollutant	Averaging Period	Emissions Rate (lb/hr)[a]
DRYER – drum dryer/mixer - emissions controlled by a baghouse	$PM_{2.5}$	24-hour	4.646[b]
		Annual	0.8273[c]
	PM_{10}	24-hour	4.792[b]
	NOx	1-hour	15.60
SILO – asphalt storage silo	Emissions captured and routed back to drum dryer		
LOAD – asphalt loadout	$PM_{2.5}$	24-hour	0.1087[b]
		Annual	0.01936[c]
	PM_{10}	24-hour	0.1087[b]
GEN1 – electrical generator - 1,340 hp diesel engine; - 13 hr/day, 1,161 hr/yr; - 0.0015% sulfur diesel; - Tier 2 certified	$PM_{2.5}$	24-hour	0.2825[b]
		Annual	0.06912[c]
	PM_{10}	24-hour	0.2825[b]
	NOx	1-hour	14.10
GEN2 – electrical generator - 268 hp diesel engine; - 24 hr/day, 2,322 hr/yr; - 0.0015% sulfur diesel; - Tier 3 certified	$PM_{2.5}$	24-hour	0.0[d]
		Annual	0.03481[c]
	PM_{10}	24-hour	0.0[d]
	NOx	1-hour	0.0[d]
HOTOIL – asphalt oil heater	$PM_{2.5}$	24-hour	0.004773[b]
		Annual	0.002041[c]
	PM_{10}	24-hour	0.004773[b]
	NOx	1-hour	0.05882
LOADCONV – aggregate handling by frontend loader and conveyor transfers	$PM_{2.5}$	24-hour	0.1089[b,e]
		Annual	0.01939[c,e]
	PM_{10}	24-hour	0.7191[b,e]
SCREEN – scalping screen	$PM_{2.5}$	24-hour	0.002600[b]
		Annual	0.0004630[c]
	PM_{10}	24-hour	0.1740[b]

a. Pounds per hour emissions rate used in modeling analyses for specified averaging periods.
b. Calculated by multiplying the daily throughput or daily operational hours by the emissions factor, then dividing by 24.
c. Emissions rate is equal to annual emissions divided over 8,760 hours/year.
d. GEN2 will not operate simultaneously with GEN1 and other sources at the facility while asphalt is produced. Emissions from GEN2 are much lower than GEN1 and impacts from operation of GEN2 by itself are estimated to be negligible compared to GEN1.
e. Emissions are varied in the model according to wind speed category. Emissions listed are based on a 10 mph wind speed.

Setback distances were calculated for four operational scenarios: 1) operations with the use of diesel-fired generators to supply electrical power; 2) operations without the use of diesel-fired generators; 3) operations with use of diesel-fired generators and at a single location not more than 12 months; operations without the use of diesel-fired generators and at a single location not more than 12 months.

Fugitive particulate emissions from frontend loader handling of aggregate materials and three conveyor transfers for the HMA plant were designated as emissions point LOADCONV in the model. Two transfers were included for the frontend loader source: 1) transfer of aggregate from truck unloading or other transfer means to a storage pile; 2) transfer of aggregate from the storage pile to a hopper. Three transfers were included with this source for aggregate conveyors as indicated by the applicant. Emissions rates for LOADCONV are a function of wind speed and were varied in the model according to wind speed. Attachment 1 provides details on emissions calculations.

DEQ's air impact analyses assumed that the facility will not operate during the period of December 1 through March 31, as indicated by the applicant. Emissions were turned off in the model for this time period for all sources.

Modeling Applicability

Facility-wide potential emissions of PM_{10}, $PM_{2.5}$, and NOx exceed modeling thresholds stated in the *Idaho Air Quality Modeling Guideline*, thereby requiring a NAAQS impact analysis in accordance to Idaho Air Rules Section 203.02. Emissions of SO_2 and CO exceeded Level I modeling thresholds, but were below Level II modeling thresholds. DEQ determined that Level II thresholds are appropriate because of the following: 1) the required setback distances result in a large distance between the emissions sources and the ambient air boundary; 2) CO and SO_2 are primarily emitted from the drum dryer stack, which exhibits good dispersion characteristics because of the high flow rate and elevated stack temperature; 3) modeling thresholds are designed to assure impacts are below applicable SILs, so such an approach is very conservative for assuring NAAQS compliance when using facility-wide emissions.

Secondary Particulate Formation

The impact from secondary particulate formation resulting from emissions of NOx, SO_2, and/or VOCs was assumed by DEQ to be negligible on the basis of the magnitude of emissions and the short distance (short with regard for allowing sufficient time for pollutants to react in the atmosphere to produce particulate) from emissions sources to modeled receptors where maximum PM_{10} and $PM_{2.5}$ impacts were predicted.

3.1.2 TAP Emissions Rates

The proposed HMA plant will emit TAPs. Table 4 lists the emissions of those TAPs having facility-wide emissions in excess of ELs. Emissions of non-carcinogenic TAPs were all below applicable ELs. The pound/hour long-term TAP emissions rates were modeled in the same way as annual $PM_{2.5}$ (see Section 3.1.1), and rates listed in Table 4 are based on annual emissions divided by 8,760 hours/year.

DEQ allows use of a five-year period-averaged impact to demonstrate compliance with AACCs, rather than the maximum annual impact of five years modeled individually. DEQ determined this was adequately protective for carcinogenic risks.

Emissions of all TAPs from the generators are regulated by an NSPS or NESHAP and are excluded from the modeling analyses as per Idaho Air Rules Section 210.20.

3.1.3 Emissions Release Parameters

Table 5 provides emissions release parameters for the analyses including stack height, stack diameter, exhaust temperature, and exhaust velocity. Additional details are provided in Attachment 1.

Asphalt loadout was modeled as a point source, rather than volume sources, to account for thermal buoyancy of the emissions plume. Release parameters for asphalt loadout were based on the following:

- 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 346K was calculated by assuming the gas temperature would be half that of the default asphalt temperature of 325°F (1/2 of 325° F = 163° F = 346 K).

- 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 4. TAP EMISSIONS USED IN DEQ ANALYSES

Emissions Point in Model	Pollutant	Averaging Period	Emissions Rate for 325,000 ton HMA/year (lb/hr)[a]
DRYER – drum dryer/mixer - emissions controlled by a baghouse	PAH (Acenaphthene)	period	5.194E-5
	PAH (Acenaphthylene)	period	3.191E-4
	Arsenic	period	2.078E-5
	Benzene	period	1.447E-2
	Cadmium	period	1.521E-5
	Chromium 6+	period	1.670E-5
	PAH (Fluorene)	period	1.410E-4
	Formaldehyde	period	1.150E-1
	PAH (2-Methylnaphthalene)	period	2.745E-3
	Nickel	period	2.337E-3
	PAH (naphthalene)	period	3.339E-3
	PAH (Phenanthrene)	period	2.820E-4
	POM	period	2.032E-5
LOAD – asphalt loadout	PAH (Acenaphthene)	period	3.289E-5
	PAH (Acenaphthylene)	period	3.542E-6
	Benzene	period	8.024E-5
	PAH (Fluorene)	period	9.740E-5
	Formaldehyde	period	1.358E-4
	PAH (2-Methylnaphthalene)	period	3.010E-4
	PAH(naphthalene)	period	1.581E-4
	PAH (Phenanthrene)	period	1.025E-4
	POM	period	1.707E-5
HOTOIL – asphalt oil heater	PAH (Acenaphthene)	period	4.835E-10
	PAH (Acenaphthylene)	period	4.835E-10
	Arsenic	period	5.372E-8
	Benzene	period	5.641E-7
	Cadmium	period	2.955E-7
	PAH (Fluorene)	period	7.521E-10
	Formaldehyde	period	2.015E-5
	PAH (2-Methylnaphthalene)	period	6.446E-9
	PAH (naphthalene)	period	1.638E-7
	PAH (Phenanthrene)	period	4.566E-9
	POM	period	3.062E-9

[a] lb/hr long-term rate based on 8760 hr/yr modeled.

3.2 Background Concentrations

Background concentrations are used in the cumulative NAAQS impact analyses to account for impacts from sources not explicitly modeled. Table 6 lists reasonably conservative background concentrations for Idaho. Ozone background concentrations were used in the 1-hour NO_2 modeling analysis to more accurately account for conversion of NO to NO_2.

Table 5. 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	1.15	377	26.7
GEN1	Point	2.17	0.20	750	117
GEN2	Point	1.71	0.10	566	70
HOTOIL	Point	4.57	0.26	339	1.32
LOADOUT	Point	3.5	3.0	346	0.1
Volume Sources					
Release Point /Location	Source Type	Release Height (m)	Initial Horizontal Dispersion Coefficient σ_{y0} (m)	Initial Vertical Dispersion Coefficient σ_{z0} (m)	
LOADCONV	Volume	2.5	4.65	1.16	
SCREEN	Volume	3.0	0.70	0.70	

a. Meters
b. Kelvin
c. Meters per second

Table 6. BACKGROUND CONCENTRATIONS		
Pollutant	Averaging Period	Background Concentration (µg/m³)[a]
PM_{10}[b]	24-hour	83.2
$PM_{2.5}$[c]	24-hour	21.9
	Annual	7.77
Nitrogen dioxide (NO_2)	1-hour	56.6
	Annual	5.64
Ozone (O_3)	1-hour	57.7 ppb

a. Micrograms per cubic meter.
b. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.

Background concentration values were based on a background concentration tool developed by the Northwest International Air Quality Environmental Science and Technology Consortium (NW AIRQUEST) and provided through Washington State University (located at http://lar.wsu.edu/nw-airquest/lookup.html). The tool uses regional scale modeling of pollutants in Washington, Oregon, and Idaho, with model results adjusted according to available monitoring data. DEQ used the background concentration tool to determine design value concentrations at the following locations: Rathdrum, Lewiston, Grangeville, Star, Twin Falls, Blackfoot, Plummer, Sandpoint, Kamiah, Idaho Falls, Burley, Middleton, Caldwell, and Post Falls. The statewide background concentration for each pollutant and applicable averaging period was then determined by using the mean of all locations plus the standard deviation.

3.3 NAAQS Impact Modeling Methodology

This section describes the modeling methods used to demonstrate preconstruction compliance with applicable air quality standards.

3.3.1 *General Overview of NAAQS Analyses*

DEQ performed non-site-specific analyses that were determined to be reasonably representative of the proposed HMA plant, and the results demonstrated compliance with applicable air quality standards to DEQ's satisfaction, provided specified setbacks and operational restrictions are maintained. Alternatively, site-specific air impact analyses, demonstrating compliance with NAAQS and TAP increments, could be performed for those locations where the setback requirement cannot be achieved.

Non-site-specific modeling was used because of the portable nature of an HMA plant. Results of the analyses were used to establish setback distances between locations of primary emissions points and the property boundary of the HMA plant.

Table 7 provides a brief description of general parameters used in the DEQ modeling analyses.

Table 7. MODELING PARAMETERS

Parameter	Description/Values	Documentation/Addition Description
General Facility Location	Portable	All locations not within non-attainment areas.
Model	AERMOD	AERMOD with the PRIME downwash algorithm, version 12345
Meteorological Data	Multiple Data Sets	See Section 3.3.5
Terrain	Flat	The analyses assumed flat terrain for the immediate area
Building Downwash	Considered	No substantial structures were identified in the application. Downwash for the enclosure of the large generator was considered in the analyses.
Receptor Grid	Grid 1	Polar grid with 10-meter downwind spacing out 200 meters
	Grid 2	Polar grid with 25-meter downwind spacing out 400 meters
	Grid 3	Polar grid with 50-meter downwind spacing out 700 meters

3.3.2 *Modeling protocol and Methodology*

A modeling protocol was not submitted to DEQ prior to the application. DEQ met with Knife River and discussed modeling data and methods in detail prior to the submission of the PTC application. The uncertainty associated with both the general geographical location and specific locations of equipment at the site of the HMA dictated the non-site-specific methods, with results used to establish setback distances between locations of emissions points and the ambient air boundary for the site. Non-site-specific modeling was generally conducted using data and methods described in the *State of Idaho Air Quality Modeling Guideline.*

3.3.3 *Model Selection*

Idaho Air Rules Section 202.02 requires 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. 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 version 12345 was used for the modeling analyses to evaluate impacts of the facility.

3.3.4 Data and Parameters used for Modeling 1-Hour NO_2 with PVMRM

The Plume Volume Molar Ratio Method (PVMRM) was used with AERMOD to provide a more refined estimate of 1-hour NO_2 concentrations at specific receptors. Table 8 lists the data and parameters used for PVMRM. Background NO_2 and O_3 concentrations, as specified in Section 3.2, were used in PVMRM to estimate the conversion of NO to NO_2.

An NO_2/NOx ratio for NOx emissions is also used in PVMRM.

Table 8. PARAMETERS AND DATA FOR PVMRM

Parameter	Value	Source/Comments
NO_2/NOx ratio for Emissions	0.2 for dryer, 0.2 for the large generator. The smaller engine was not used in the NO_2 impact analysis because it was conservatively assumed that the larger generator was operating at all times. 0.1 was used for the oil heater.	0.5 is an EPA suggested default when source-specific data are not available.
Ambient Equilibrium for NO_2/NOx	0.90	Default value.
NO_2 and O_3 background concentrations	$NO_2 = 56.6\ \mu g/m^3$ $O_3 = 57.7$ ppb	The mean + standard deviation concentration from selected areas in Idaho, as determined by the NW AIRQUEST background concentration tool (see Section 3.2), was used as a background value.

3.3.5 Meteorological Data

Because of the portable nature of HMA plants, DEQ used up to 11 different meteorological datasets from various locations in Idaho to assure compliance with applicable standards for the non-site-specific analyses. Table 9 lists the meteorological datasets used in the air impact analyses.

Table 9. METEOROLOGICAL DATA SETS USED IN MODELING ANALYSES

Surface Data	Upper Air Data	Years
Boise[a]	Boise	2008-2012
Spokane[a]	Spokane, Wa	2008-2012
Idaho Falls[a]	Boise	2008-2012
Burley[a]	Boise	2008-2012
Coeur d'Alene	Spokane, Wa	2008-2012
Twin Falls[a]	Boise	2008-2012
Jerome[a]	Boise	2008-2012
Pocatello[a]	Boise	2008-2012
Lewiston[a]	Spokane, WA	2008-2012
McCall[a]	Boise	2008-2012
Sandpoint	Spokane, Wa	2008-2012

a. Processed using AERMINUTE.

3.3.6 Effects of Terrain on Modeled Impacts

Terrain effects on dispersion were not considered in the non-site-specific analyses. DEQ contends that assuming flat terrain is not a critical limitation of the analyses because most emissions points associated with HMA plants are near ground-level and the immediate 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.

3.3.7 Facility Layout

DEQ's analyses used a conservative generic facility layout. This was done because the specific layout will vary depending upon product needs and specific characteristics of the site and equipment. To provide conservative results, DEQ used a tight grouping of emissions sources. Sources were positioned within 7 meters of the center of the facility. The drum dryer was placed at the center of the facility.

3.3.8 Effects of Building Downwash on Modeled Impacts

The housing of the large generator was assessed for potential plume downwash effects, modeled as a 2-meter square structure, 3-meters high. No other substantial structures were identified in the application. Downwash effects from equipment or other minor structures at the site were not accounted for because much of the equipment is porous with regard to wind, thereby minimizing downwash effects

3.3.9 Ambient Air Boundary

DEQ's non-site-specific analysis methods, using a generic facility layout, were used to generate minimum setback distances between emissions points and the property boundary or the established boundary to ambient air (if not the same as the property boundary). Ambient air is any area where the general public (anyone not under direct control of the HMA plant) has access. Compliance with NAAQS is not demonstrated unless setback distances are maintained.

3.3.10 Receptor Network and Generation of Setback Distances

Setback distances were determined by first modeling the plant using a dense receptor grid. Results were then reviewed to find the receptor furthest from the center of the facility that shows an exceedance of the standard when combined with a background value. The setback distance was calculated as the maximum distance between the next furthest receptor and the center of the facility (taken to be the drum dryer stack).

A polar grid with 10-meter receptor spacing extending out to 200 meters, 25-meter spacing extending out to 400 meters, and 50-meter spacing extending out to 700 meters was used in the non-site-specific modeling performed by DEQ. Additional receptors were added in refined modeling to more precisely define the required setback. To establish a setback distance, the following procedure was followed for the requested production level and operational configuration:

1) Appropriate emissions rates were modeled and background concentrations were added to the resulting impact levels.

2) For the operational configuration, pollutant, averaging period, and meteorological data set, all receptors with concentrations (modeled value plus background) equal or greater than the

NAAQS were plotted, effectively giving a plot of receptors where the standard could 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 NAAQS that was the furthest from the center of the facility was identified. The controlling receptor was the next furthest downwind receptor from that point.

4) The minimum required setback distance was calculated. This was the furthest distance between the center of the facility and the controlling receptor.

Figure 1 shows an example of how setback distances are determined for a specific modeling run. Emissions points are grouped in a cluster at the center within a 10.0 meter square area. The inner contour line shows the extent of modeled concentrations exceeding the 24-hour $PM_{2.5}$ NAAQS. The outer-most contour line shows modeled 1-hour NO_2 design value concentrations that exceed the NAAQS. The point on the contour line that is the furthest from the drum dryer stack is identified, and then the controlling receptor is identified as the next furthest receptor beyond that point. The setback distance is determined from the coordinates of the controlling receptor.

3.3.11 Setback Analysis for Operations of less than One Year

Design value impacts for 1-hour NO_2, 24-hour PM_{10}, and 24-hour $PM_{2.5}$ are drivers in the determination of required setbacks. The NO_2 and $PM_{2.5}$ standards are "probabilistic," based on three-year averages of design values. If the HMA plant will only remain at one specific location less than or equal to one year, then the design value impact will be substantially lowered because only background concentrations will be averaged with the single-year impacts.

The design value at any receptor is given by: $y = (m_1 + x_1 + x_2 + x_3) / 3$

where: m_1 = modeled design value

x_1 = background concentration occurring with modeled design value

x_2, x_3 = background concentration for years 2 and 3

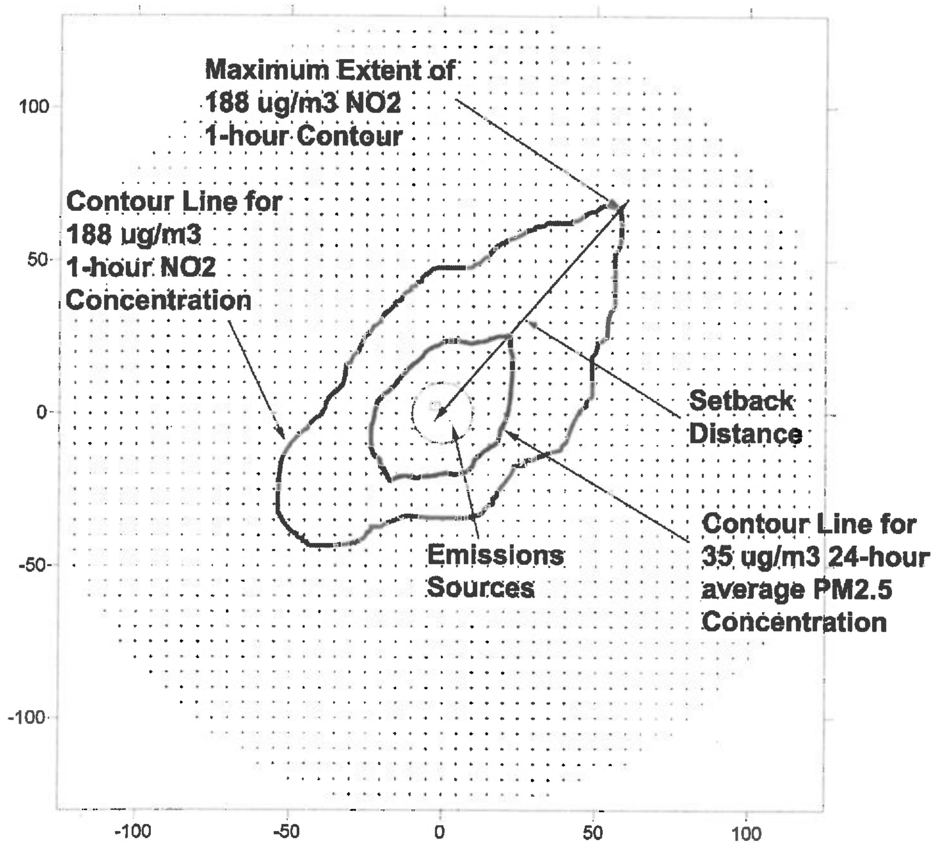
A Background x_1, x_2, and x_3 value of 56.6 $\mu g/m^3$ was used for 1-hour NO_2 and a value of 21.9 $\mu g/m^3$ was used for 24-hour $PM_{2.5}$. These values represent design value background concentrations as described in Section 3.2.

The 5-year mean of modeled 1-hour NO_2 and 24-hour $PM_{2.5}$ design values for each year was used for the m_1 value rather than the design value for an individual year. Considering other conservative measures in the analyses, DEQ determined this method was adequately conservative.

The 1-hour NO_2 model results were in the form of the 5-year mean of the 98th percentile of daily maximum 1-hour concentrations for a single year. This value was converted to a design value that accounts for two additional years without operation of the HMA plant by using the following equation for NO_2:

$$
\begin{aligned}
y &= ((m_1 + 56.6) + 56.6\ \mu g/m^3 + 56.6\ \mu g/m^3) / 3 \\
&= (m_1 + 169.8\ \mu g/m^3) / 3 \\
&= m_1/3 + 56.6\ \mu g/m^3
\end{aligned}
$$

Figure 1 - Determination of Setback Distance for a Modeling Run



The 24-hour $PM_{2.5}$ model results were in the form of the 5-year mean of the 98th percentile of 24-hour concentrations for a single year. This value was converted to a design value that accounts for two additional years without operation of the HMA plant by using the following equation for $PM_{2.5}$:

$$
\begin{aligned}
y &= (m_1 + 21.9\ \mu g/m^3 + 21.9\ \mu g/m^3 + 21.9\ \mu g/m^3)\ /\ 3 \\
&= (m_1 + 65.7\ \mu g/m^3)\ /\ 3 \\
&= m_1/3 + 21.9\ \mu g/m^3
\end{aligned}
$$

Compliance with the 24-hour PM_{10} standard is based on expected exceedances of not more than once per year over a 3-year period. When modeling a 5-year period, this translates into a design value of the 6th highest 24-hour concentration at a specific receptor. If the HMA is only operating for a single year, with the source not present for the remaining two years, then only a single year of meteorological data would be modeled and the 4th highest modeled value would be used (assuming a constant background).

3.3.12 Crucial HMA Plant Characteristics Affecting Air Quality Impacts

Table 10 lists characteristics of the HMA plant that are critical to the NAAQS and TAPs compliance demonstrations.

Table 10. IMPORTANT CHARACTERISTIC OF HMA PLANT USED IN DEQ ANALYSES

Parameter	Value or Description
HMA Throughput Rates	400 ton/hr, 5,000 ton/day, 325,000 ton/yr
Co-Contributing Sources	The HMA plant will not move into an area where there is a co-contributing stationary emissions source within 1,000 feet of the drum dryer stack. Also, co-contributing emissions sources will not locate on the plant property and within 1,000 feet of emissions points of the HMA, except as noted below for a rock crushing plant. A rock crushing plant could be operated at the site provided it is not operated during any day when the HMA plant is operated and annual throughput is less than 500,000 ton/yr. Alternatively, a rock crusher could be operated simultaneously (both operating in a given day) with the HMA plant provided the HMA throughput for that day does not exceed a value of half that otherwise allowed.
Drum Dryer	Drum dryer fueled by natural gas or propane, with a baghouse for emissions control.
Electrical Power	Line power or generators powered by diesel-fired IC engines with the following characteristics: 1) a large generator powered by a 1,340 bhp, EPA Tier 2 certified engine, burning 0.0015% sultur diesel fuel, operating less than 13 hr/day; 2) a small generator powered by a engine of less than 268 bhp, EPA Tier 3 certified engine, burning 0.0015% sulfur diesel fuel, operating up to 13 hr/day. The two engines will not operate simultaneously.
Large Generator Stack Parameters	Stack height ≥7.1 ft, unobstructed release to the atmosphere
Small Generator Stack Parameters	Stack height ≥4.6 ft, unobstructed release to the atmosphere
Dryer Stack Parameters	Stack height ≥24 ft, stack diameter ≈3.8 ft, gas temp ≥ 219° F, flow velocity ≥107 ft/sec.
Asphalt Silo Filling	Emissions are captured and routed back into the drum dryer.
Conveyor Transfers	≤3 transfers for any given quantity of material processed. Emissions controlled by 90%.
Scalping Screen	≤1 screen for any given quantity of material processed. Emissions controlled by 90%.
Frontend Loader Transfers	≤2 transfers for any given quantity of material processed. Typically involves: 1) aggregate to storage pile; 2) aggregate from pile to hopper.
Seasonal Restriction	The HMA plant will not operate during the period between December 1 and March 31.

4.0 NAAQS Impact Modeling Results

4.1 Results for Cumulative NAAQS Impact Analyses and TAPs Analyses

DEQ determined required setback distances from the non-site-specific modeling results for each proposed operating scenario, criteria pollutant and TAP, and averaging period. Table 11 lists controlling setback distances for each operational scenario. Setback distances are the closest allowable distance between the property boundary and the center of the facility, which is taken to be the drum dryer stack location. Attachment 2 provides calculated setback distances for individual impact analyses.

The PM_{10} required setback did not change for operations of less than one year. This results because one year of meteorological data can often drive the PM_{10} analyses.

Table 11. SETBACK DISTANCES AS A FUNCTION OF THROUGHPUT AND OPERATIONAL CONFIGURATION		
HMA Configuration Scenario	**Setback (ft (m))**	**Controlling Pollutant**
400 ton HMA/hr, 5,500 ton HMA/dy, 325,000 ton HMA/yr operating with two generator engines	738 (225)	1-hr NO_2
400 ton HMA/hr, 5,500 ton HMA/dy, 325,000 ton HMA/yr operating without generator engines	492 (150)	24-hr PM_{10}
Operations not more than 1 year at any one location, with or without generator engines	492 (150)	24-hr PM_{10}

4.2 Locating with Other Facilities/Equipment

The air impact analyses performed by DEQ assume there are no other emissions sources in the immediate area that measurably contribute to pollutant concentrations in a way not adequately accounted for by the background concentrations used. Such emissions sources could include a rock crushing plant, another HMA plant, a ready-mix concrete plant, or other permitted facility. DEQ modeling staff established a rule-of-thumb distance of 1,000 feet from emissions sources at the HMA plant where emissions from a nearby source/facility would need to be considered in the air impact analyses for the HMA plant. Emissions sources located beyond 1,000 feet are considered to be too distant to have a measureable impact on receptors substantially impacted by the HMA plant.

HMA plants commonly co-locate with rock crushing plants. Since the short-term impacts are the governing criteria, simultaneously operation on an annual basis is not a large concern. DEQ modeling staff determined NAAQS compliance is still assured when a rock crushing plant locates with the HMA plant, provided the HMA plant does not operate during any day when the rock crushing plant is operating and the annual actual throughput of the rock crushing plant is not greater than 500,000 tons. DEQ modeling staff also determined NAAQS compliance is assured when operating the HMA plant during the same day as the rock crushing plant, provided the throughput of the HMA plant for that day is half that assumed for the modeling analyses used to generate setback distances.

Once the HMA plant is established at a site, the plant has no control over other facilities locating on neighboring properties (this does not include facilities locating on the same property as the HMA plant). Cumulative impacts would be assessed in the permitting analyses performed for the neighboring facility. The 1,000 foot restriction assumption on off-property co-contributing sources only applies when the HMA plant is relocating to a new site.

5.0 Conclusions

The ambient air impact analyses demonstrated to DEQ's satisfaction that emissions from the facility, as described in the submitted application materials and operated as specified in this memorandum, will not cause or significantly contribute to a violation of any ambient air quality standard.

ATTACHMENT 1

EMISSIONS CALCULATIONS AND MODELING PARAMETERS FOR DEQ'S AIR IMPACT ANALYSES

HMA Plant Modeled Emissions Rates

Setback requirements are linked to throughput levels and the equipment configuration.

Drum Dryer Emissions

Knife River's consultant, CH2M Hill, used the DEQ-provided HMA spreadsheet to calculate emissions rates for various averaging periods.

An NO_2/NOx ratio of 0.2 was used for this source. DEQ determined this was a reasonable estimate, given typical values below 0.1 for boilers and the conservative default value of 0.5 for source where the ratio is unknown.

Asphalt Loadout

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

Asphalt Silo Filling

Emissions from silo-filling are captured and routed back into the drum dryer.

Asphalt Tank Heater Emissions

CH2M calculated emissions from the asphalt oil heater based on 24 hour/day operation, using natural gas.

An NO_2/NOx ratio of 0.1 was used for this source.

Power Generator

The application indicated two diesel engines may be operated at the HMA plant to power electrical generators: 1) an EPA Tier II certified 1,340 bhp diesel engine operating up to 13 hr/day and 1,161 hr/year; 2) an EPA Tier III certified 268 bhp diesel engine operating up to 13 hr/day and 2,322 hr/year. Emissions estimates were calculated assuming the engines will combust diesel with a maximum 0.0015% sulfur content.

The two generators will not operate simultaneously. The large generator will operate when the remainder of the HMA plant is operating, and the smaller generator will only operate when the plant is not producing asphalt. Emissions for various standards were calculated as follows:

- 1-hour NO_2, 1-hour SO_2, and CO: Hourly emissions from the larger generator are larger than those from the small generator, and the larger generator operates along with the drum dryer; therefore, maximum impacts will occur when the larger generator is operating and the smaller generator is not operating.

- 24-hour $PM_{2.5}$, 24-hour PM_{10}: daily emissions are a mix of both the large and small generator operations. The application states that each generator may operate up to 13 hr/day. Therefore maximum daily generator PM emissions associated with operation of the HMA plant would be from 13 hours operation of the large generator and 11 hours operation of the small generator.

Large Generator Daily $PM_{2.5}$:

$$\frac{0.5215 \text{ lb } PM_{2.5}}{\text{hr}} \left| \frac{13 \text{ hr}}{24 \text{ hr}} \right. = \frac{0.2825 \text{ lb}}{\text{hr}}$$

Small Generator Daily $PM_{2.5}$:

$$\frac{0.1313 \text{ lb } PM_{2.5}}{\text{hr}} \left| \frac{11 \text{ hr}}{24 \text{ hr}} \right. = \frac{0.06018 \text{ lb}}{\text{hr}}$$

- Annual emissions: Calculated using specified annual operating hours of 1,161 hour/year for the large generator and 2,322 hour/year for the small generator.

Large Generator Annual $PM_{2.5}$:

$$\frac{0.5215 \text{ lb } PM_{2.5}}{\text{hr}} \left| \frac{1{,}161 \text{ hr}}{8{,}760 \text{ hr}} \right. = \frac{0.06912 \text{ lb}}{\text{hr}}$$

Small Generator Annual $PM_{2.5}$:

$$\frac{0.1313 \text{ lb } PM_{2.5}}{\text{hr}} \left| \frac{2{,}322 \text{ hr}}{8{,}760 \text{ hr}} \right. = \frac{0.03480 \text{ lb}}{\text{hr}}$$

Aggregate Handling Emissions

Emissions from aggregate handling were calculated for the following transfers: 1) aggregate to a storage pile by frontend loader; 2) aggregate from a pile to a hopper by frontend loader; 3) three conveyor transfers.

PM_{10} and $PM_{2.5}$ emissions associated with the handling of aggregate materials were calculated using emissions factors from AP42 Section 13.2.4.

Emissions were 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	=	0.053 for $PM_{2.5}$, 0.35 for PM_{10}
M	=	3% 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. The lower level of moisture combined with an additional 90% emissions control was applied to calculated emissions from the conveyor transfers to account for additional emissions control measures required by Idaho regulations and the permit.

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 $PM_{2.5}$ factor – use 10 mph wind: $0.053(0.0032)\frac{(10/5)^{1.3}}{(3/2)^{1.4}} = 2.367\,E-4$ lb/ton

Adjustment factors to put in the model:

Cat 1: $(1.72/5)^{1.3}$ (9.614 E-5) = 2.401 E-5 lb/ton
Factor = 2.401 E-5/2.367 E-4 = 0.1014

Cat 2: $(5.18/5)^{1.3}$ (9.614 E-5) = 1.007 E-4 lb/ton
Factor = 1.007 E-4 /2.367 E-4 = 0.4253

Cat 3: $(9.20/5)^{1.3}$ (9.614 E-5) = 2.124 E-4 lb/ton
Factor = 2.124 E-4/2.367 E-4 = 0.8974

Cat 4: $(14.95/5)^{1.3}$ (9.614 E-5) = 3.993 E-4 lb/ton
Factor = 3.993 E-4/2.367 E-4 = 1.687

Cat 5: $(21.28/5)^{1.3}$ (9.614 E-5) = 6.318 E-4 lb/ton
Factor = 6.318 E-4/2.367 E-4 = 2.669

Cat 6: $(27.74/5)^{1.3}$ (9.614 E-5) = 8.918 E-4 lb/ton
Factor = 8.918 E-4/2.367 E-4 = 3.768

For the operational scenario for 5,000 ton/day HMA and 325,000 ton/year HMA, emissions from the loader are as follows (daily and annual throughputs were based on aggregate being 96% of the total HMA production):

Daily $PM_{2.5}$:

2.367 E-4 lb $PM_{2.5}$	4,800 ton	day	2 transfers	=	0.09468 lb
ton	day	24 hr			hr

Annual $PM_{2.5}$:

2.367 E-4 lb $PM_{2.5}$	312,000 ton	yr	2 transfers	=	0.01686 lb
ton	yr	8,760 hour			hr

Emissions from the three conveyor transfers are as follows:

Daily $PM_{2.5}$:

2.367 E-4 lb $PM_{2.5}$	4,800 ton	day	3 transfers	(1-0.90)	=	0.01420 lb
ton	day	24 hr				hr

Annual $PM_{2.5}$:

2.367 E-4 lb $PM_{2.5}$	312,000 ton	yr	3 transfers	(1-0.90)	=	0.002529 lb
ton	yr	8,760 hour				hr

Total aggregate handling emissions:

Daily $PM_{2.5}$: 0.09468 lb/hr + 0.01420 lb/hr = 0.1089 lb/hr
Annual $PM_{2.5}$: 0.01686 lb/hr + 0.002529 lb/hr = 0.01939 lb/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

Screening Emissions

This HMA plant uses one scalping screen. A $PM_{2.5}$ factor for uncontrolled emissions was not available in AP42. A $PM_{2.5}$ factor was estimated by DEQ permit writers and entered into the HMA calculation spreadsheet. The uncontrolled emissions factor was used and a 90% reduction applied to calculated emissions to account for additional emissions control measures required by Idaho regulations and the permit.

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

For the operational scenario for 5,000 ton/day HMA and 325,000 ton/year HMA, emissions are as follows:

Scalping Screen (controlled emissions):

Daily $PM_{2.5}$:

0.000130 lb PM_{10}	4,800 ton	day	(1-0.90)	=	0.002600 lb
ton	day	24 hour			hr

Annual $PM_{2.5}$:

0.000130 lb PM_{10}	312,000 ton	yr	(1-0.90)	=	0.0004630 lb
ton	yr	8,760 hour			hr

This source was modeled as a single volume source on or adjacent to a structure 5 m X 4 m, 5.0 meters thick, with a release height of 3.0 meters. The initial dispersion coefficients are calculated as follows:

σ_{yo} = 3 m / 4.3 = 0.70 m
σ_{zo} = 3 m / 4.3 = 0.70 m

HMA Plant Modeling Parameters

Dryer baghouse Stack

Release height = 7.3 meters; effective diameter of release area = 1.15 meters; typical stack gas temperature = 377 K; typical flow velocity = 32.6 meters/second

Asphalt Silo Filling

Emissions are captured and routed back to the drum dryer.

Asphalt Loadout

DEQ modeled this source as a point source.
- release height of 3.5 meters
- 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° F / 2 = 163° F
- stack velocity of 0.1 m/sec to account for convective air flow.

Aggregate to and from Storage and Conveyor Transfers

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: five transfers, equivalent in emissions to that of a frontend loader, from the point of aggregate delivery to transfer to the HMA plant hopper, and three conveyor transfers.

Asphalt Oil Heater

Parameters were provided by Knife River. Release height = 4.6 meters; effective diameter of release area = 0.26 meters; typical stack gas temperature = 339 K; typical flow velocity = 1.32 meters/second.

Power Generator

Point source parameters for the1340 hp engine (GEN1) were as follows:

Stack height = 2.17 m; stack diameter = 0.20 meters; stack gas temperature = 750 K; flow velocity = 117 meters/second.

Point source parameters for the 268 hp engine (GEN2) were as follows:

Stack height = 1.71 m; stack diameter = 0.10 meters; stack gas temperature = 566 K; flow velocity = 70 meters/second.

An NO_2/NOx ratio of 0.2 was used for the engines. This is a moderately conservative value based on review of such sources in EPA's NO_2/NOx database available on the SCRAM website (http://www.epa.gov/ttn/scram/guidance/guide/NO2_ISR_alpha_database.slsx).

ATTACHMENT 2

CALCULATED SETBACK DISTANCES FOR

DEQ'S AIR IMPACT ANALYSES

Setback Distances for Specific Pollutants, Averaging Periods, and Meteorological Datasets			
Meteorological Data	**Setback (m)**	**Setback (m)**	**Setback (m)**
NO_2 1-hour Modeling Results	**400 ton/hr throughput, with engines**	**400 ton/hr throughput, without engines**	**400 ton/hr throughput, with engines, < 1yr**
Burley	**225**	**<50**	<50
Sandpoint	140	<50	<50
McCall	<50	<50	<50
Boise	150	<50	60
Jerome	200	<50	70
Spokane	210	<50	**80**
Twin Falls	160	<50	70
Coeur d'Alene	180	<50	<50
Pocatello	160	<50	80
Idaho Falls	170	<50	80
Lewiston	160	<50	60
$PM_{2.5}$ 24-hour Modeling Results	**5,000 ton/day throughput, with engines**	**5,000 ton/day throughput, without engines**	**5,0000 ton/day throughput, with engines, < 1yr**
Burley	120	100	**<50**
Sandpoint	130	90	<50
McCall	60	<50	<50
Boise	100	90	<50
Jerome	150	100	<50
Spokane	110	100	<50
Twin Falls	110	70	<50
Coeur d'Alene	110	100	<50
Pocatello	140	70	<50
Idaho Falls	**170**	**140**	<50
Lewiston	60	<50	<50
PM_{10} 24-hour Modeling Results	**5,000 ton/day throughput, with engines**	**5,000 ton/day throughput, without engines**	**5,0000 ton/day throughput, with engines, < 1yr**
Burley	120	120	
Sandpoint	90	90	
McCall	80	80	
Boise	120	120	
Jerome	100	100	
Spokane	**150**	**150**	160[a]
Twin Falls	80	80	
Coeur d'Alene	140	140	
Pocatello	80	80	
Idaho Falls	120	120	
Lewiston	100	100	

a. Based on the 4th high concentration from using meteorological data from 2010. Since this value exceeds the setback obtained from modeling all five years of meteorological data and using the 6th high concentrations, a shorter PM_{10} setback distance cannot be used for operations limited to one year or less.

Setback Distances for Specific Pollutants, Averaging Periods, and Meteorological Datasets			
Meteorological Data	**Setback (m)**	**Setback (m)**	**Setback (m)**
$PM_{2.5}$ Annual Modeling Results	**325,000 ton/yr throughput, with engines**	**325,000 ton/yr throughput, with engines**	**325,000 ton/yr throughput, < 1yr operation**
Burley	<50	<50	<50
Sandpoint	<50	<50	<50
McCall	<50	<50	<50
Boise	<50	<50	<50
Jerome	<50	<50	<50
Spokane	<50	<50	<50
Twin Falls	<50	<50	<50
Coeur d'Alene	<50	<50	<50
Pocatello	<50	<50	<50
Idaho Falls	<50	<50	<50
Lewiston	<50	<50	<50

TAPs Modeling Results for 325,000 ton/yr throughput	Setback (meters) With or Without Generators	< 1 Yr Operations Setback (meters)
Acenaphthene (PAH) AACC = 1.4 E-2 μg/m³		
Burley met	<50 (max = 9.9 E-4 μg/m³)	
Spokane met	<50 (max = 8.9 E-4 μg/m³)	
Acenaphthylene (PAH) AACC = 1.4 E-2 μg/m³		
Burley met	<50 (max = 1.2 E-4 μg/m³)	
Spokane met	<50 (max = 1.0 E-4 μg/m³)	
Arsenic AACC = 2.3 E-4 μg/m³		
Boise met	<50 (max = 5.7 E-6 μg/m³)	
Benzene AACC = 1.2 E-1 μg/m³		
Burley met	<50 (max = 3.5 E-3 μg/m³)	
Spokane met	<50 (max = 3.1 E-3 μg/m³)	
Coeur d'Alene met	<50 (max = 2.8 E-3 μg/m³)	
Cadmium AACC = 5.6 E-4 μg/m³		
Boise met	<50 (max = 8.9 E-6 μg/m³)	
Chromium 6+ AACC = 8.3 E-5 μg/m³		
Spokane met	<50 (max = 3.3 E-6 μg/m³)	
Coeur d'Alene met	<50 (max = 1.9 E-6 μg/m³)	
Fluorene (PAH) AACC = 1.4 E-2 μg/m³		
Burley met	<50 (max = 2.9 E-4 μg/m³)	
Spokane met	<50 (max = 2.7 E-4 μg/m³)	
Formaldehyde AACC = 7.7 E-2 μg/m³		
Burley met	<50 (max = 2.6 E-2 μg/m³)	
Spokane met	<50 (max = 2.3 E-2 μg/m³)	
Coeur d'Alene met	<50 (max = 1.3 E-2 μg/m³)	
2-Methylnaphthalene (PAH) AACC = 1.4 E-2 μg/m³		
Burley met	<50 (max = 9.1 E-3 μg/m³)	
Spokane met	<50 (max = 8.2 E-3 μg/m³)	
Coeur d'Alene met	<50 (max = 9.7 E-3 μg/m³)	
Jerome met	70	
Naphthalene (PAH) AACC = 1.4 E-2 μg/m³		
Burley met	<50 (max = 4.8 E-3 μg/m³)	
Spokane met	<50 (max = 4.4 E-3 μg/m³)	
Coeur d'Alene met	<50 (max = 5.1 E-3 μg/m³)	
Nickel AACC = 4.2 E-3 μg/m³		
Spokane met	<50 (max = 4.6 E-4 μg/m³)	
Coeur d'Alene met	<50 (max = 2.7 E-4 μg/m³)	

TAPs Modeling Results for 325,000 ton/yr throughput	Setback (meters) With or Without Generators	< 1 Yr Operations Setback (meters)
POM AACC = 3.0 E-4 μg/m³		
Burley met	80	
Spokane met	70	
Coeur d'Alene met	80	
Idaho Falls met	70	
Twin Falls met	80	
Jerome met	70	
Boise met	90	
Phenanthrene (PAH) AACC = 1.4 E-2 μg/m³		
Burley met	<50 (max = 3.1 E-3 μg/m³)	
Spokane met	<50 (max = 2.8 E-3 μg/m³)	

APPENDIX C – T-RACT ANALYSIS

T-RACT ANALYSIS
Permit to Construct for a Portable Asphalt Plant

IDAPA 58.01.01.210: DEMONSTRATION OF PRECONSTRUCTION COMPLIANCE WITH TOXIC STANDARDS.

01. Identification of Toxic Air Pollutants. *The applicant may use process knowledge, raw materials inputs, EPA and Department references and commonly available references approved by EPA or the Department to identify the toxic air pollutants emitted by the stationary source or modification.* *(6-30-95)*

DEQ developed an emissions inventory spreadsheet, which includes toxic air pollutants, based on the conditions and assumptions used to develop this Permit to Construct. The spreadsheet for the proposed permitted asphalt production rates (400 T/hour, 5,000 T/day and 325,000 T/year) is provided in Appendix A of the Statement of Basis.

02. Quantification of Emission Rates.

a. *The applicant may use standard scientific and engineering principles and practices to estimate the emission rate of any toxic air pollutant at the point(s) of emission.* *(6-30-95)*

i. Screening engineering analyses use unrefined conservative data. *(6-30-95)*

ii. Refined engineering analyses utilize refined and less conservative data including, but not limited to, emission factors requiring detailed input and actual emissions testing at a comparable emissions unit using EPA or Department approved methods. *(6-30-95)*

Documentation of emissions factors is provided in the DEQ-developed Emissions Inventory Spreadsheet provided in Appendix A of the Statement of Basis.

Information regarding the following presentation of 02.b, c, and d:

- The yellow highlighted text identifies the three types of emission rates: uncontrolled; controlled; and T-RACT.
- The underlined text indicates the subtle differences between the three types of emission rates.

b. *The uncontrolled emissions rate of a toxic air pollutant from a source or modification is calculated using the maximum capacity of the source or modification under its physical and operational design without the effect of any physical or operational limitations.* *(6-30-95)*

i. Examples of physical and operational design include but are not limited to: the amount of time equipment operates during batch operations and the quantity of raw materials utilized in a batch process.

ii. Examples of physical or operational limitations include but are not limited to: shortened hours of operation, use of control equipment, and restrictions on production which are less than design capacity.

c. The controlled emissions rate of a toxic air pollutant from a source or modification is calculated using the maximum capacity of the source or modification under its physical and operational design with the effect of any physical or operational limitation that has been specifically described in a written and certified submission to the Department. *(6-30-95)*

d. The T-RACT emissions rate of a toxic air pollutant from a source or modification is calculated using the maximum capacity of the source or modification under its physical and operational design with the effect of: *(6-30-95)*

i. Any physical or operational limitation other than control equipment that has been specifically described in a written and certified submission to the Department; and *(6-30-95)*

ii. An emission standard that is T-RACT. *(6-30-95)*

T-RACT is defined in IDAPA 58.01.007.12 as:

"An emission standard based on the lowest emission of toxic air pollutants that a particular source is capable of meeting by the application of control technology that is reasonably available, as determined by the Department, considering technological and economic feasibility. If control technology is not feasible, the emission standard may be based on the application of a design, equipment, work practice or operational requirement, or combination thereof."

INTERPRETATIONS of 210.02:

- 210.02.d.i: T-RACT emissions are based on the uncontrolled emissions from the drum mixer, not the exit of the control device. For this permit, annualized cost effectiveness for each potential T-RACT equipment option for the drum mixer is based on the uncontrolled emissions.
- 210.02.d.ii: Once the T-RACT control device is determined, the ambient concentrations at the property boundary predicted by Subsections 585-586 may be increased by a factor of ten. As explained in Appendix B of the Statement of Basis, this goal is met through a non-standard Ambient Air Quality Impact Analysis developed by DEQ.

DISCUSSION: Metals - Quantification of Emission Rates:

- AP-42, Compilation of Air Pollutant Emission Factors, is the primary compilation of EPA's emission factor information. AP-42, Section 11, Hot Mix Asphalt Plants, Table 11.1-12 provides emission factors for metals from drum mixers for:
  - uncontrolled emissions with fuel oil;
  - baghouse controlled emissions with natural gas or propane;
  - baghouse controlled emissions with diesel and No. 6 fuel oil.
- The emission factor ratings range from C to E.
- The emission factors are the same for gaseous fuels and liquid fuels for all metals except lead and mercury.
- There are no emission factors in AP-42 for metals from any other type of control device.
- The control device manufacturers provide specific particulate control efficiencies for their equipment.
- Metals are part of the particulate load to the control device. The control efficiency is assumed to be the same for each metal.

03. Quantification of Ambient Concentrations. *(6-30-95)*

Refer to Appendix B of the Statement of Basis for a detailed discussion of the Ambient Air Quality Impact Analysis.

04. Preconstruction Compliance Demonstration. *The applicant may use any of the Department approved standard methods described in Subsections 210.05 through 210.08, and may use any applicable specialized method described in Subsections 210.09 through 210.12 to demonstrate preconstruction compliance for each identified toxic air pollutant.* *(6-30-95)*

TRACT analysis, as described in Subsection 210.12, is used to demonstrate preconstruction compliance with the toxic air pollutants of Sections 585-586.

05. Uncontrolled Emissions. *(6-30-95)*

a. *Compare the source's or modification's uncontrolled emissions rate for the toxic air pollutant to the applicable screening emission level listed in Sections 585- 586.* *(6-30-95)*

b. *If the source's or modification's uncontrolled emission rate is less than or equal to the applicable screening emission level, no further procedures for demonstrating preconstruction compliance will be required for that toxic air pollutant as part of the application process.* *(6-30-95)*

As explained earlier, uncontrolled emissions of metals from the drum mixer can be calculated. However, the only emissions factors for organic emissions from the drum mixer incorporate some type of control. For consistency in this T-RACT analysis, the emissions presented in Table 1 are all based on AP-42 values which incorporate some type of control. However, the emissions used in the T-RACT cost analysis spreadsheet for metals uses the uncontrolled values.

The majority of the potentially toxic air pollutants from this facility are below the screening ELs and no further action is required. However, DEQ has determined that the pollutants identified in the following table exceed Sections 585-586 ELs.

Table 1 Summary of TAPs that exceed Subsections 210.585-586 Emissions Levels (ELs)
All units expressed as lb/hr[1]

Toxic Air Pollutants	**Post Project 24-hour Average Emissions Rates for Units at the Facility (lb/hr)**	**Screening Emission Level (lb/hr)**	**Exceeds Screening Level? (Y/N)**
Benzene	1.45E-02	8.00E-04	Yes
Formaldehyde	1.15E-01	5.10E-04	Yes
2-Methylnaphthalene	3.05E-03	9.10E-05	Yes
Acenaphthylene	3.23E-04	9.10E-05	Yes
Fluorene	2.38E-04	0.033	Yes
Naphthalene	3.50E-03	9.10E-05	Yes
Phenanthrene	3.84E-04	9.10E-05	Yes
Polycyclic Organic Matter	3.74E-05	2.00E-06	Yes
Arsenic	2.08E-05	1.50E-06	Yes
Cadmium	1.55E-05	3.70E-06	Yes
Hexavalent Chromium	1.67E-05	5.60E-07	Yes
Nickel	2.34E-03	2.70E-05	Yes

1 Emissions rates are expressed as annual averages, except for quinone which is a 24-hour average.

In terms of control, these toxic pollutants are grouped into two categories:

- Carcinogenic Metals: Arsenic, Cadmium, Hexavalent Chromium and Nickel
- Organics and acids:
  - Acetaldehyde (used oil combustion only), a HAP
  - Dioxins and furans, when treated as a single TAP
  - Hydrochloric acid (used oil combustion only), a TAP
  - Poly-Aromatic Hydrocarbons (PAH), including formaldehyde, when treated as a single HAP
  - Polycyclic Organic Matter (POM) , when treated as a single TAP
  - Quinone (used oil combustion only), a HAP

06. Uncontrolled Ambient Concentration. ***(6-30-95)***
Refer to Appendix B of the Statement of Basis for a detailed discussion of the Ambient Air Quality Impact Analysis.

07. Controlled Emissions and Uncontrolled Ambient Concentration. ***(6-30-95)***
Refer to Appendix B of the Statement of Basis for a detailed discussion of the Ambient Air Quality Impact Analysis.

08. Controlled Ambient Concentration. ***(6-30-95)***
Refer to Appendix B of the Statement of Basis for a detailed discussion of the Ambient Air Quality Impact Analysis.

09. Net Emissions ***(6-30-95)***
Net emissions are not considered in this permit.

10. Net Ambient Concentration. ***(6-30-95)***
Refer to Appendix B of the Statement of Basis for a detailed discussion of the Ambient Air Quality Impact Analysis.

11. Toxic Air Pollutant Offset Ambient Concentration. ***(6-30-95)***
Refer to Appendix B of the Statement of Basis for a detailed discussion of the Ambient Air Quality Impact Analysis.

12. T-RACT Ambient Concentration for Carcinogens. ***(6-30-95)***

a. As provided in Subsections 210.12 and 210.13, the owner or operator may use T-RACT to demonstrate preconstruction compliance for toxic air pollutants listed in Section 586. *(6-30-95)*

i. This method may be used in conjunction with netting (Subsection 210.09), and offsets (Subsection 210.11). *(6-30-95)*

Neither netting nor offsets are considered in this permit.

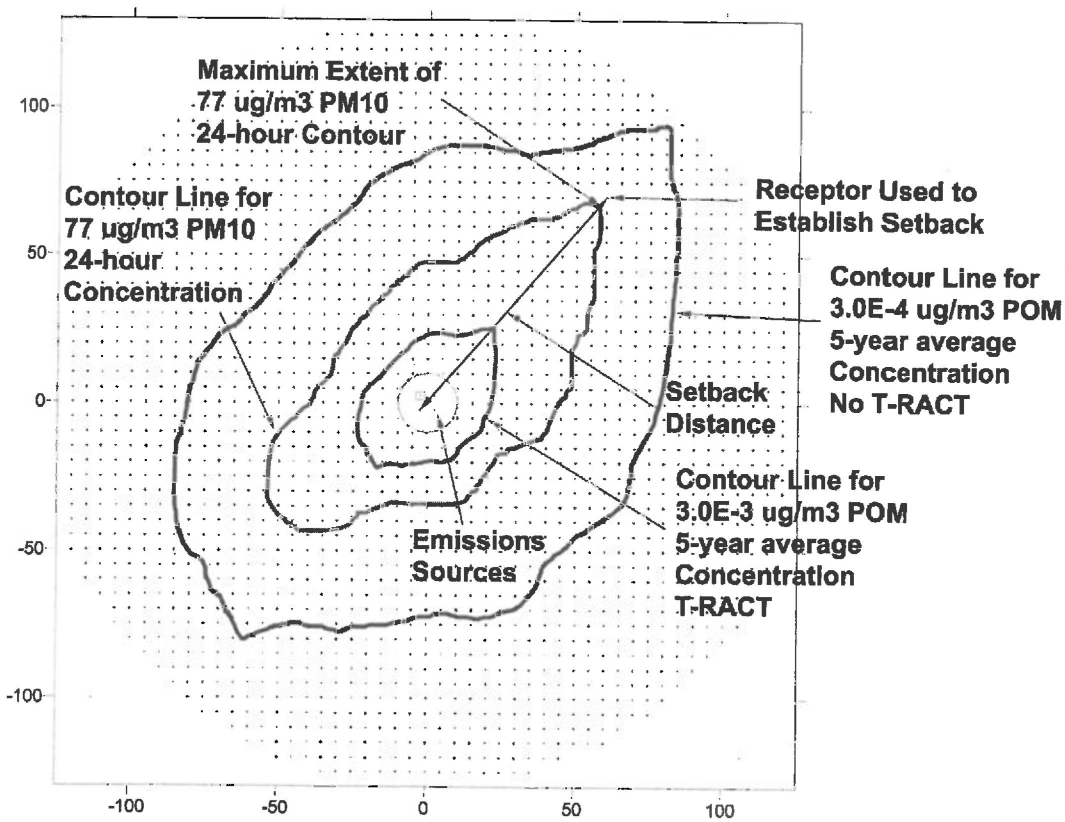
ii. This method is not to be used to demonstrate preconstruction compliance for toxic air pollutants listed in Section 585. *(6-30-95)*

Table 1 includes toxic air pollutants listed in either Section 585 or 586. Hydrochloric acid and quinone are listed in Section 585 and are not considered in this T-RACT analysis. T-RACT is being proposed for the toxic air pollutants listed in Section 586.

b. Compare the source's or modification's approved T-RACT ambient concentration at the point of compliance for the toxic air pollutant to the amount of the toxic air pollutant that would contribute an ambient air cancer risk probability of less than one to one hundred thousand (1:100,000) (which amount is equivalent to ten (10) times the applicable acceptable ambient concentration listed in Section 586). *(6-30-95)*

Under this permit, the ambient air quality impact analysis process is non-standard. In summary, the AACC is input to the impact analysis program to determine the distance required between the source and the point at which the ambient concentration has decreased to the AACC level. This point is called the "setback distance". This procedure is applied for each pollutant which triggered the T-RACT analysis. This is the "T-RACT setback distance". Refer to the following figure for a graphical representation.

Figure 1 - Determination of Setback Distance for a Modeling Run



Refer to Appendix B of the Statement of Basis for a detailed discussion of the Ambient Air Quality Impact Analysis.

c. If the source's or modification's approved T-RACT ambient concentration at the point of compliance is less than or equal to the amount of the toxic air pollutant that would contribute an ambient air cancer risk probability of less than one to one hundred thousand (1:100,000), no further procedures for demonstrating preconstruction compliance will be required for that toxic air pollutant as part of the application process. *(6-30-95)*

As discussed previously, T-RACT setback distances are determined by the point at which the potential toxic air pollutant levels have dissipated to a concentration below the ambient air cancer risk probability of less than one to one hundred thousand (1:100,000). As shown in the previous figure, the setback distance required for proper dissipation of PM_{10} is generally greater than the setback distance required to satisfy T-RACT concerns. The largest setback distance, whether for T-RACT or PM_{10}, is set as the permitted setback distance. For details, refer to Appendix B of the

Statement of Basis.

DEQ is satisfied that preconstruction compliance with toxic air pollutants listed in section 586 has been demonstrated.

d. The Department shall include emission limits and other permit terms for the toxic air pollutant in the permit to construct that assure that the facility will be operated in the manner described in the preconstruction compliance demonstration. *(6-30-95)*

Table 2: Permit Conditions that Assure Compliance with Toxic Standards

TAP	Contributing source	Permit conditions
Metals	Drum mixer	Used oil (RFO) meeting the specifications of 279.11
Metals	Drum mixer	Use of baghouse with ≥ 99% PM_{10} control
Metals	Drum mixer	Recycling of particulate collected from the baghouse back to the drum mixer
Organics (formaldehyde)	Drum mixer and loadout and silo-filling	Use of a covered conveyor from the drum mixer to the loadout and silo-filling

13. T-RACT Determination Processing. ***(6-30-95)***

a. The applicant may submit all information necessary to the demonstration at the time the applicant submits the complete initial application or the applicant may request the Department to review a complete initial application to determine if Subsection 210.12 may be applicable to the source or modification. *(6-30-95)*

b. Notwithstanding Subsections 209.01.a. and 209.01.b., if the applicant requests the Department to review a complete initial application and Subsection 210.12 is determined to be applicable, the completeness determination for the initial application will be revoked until a supplemental application is submitted and determined complete. When the supplemental application is determined complete, the timeline for agency action shall be reinitiated. *(6-30-95)*

All of the documents submitted by the Applicant have been developed and reviewed by the Department.

14. T-RACT Determination. T-RACT shall be determined on a case-by-case basis by the Department as follows: ***(6-30-95)***

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. *(5-1-94)*

For the purposes of this analysis, the toxic air pollutants included in this analysis are grouped into two categories: metals (which are particulate); and organics (which are gaseous).

Metals, including arsenic, cadmium, hexavalent chromium, and nickel, may be contained in trace amounts in the liquid fuels. Liquid fuels may be combusted in the drum mixer, asphalt tank heater, and the IC engines. Metals, if present, exit the combustion units as particulate.

A DEQ review of previously submitted and online used oil analysis did not report nickel concentrations. DEQ is satisfied that the T-RACT controls for arsenic, hexavalent chromium, and nickel will also be appropriate for cadmium because all metals are carried with the particulate. Therefore, whatever control technology most reasonably controls particulate will satisfy T-RACT for cadmium.

Organics, including acetaldehyde, benzene, dioxins/furans, formaldehyde, PAH and POM, may be emitted either during combustion or during silo filling or load-out of the HMA product.

Based on a review of permitted facilities and research contained in the EPA Air Pollution Control Cost Manual (EPA/452/B-02-001), the following control technologies were reviewed:

Metals:

- Additional treatment of used oil by the supplier
- Drum mixer baghouse
- Drum mixer scrubber

Organics:

- Good combustion practices on all combustion devices
- Covered conveyors from the drum mixer to the silo or load-out points
- Thermal oxidizer on the asphalt storage silo
- Thermal oxidizer (RTO) on the exhaust of the drum mixer baghouse

b. The Department shall review the information submitted by the applicant and determine whether the applicant has proposed T-RACT. *(5-1-94)*

All of the documents submitted by the Applicant have been developed and reviewed by the Department. The Department is satisfied that the information provided in this document meets the requirements of a T-RACT analysis.

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: *(5-1-94)*

i. Process and operating procedures, raw materials and physical plant layout. *(5-1-94)*

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. *(5-1-94)*

iii. The energy requirements of the control technology. *(5-1-94)*

Metals Control Technological Feasibility

Options considered for technological feasibility:

- Additional treatment of used oil (by the supplier)
- Drum mixer baghouse
- Drum mixer scrubber

Additional treatment on used oil:

The permit allows only the use of used oil classified as RFO4, RFO5l, and RFO5H (as defined by ASTM D6488); and 40 CFR 279.11 and ASTM 6448. Used oil is different from "waste oil" in that used oil is oil that is cleaned of impurities, including metals, and may be blended with other oil to provide for clean and consistent combustion.

i. Used oil suppliers are capable of supplying used oil with lower metals content. This treatment would not take place at the asphalt plant site.

ii. The used oil supplier would be responsible for the disposable of the extracted metals; therefore, this additional treatment would not have an environmental impact at the asphalt plant site.

iii. The used oil supplier is responsible for additional energy costs; therefore, this additional treatment would not increase energy consumption at the asphalt plant site.

Additional treatment on used oil to control metal emissions meets the criteria for technological feasibility and will be considered for economic feasibility.

Drum Mixer baghouse:

i. For new installations, a baghouse is the preferred control device for a drum mixer. Baghouses are highly portable and considered as part of the typical installation.

  - In December 2000, EPA-454/R-00-019, published the "Hot Mix Asphalt Plants Emission Assessment Report". Section 2.1.4 states: "At most HMA facilities, fabric filters (baghouses) are used to control emissions from dryers (drum mixers). The material collected in those devices is recycled back into the process."
  - Two providers of drum mixer control equipment in Idaho no longer use scrubbers (per Dennis Hunt with Gencor Industries, Inc., and Catherine Sutton of Astec, Inc.)

ii. Baghouses are capable of providing ≥ 99% control of PM_{10}, i.e. metals control.

iii. The energy costs related to a baghouse system are less than those for scrubbers, per *Baghouse Applications* by Malcolm Swanson, P.E.

A drum mixer baghouse to control metal emissions meets the criteria for technological feasibility and will be considered for economic feasibility.

Regardless of the T-RACT determination, the permit requires the operation of a baghouse on the exit of the drum mixer. In most operating scenarios, PM_{10} emissions from the drum mixer are the determining factor in calculating setback distance. This distance is minimized when the emissions from the drum mixer are controlled to ≥ 99% by a baghouse. The metals, which exist as particulate in the flue gas exiting the drum mixer, would be collected by this device.

Recycle of particulate collected from drum mixer baghouse:

The permit also requires that the collected particulate be routed back to the drum mixer. In this manner, the metals that may be contained in the particulate are encapsulated into the hot mix and not released to the atmosphere.

Recycling of particulate collected from the drum mixer baghouse to control metal emissions meets the criteria for technological feasibility and will be considered for economic feasibility.

Drum mixer scrubber:

i. Particulate may be captured by a wet scrubber system. For a 130 T/day drum mixer, approximately 100 gallons per minute of water would be required. Particulate collection efficiency varies from 50 to 98% depending on particle size and pressure drop. The scrubbing water would be treated and recycled through some type of mechanical and/or chemical means. It is possible for a portable HMA to construct a wastewater collection system at each site. However, several of the major HMA plant manufacturers, including Gencor and Astec, no longer use scrubber control systems

ii. Wastewater stored in a pond would require on-going, supervised treatment, even after the HMA plant relocates. There is a possibility of ground water or surface water contamination.

iii. The energy costs related to waste water treatment vary depending on a variety of factors including: volume of water; concentration of pollutants in the water; weather; and pond design.

A drum mixer scrubber to control metal emissions meets the criteria for technological feasibility and will be considered for economic feasibility.

Review of the EPA RACT/BACT/LAER Clearinghouse (RBLC) Review for Metals

The engineering consulting firm CH2MHill, Boise, has presented this review to the Department on behalf of their clients on several previous occasions. The Department continues to be satisfied with the completeness of this review as submitted.

"A review of technologies for the control of chromium, arsenic and nickel was performed. The Environmental Protection Agency (EPA) RBLC was reviewed for a 10 year look-back period to determine the types of controls that have been required on similar sources. The RBLC is a compilation of existing and proposed control technologies, permit limits, and emission estimates for a very wide variety of process and emission point sources in the U.S. This database was developed and is maintained by the EPA to provide information on emissions control technology and other information for air pollutants and is regularly updated by EPA and state regulatory agencies to reflect the current state of controls. The RBLC was reviewed for HMA plants and searched for other related categories, such as external combustion. The categories searched of the in the RBLC were:

- Asphalt Concrete Manufacturing
- Asphalt Processing
- Liquid Fuel & Liquid Fuel Mixtures (< 100 million Btu/hr)
- Distillate Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel)
- Other Liquid Fuel & Liquid Fuel Mixtures

- Other Fuel and Combinations (< 100 million Btu/hr)

For each category listed above, the RBLC was used to search for records relating to the control of arsenic and chromium specific to asphalt processing and manufacturing (mineral products) or related to fuel combustion. Based on a 10 year review of related sources, no controls were identified for HMA plants for the control of chromium, arsenic and nickel. A copy of the results of the RBLC search was included in the April, 2008 permit application submitted to DEQ. Based on the search, removal controls for chromium, arsenic and nickel were not determined to be present in the source categories and no additional controls, beyond the high-efficiency baghouse are considered reasonable."

DEQ is satisfied that the review results for the metal particulates of chromium, arsenic and nickel is also appropriate for cadmium metal particulate.

Organic Control Technological Feasibility

Options considered for technological feasibility:

- Good combustion practices on all combustion devices
- Covered conveyors from the drum mixer to the silo or load-out points
- Thermal oxidizer on the asphalt storage silo
- Thermal oxidizer following the drum mixer baghouse

Good combustion practices on all combustion devices:

i. Fuel cost is one of the major expenses at any HMA plant. Efficient combustion reduces costs, while also reducing organic emissions. Process operation and maintenance procedures are in place to ensure good combustion practices.

ii. The practice of good combustion practices does not adversely impact the environment.

iii. Good combustion practices reduce energy costs.

Good combustion practices on all combustion devices to control organic emissions meets the criteria for technological feasibility and will be considered for economic feasibility.

Covered conveyors from the drum mixer to the silo or load-out points:

Organics, generally referred to as "blue smoke", are generated by the hot asphalt product as it is conveyed from the drum mixer to the silo. Blue smoke is actually a haze of petroleum (organic) droplets suspended in the air.

i. Covering this conveyor protects the HMA product from airborne contaminants and helps to maintain the temperature of the HMA product.

ii. This covering and reduces the droplets from escaping to the environment. It is considered an inexpensive "good neighbor" control for potential blue smoke.

iii. Construction of this covering may provide a slight energy savings.

Covering the conveyors from the drum mixer to the silo or load-out points to control organic emissions meets the criteria for technological feasibility and will be considered for economic feasibility.

Thermal oxidizer on the asphalt storage silo:

Incineration is one of the best known methods of industrial gas waste disposal. Incineration is the ultimate disposal method in that the objectionable combustible compounds in the waste gas are converted rather than collected. The heart of an incinerator system is a combustion chamber in which the organic-containing waste stream is burned. However, the energy released by the combustion of the organics is not sufficient to raise its own inlet temperature to the desired levels, so that supplemental air and auxiliary fuel must be added.

The use of a catalyst increases the reaction rate, enabling conversion at lower reaction temperature than in thermal incinerator units, and thereby lowering the fuel costs. However, particulate matter and the metals can rapidly blind the pores of catalysts and deactivate them over time. The use of a catalyst in a thermal oxidizer will not be further explored

i. The incinerator chamber and auxiliary equipment require their own foundations & supports, instrumentation, electrical, piping, insulation, and extensive handling & erection by specially trained personnel.

ii. The organics entering the oxidizer would be destroyed.

iii. This process requires additional energy. The auxiliary fuel of choice for a thermal oxidizer is natural gas because the combustion of any liquid fuels would create additional pollutants, including organic compounds.

Thermal oxidizer on the asphalt storage silo to control organic emissions **does not** meet the criteria for technological feasibility and only a brief discussion of economic feasibility will be presented.

Thermal oxidation following the drum mixer baghouse:

A thermal oxidizer could potentially be installed following the drum mixer baghouse. However, all of the concerns regarding this device on the silo apply to the baghouse exhaust as well.

Thermal oxidation following the drum mixer baghouse to control organic emissions **does not** meet the criteria for technological feasibility and only a brief discussion of economic feasibility will be presented.

EPA RACT/BACT/LAER Clearinghouse Review and AP-42

The engineering consulting firm CH2MHill, Boise, has presented this review to the Department on behalf of their clients on several previous occasions. The Department continues to be satisfied with the completeness of this review as submitted:

"A review of technologies for the control of formaldehyde, POM and PAH was performed. The Environmental Protection Agency (EPA) RACT/BACT/LAER Clearinghouse (RBLC) was reviewed to determine the types of controls that have been required on similar sources. The same source categories were reviewed for the pollutants, namely:

- Asphalt Concrete Manufacturing
- Asphalt Processing
- Liquid Fuel & Liquid Fuel Mixtures (< 100 million Btu/hr)
- Distillate Fuel Oil (ASTM # 1,2, includes kerosene, aviation, diesel fuel)
- Other Liquid Fuel & Liquid Fuel Mixtures

- Other Fuel and Combinations (<100 million Btu/hr)

This review returned one record for limitations of formaldehyde emissions, and no records for the specific control of POM/PAH.

Formaldehyde – Only one record for the control of emissions was found in the RBLC database. This record applied to a diesel generator which was assigned an emissions limit and no control equipment or work practice was required.

In addition to formaldehyde and POM/PAH discussed in the EPA RBLC investigation above, this T-RACT analysis needs to address the other organic compounds which exceeded the 586 ELs; i.e. acetaldehyde, benzene, and dioxins/furans. Because all organic compounds are the destroyed by the same devices, DEQ is satisfied that the review results for formaldehyde and POM/POH is appropriate for all organic compounds.

14. T-RACT Determination. T-RACT shall be determined on a case-by-case basis by the Department as follows: (continued)

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: *(5-1-94)*

i. Capital costs. *(5-1-94)*

ii. Cost effectiveness, which is the annualized cost of the control technology divided by the amount of emission reduction. *(5-1-94)*

iii. The difference in costs between the particular source and other similar sources, if any, that have implemented emissions reductions. *(5-1-94)*

Cost Analysis Metals

Additional treatment of used oil by the supplier:

A used oil vendor, Commercial Fuel in Nampa, Idaho was contacted by the engineering consulting firm CH2MHill, Boise, for the specific management of used oil to minimize the content of **chromium and arsenic**. Note that all chromium compounds, not the subset of hexavalent chromium, are considered in these cost calculations because 279.11 does not distinguish between the two.

Randy Blackburn of Commercial Fuel indicated that the used oil could be managed to minimize the metals content for an additional cost of $0.55/gallon.

A RFO fuel vendor, Gem State Oil Recovery in Kuna, Idaho was contacted by the engineering consulting firm CH2MHill, Boise, for the specific management of used oil to minimize the content of **nickel**. Doug Stowers of Gem State Oil Recovery indicated that the used oil could be managed to minimize the metals content for an additional cost of $0.55/gallon.

Minimum detection limits (MDLs) vary, even at the same laboratory and with the same equipment, due to calibration procedures. A review of used oil analysis online and submitted to the Department indicated MDLs between 0.5 and 1.0 ppm (mg/l). For consistency, the cost calculations are based on 1.0 ppm for each of the metals.

As shown in the following table, the reduction of the metal pollutant is calculated as the difference between the used oil as-received and the used oil after additional treatment. Because

279.11 does not specify a concentration for nickel, the cost analysis conclusions for the other metals is considered appropriate for nickel.

For details of this economic analysis, refer to the spreadsheet "Additional Treatment on Used Oil Cost Analysis" provided in Sub Appendix A. The results are summarized in the following table:

Table 3: Additional Treatment on Used Oil Cost Analysis

Pollutant	Capital Cost for Applicant ($)	Annualized Cost ($/lb reduction of pollutant)
Arsenic	0	$16,487
Cadmium	0	$65,947
Chromium	0	$7,327

Additional treatment on used oil to reduce metal particulate emissions is not considered economically feasible and therefore does not meet the economic requirements of T-RACT.

Drum Mixer controls:

Calculation of the cost effectiveness of each type of control equipment on metals exiting the drum mixer:

- Metal emissions entering the control device: the AP-42 uncontrolled emissions with fuel oil (Table 11.1-12).
- Metal emissions exiting the control device: the control device manufacturer's particulate control efficiencies
- Emission reductions and annual cost per ton of emission reduction: based on the difference between the emissions entering and exiting the device (as explained in the previous two bullets)

Equipment costs for both the baghouse and scrubbers systems were provided to the Department by Andy Guth of CEI Enterprises, Inc., an Astec Company. For cost details of this economic analysis, refer to the spreadsheet "Drum Mixer Baghouse and Scrubber Cost Analysis" provided in Sub Appendix B. The results are summarized in the following table:

Table 3: Drum Mixer Baghouse and Scrubber Cost Analysis

Pollutant	Capital Cost		Annualized Cost ($/lb reduction of pollutant)	
	Baghouse	Scrubber	Baghouse	Scrubber
Arsenic	$264,990	$231,110	$284,750	$281,220
Cadmium			$94,917	$93,740
Hexavalent chromium			$14,987	$15,623
Nickel			$284	$289

Cost effectiveness:

The Department is satisfied that the operation of a baghouse on the drum mixer to reduce metal particulate meets the T-RACT criteria for economic feasibility.

As explained in the Statement of Basis, this permit requires the operation of a baghouse on the drum mixer with ≥ 99% control efficiency of PM_{10}.

Cost Analysis Organic Control

Covered conveyors from the drum mixer to the silo or load-out points:

As discussed in "Organics Control – Technological Feasibility", covered conveyors from the drum mixer to the silo or load-out points to control organic emissions meets the T-RACT criteria for technological feasibility and will be considered for economic feasibility.

Covered conveyors are a standard on most HMA plant systems in order to shield the HMA product from the weather, maintain temperature, and minimize the release of organic droplets. Cost itemization for the covering and the exact quantity of emissions reduction is not provided with manufacturer quotes. The quote does specify that the cover is composed of a series of hinged steel plates, about 18 inches wide over the length of the conveyor.

For this T-RACT analysis, the following table is considered by the Department to be reasonable:

Table 4: Covered Conveyors from the Drum Mixer to the Silo or Load-out Points Cost Analysis

Pollutant	Capital Cost	Annualized Cost ($/lb reduction of pollutant)
Organic	minimal	Negligible

Cost effectiveness:

The Department is satisfied that the cost of covering the conveyor(s) from the drum mixer to the silo or load-out point to reduce organic emissions meets the T-RACT criteria for economic feasibility.

Thermal Oxidizer on the Silo or Load-Out Points and Thermal Oxidation Following the Drum Mixer Baghouse

As discussed in "Organics Control – Technological Feasibility", installing a thermal oxidizer on either the silo or load-out points or the discharge of a drum mixer baghouse to control organic emissions **does not** meet the criteria for technological feasibility for this T-RACT analysis. However, a brief discussion of economic feasibility is presented.

The engineering consulting firm CH2MHill, Boise contacted the vendor Baker Furnace, in Yorba Linda CA, (Gabe Trinidad, 800-237-5675) for information regarding a thermal oxidizer on the silo or load-out points. The following information was presented in multiple permit applications in 2008 and 2009:

- The capital cost estimate to accommodate 5,000 acfm was $462,875 (2005$).
- Annualized cost was $171,684 (2005$)

To obtain an order of magnitude cost estimate, the above annualized cost (based on a different size asphalt storage silo) and formaldehyde (at 0.018 lb/hr, the 586 pollutant with the highest concentration discharged from the drum mixer, as presented in Table 1) on the silo or load-out points.

Table 5: Thermal Oxidizer on the Silo or Load-out Points Cost Analysis

Pollutant	Capital Cost	Annualized Cost (\$/lb reduction of pollutant)
Formaldehyde	\$462,875	\$25,715,278

The engineering consulting firm CH2MHill, Boise contacted the vendor CMM Group, DePere WI, (David Martin, 920-336-9800) for information regarding a thermal oxidizer on the discharge of the drum mixer. The following information was presented in multiple permit applications in 2008 and 2009:

- The capital cost estimate to accommodate 35,000 acfm at 1400-1600 °F was \$425,000 (2005\$).
- Annualized cost was \$452,355

To obtain an order of magnitude cost estimate, the above annualized cost (based on a different size drum mixer) and formaldehyde (at 0.018 lb/hr, the 586 pollutant with the highest concentration discharged from the drum mixer, as presented in Table 1) are used to calculate the annualized cost of installing thermal oxidation following the drum mixer.

Table 6: Thermal Oxidizer on the Discharge of the Drum Mixer Baghouse Cost Analysis

Pollutant	Capital Cost	Annualized Cost (\$/lb reduction of pollutant)
Formaldehyde	\$786,888	\$43,716,000

Cost effectiveness:

Thermal oxidation on the asphalt to control organic emissions **does not** meet the criteria for economic feasibility. Thermal oxidation on the exhaust of the drum mixer baghouse to control organic emissions **does not** meet the criteria for economic feasibility.

14. T-RACT Determination. T-RACT shall be determined on a case-by-case basis by the Department as follows: (continued)

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. *(5-1-94)*

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.* *(6-30-95)*

Based on this T-RACT analysis, the Department has determined that the proposed control technologies constitute T-RACT for this permit.

Table 7: Permit Conditions that Assure Compliance with Toxic Standards

TAP	Contributing source	Permit conditions
Metals	Drum mixer	Used oil (RFO) meeting the specifications of 279.11 (Knife River is not permitted for oil or RFO)
Metals	Drum mixer	Use of baghouse with ≥99% PM_{10} control
Metals	Drum mixer	Recycling of particulate collected from the baghouse back to the drum mixer
Organics (formaldehyde)	Drum mixer and loadout and silo-filling	Use of a covered conveyor from the drum mixer to the loadout and silo-filling

T-RACT for IC Engines:

All applicants who choose to permit a portable asphalt plant are required to comply with 40 CFR 60 Subpart IIII or 40 CFR 63 Subpart ZZZZ. Both of these subparts are intended to reduce emissions, including Idaho TAP/HAP emissions from engines through emission standards, fuel limitations and specific operation and maintenance procedures.

Per IDAPA 58.01.01.210.20 compliance with these two MACT subparts constitutes T-RACT for the IC engines.

APPENDIX D – PROCESSING FEE

PTC Fee Calculation

Instructions:
Fill in the following information and answer the following questions with a Y or N. Enter the emissions increases and decreases for each pollutant in the table.

Company: **Knife River, Inc.**
Address: **5450 Gowen Road**
City: **Boise**
State: **Idaho**
Zip Code: **83709**
Facility Contact: **Dough Elliott**
Title: **Responsible Official**
AIRS No.: **777-00533**

y Does this facility qualify for a general permit (i.e. concrete batch plant, hot-mix asphalt plant)? Y/N

Y Did this permit require engineering analysis? Y/N

N Is this a PSD permit Y/N (IDAPA 58.01.01.205.04)

Emissions Inventory			
Pollutant	Annual Emissions Increase (T/yr)	Annual Emissions Reduction (T/yr)	Annual Emissions Change (T/yr)
NO_X	16.7	0	16.7
SO_2	0.6	0	0.6
CO	27.7	0	27.7
PM10	3.7	0	3.7
VOC	8.2	0	8.2
TAPS/HAPS	2.2	0	2.2
Total:	0.0	0	**59.1**
Fee Due	**$ 500.00**		

Comments: