Statement of Basis

Permit to Construct P-2011.0104
Project No. 60874

Knife River, Inc.
Keeler Pit
EC **Grangeville, Idaho**

Facility ID No. 777-00514

Final

July 22, 2011
Eric Clark
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
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
BMP	best management practices
Btu	British thermal units
CAA	Clean Air Act
CAM	Compliance Assurance Monitoring
CAS No.	Chemical Abstracts Service registry number
CBP	concrete batch plant
CEMS	continuous emission monitoring systems
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CI	compression ignition
CMS	continuous monitoring systems
CO	carbon monoxide
COMS	continuous opacity monitoring systems
CPMS	continuous pollutant monitoring system
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EL	screening emission levels
EPA	U.S. Environmental Protection Agency
FEC	Facility Emissions Cap
gpm	gallons per minute
gph	gallons per hour
gr	grain (1 lb = 7,000 grains)
HAP	hazardous air pollutants
HMA	hot mix asphalt
hp	horsepower
hr/yr	hours per year
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
lb/qtr	pound per quarter
m	meters
MACT	Maximum Achievable Control Technology
mg/dscm	milligrams per dry standard cubic meter
MMBtu	million British thermal units
MMscf	million standard cubic feet
NAAQS	National Ambient Air Quality Standard
NAICS	North American Industry Classification System
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
PCB	polychlorinated biphenyl
PERF	Portable Equipment Relocation Form
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
POM	polycyclic organic matter
ppm	parts per million
PSD	Prevention of Significant Deterioration
PTC	permit to construct
PTC/T2	permit to construct and Tier II operating permit
PTE	potential to emit
RAP	recycled asphalt pavement
RFO	reprocessed fuel oil
Rules	Rules for the Control of Air Pollution in Idaho
scf	standard cubic feet
SCL	significant contribution limits
SIC	Standard Industrial Classification
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/yr	tons per consecutive 12-calendar month period
T2	Tier II operating permit
TAP	toxic air pollutants
TEQ	toxicity equivalent
T-RACT	Toxic Air Pollutant Reasonably Available Control Technology
U.S.C.	United States Code
UTM	Universal Transverse Mercator
VOC	volatile organic compounds
yd^3	cubic yards
$\mu g/m^3$	micrograms per cubic meter

FACILITY INFORMATION

Description

A portable Hot Mix Asphalt (HMA) plant use aggregate material that is mixed, heated and dried. The aggregate is then combined with liquid asphalt to create hot mix asphalt. This hot mix asphalt will be primarily used for road surfaces.

The HMA manufacturing process is typified by the following types of plants: batch mix plants, parallel flow mix plants and counter flow mix plants. The Knife River plant permitted here is a portable counter flow mix HMA plant.

The counter flow drum dryer design uses proportioning cold feed (aggregate) controls for the process materials. Sized aggregate is introduced to the counter flow drum at the opposing end to the burner. As the drum rotates, the aggregate and the combustion air move in opposing directions with the aggregate moving toward the burner. Recycled Asphalt Pavement (RAP) is introduced into the process at approximately the mid-point of the drum dryer. Drying of the materials takes place in the rotating, slightly declined, direct-fired drum dryer. During the drying process, the mixture is heated to temperatures around 325 °F and then coated with liquid asphalt cement. In this plant, the heated aggregate is coated with liquid asphalt cement at the end of the drum. Liquid asphalt cement flow is controlled by a variable flow pump that is electronically linked to the aggregate weigh scales. The resulting HMA is conveyed to an enclosed silo where it is loaded into trucks for transport to the work site.

The exhaust gases from the drum dryer are collected and ducted to a baghouse by an induced draft fan. Silo filling and conveyance from the drum dryer to the silo is an enclosed process with exhaust gases routed to the baghouse. Fine particulates collected by the baghouse are returned for blending with the aggregate and production of HMA.

Aggregate and RAP will constitute approximately 94% by weight of the total mixture but can vary with the types of aggregate RAP used and the grade of asphalt cement. This includes a maximum of 50% RAP

The counter flow Knife River HMA plant will have a maximum production rate of 5,000 T/day and a maximum annual production rate of 500,000 T/yr. The 1,350 bhp internal combustion engine will have an hourly operational limit of 16 hr/day and an annual operating limit of 2,000 hr/yr. The 231 bhp engine only has annual limit of1,800 hours. The facility will also abide by a 590 foot (180 meters) setback distance.

Permitting History

This the initial permit for this facility. Therefore, no permitting history is applicable.

Application Scope

This permit is the initial PTC for this facility.

The applicant has proposed to:

Construct and operate a Hot Mix Asphalt Plant at the Keeler Pit outside Grangeville, Idaho.

Application Chronology

May 27, 2011	DEQ received an application and an application fee.
June 8 – June 23, 2011	DEQ provided an opportunity to request a public comment period on the application and proposed permitting action.
June 20, 2011	DEQ determined that the application was complete.
July 6, 2011	DEQ made available the draft permit and statement of basis for peer and regional office review.
July 8, 2011	DEQ made available the draft permit and statement of basis for applicant review.

July 15, 2011	DEQ received the permit processing fee.
July 22, 2011	DEQ issued the final permit and statement of basis.

TECHNICAL ANALYSIS

Emissions Units and Control Devices

Table 1 EMISSIONS UNIT AND CONTROL DEVICE INFORMATION

ID No.	Source Description	Control Equipment Description	Emissions Point ID No. and Description
Dryer	Hot Mix Asphalt Dryer Manufacturer: GENCOR Industries Model: 400 Ultra Plant Manufacture Date: 2008 Max. Capacity: 135 MMBtu/hr Max. Production: 500,000 T/hr Fuel: Natural gas/propane, distillate or RFO	Baghouse Manufacturer GENCOR Industries Model: CFP 182 Number of bags: 1050 Air to Cloth ratio: 4.92 to 1 PM/PM_{10} efficiency: 99.9%	Exit height: 60 ft Exit diameter: 4.833 ft Exit flow rate: 50,292 acfm Exit temperature: 291 °F
IC Engines	Internal Combustion Engines (or equivalent[a]) Manufacturer: Caterpillar Model: C32 Rated power: 1,350 bhp Construction date: 2006 EPA Rating (Subpart ZZZZ): 2 Displacement: 2.68 l/cly Fuel: #2 Distillate Sulfur Content: 0.0015%	Oxidation Catalyst Muffler	Exit height: 22.2 ft Exit diameter: 0.67 ft Exit flow rate: 22,386 acfm Exit temperature: 926.4 °F
	Manufacturer: IVECO Model: NEF67 TE1X Rated power: 231 bhp Construction date: 1997 Displacement: 6.7 l/cly Fuel: #2 Distillate Sulfur Content: 0.5%	Good Combustion Control	Exit height: 21.9 ft Exit diameter: 0.33 ft Exit flow rate: 583 acfm Exit temperature: 649 °F
Tanks	Diesel Storage Tank Maximum Capacity: 10,000 gal	None	Exit height: 16 ft Exit diameter: 0.25 ft
	RFO Storage Tanks (2) Maximum Capacity: 10,000 gal 12,000 gal	None	Exit height: 9.5 ft Exit diameter: 0.25 ft
Fugitives	Materials transfer points (includes fugitives) Aggregate dump to ground, Aggregate dump to conveyor (includes bin loading), Conveyor transfer Screen Drum loading Silo filling and truck loading	Gencor Baghouse for conveyor transfer. Minimized drop heights, water sprays, enclosures, or equivalent control methods	Fugitive Emissions – Estimated 75% Control

a. "or equivalent" is defined as equipment which has an equivalent or less maximum brake horsepower than listed in this table, which does not result in an increase in emissions, and which does not result in the emission of a toxic air pollutant not previously emitted

Emissions Inventories

An emission inventory was developed for the drum dryer, two internal combustion engines, silo-filling and loadout and other material handling operations at the facility (see Appendix A) associated with this proposed project. The emission inventory is based on emission factors from Section 11.1 of AP-42, the sources and emission controls descriptions summarized in Table 2, the fuel types summarized in Table 2, and the following operational limits: 5,000 T/day; 500,000 T/yr maximum asphalt production; 16 hr/day and 1,800 and 2,000 hr/yr maximum operation of the engines. Additional emission factors for the Diesel Oxidation catalyst muffler were incorporated in place of AP-42 factors for the 1,350 bhp engine.

Emissions estimates were calculated separately for each fuel evaluated for use in the HMA. An emission estimate for each emission source was then developed by selecting the maximum value for each pollutant and each fuel type evaluated for that source. This represents a worst-case approach for conservatively evaluating the maximum potential emissions from each source regardless of which fuel the facility chooses to use.

The data available in AP-42 Section 11.1.1.3 does not discern differences in emissions between parallel-flow and counter-flow designs. As a result, it is reasonable to assume that recycled asphalt pavement (RAP) may be processed at ratios up to 50% with little to no observed effect on emissions. This permit allows processing of design aggregate that is comprised of up to 50% RAP.

Uncontrolled Emissions

The following table presents the post project uncontrolled emissions for criteria pollutants as submitted by the Applicant and verified by DEQ staff. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit.

Table 2 POST PROJECT UNCONTROLLED EMISSIONS FOR CRITERIA POLLUTANTS

Emissions Unit	$PM_{2.5}$ T/yr	PM_{10} T/yr	SO_2 T/yr	NO_X T/yr	CO T/yr	VOC T/yr	Lead lb/quarter	GHG (CO_2e) T/yr
Point Sources								
Drum Dryer	39.09	40.30	134.90	96.36	227.76	56.06	13.14	58,605.3
1,350 bhp IC Engine	0.287	0.287	0.062	61.66	2.48	0.13	0.00	6,859.1
231 bhp IC Engine	0.495	2.19	2.05	31.20	6.72	2.55	0.00	1,173.1
Loadout &Silo Filling	1.94	1.94	0.00	0.00	4.43	7.06	0.00	0.00
Total, Point Sources	**41.81**	**44.72**	**137.01**	**189.22**	**241.39**	**65.80**	**13.14**	**66,637.50**

Post Project Potential to Emit

The following table presents the post project potential to emit for criteria pollutants from all emissions units at the facility as submitted by the Applicant and verified by DEQ staff. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit.

Table 3 POST-PROJECT POTENTIAL TO EMIT FOR CRITERIA POLLUTANTS

Emissions Unit	PM_{10}		SO_2		NO_X		CO		VOC	
	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]
Point Sources										
Drum Dryer	9.20	5.75	6.16	3.85	22.00	13.75	52.00	32.50	12.80	8.00
1,350 bhp IC Engine	0.066	0.066	0.014	0.014	14.08	14.08	0.56	0.56	0.03	0.03
231 bhp IC Engine	0.50	0.45	0.0014	$3.80E^{-06}$	7.13	6.42	1.54	1.38	0.58	0.52
Post-Project Totals	**9.77**	**6.27**	**6.18**	**3.86**	**43.21**	**34.25**	**54.10**	**34.44**	**13.41**	**8.55**
Fugitive Sources										
Loadout &Silo Filling	0.44	0.27	0	0	0	0	1.01	0.63	1.61	1.01
Post-Project Totals	**0.44**	**0.27**	**0.00**	**0.00**	**0.00**	**0.00**	**1.01**	**0.63**	**1.61**	**1.01**

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

Table 3 POST-PROJECT POTENTIAL TO EMIT FOR CRITERIA POLLUTANTS (Continued)

Emissions Unit	$PM_{2.5}$		GHG (CO_2e)		Lead	
	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]
Point Sources						
Drum Dryer	8.92	5.58	13,462.67	8,414.17	6.0E-03	3.75E-03
1,350 bhp IC Engine	0.066	0.066	1,566	1,556	0	0
231 bhp IC Engine	0.11	0.10	267.96	241.16	0	0
Post-Project Totals	**9.10**	**5.75**	**15,296.63**	**10,211.33**	**6.0E-03**	**3.75E-03**
Fugitive Sources						
Loadout &Silo Filling	0.44	0.27	0	0	0	0
Post-Project Totals	**0.44**	**0.27**	**0.00**	**0.00**	**0.00**	**0.00**

a) Controlled average emission rate in pounds per hour is a daily average, based on the proposed daily operating schedule and daily limits.
b) 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 and 3, this facility has uncontrolled potential to emit for NO_x, SO_2, and CO emissions greater than the Major Source threshold of 100 T/yr and a controlled potential to emit for all criteria pollutant emissions less than the Major Source threshold of 100 T/yr. Also, the controlled Greenhouse Gas emissions are less than 100,000 T/yr CO_2e. Therefore, this facility is designated as a Synthetic Minor facility. As demonstrated in Table 3 the facility's PTE for all pollutants are less than 80% of the Major Source thresholds of 100 T/yr. Therefore, this facility will be designated as a SM facility.

Change in Potential to Emit

The change in facility-wide potential to emit is used to determine if a public comment period may be required or if emissions modeling may be required, and to determine the processing fee per IDAPA 58.01.01.225. The following table presents the facility-wide change in the potential to emit for criteria pollutants.

Table 4 CHANGES IN POTENTIAL TO EMIT FOR CRITERIA POLLUTANTS

	PM_{10}		SO_2		NO_X		CO		VOC	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Point Sources										
Pre-Project Potential to Emit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Post Project Potential to Emit	9.77	6.27	6.18	3.86	43.21	34.25	54.10	34.44	13.41	8.55
Changes in Potential to Emit	**9.77**	**6.27**	**6.18**	**3.86**	**43.21**	**34.25**	**54.10**	**34.44**	**13.41**	**8.55**

Table 4 CHANGES IN POTENTIAL TO EMIT FOR CRITERIA POLLUTANTS (Continued)

	$PM_{2.5}$		GHG (CO_2e)		Lead	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Point Sources						
Pre-Project Potential to Emit	0.0	0.0	0.0	0.0	0.0	0.0
Post Project Potential to Emit	9.10	5.75	15,296.63	10,211.33	6.0E-03	3.75E-03
Changes in Potential to Emit	**9.10**	**5.75**	**15,296.63**	**10,211.33**	**6.0E-03**	**3.75E-03**

Non-Carcinogenic TAP Emissions

A summary of the estimated uncontrolled and controlled non-carcinogenic emissions increase of toxic air pollutants (TAP) is provided in the following table. Some estimated controlled emissions increases of TAP exceeded applicable emissions screening levels (EL). Estimated controlled TAP emissions were below the annual major source threshold. Post project, non-carcinogenic TAP emissions are presented in the following table:

Table 5 POST PROJECT NON-CARCINOGENIC TAP EMISSIONS SUMMARY POTENTIAL TO EMIT

Non-Carcinogenic Toxic Air Pollutants	Post Project 24-hour Average Emissions Rates for Units at the Facility (lb/hr)	Non-Carcinogenic Screening Emission Level (lb/hr)	Exceeds Screening Level? (Y/N)
Non-PAH HAPs			
Acrolein	8.87E-03	1.7E-02	No
Ethylbenzene	2.46E-02	29	No
Hexane	1.30E-05	12	No
Methyl Ethyl Ketone	8.54E-02	39.3	No
Propionaldehyde	4.33E-02	2.87E-02	Yes
Quinone	5.33E-02	2.70E-02	Yes
Methyl Chroloform	1.60E-02	127	No
Toluene	9.75E-01	25	No
Xylene	9.56E-02	29	No
Non HAP Organic Compounds			
Acetone	2.80E-01	119	No
Crotonaldehyde	2.87E-02	3.80E-01	No
Heptane	3.13	109	No
n-Pentane	7.00E-02	118	No
Valeraldehyde	2.23E-02	11.7	No
Metals			
Antimony	6.00E-05	3.30E-02	No
Barium	3.20E-05	3.30E-02	No
Chromium	1.83E-03	3.30E-02	No
Cobalt	8.67E-06	3.30E-03	No
Copper	1.03E-03	1.30E-03	No
Manganese	2.57E-03	6.70E-02	No
Mercury	8.67E-04	3.00E-03	No
Phosphorus	9.33E-03	7.00E-03	Yes
Silver	1.60E-04	7.00E-03	No
Selenium	1.17E-04	1.3E-02	No
Thallium	1.37E-06	7.00E-03	No
Zinc	2.03E-02	6.67E-01	No
Non-PAH HAPs (Fugitives)			
Methyl Bromide	3.32E-04	1.27	No
Carbon Disulfide	8.30E-04	2	No
Ethyl Chloride	1.65E-04	176	No
Methyl Chroride	1.14E-03	6.867	No
Cumene	1.52E-03	16.3	No
Styrene	3.21E-04	6.67	No
Tetrachloroethylene	1.07E-04	1.30E-02	No
Phenol	1.34E-03	1.27	No

Therefore, modeling is required for Propionaldehyde, Quinone and phosphorus because the 24-hour average non-carcinogenic screening EL identified in IDAPA 58.01.01.585 were exceeded.

Carcinogenic TAP Emissions

A summary of the estimated uncontrolled and controlled carcinogenic emissions increase of toxic air pollutants (TAP) is provided in the following table. Some of the estimated controlled emissions increases of TAP exceeded applicable emissions screening levels (EL). Estimated controlled TAP emissions were below the annual major source threshold. Post project, carcinogenic TAP emissions are presented in the following table:

Table 6 POST PROJECT CARCINOGENIC TAP EMISSIONS SUMMARY POTENTIAL TO EMIT

Carcinogenic Toxic Air Pollutants	Post Project Annual Average Emissions Rates for Units at the Facility (lb/hr)	Carcinogenic Screening Emission Level (lb/hr)	Exceeds Screening Level? (Y/N)
Dioxins/Furans	1.14E-08	1.50E-10	Yes
Non-PAH HAPs			
Acetaldehyde	7.42E-02	3.00E-03	Yes
Benzene	8.67E-03	1.70E-02	No
Formaldehyde	2.23E-02	5.10E-04	Yes
Metals			
Arsenic	3.20E-05	1.50E-06	Yes
Cadmium	2.34E-05	3.70E-06	Yes
Hexavalent Chromium	2.57E-05	5.60E-07	Yes
Nickel	3.60E-03	2.70E-05	Yes
PAH HAPs			
2-Methynaphthalene	9.70E-03	9.10E-05	Yes
Acenaphthene	7.99E-05	9.10E-05	Yes
Acenaphthylene	1.26E-03	9.10E-05	Yes
Anthracene	1.77E-04	9.10E-05	Yes
Polycyclic Organic Matter[a]	3.13E-05	2.00E-06	Yes
Benzo(e)pyrene	6.28E-06	9.10E-05	No
Benzo(g,h,l)perylene	2.28E-06	9.10E-05	No
Fluoranthene	3.48E-05	9.10E-05	No
Fluorene	6.28E-04	9.10E-05	Yes
Naphthalene	3.71E-02	9.10E-05	Yes
Perylene	5.02E-07	9.10E-05	No
Phenanthrene	1.31E-03	9.10E-05	Yes
Pyrene	1.71E-04	9.10E-05	Yes

a) Polycyclic Organic Matter (POM) is considered as one TAP comprised of: benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, chrysene, indeno(1,2,3-cd)pyrene, benzo(a)pyrene. The total is compared to benzo(a)pyrene.

Therefore, modeling is required for nearly all TAPs listed in Table 6 because the annual average carcinogenic screening EL identified in IDAPA 58.01.01.586 was exceeded.

Post Project HAP Emissions

The following table presents the post project potential to emit for HAP pollutants from all emissions units at the facility as submitted by the Applicant and verified by DEQ staff. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit.

Table 7 HAP EMISSIONS SUMMARY POTENTIAL TO EMIT

HAP Pollutants	PTE (T/yr)
Acetaldehyde	3.26E-01
Acrolein	6.71E-03
Benzene	1.06E-01
1,3-Butadiene	5.69E-05
Ethyl benzene	6.00E-02
Formaldehyde	7.77E-01
Hexane	2.30E-01
Isooctane	1.00E-02
Propionaldehyde	3.25E-02
Quinone	4.00E-02
Methyl chloroform	1.20E-02
Toluene	7.28E-01
Xylene	5.22E-02
Metals	6.50E-04
Dioxins/Furans	1.18E-07
Total PAH	2.23E-01
Total HAP	**2.71**

Ambient Air Quality Impact Analyses

As presented in accompanying Modeling Memo in Appendix B, the estimated emission rates of PM_{10}, SO_2, NO_X, CO, VOC, HAP, and TAPs from this project exceeded applicable screening emission levels (EL) and published DEQ modeling thresholds established in IDAPA 58.01.01.585-586 and in the State of Idaho Air Quality Modeling Guideline[1]. Refer to the Emissions Inventories section for additional information concerning the emission inventories.

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 TAPs is provided in Appendix B.

An ambient air quality impact analyses document has been crafted by DEQ based on a review of the modeling analysis submitted in the application. That document is part of the final permit package for this permitting action (see Appendix B).

REGULATORY ANALYSIS

Attainment Designation (40 CFR 81.313)

Because a separate modeling analysis was not provided to demonstrate compliance with applicable standards in nonattainment areas, this portable facility is not permitted for operation in nonattainment areas.

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.

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[1] Criteria pollutant thresholds in Table 1, State of Idaho Air Quality Modeling Guideline, Doc ID AQ-011, rev. 1, December 31, 2002.

Tier II Operating Permit (IDAPA 58.01.01.401)

IDAPA 58.01.01.401 Tier II Operating Permit

The application was submitted for a permit to construct (refer to the Permit to Construct section), and an optional Tier II operating permit has not been requested. Therefore, the procedures of IDAPA 58.01.01.400–410 were not applicable to this permitting action.

Other Rules as Applicable (IDAPA 58.01.01.500)

IDAPA 58.01.01.500 Registration Procedures & Requirements for Portable Equipment

Portable equipment needs to be registered within 90 days after permit issuance and DEQ must be notified at least 10 days prior to relocation. This requirement is assured by Permit Condition 24.

Visible Emissions (IDAPA 58.01.01.625)

IDAPA 58.01.01.625 Visible Emissions

The sources of PM_{10} emissions at this facility are subject to the State of Idaho visible emissions standard of 20% opacity. This requirement is assured by Permit Conditions 6 and 17.

Rules For Control of Fugitive Dust (IDAPA 650-651)

IDAPA 58.01.01.650-651 Rules for Control of Fugitive Dust

All sources of fugitive dust emissions at the facility are subject to the State of Idaho rules for controlling fugitive dust. Reasonable precautions shall be taken to prevent particulate matter from becoming airborne. This requirement is assured by Permit Condition 14.

Rules For Control of Odors (IDAPA 58.01.01.775-776)

IDAPA 58.01.01.775-776 Rules for Control of Odors

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. This requirement is assured by Permit Conditions 8 and 23.

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 for PM_{10}, SO_2, NO_X, CO, or VOC nor 10 tons per year for any one HAP or 25 tons per year for all HAPs combined as demonstrated previously in the Emissions Inventories Section of this analysis. Therefore, the facility is not a Tier I source in accordance with IDAPA 58.01.01.006.113 and the requirements of IDAPA 58.01.01.301 do not apply.

As presented in Table 7, the PTE for each HAP is less than 10 T/yr and the PTE for all HAPs combined is less than 25 T/yr. Therefore, this facility is not a HAPs Major Source subject to Tier I requirements.

Therefore, it needs to be determined if this facility is a criteria pollutant Major Source. As discussed previously the Knife River facility is located in Nez Perce County (AQCR 63), which is designated as unclassifiable/attainment for $PM_{2.5}$, PM_{10}, SO_2, NO_X, CO, and Ozone for federal and state criteria air pollutants. Therefore, the following table compares the post-project facility-wide annual PTE for all criteria pollutants emitted by the source to the applicable criteria pollutant Major Source thresholds in order to determine if the facility is a criteria pollutant Major Source.

Table 8 PTE FOR CRITERIA POLLUTANTS COMPARED TO THE CRITERIA POLLUTANT MAJOR SOURCE THRESHOLDS

Criteria Pollutants	PTE (T/yr)	Major Source Threshold (T/yr)	Exceeds the Major Source Threshold?
PM_{10}	6.27	100	No
SO_2	3.86	100	No
NO_X	34.25	100	No
CO	34.45	100	No
VOC	8.55	100	No

As presented in the preceding table the PTE for each criteria pollutant is less than 100 T/yr. Therefore, this facility is not a criteria pollutant Major Source subject to Tier I requirements.

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), nor is it undergoing any physical change at a stationary source not otherwise qualifying under paragraph 40 CFR 52.21(b)(1) as a major stationary source, that would constitute a major stationary source by itself as defined in 40 CFR 52. Therefore in accordance with 40 CFR 52.21(a)(2), PSD requirements are not applicable to this permitting action. The facility is/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 criteria pollutant that exceed 250 T/yr.

NSPS Applicability (40 CFR 60)

The facility is subject to the requirements of 40 CFR 60 Subpart I – Standards of Performance for Hot Mix Asphalt Facilities.

40 CFR 60, Subpart I..............Standards of Performance for Hot Mix Asphalt Facilities

§ 60.90 Applicability and designation of affected facility.

(a) The affected facility to which the provisions of this subpart apply is each hot mix asphalt facility. For the purpose of this subpart, a hot mix asphalt facility is comprised only of any combination of the following: dryers; 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.

(b) Any facility under paragraph (a) of this section that commences construction or modification after June 11, 1973, is subject to the requirements of this subpart.

Knife River, Inc. – The HMA was constructed by GENCOR Industries in 2008. Therefore, the facility is subject to subpart I.

§ 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 percent opacity or greater. This NSPS emission limit is included as a permit condition in the PTC.

§ 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.

In accordance with §60.93(b), compliance with the particulate matter standards shall be determined by EPA Reference Method 5, and opacity shall be determined by EPA Reference Method 9. These test requirements are included as a permit condition in the PTC.

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

§ 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.

Knife River, Inc. – Neither the 1,350 bhp IC Engine nor the 231 bhp IC Engine are subject as they were both constructed prior to June 12, 2006. Therefore, IIII does not apply to these two engines.

NESHAP Applicability (40 CFR 61)

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

MACT Applicability (40 CFR 63)

The facility is subject to the requirements of 40 CFR 63, Subpart ZZZZ – Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines should the two engines associated with the HMA no longer meet the definition of a Non-road Engines in accordance with 40 CFR 1068.30.

40 CFR 63, Subpart ZZZZ **National Emission Standards for Hazardous Air Pollutants: Stationary Reciprocating Internal Combustion Engines**

§ 63.6580 *What is the purpose of subpart ZZZZ?*

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations. As demonstrated previously in the Emissions Inventories Section of this analysis this facility is an area source for HAPs as the potential to emit for HAPs is 0.72 T/yr. Therefore, the engines at this facility will be subject to the requirements of Subpart ZZZZ should they fail to meet the definition of a non-road engine.

§ 63.6585 Am I subject to this Subpart?

You are subject to this Subpart if you own or operate a stationary RICE at a major or area source of HAP emissions, except if the stationary RICE is being tested at a stationary RICE test cell/stand.

(a) A stationary RICE is any internal combustion engine which uses reciprocating motion to convert heat energy into mechanical work and which is not mobile. Stationary RICE differ from mobile RICE in that a stationary

RICE is not a non-road engine as defined at 40 CFR 1068.30, and is not used to propel a motor vehicle or a vehicle used solely for competition.

Both engines are considered non-road and thus the Subpart does not apply.

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.

Initial Permit Conditions 1-2

Establishes the permit to construct scope and the table of regulated emission units under this permit.

Initial Permit Conditions 3-4

A description of the HMA plant is provided as well as a table outlining the control devices and emission points for the drum dryer and material handling.

Initial Permit Condition 5

Emission limits associated with the drum dryer are set in this condition. $PM_{2.5}$ limits were established because this pollutant was the driver for the setback distance established in condition 10. Daily HMA plant throughput limits were established to ensure compliance with the 24-hour PM_{10} National Ambient Air Quality Standard (NAAQS). It was not necessary to include emission rate limits for other air pollutants because they are inherently limited by hours of operation or production limitations and because a source test is not required to reasonably assure compliance with the estimated emission rates.

Initial Permit Condition 6

This condition establishes the opacity limit of 20% in accordance IDAPA 58.01.01.625.

Initial Permit Condition 7

The particulate standard as defined in NSPS, 40 CFR 60, Subpart I is stated as is the opacity standard. Because this facility is subject to Subpart I, these standards are required in the permit.

Initial Permit Condition 8

Odor control is required by Idaho State law and is included into the permit in accordance with IDAPA 58.01.01.776.

Initial Permit Condition 9

The production limits are added to help guarantee the facility can meet NAAQS standards. Emission and throughput limits as well as operational hour restrictions and a minimum setback distance are included to help the facility meet NAAQS standards and remain a minor source. The 50% RAP was requested by the applicant. According to AP-42 section 11.1, "RAP is mixed in a zone removed from the exhaust gas stream, counter-flow drum mix plants will likely have organic emissions (gaseous and liquid aerosol) that are lower than parallel flow drum mix plants. However, the available data are insufficient to discern any differences in emissions that result from differences in the two processes. A counter-flow drum mix plant can normally process RAP at ratios up to 50 percent with little or no observed effect upon emissions".

Initial Permit Condition 10

A setback distance from the property boundary was used in the modeling analyses developed to demonstrate preconstruction compliance with NAAQS and TAP standards. Because the equipment is portable and the location may be changed from its initial location, compliance with a minimum equipment setback distance limit is required. Setback distances of both line power and engine use are included in the condition. This allows for the facility to move from one site that requires an engine for power to another site in which line power is available without requiring a permit revision. The distances are 590 feet (180 meters) when using engines and 492 feet (150 meters) when using line power with a daily production of 5,000 tons. The distance is 722 feet (220 meters) for either line power only or engine use when the daily production is 8,000 tons.

Initial Permit Condition 11

This conduction restricts the fuel types to only those requested by the permittee within the permit application.

Initial Permit Condition 12

When using distillate sulfur containing fuel, the maximum percentage by weight that is allowed is 0.5%. This is accordance with IDAPA 58.01.01.725-728. When using RFO, the maximum sulfur content allowed is 0.1% as requested by the permittee.

Initial Permit Condition 13

The used oil specifications were added to ensure compliance with 40 CFR 279.11 when combusting RFO in the drum dryer.

Initial Permit Condition 14

This condition requires that the permittee perform visible emissions checks on see/no see basis to verify that fugitive emissions are not extending beyond the property boundary. If visible emissions are seen, corrective action must be taken. Reasonable control requirements for fugitive dust are needed at any potential site. Permit conditions requires that the plant must take corrective action where practical to control fugitive dust when operating.

Initial Permit Condition 15

A baghouse filter/cartridge system must be installed and all control equipment must be operated with a developed procedures document. This is required to control particulate emissions and demonstrate compliance with NAAQS standards.

Initial Permit Condition 16

Within 60 days of startup, the permittee needs to develop a procedures document outlining operations and maintenance schedules. This procedure must be submitted to the appropriate regional DEQ office for approval. This is to demonstrate that all required control equipment is being operated and maintained properly.

Initial Permit Condition 17

Requires the permittee to conduct inspections each day that the plant is operating to assess the control of fugitive emissions and specifies corrective actions to take if fugitive dust is not reasonably controlled.

Initial Permit Condition 18

This condition is added to require monitoring and recordkeeping and demonstrate compliance with the throughput limits.

Initial Permit Condition 19

Setback monitoring is required to demonstrate compliance with the setback distance requirements. This must be done each time the HMA relocates or anytime the layout has changed.

Initial Permit Condition 20

Each time a fuel is received; the sulfur content must be verified by the supplier and documented. This is required to demonstrate compliance with the sulfur content limits.

Initial Permit Condition 21

Requires certification of the properties associated with used oil when it is received. This is required to demonstrate compliance with 40 CFR 279.11.

Initial Permit Condition 22

This condition requires that the permittee take appropriate corrective action if/when a valid odor complaint is filed. This must be done to demonstrate compliance with IDAPA 58.01.01.776.

Initial Permit Condition 23

When relocating to another site, the permittee must submit a Portable Equipment Relocation Form (PERF) within 10 days of desired moving date in accordance with IDAPA 58.01.01.500. A scaled plot must also be included with the PERF form.

Initial Permit Condition 24

The HMA plant may only co-locate with one (1) rock crushing facility. Co-location is defined as being within 1,000 feet of the nearest emission unit. This includes the HMA plant, silos and the center of any stockpile.

Initial Permit Condition 25

The HMA plant cannot relocate and operate in any nonattainment area. Operations within a nonattainment area were not included in the modeling compliance analysis. Therefore, it is not permitted with this permit. See the associated modeling memo.

Initial Permit Condition 26

The permittee has confirmed that the initial performance test was performed with passing results, so the requirement to conduct the initial performance test has been satisfied and was removed.[2] The requirement to perform followup performance testing at least every five years to demonstrate compliance with hourly $PM_{2.5}$ emission limits was included and the requirement to maintain a copy of the test results was retained.

Initial Permit Condition 27

When a performance test is required the appropriate test methods shall be adhered to. This is in accordance with 40 CFR 60 Subpart I. Also, because $PM_{2.5}$ is the driver for the setback distance of the dryer the corresponding limit needs to be tested. This condition allows the permittee some flexibility in the testing methodology. If a test is implemented using EPA Methods 5 and 202 it may be easier as Method 5 also captures the grain loading results, but it requires the permittee to assume that all PM is $PM_{2.5}$. As an alternative, the permittee may use Methods 201A and 202. This only captures the true $PM_{2.5}$ portion of the filterable PM. Method 202 is required regardless as it captures the condensable half of the particulate.

Initial Permit Conditions 28-29

When conducting a performance test, each of the components of the Performance Test Monitoring & Recordkeeping Permit Condition is required. This is done to better assess the accuracy of the test. Testing shall be performed to measure PM_{10}, opacity, and $PM_{2.5}$ from the HMA Dryer Baghouse stack.

Initial Permit Condition 30

All performance test related reports need to be sent to the appropriate DEQ Regional Office. Because the initial site for this portable facility is outside Grangeville, the nearest regional office is Lewiston. All correspondence related to this permit should be sent to Lewiston.

Initial Permit Condition 31

This condition outlines the General Provisions, Subpart A associated with all NSPS subject facilities. The Lewiston regional office is again stated as the entity to contact regarding any correspondence.

Initial Permit Condition 32

This condition was added to remind the permittee that if there is ever a discrepancy between the permit and 40 CFR 60, that all federal requirements govern and must be adhered to.

Initial Permit Conditions 33-34

The two IC engines are described as are the corresponding control devices. Note that there are no explicit emission limits for either engine as there are operational hour restrictions, requirements for the diesel oxidation catalyst muffler and a sulfur content limit for both of engines of 15 ppm or 0.0015%

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[2] Source Test Report, EPA Methods 5 and 9 Initial Source Test, Environmental Technical Services, Inc., August 19, 2004.

Initial Permit Condition 35

The hours are limited to help stay below NAAQS standards and becoming a major source for NO_x.

Initial Permit Condition 36

This condition requires that 15 ppm or lower sulfur content distillate fuel be used in both engines. Cetane index and/or aromatic content maximums and minimums are defined in accordance with 40 CFR 80.510(b). This requirement is also necessary to maintain non-road status.

Initial Permit Condition 37

Only #2 distillate fuel may be used in the two ICEs. This was added per the application specifications.

Initial Permit Condition 38

The permittee applied control efficiencies associated with the DOC within the emissions inventory. Therefore, installing and operating the DOC is necessary. The control efficiencies are PM = 20%, CO = 41% and VOC 66%. These numbers are only achievable if 15 ppm sulfur content distillate fuel is used. The temperature restriction is required per manufacturer specifications.

Initial Permit Condition 39

To be considered a non-road engine both IC engine must be the definition as stated in 40 CFR 1068.30.

Initial Permit Condition 40

This condition identifies that the engines need to meet the definition of non-road, but also the less than 12 consecutive months. The 12 month clock continues even if the engine is not operated at a site, but is located there. Also, a replacement engine does not restart the clock either. If an engine is located at a site for 12 months or more it becomes applicable to any stationary source requirements. 40 CFR 63, subpart ZZZZ would apply to both IC engines.

Initial Permit Condition 41

This condition requires that operating hours be monitored and recorded to demonstrate compliance with the hour limitations of each engine.

Initial Permit Condition 42

Each time a fuel is received; the sulfur content must be verified by the supplier and documented. This is required to demonstrate compliance with the sulfur content limits.

Initial Permit Condition 43

This condition was made to include the PERF form rather than requiring specific records to be kept. The PERF is required each time the facility or any regulated source relocates and the form requires dates to be submitted demonstrating the facility has moved. Therefore, it would be considered redundant to require identical records in two permit conditions.

Initial Permit Condition 44

The duty to comply general compliance provision requires that the permittee comply with all of the permit terms and conditions pursuant to Idaho Code §39-101.

Initial Permit Condition 45

The maintenance and operation general compliance provision requires that the permittee maintain and operate all treatment and control facilities at the facility in accordance with IDAPA 58.01.01.211.

Initial Permit Condition 46

The obligation to comply general compliance provision specifies that no permit condition is intended to relieve or exempt the permittee from compliance with applicable state and federal requirements, in accordance with IDAPA 58.01.01.212.01.

Initial Permit Condition 47

The inspection and entry provision requires that the permittee allow DEQ inspection and entry pursuant to Idaho Code §39-108.

Initial Permit Condition 48

The construction and operation notification provision requires that the permittee notify DEQ of the dates of construction and operation, in accordance with IDAPA 58.01.01.211.

Initial Permit Condition 49

The performance testing notification of intent provision requires that the permittee notify DEQ at least 15 days prior to any performance test to provide DEQ the option to have an observer present, in accordance with IDAPA 58.01.01.157.03.

The performance test protocol provision requires that any performance testing be conducted in accordance with the procedures of IDAPA 58.01.01.157, and encourages the permittee to submit a protocol to DEQ for approval prior to testing.

The performance test report provision requires that the permittee report any performance test results to DEQ within 30 days of completion, in accordance with IDAPA 58.01.01.157.04-05.

Initial Permit Condition 50

The monitoring and recordkeeping provision requires that the permittee maintain sufficient records to ensure compliance with permit conditions, in accordance with IDAPA 58.01.01.211.

Initial Permit Condition 51

The excess emissions provision requires that the permittee follow the procedures required for excess emissions events, in accordance with IDAPA 58.01.01.130.

Initial Permit Condition 52

The certification provision requires that a responsible official certify all documents submitted to DEQ, in accordance with IDAPA 58.01.01.123.

Initial Permit Condition 53

The false statement provision requires that no person make false statements, representations, or certifications, in accordance with IDAPA 58.01.01.125.

Initial Permit Condition 54

The tampering provision requires that no person render inaccurate any required monitoring device or method, in accordance with IDAPA 58.01.01.126.

Initial Permit Condition 55

The transferability provision specifies that this permit to construct is transferable, in accordance with the procedures of IDAPA 58.01.01.209.06.

Initial Permit Condition 56

The severability provision specifies that permit conditions are severable, in accordance with IDAPA 58.01.01.211.

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. During this time, there were no comments on the application and there was not a request for a public comment period on DEQ's proposed action. Refer to the chronology for public comment opportunity dates.

APPENDIX A – EMISSIONS INVENTORIES

Uncontrolled Calculations for the Knife River HMA Plant

Drum Dryer

The maximum potential hourly throughput of the GENCOR 400 Ultra Plant is 400 T/hr. The following calculations were derived using emission factors from AP-42 Section 11-1 and assuming operations of 8,760 hr/yr. 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), the factor increased from 0.058 to 0.061. Second, to account for the average scavenging factor of 63% down to 50%, the factor increased from 0.61 to 0.077. Also, $PM_{2.5}$ calculations include the addition of condensable and filterable portions, 0.0029 + 0.0074 + 0.012. The Greenhouse Gas calculations are derived using AP-42 Section 11-1 factors for CO_2 and methane, while N_20 emission factor is from Section 1.3, Table 8.

Uncontrolled Emissions (T-$PM_{2.5}$/yr) = EF lb-PM_{10}/ton x Production Rate (tons/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

$PM_{2.5}$ emissions = 0.0223 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **39.07 T-$PM_{2.5}$/yr**

Uncontrolled Emissions (T-$PM_{2.5}$/yr) = EF lb-$PM_{2.5}$/ton x Production Rate (tons/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

PM_{10} emissions = 0.23 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **40.30 T-PM_{10}/yr**

Uncontrolled Emissions (T-SO_2/yr) = EF lb-SO_2/ton x Production Rate (tons/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

SO_2 emissions = 0.077 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **134.9 T-SO_2/yr**

Uncontrolled Emissions (T-NO_x/yr) = EF lb-NO_x/ton x Production Rate (tons/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

NO_x emissions = 0.055 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **96.36 T-NO_x/yr**

Uncontrolled Emissions (T-CO/yr) = EF lb-CO/ton x Production Rate (tons/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

CO emissions = 0.13 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **227.76 T-CO/yr**

Uncontrolled Emissions (T-VOC/yr) = EF lb-VOC/ton x Production Rate (tons/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

VOC emissions = 0.032 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **56.06 T-VOC/yr**

Uncontrolled Emissions (T-Pb/yr) = EF lb-Pb/ton x Production Rate (tons/hr) x 8,760 hr/yr ÷ 4 qtr/yr

Pb emissions = 1.5E-05 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 4 qtr/yr = **13.14 lb-Pb/qtr**

Uncontrolled Emissions (T-CO_2e/yr) = (EF lb-CO_2/ton x Production Rate (tons/hr) * 8,760 hr/yr * GWP ÷ 2,000 lb/ton) + (EF lb-CH_4/ton x Production Rate (tons/hr) * 8,760 hr/yr * GWP ÷ 2,000 lb/ton) + (EF lb-$N_2O/10^3$ gal x Input Rating (MMBtu/hr) * 1,000,000 Btu/MMBtu ÷ Fuel Heating value (Btu/gal) * 8,760 hr/yr * GWP ÷ 2,000 lb/ton)

CO_2e emissions = CO_2 + CH_4 + N_2O = (33 lb/ton * 400 tons/hr * 8,760 hr/yr * 1 ÷ 2,000 lb/ton) + (0.012 lb/ton * 400 tons/hr * 8,760 hr/yr * 21 ÷ 2,000 lb/ton) + (0.26 lb/10^3 gal * 135 MMbtu/hr ÷ 137,030 Btu/gal * 8,760 hr/yr * 310 ÷ 2,000 lb/ton) = 57,816 + 441.5 + 347.8 = **58,605.3 T-CO_2e/yr**

Asphalt Tank Heater

The asphalt tank heater is operated on electrical power and is not a regulated source for this project.

1,350 hp Engine

This engine applied emissions factor from Caterpillar, the manufacturer, specifications for all pollutants with the exception of SO_2. The SO_2 factor is from AP-42, Section 11-1. All manufacturer factors are in units of g/hp-hr while SO_2 is in units of lb/MMBtu. A sulfur content of 0.0015% was assumed and applied to the emission factor for SO_2. Also, a fuel usage rate was applied in MMBtu/hr. All other calculations assume a power rating from the engine of 1,350 hp as defined in the manufacturer specifications. Operations were assumed to be 8,760 hr/yr.

Maximum Fuel Usage Rate = 1,350 hp x 7,000 Btu/hp-hr ÷ 137,030 Btu/gal = 68.96 gal/hr

Converting to MMBtu/hr = 68.96 gal/hr x 137,030 Btu/gal ÷ 1E6 Btu/MMBtu = 9.45 MMBtu/hr

Uncontrolled Emissions (T-$PM_{2.5}$/yr) = EF g-$PM_{2.5}$/hp-hr x Power rating (hp) ÷ 453.6 g/lb x 8,760 hr/yr ÷ 2,000 lb/ton

$PM_{2.5}$ emissions = 0.022 g/hp-hr x 1,350 hp ÷ 453.6 g/lb x 8,760 hr/yr ÷ 2,000 lb/ton = **0.287 T-$PM_{2.5}$/yr**

Uncontrolled Emissions (T-PM_{10}/yr) = EF g-PM_{10}/hp-hr x Power rating (hp) ÷ 453.6 g/lb x 8,760 hr/yr ÷ 2,000 lb/ton

PM_{10} emissions = 0.022 g/hp-hr x 1,350 hp ÷ 453.6 g/lb x 8,760 hr/yr ÷ 2,000 lb/ton = **0.287 T-PM_{10}/yr**

Uncontrolled Emissions (T-SO_2/yr) = EF lb-SO_2/MMBtu x Sulfur Content x Fuel Usage Rate (MMBtu/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

SO_2 emissions = 1.01 lb/MMBtu x 0.0015 x 9.45 MMBtu/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **0.062 T-SO_2/yr**

Uncontrolled Emissions (T-NO_x/yr) = EF g-NO_x/hp-hr x Power rating (hp) ÷ 453.6 g/lb x 8,760 hr/yr ÷ 2,000 lb/ton

NO_x emissions = 4.73 g/hp-hr x 1,350 hp ÷ 453.6 g/lb x 8,760 hr/yr ÷ 2,000 lb/ton = **61.66 T-NO_x/yr**

Uncontrolled Emissions (T-CO/yr) = EF g-CO/hp-hr x Power rating (hp) ÷ 453.6 g/lb x 8,760 hr/yr ÷ 2,000 lb/ton

CO emissions = 0.19 g/hp-hr x 1,350 hp ÷ 453.6 g/lb x 8,760 hr/yr ÷ 2,000 lb/ton = **2.48 T-CO/yr**

Uncontrolled Emissions (T-VOC/yr) = EF g-VOC/hp-hr x 1,350 hp ÷ 453.6 g/lb x 8,760 hr/yr ÷ 2,000 lb/ton

VOC emissions = 0.01 g/hp-hr x 1,350 hp ÷ 453.6 g/lb x 8,760 hr/yr ÷ 2,000 lb/ton = **0.13 T-VOC/yr**

Uncontrolled Emissions (T-CO_2e/yr) = EF lb-CO_2/hp-hr x Power rating (hp) x 8,760 hr/yr ÷ 2,000 lb/ton

GHG emissions = 1.16 lb/hp-hr x 1,350 hp x 8,760 hr/yr ÷ 2,000 lb/ton = **6,859.08 T-CO_2e/yr**

231 hp Engine

AP-42 emissions factors were used for all pollutants in determining the uncontrolled emissions. All calculations assume a power rating from the engine of 231 hp as defined in the manufacturer specifications. Operations were assumed to be 8,760 hr/yr.

Maximum Fuel Usage Rate = 231 hp x 7,000 Btu/hp-hr ÷ 137,030 Btu/gal = 11.80 gal/hr

Converting to MMBtu/hr = 11.80 gal/hr x 137,030 Btu/gal ÷ 1E6 Btu/MMBtu = 1.615 MMBtu/hr

Uncontrolled Emissions (T-$PM_{2.5}$/yr) = EF lb-$PM_{2.5}$/MMBtu x Fuel Use Rate (MMBtu/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

$PM_{2.5}$ emissions = 0.07 lb/MMBtu x 1.615 MMBtu/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **0.495 T-$PM_{2.5}$/yr**

Uncontrolled Emissions (T-PM_{10}/yr) = EF lb-PM_{10}/MMBtu x Fuel Use Rate (MMBtu/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

PM_{10} emissions = 0.31 lb/MMBtu x 1.615 MMBtu/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **2.19 T-PM_{10}/yr**

Uncontrolled Emissions (T-SO_2/yr) = EF lb-SO_2/MMBtu x Fuel Use Rate (MMBtu/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

SO_2 emissions = 0.29 lb/MMBtu x 1.615 MMBtu/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **2.05 T-SO_2/yr**

Uncontrolled Emissions (T-NO_x/yr) = EF lb-NO_x/MMBtu x Fuel Use Rate (MMBtu/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

NO_x emissions = 4.41 lb/MMBtu x 1.615 MMBtu/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **31.20 T-NO_x/yr**

Uncontrolled Emissions (T-CO/yr) = EF lb-CO/MMBtu x Fuel Use Rate (MMBtu/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

CO emissions = 0.95 lb/MMBtu x 1.615 MMBtu/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **6.72 T-CO/yr**

Uncontrolled Emissions (T-VOC/yr) = EF lb-VOC/MMBtu x Fuel Use Rate (MMBtu/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

VOC emissions = 0.36 lb/MMBtu x 1.615 MMBtu/hr x 8,760 hr/yr ÷ 2,000 lb/ton = **2.55 T-VOC/yr**

Uncontrolled Emissions (T-CO_2e/yr) = EF lb-CO_2/hp-hr x Power rating (hp) x 8,760 hr/yr ÷ 2,000 lb/ton

GHG emissions = 1.16 lb/hp-hr x 231 hp x 8,760 hr/yr ÷ 2,000 lb/ton = **1,173.67 T-CO_2e/yr**

Loadout and Silo Filling

All emissions were derived from Ap-42, Section 11.1-14. The maximum potential hourly throughput of the GENCOR 400 Ultra Plant is 400 T/hr and operations were assumed to be 8,760 hr/yr.

Uncontrolled Emissions (T-$_{PM10}$ and $PM_{2.5}$ /yr) = EF lb-PM_{10} (lb-$PM_{2.5}$/ton) x Production Rate (tons/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

Loadout

$PM_{2.5}$ emissions = 5.22E-04 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 0.915 T-$PM_{2.5}$/yr

PM_{10} emissions = 5.22E-04 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 0.915 T-PM_{10}/yr

Silo-filling

$PM_{2.5}$ emissions = 5.859E-04 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 1.026 T-$PM_{2.5}$/yr

PM_{10} emissions = 5.859E-04 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 1.026 T-PM_{10}/yr

Total Uncontrolled Emissions

0.915 T-$PM_{2.5}$/yr + 1.026 T-PM_{10}/yr = **1.94 T-$PM_{2.5}$/yr**

0.915 T-PM_{10}/yr + 1.026 T-PM_{10}/yr = **1.94 T-PM_{10}/yr**

Uncontrolled Emissions (T-CO/yr) = EF lb-CO/ton x Production Rate (tons/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

Loadout

CO emissions = 1.35E-03 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 2.365 T-CO/yr

Silo-filling

CO emissions = 1.18E-03 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 2.067 T-CO/yr

Total Uncontrolled Emissions

2.365 T-CO/yr + 2.067 T-CO/yr = **4.43 T-CO/yr**

Uncontrolled Emissions (T-VOC/yr) = EF lb-VOC/ton x Production Rate (tons/hr) x 8,760 hr/yr ÷ 2,000 lb/ton

Loadout

VOC emissions = 3.91E-03 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 6.85 T-VOC/yr

Silo-filling

VOC emissions = 1.22E-04 lb/ton x 400 tons/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 0.213 T-VOC/yr

Total Uncontrolled Emissions

6.85 T-VOC/yr + 0.213 T-VOC/yr = **7.06 T-VOC/yr**

CURRENT PTC APPLICATION VALUES

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

Facility ID/AIRS No.	777-00514	Spreadsheet Date	7/14/2011 12:09
Permit No.	P-2011.0104	DEQ Version Date	6/22/2011
Facility Owner/Company Name:	Knife River, Inc.		
Address:	Facility Address	Processing Fee	TOTAL (T/YR)
City, State, Zip:	City, State Zip	$5,000	93.12
Facility Contact:	Facility Contact		
Contact Number/ e-mail:	Contact Number/e-mail		
		Include Silo Fill & Loadout Emissions?	Y
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 400	Distallate (#2) Fuel Oil	1
Rated heat input capacity, MMBtu/hr	135	Used Oil or RFO4 Oil	1
Drum Dryer Hourly HMA Production, Tons/hour	400	Natural Gas	1
Max Production Per day, Tons per day	8,000	LPG or Propane	0
Max Annual HMA Production, Tons/year	500,000	Default #2 fuel oil and used oil sulfur content percentage by weight	0.5%
Min Hours of operation per year (annual/max hourly production)	1,250	#2 Fuel Oil Max Sulfur Content	0.0500%
		Used Oil/RFO4 Oil Max Sulfur Content	0.1000%

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	0.000	Fuel Type(s)	Fuel Toggle
Hours of operation per day	0	#2 Fuel Oil	0
Operation, days per year (DEQ Assumption)	#DIV/0!	Fuel oil sulfur content	0.500%
Max Hours of operation per year (DEQ Assumption)	4,000	Natural Gas	0

Asphaltic Oil Tank Heater Fuel Consumption Calculations	#2 Fuel Oil	Natural Gas
Heat Input Rating, MMBtu/hr	0.000	0.000
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]	0.00	0
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	MultiQuip MG70	Fuel Type(s)	IC Engine Toggle
IC Engine Max Rated Power (bhp)	231	#2 Fuel Oil (Diesel)	1
IC Engine Max Rated Capacity (kW)	172	Max Sulfur weight percentage	0.0015%
		Max Operational Hours/Day	24
IC Engine 1 EPA Certification:	0	Max Operational Hours/Year	1,800
Not EPA-certified: Enter "0" (zero)		Calculated Max Fuel Use Rate, gal/hr	11.80
Certified Tier I, Tier 2, or Tier 3: Enter 1, 2, or 3		Calculated MMBtu/hr	1.62
Certified "BLUE SKY" engine: Enter 4			

IC Engine 2 > 600 bhp (447 kW) AP-42 Section 3.4 (diesel fueled)			
IC Engine Make/Model	Catepillar C32	Fuel Type(s)	IC Engine Toggle
IC Engine Rated Capacity (bhp)	1,350	#2 Fuel Oil (Diesel)	1
IC Engine Max Rated Capacity (kW)	1,007	Max Sulfur weight percentage	0.0015%
		Max Operational Hours per Day	20
IC Engine 2 EPA Certification:	2	Max Operational Hours per Year	2,000
Not EPA-certified: Enter "0" (zero)		Calculated Max Fuel Use Rate, gal/hr	68.96
Certified Tier I, Tier 2, or Tier 3: Enter 1, 2, or 3		Calculated MMBtu/hr	9.45
Certified "BLUE SKY" engine: Enter 5			

Aggregate Handling - Fugitive Emissions		
U = mean wind speed (miles per hour)	14.3	
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 convey
M = moisture content (%)	5	Bulk aggregate for HMAstypically stabilizes at 3 to 5% by weight.
If higher moisture is maintained, apply additional % control:	15.00%	For M=3% add 10% control. For M=5% add 15% control.
Number of front-end loader drop points (aggregate and RAP) (DEQ Assumption)	5	Drops to storage pile(s) and drop(s) to bins
Aggregate weigh conveyor transfer points (DEQ Assumption)	3	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.
7/14/2011 12:09 **Permit/Facility ID:** P-2011.0104 777-00514

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

Fuel Type Toggle =	1	
Max Hourly Production	400	T/hr
Max Daily Production	8,000	Tons/day
Max Annual Production	500,000	Tons/yr

User Input Weight % Sulfur = 0.1000%
AP-42 EF of 0.011 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% = 0.20

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	8.25	
PM-10 (total) [b]	0.023	9.20	5.75	
PM-2.5 [b1]	0.0223	8.92	5.58	
CO [c]	0.13	52.00	32.50	
NOx [c]	0.055	22.00	13.75	
SO_2 [c]	0.077	6.16	3.85	
VOC [d]	0.032	12.80	8.00	
Lead	1.50E-05	6.00E-03	3.75E-03	
HCl [d,e]	0.00021	0.084	5.25E-02	
Dioxins[e,f]				
2,3,7,8-TCDD	2.10E-13	8.40E-11	5.25E-11	**1.20E-11**
Total TCDD	9.30E-13	3.72E-10	2.33E-10	**5.31E-11**
1,2,3,7,8-PeCDD	3.10E-13	1.24E-10	7.75E-11	**1.77E-11**
Total PeCDD	2.20E-11	8.80E-09	5.50E-09	**1.26E-09**
1,2,3,4,7,8-HxCDD	4.20E-13	1.68E-10	1.05E-10	**2.40E-11**
1,2,3,6,7,8-HxCDD	1.30E-12	5.20E-10	3.25E-10	**7.42E-11**
1,2,3,7,8,9-HxCDD	9.80E-13	3.92E-10	2.45E-10	**5.59E-11**
Total HxCDD	1.20E-11	4.80E-09	3.00E-09	**6.85E-10**
1,2,3,4,6,7,8-Hp-CDD	4.80E-12	1.92E-09	1.20E-09	**2.74E-10**
Total HpCDD	1.90E-11	7.60E-09	4.75E-09	**1.08E-09**
Octa CDD	2.50E-11	1.00E-08	6.25E-09	**1.43E-09**
Total PCDD[h]	7.90E-11	3.16E-08	1.98E-08	**4.51E-09**
Furans[e,f]				
2,3,7,8-TCDF	9.70E-13	3.88E-10	2.43E-10	**5.54E-11**
Total TCDF	3.70E-12	1.48E-09	9.25E-10	**2.11E-10**
1,2,3,7,8-PeCDF	4.30E-12	1.72E-09	1.08E-09	**2.45E-10**
2,3,4,7,8-PeCDF	8.40E-13	3.36E-10	2.10E-10	**4.79E-11**
Total PeCDF	8.40E-11	3.36E-08	2.10E-08	**4.79E-09**
1,2,3,4,7,8-HxCDF	4.00E-12	1.60E-09	1.00E-09	**2.28E-10**
1,2,3,6,7,8-HxCDF	1.20E-12	4.80E-10	3.00E-10	**6.85E-11**
2,3,4,6,7,8-HxCDF	1.90E-12	7.60E-10	4.75E-10	**1.08E-10**
1,2,3,7,8,9-HxCDF	8.40E-12	3.36E-09	2.10E-09	**4.79E-10**
Total HxCDF	1.30E-11	5.20E-09	3.25E-09	**7.42E-10**
1,2,3,4,6,7,8-HpCDF	6.50E-12	2.60E-09	1.63E-09	**3.71E-10**
1,2,3,4,7,8,9-HpCDF	2.70E-12	1.08E-09	6.75E-10	**1.54E-10**
Total HpCDF	1.00E-11	4.00E-09	2.50E-09	**5.71E-10**
Octa CDF	4.80E-12	1.92E-09	1.20E-09	**2.74E-10**
Total PCDF[h]	4.00E-11	1.60E-08	1.00E-08	**2.28E-09**
Total PCDD/PCDF[h]	1.20E-10	4.80E-08	3.00E-08	**6.85E-09**
Non-PAH HAPs[f]				
Acetaldehyde[e]	1.30E-03	5.20E-01	3.25E-01	**7.42E-02**
Acrolein[e]	2.60E-05	1.04E-02	6.50E-03	8.67E-03
Benzene[e]	3.90E-04	1.56E-01	9.75E-02	**2.23E-02**
1,3-Butadiene[e]				
Ethylbenzene[e]	2.40E-04	9.60E-02	6.00E-02	8.00E-02
Formaldehyde[e]	3.10E-03	1.24E+00	7.75E-01	**1.77E-01**
Hexane[e]	9.20E-04	3.68E-01	2.30E-01	3.07E-01
Isooctane	4.00E-05	1.60E-02	1.00E-02	1.33E-02
Methyl Ethyl Ketone[e]	2.00E-05	8.00E-03	5.00E-03	6.67E-03
Pentane[e]				
Propionaldehyde[e]	1.30E-04	5.20E-02	3.25E-02	4.33E-02
Quinone[e]	1.60E-04	6.40E-02	4.00E-02	5.33E-02
Methyl chloroform[e]	4.80E-05	1.92E-02	1.20E-02	1.60E-02
Toluene[e]	2.90E-03	1.16E+00	7.25E-01	9.67E-01
Xylene[e]	2.00E-04	8.00E-02	5.00E-02	6.67E-02
POM (7-PAH Group)		2.19E-04		**3.13E-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	1.70E-04	6.80E-02	4.25E-02	**9.70E-03**
3-Methylchloranthrene[e]				
Acenaphthene	1.40E-06	5.60E-04	3.50E-04	**7.99E-05**
Acenaphthylene	2.20E-05	8.80E-03	5.50E-03	**1.26E-03**
Anthracene	3.10E-06	1.24E-03	7.75E-04	**1.77E-04**
Benzo(a)anthracene	2.10E-07	8.40E-05	5.25E-05	**1.20E-05**
Benzo(a)pyrene[e]	9.80E-09	3.92E-06	2.45E-06	**5.59E-07**
Benzo(b)fluoranthene	1.00E-07	4.00E-05	2.50E-05	**5.71E-06**
Benzo(e)pyrene	1.10E-07	4.40E-05	2.75E-05	**6.28E-06**
Benzo(g,h,i)perylene	4.00E-08	1.60E-05	1.00E-05	**2.28E-06**
Benzo(k)fluoranthene	4.10E-08	1.64E-05	1.03E-05	**2.34E-06**
Chrysene	1.80E-07	7.20E-05	4.50E-05	**1.03E-05**
Dibenzo(a,h)anthracene				
Dichlorobenzene				
Fluoranthene	6.10E-07	2.44E-04	1.53E-04	**3.48E-05**
Fluorene	1.10E-05	4.40E-03	2.75E-03	**6.28E-04**
Indeno(1,2,3-cd)pyrene	7.00E-09	2.80E-06	1.75E-06	**4.00E-07**
Naphthalene[e]	6.50E-04	2.60E-01	1.63E-01	**3.71E-02**
Perylene	8.80E-09	3.52E-06	2.20E-06	**5.02E-07**
Phenanthrene	2.30E-05	9.20E-03	5.75E-03	**1.31E-03**
Pyrene	3.00E-06	1.20E-03	7.50E-04	**1.71E-04**
Non-HAP Organic Compounds[f]				
Acetone[e]	8.30E-04	3.32E-01	2.08E-01	2.77E-01
Benzaldehyde	1.10E-04	4.40E-02	2.75E-02	3.67E-02
Butane	6.70E-04	2.68E-01	1.68E-01	2.23E-01
Butyraldehyde	1.60E-04	6.40E-02	4.00E-02	5.33E-02
Crotonaldehyde[e]	8.60E-05	3.44E-02	2.15E-02	2.87E-02
Ethylene	7.00E-03	2.80E+00	1.75E+00	2.33E+00
Heptane	9.40E-03	3.76E+00	2.35E+00	3.13E+00
Hexanal	1.10E-04	4.40E-02	2.75E-02	3.67E-02
Isovaleraldehyde	3.20E-05	1.28E-02	8.00E-03	1.07E-02
2-Methyl-1-pentene	4.00E-03	1.60E+00	1.00E+00	1.33E+00
2-Methyl-2-butene	5.80E-04	2.32E-01	1.45E-01	1.93E-01
3-Methylpentane	1.90E-04	7.60E-02	4.75E-02	6.33E-02
1-Pentene	2.20E-03	8.80E-01	5.50E-01	7.33E-01
n-Pentane	2.10E-04	8.40E-02	5.25E-02	7.00E-02
Valeraldehyde[e]	6.70E-05	2.68E-02	1.68E-02	2.23E-02
Metals[g]				
Antimony[e]	1.80E-07	7.20E-05	4.50E-05	6.00E-05
Arsenic[e]	5.60E-07	2.24E-04	1.40E-04	**3.20E-05**
Barium[e]	5.80E-06	2.32E-03	1.45E-03	1.93E-03
Beryllium[e]				
Cadmium[e]	4.10E-07	1.64E-04	1.03E-04	**2.34E-05**
Chromium[e]	5.50E-06	2.20E-03	1.38E-03	1.83E-03
Cobalt[e]	2.60E-08	1.04E-05	6.50E-06	8.67E-06
Copper[e]	3.10E-06	1.24E-03	7.75E-04	1.03E-03
Hexavalent Chromium[e]	4.50E-07	1.80E-04	1.13E-04	**2.57E-05**
Manganese[e]	7.70E-06	3.08E-03	1.93E-03	2.57E-03
Mercury[e]	2.60E-06	1.04E-03	6.50E-04	8.67E-04
Molybdenum[e]				
Nickel[e]	6.30E-05	2.52E-02	1.58E-02	**3.60E-03**
Phosphorus[e]	2.80E-05	1.12E-02	7.00E-03	9.33E-03
Silver[e]	4.80E-07	1.92E-04	1.20E-04	1.60E-04
Selenium[e]	3.50E-07	1.40E-04	8.75E-05	1.17E-04
Thallium[e]	4.10E-09	1.64E-06	1.03E-06	1.37E-06
Vanadium[e]				
Zinc[e]	6.10E-05	2.44E-02	1.53E-02	2.03E-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
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), 0.058 to 0.061. Second, to account for the average scavenging factor of 63% down to 50%, 0.61 to 0.077.
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.**
7/14/2011 12:09 **Permit/Facility ID: P-2011.0104 777-00514**

Silo Filling Operations AP-42 Section 11.1

Emissions Toggle =	1	
Max Hourly Production	400	T/hr
Max Daily Production	8,000	Tons/day
Max Annual Production	500,000	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	0.2344	0.1465	
PM-10 (total) [b]	5.86E-04	0.2344	0.1465	
PM-2.5 [b]	5.86E-04	0.2344	0.1465	
CO [b]	1.18E-03	0.4720	0.2950	
NOx				
SO_2				
VOC [d,g]	1.22E-04	4.87E-02	0.0305	
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	1.56E-03	9.75E-04	0.0002
1,3-Butadiene[e]				
Ethylbenzene[e]	4.63E-06	1.85E-03	1.16E-03	1.54E-03
Formaldehyde[e]	8.41E-05	3.36E-02	2.10E-02	0.0048
Hexane[e]	1.22E-05	4.87E-03	3.05E-03	4.06E-03
Isooctane	3.78E-08	1.51E-05	9.44E-06	1.26E-05
Methyl Ethyl Ketone[e]	4.75E-06	1.90E-03	1.19E-03	1.58E-03
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]		0.00E+00	0.00E+00	
Toluene[e]	7.56E-06	3.02E-03	1.89E-03	2.52E-03
Xylene[e]	3.13E-05	1.25E-02	7.83E-03	1.04E-02
POM (7-PAH Group)		2.70E-04		**3.85E-05**

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	5.35E-03	3.34E-03	7.64E-04
3-Methylchloranthrene[e]				
Acenaphthene	1.19E-06	4.77E-04	2.98E-04	6.81E-05
Acenaphthylene	3.55E-08	1.42E-05	8.89E-06	2.03E-06
Anthracene	3.30E-07	1.32E-04	8.25E-05	1.88E-05
Benzo(a)anthracene	1.42E-07	5.69E-05	3.55E-05	8.12E-06
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	9.65E-06	6.03E-06	1.38E-06
Benzo(g,h,l)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	2.13E-04	1.33E-04	3.04E-05
Dibenzo(a,h)anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dichlorobenzene				
Fluoranthene	3.81E-07	1.52E-04	9.52E-05	2.17E-05
Fluorene	2.56E-06	1.03E-03	6.41E-04	1.46E-04
Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene[e]	4.62E-06	1.85E-03	1.16E-03	2.64E-04
Perylene	7.62E-08	3.05E-05	1.90E-05	4.35E-06
Phenanthrene	4.57E-06	1.83E-03	1.14E-03	2.61E-04
Pyrene	1.12E-06	4.47E-04	2.79E-04	6.38E-05
Non-HAP Organic Compounds				
Acetone[e]	6.70E-06	2.68E-03	0.0017	2.23E-03
Benzaldehyde				
Butane				
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene	1.34E-04	5.36E-02	0.0335	4.47E-02
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.**
7/14/2011 12:09 **Permit/Facility ID: P-2011.0104 777-00514**

Silo Filling Operations AP-42 Section 11.1, Page 2

Fuel Type Toggle =	1	
Max Hourly Production	400	T/hr
Max Daily Production	8,000	Tons/day
Max Annual Production	500,000	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
non-PAH HAPs[g]				
Bromomethane[e]	5.97E-07	2.39E-04	0.0001	1.99E-04
2-Butanone (see Methyl Ethyl Ketone)				
Carbon disulfide[e]	1.95E-06	7.80E-04	0.0005	6.50E-04
Chloroethane (Ethyl chloride[e])	4.87E-07	1.95E-04	0.0001	1.62E-04
Chloromethane (Methyl chloride[e])	2.80E-06	1.12E-03	0.0007	9.34E-04
Cumene[e]				
n-Hexane (see Hexane[e])				
Methylene chloride (Dichloromethane[e])	3.29E-08	1.32E-05	8.23E-06	1.10E-05
MTBE				
Styrene[e]	6.58E-07	2.63E-04	1.65E-04	2.19E-04
Tetrachloroethene (Tetrachloroethylene[e])	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,1,1-Trichloroethane (Methyl chloroform[e])	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Trichloroethene (Trichloroethylene[e])				
Trichlorofluoromethane				
m-/p-Xylene[e] (added into Xylene[e])	2.44E-05	9.75E-03	0.0061	8.12E-03
o-Xylene[e] (added into Xylene[e])	6.95E-06	2.78E-03	0.0017	2.32E-03
Phenol[e,f]				
Non-HAP Organic Compounds				
Methane	3.17E-03	1.27E+00	0.7921	1.06E+00

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

Facility: **Knife River, Inc.**
7/14/2011 12:09 **Permit/Facility ID: P-2011.0104 777-00514**

Load-out Operations AP-42 Section 11.1

Emissions Toggle =	1	
Max Hourly Production	400	T/hr
Max Daily Production	8,000	Tons/day
Max Annual Production	500,000	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	0.13	
PM-10 (total) [b]	5.22E-04	0.209	0.13	
PM-2.5 [b]	5.22E-04	0.209	0.13	
CO [b]	1.35E-03	0.540	0.34	
NOx				
SO_2				
VOC [d,g]	3.91E-03	1.564	0.98	
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	5.41E-04	**1.23E-04**
1,3-Butadiene[e]				
Ethylbenzene[e]	1.16E-05	4.66E-03	2.91E-03	3.88E-03
Formaldehyde[e]	3.66E-06	1.46E-03	9.15E-04	**2.09E-04**
Hexane[e]	6.24E-06	2.50E-03	1.56E-03	2.08E-03
Isooctane	7.49E-08	2.99E-05	1.87E-05	2.50E-05
Methyl Ethyl Ketone[e]	2.04E-06	8.15E-04	5.09E-04	6.79E-04
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]				
Toluene[e]	8.73E-06	3.49E-03	2.18E-03	2.91E-03
Xylene[e]	5.03E-05	2.01E-02	1.26E-02	1.68E-02
POM (7-PAH Group)		1.84E-04		**2.63E-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	2.03E-03	**4.63E-04**
3-Methylchloranthrene[e]				
Acenaphthene	8.86E-07	3.55E-04	2.22E-04	**5.06E-05**
Acenaphthylene	9.55E-08	3.82E-05	2.39E-05	**5.45E-06**
Anthracene	2.39E-07	9.55E-05	5.97E-05	**1.36E-05**
Benzo(a)anthracene	6.48E-08	2.59E-05	1.62E-05	**3.70E-06**
Benzo(a)pyrene[e]	7.84E-09	3.14E-06	1.96E-06	**4.48E-07**
Benzo(b)fluoranthene	2.59E-08	1.04E-05	6.48E-06	**1.48E-06**
Benzo(e)pyrene	2.66E-08	1.06E-05	6.65E-06	**1.52E-06**
Benzo(g,h,l)perylene	6.48E-09	2.59E-06	1.62E-06	**3.70E-07**
Benzo(k)fluoranthene	7.50E-09	3.00E-06	1.88E-06	**4.28E-07**
Chrysene	3.51E-07	1.40E-04	8.78E-05	**2.00E-05**
Dibenzo(a,h)anthracene	1.26E-09	5.05E-07	3.15E-07	**7.20E-08**
Dichlorobenzene				
Fluoranthene	1.70E-07	6.82E-05	4.26E-05	**9.73E-06**
Fluorene	2.63E-06	1.05E-03	6.56E-04	**1.50E-04**
Indeno(1,2,3-cd)pyrene	1.60E-09	6.41E-07	4.01E-07	**9.15E-08**
Naphthalene[e]	4.26E-06	1.70E-03	1.07E-03	**2.43E-04**
Perylene	7.50E-08	3.00E-05	1.88E-05	**4.28E-06**
Phenanthrene	2.76E-06	1.10E-03	6.90E-04	**1.58E-04**
Pyrene	5.11E-07	2.05E-04	1.28E-04	**2.92E-05**
Non-HAP Organic Compounds				
Acetone[e]	1.95E-06	7.79E-04	4.87E-04	6.49E-04
Benzaldehyde				
Butane				
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene	2.95E-05	1.18E-02	7.38E-03	9.84E-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.
7/14/2011 12:09 **Permit/Facility ID: P-2011.0104 777-00514**

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

Fuel Type Toggle =	1	
Max Hourly Production	400	T/hr
Max Daily Production	8,000	Tons/day
Max Annual Production	500,000	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	9.98E-05	1.33E-04
2-Butanone (see Methyl Ethyl Ketone)				
Carbon disulfide[e]	5.41E-07	2.16E-04	1.35E-04	1.80E-04
Chloroethane (Ethyl chloride[e])	8.73E-09	3.49E-06	2.18E-06	2.91E-06
Chloromethane (Methyl chloride[e])	6.24E-07	2.50E-04	1.56E-04	2.08E-04
Cumene[e]	4.57E-06	1.83E-03	1.14E-03	1.52E-03
n-Hexane (see Hexane[e])				
Methylene chloride (Dichloromethane[e])				
MTBE				
Styrene[e]	3.04E-07	1.21E-04	7.59E-05	1.01E-04
Tetrachloroethene (Tetrachloroethylene[e])	3.20E-07	1.28E-04	8.01E-05	1.07E-04
1,1,1-Trichloroethane (Methyl chloroform[e])				
Trichloroethene (Trichloroethylene[e])				
Trichlorofluoromethane	5.41E-08	2.16E-05	1.35E-05	1.80E-05
m-/p-Xylene[e] (added into Xylene[e])	1.71E-05	6.82E-03	4.26E-03	5.68E-03
o-Xylene[e] (added into Xylene[e])	3.33E-05	1.33E-02	8.32E-03	1.11E-02
Phenol[e,f]	4.02E-06	1.61E-03	1.01E-03	1.34E-03
Non-HAP Organic Compounds				
Methane	2.70E-04	1.08E-01	6.76E-02	9.01E-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.
7/14/2011 12:09 **Permit/Facility ID:** P-2011.0104 777-00514

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

Fuel Type Toggle =	1	172 kw	User Input Weight % Sulfur = 0.0015%
Fuel Consumption Rate	11.80 gal/hr		AP-42 3.3 SO2 EF = 0.29 for #2 fuel oil, presumed max 0.5%
Calculated MMBtu/hr	1.617 MMBtu/hr		SO2 emissions are multiplied by a factor: User Input Value/0.5% = 0.00
Max Daily Operation	24 hr/day		Not an EPA-Certified Generator
Max Annual Operation	1,800 hrs/yr		

Pollutant	Emission Factor[a] (lb/MMBtu)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) **Annual** or 24-hr Average
PM (total) [b]	0.31	0.501	4.51E-01	
PM-10 (total) [b]	0.31	0.501	4.51E-01	
PM-2.5	0.07	0.113	1.02E-01	
CO [b]	0.95	1.536	1.38E+00	
NOx[b]	4.41	7.131	6.42E+00	
SO_2 [b] (total SOx presumed SO2)	0.29	1.41E-03	3.80E-06	
VOC [b] (total TOC--> VOCs)	0.36	0.582	5.24E-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]	7.67E-04	1.24E-03	1.12E-03	**2.55E-04**
Acrolein[c]	9.25E-05	1.50E-04	1.35E-04	1.50E-04
Benzene[c,e]	9.33E-04	1.51E-03	1.36E-03	**3.10E-04**
1,3-Butadiene[c,e]	3.91E-05	6.32E-05	5.69E-05	**1.30E-05**
Ethylbenzene[e]				
Formaldehyde[c,e]	1.18E-03	1.91E-03	1.72E-03	**3.92E-04**
Hexane[e]				
Isooctane				
Methyl Ethyl Ketone[e]				
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]				
Toluene[c,e]	4.09E-04	6.61E-04	5.95E-04	6.61E-04
Xylene[c,e]	2.85E-04	4.61E-04	4.15E-04	4.61E-04
POM (7-PAH Group)		5.55E-06		**1.14E-06**

Pollutant	Emission Factor[a] (lb/MMBtu)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) **Annual** or 24-hr Average
PAH HAPs				
2-Methylnaphthalene				
3-Methylchloranthrene[e]				
Acenaphthene[c]	1.42E-06	2.30E-06	2.07E-06	**4.72E-07**
Acenaphthylene[c]	5.06E-06	8.18E-06	7.36E-06	**1.68E-06**
Anthracene[c]	1.87E-06	3.02E-06	2.72E-06	**6.21E-07**
Benzo(a)anthracene[c]	1.68E-06	2.72E-06	2.44E-06	**5.58E-07**
Benzo(a)pyrene[c,e]	1.88E-07	3.04E-07	2.74E-07	**6.25E-08**
Benzo(b)fluoranthene[c]	9.91E-08	1.60E-07	1.44E-07	**3.29E-08**
Benzo(e)pyrene				
Benzo(g,h,l)perylene[c]	4.89E-07	7.91E-07	7.12E-07	**1.62E-07**
Benzo(k)fluoranthene[c]	1.55E-07	2.51E-07	2.26E-07	**5.15E-08**
Chrysene[c]	3.53E-07	5.71E-07	5.14E-07	**1.17E-07**
Dibenzo(a,h)anthracene[c]	5.83E-07	9.43E-07	8.48E-07	**1.94E-07**
Dichlorobenzene				
Fluoranthene[c]	7.61E-06	1.23E-05	1.11E-05	**2.53E-06**
Fluorene[c]	2.92E-05	4.72E-05	4.25E-05	**9.70E-06**
Indeno(1,2,3-cd)pyrene[c]	3.75E-07	6.06E-07	5.46E-07	**1.25E-07**
Naphthalene[c,e]	8.48E-05	1.37E-04	1.23E-04	**2.82E-05**
Perylene				
Phenanthrene[c]	2.94E-05	4.75E-05	4.28E-05	**9.77E-06**
Pyrene[c]	4.78E-06	7.73E-06	6.96E-06	**1.59E-06**
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

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

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Controls Reduction (%)[f]	
PM	20%
CO	41%
VOC	66%

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

Fuel Type Toggle =	1		1,007 kw	
Fuel Consumption Rate	68.96	gal/hr	1,350 bhp	
Calculated MMBtu/hr	9.45	MMBtu/hr		
Max Daily Operation	20	hr/day		
Max Annual Operation	2,000	hrs/yr		

User Input Weight % Sulfur = 0.0015%
AP-42 3.4-1 SO2 EF = 1.01 x S

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 [b]		0.022	0.065	6.55E-02	1.49E-02
PM-10 (total) [d]		0.022	0.065	6.55E-02	1.49E-02
PM-2.5		0.022	0.065	6.55E-02	1.49E-02
CO [b]		0.19	0.565	5.65E-01	
NOx[b]		4.73	14.077	1.41E+01	3.21E+00
SO_2 [b] (total SOx presumed SO2)	0.001515		0.014	0.014	3.27E-03
VOC [b] (total TOC--> VOCs)		0.01	0.030	0.030	
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]	2.52E-05		2.38E-04	2.38E-04	**5.44E-05**
Acrolein[c]	7.88E-06		7.45E-05	7.45E-05	6.21E-05
Benzene[c,e]	7.76E-04		7.33E-03	7.33E-03	**1.67E-03**
1,3-Butadiene[c,e]					
Ethylbenzene[e]					
Formaldehyde[c,e]	7.89E-05		7.46E-04	7.46E-04	**1.70E-04**
Hexane[e]					
Isooctane					
Methyl Ethyl Ketone[e]					
Pentane[e]					
Propionaldehyde[e]					
Quinone[e]					
Methyl chloroform[e]					
Toluene[c,e]	2.81E-04		2.66E-03	2.66E-03	2.21E-03
Xylene[c,e]	1.93E-04		1.82E-03	1.82E-03	1.52E-03
POM (7-PAH Group)			4.25E-05		**9.70E-06**

Pollutant	Emission Factor[a] (lb/MMBtu)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) Annual or 24-hr
PAH HAPs				
2-Methylnaphthalene				
3-Methylchloranthrene[e]				
Acenaphthene[c1]	4.68E-06	4.42E-05	4.42E-05	**1.01E-05**
Acenaphthylene[c1]	9.23E-06	8.72E-05	8.72E-05	**1.99E-05**
Anthracene[c1]	1.23E-06	1.16E-05	1.16E-05	**2.65E-06**
Benzo(a)anthracene[c1]	6.22E-07	5.88E-06	5.88E-06	**1.34E-06**
Benzo(a)pyrene[c1,e]	2.57E-07	2.43E-06	2.43E-06	**5.54E-07**
Benzo(b)fluoranthene[c1]	1.11E-06	1.05E-05	1.05E-05	**2.39E-06**
Benzo(e)pyrene				
Benzo(g,h,i)perylene[c1]	5.56E-07	5.25E-06	5.25E-06	**1.20E-06**
Benzo(k)fluoranthene[c1]	2.18E-07	2.06E-06	2.06E-06	**4.70E-07**
Chrysene[c1]	1.53E-06	1.45E-05	1.45E-05	**3.30E-06**
Dibenzo(a,h)anthracene[c1]	3.46E-07	3.27E-06	3.27E-06	**7.47E-07**
Dichlorobenzene				
Fluoranthene[c1]	4.03E-06	3.81E-05	3.81E-05	**8.69E-06**
Fluorene[c1]	1.28E-05	1.21E-04	1.21E-04	**2.76E-05**
Indeno(1,2,3-cd)pyrene[c1]	4.14E-07	3.91E-06	3.91E-06	**8.93E-07**
Naphthalene[c1,e]	1.30E-04	1.23E-03	1.23E-03	**2.80E-04**
Perylene				
Phenanthrene[c1]	4.08E-05	3.86E-04	3.86E-04	**8.80E-05**
Pyrene[c1]	3.71E-06	3.51E-05	3.51E-05	**8.00E-06**
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

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

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Max Hourly Production	400 T/hr	96% T/hr is Aggregate & RAP =	384 T/hr
Max Daily Production	8,000 Tons/day	96% T/day is Aggregate & RAP =	7,680 T/day
Max Annual Production	500,000 Tons/yr	96% T/yr is Aggregate & RAP =	480,000 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)

$E = k\ (0.0032) \times (U/5)^{1.3}\ /\ (M/2)^{1.4}$ = 2.57E-03 for PM 1.22E-03 lb/ton for PM10 1.84E-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 = 14.3 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 = 5 %

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	7.77E-05	0.0638	1.18E-05	0.0638
Cat 2:	3.09	2.32	5.18	3.25E-04	0.2670	4.92E-05	0.2670
Cat 3:	5.14	4.12	9.20	6.87E-04	0.5640	1.04E-04	0.5640
Cat 4:	8.23	6.69	14.95	1.29E-03	1.060	1.95E-04	1.060
Cat 5:	10.80	9.52	21.28	2.04E-03	1.677	3.09E-04	1.677
Cat 6:	14.00	12.40	27.74	2.88E-03	2.366	4.36E-04	2.366

Aggregate Front End Loader Drop Points

Drop to storage pile and drop to bins: 384 T/hr 5 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)	2.57E-03	0.99	0.82	0.62	0.14	4.94	4.12	3.09	0.71
PM-10 (total)	1.22E-03	0.47	0.39	0.29	0.07	2.34	1.95	1.46	0.33
PM-2.5	1.84E-04	0.07	0.06	0.04	0.01	0.35	0.29	0.22	0.05

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 15% 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 3 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)	2.57E-03	8.40E-01	7.00E-01	5.25E-01	1.20E-01	2.52E+00	2.10E+00	1.58E+00	3.60E-01
PM-10 (total)	1.22E-03	3.97E-01	3.31E-01	2.48E-01	5.67E-02	1.19E+00	9.93E-01	7.45E-01	1.70E-01
PM-2.5	1.84E-04	6.02E-02	5.01E-02	3.76E-02	8.59E-03	1.80E-01	1.50E-01	1.13E-01	2.58E-02

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	8.00E-01	6.00E-01	1.37E-01
PM-10 (total)	0.0087	0.334	2.78E-01	2.09E-01	4.77E-02
PM-2.5	1.30E-04	0.005	4.16E-03	3.12E-03	7.12E-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)	2.57E-03	8.40E-01	7.00E-01	5.25E-01	1.20E-01
PM-10 (total)	1.22E-03	3.97E-01	3.31E-01	2.48E-01	5.67E-02
PM-2.5	1.84E-04	6.02E-02	5.01E-02	3.76E-02	8.59E-03

Facility: Knife River, Inc.
7/14/2011 12:09 **Permit/Facility ID:** P-2011.0104 777-00514

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

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

Hot Mix 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	8,250.00	1.00	8,250.00
Methane	0.012	lb/T	AP-42 Table 11.1-8	3.00	21.00	63.00
N_2O	0.26	lb/10^3 gal	AP-42 Table 1.3-8	0.160093	310.00	49.63

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.			0.00	1	0.00
Methane	0.216	lb/10^3 gal	AP-42 Table 1.3-3	0.00E+00	21	0.00
N_2O	0.26	lb/10^3 gal	AP-42 Table 1.3-8	0.00E+00	310	0.00

Green House Gas Emissions When Combusting Used Oil

Hot Mix 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	8,250.00	1.00	8,250.00
Methane	0.012	lb/T	AP-42 Table 11.1-8	3.00	21.00	63.00
N_2O	0.53	lb/10^3 gal	AP-42 Table 1.3-8	0.326343	310.00	101.17

Green House Gas Emissions When Combusting Natural Gas

Hot Mix 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	8,250.00	1.00	8,250.00
Methane	0.012	lb/T	AP-42 Table 11.1-8	3.00	21.00	63.00
N_2O	0.26	lb/10^3 gal	AP-42 Table 1.3-8	0.160093	310.00	49.63

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

Hot Mix 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

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	241.16	1.00	241.16

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	1,566.00	1.00	1,566.00

Total Green House Gas Emissions

Total Emissions	CO_2e (T/yr)
CO_2	10,057.16
Methane	63.00
N_2O	101.17
Grand Total	**10,221.33**

Facility:	Knife River, Inc.			
7/14/2011 12:09	Permit/Facility ID:	P-2011.0104	777-00514	

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 1,250 Hours/year **500,000** Tons/year **8,000** Tons/day

Maximum emission for each pollutant from any fuel-burning options selected on "Facility Data" worksheet. Fuels Selected = #2 Fuel Oil Used Oil Natural Gas

B. Tank Heater: **0.0000** MMBtu/hr **4,000** Hours/year **0** hrs/day

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

C1. IC Engine 1: **11.80** gal/hour **1800** Hours/year IC Engine < 600hp #2 Fuel Oil **24** hrs/day

C2. IC Engine 2: **68.96** gal/hour **2000** Hours/year IC Engine > 600hp #2 Fuel Oil **20** 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	0.00E+00	5.67E-01	4.43E-01	14.21
PM-10 (total)	9.20	0.00E+00	5.67E-01	4.43E-01	10.21
PM-2.5	8.92	0.00E+00	1.79E-01	4.43E-01	9.54
CO	52.00	0.00E+00	2.10E+00	1.01E+00	55.11
NOx	22.00	0.00E+00	2.12E+01		43.21
SO_2	6.16	0.00E+00	1.57E-02		6.18
VOC	12.80	0.00E+00	6.12E-01	1.61E+00	15.02
Lead	6.00E-03	0.00E+00	0.00E+00		6.00E-03
HCl[e]	8.40E-02	0.00E+00	0.00E+00		8.40E-02
Dioxins[e]					
2,3,7,8-TCDD	1.20E-11				**1.20E-11**
Total TCDD	5.31E-11				**5.31E-11**
1,2,3,7,8-PeCDD	1.77E-11				**1.77E-11**
Total PeCDD	1.26E-09				**1.26E-09**
1,2,3,4,7,8-HxCDD	2.40E-11	0.00E+00			**2.40E-11**
1,2,3,6,7,8-HxCDD	7.42E-11				**7.42E-11**
1,2,3,7,8,9-HxCDD	5.59E-11	0.00E+00			**5.59E-11**
Total HxCDD	6.85E-10				**6.85E-10**
1,2,3,4,6,7,8-Hp-CDD	2.74E-10	0.00E+00			**2.74E-10**
Total HpCDD	1.08E-09	0.00E+00			**1.08E-09**
Octa CDD	1.43E-09	0.00E+00			**1.43E-09**
Total PCDD[h]	4.51E-09	0.00E+00			**4.51E-09**
Furans[e]					
2,3,7,8-TCDF	5.54E-11				**5.54E-11**
Total TCDF	2.11E-10	0.00E+00			**2.11E-10**
1,2,3,7,8-PeCDF	2.45E-10				**2.45E-10**
2,3,4,7,8-PeCDF	4.79E-11				**4.79E-11**
Total PeCDF	4.79E-09	0.00E+00			**4.79E-09**
1,2,3,4,7,8-HxCDF	2.28E-10				**2.28E-10**
1,2,3,6,7,8-HxCDF	6.85E-11				**6.85E-11**
2,3,4,6,7,8-HxCDF	1.08E-10				**1.08E-10**
1,2,3,7,8,9-HxCDF	4.79E-10				**4.79E-10**
Total HxCDF	7.42E-10	0.00E+00			**7.42E-10**
1,2,3,4,6,7,8-HpCDF	3.71E-10				**3.71E-10**
1,2,3,4,7,8,9-HpCDF	1.54E-10				**1.54E-10**
Total HpCDF	5.71E-10	0.00E+00			**5.71E-10**
Octa CDF	2.74E-10	0.00E+00			**2.74E-10**
Total PCDF[h]	2.28E-09	0.00E+00			**2.28E-09**
Total PCDD/PCDF[h]	6.85E-09	0.00E+00	0.00E+00		**6.85E-09**
Non-PAH HAPs					
Acetaldehyde[e]	7.42E-02		3.09E-04		**7.45E-02**
Acrolein[e]	8.67E-03		2.12E-04		8.88E-03
Benzene[e]	2.23E-02	0.00E+00	1.98E-03	3.46E-04	**2.46E-02**
1,3-Butadiene[e]			1.30E-05		**1.30E-05**
Ethylbenzene[e]	8.00E-02			5.43E-03	8.54E-02
Formaldehyde[e]	1.77E-01	0.00E+00	5.62E-04	5.01E-03	**1.83E-01**
Hexane[e]	3.07E-01	0.00E+00		6.14E-03	3.13E-01
Isooctane	1.33E-02			3.75E-05	1.34E-02
Methyl Ethyl Ketone[e]	6.67E-03			2.26E-03	8.93E-03
Pentane[e]		0.00E+00			0.00E+00
Propionaldehyde[e]	4.33E-02				4.33E-02
Quinone[e]	5.33E-02				5.33E-02
Methyl chloroform[e]	1.60E-02				1.60E-02
Toluene[e]	9.67E-01	0.00E+00	2.87E-03	5.43E-03	9.75E-01
Xylene[e]	6.67E-02		1.98E-03	2.72E-02	9.59E-02
POM (7-PAH Group)[e]	3.13E-05	0.00E+00	1.08E-05	6.48E-05	**1.07E-04**
TOTAL PAH HAPs	5.05E-02	0.00E+00	5.12E-04	2.81E-03	**5.38E-02**

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	9.70E-03	0.00E+00		1.23E-03	**1.09E-02**
3-Methylchloranthrene[e]	0.00E+00	0.00E+00			**0.00E+00**
Acenaphthene	7.99E-05	0.00E+00	1.06E-05	1.19E-04	**2.09E-04**
Acenaphthylene	1.26E-03	0.00E+00	2.16E-05	7.48E-06	**1.28E-03**
Anthracene	1.77E-04	0.00E+00	3.28E-06	3.25E-05	**2.13E-04**
Benzo(a)anthracene[e]	1.20E-05	0.00E+00	1.90E-06	1.18E-05	**2.57E-05**
Benzo(a)pyrene[e]	5.59E-07	0.00E+00	6.17E-07	4.48E-07	**1.62E-06**
Benzo(b)fluoranthene[e]	5.71E-06	0.00E+00	2.43E-06	1.48E-06	**9.61E-06**
Benzo(e)pyrene	6.28E-06	0.00E+00		2.89E-06	**9.17E-06**
Benzo(g,h,l)perylene	2.28E-06	0.00E+00	1.36E-06	3.70E-07	**4.01E-06**
Benzo(k)fluoranthene[e]	2.34E-06	0.00E+00	5.22E-07	4.28E-07	**3.29E-06**
Chrysene[e]	1.03E-05	0.00E+00	3.42E-06	5.05E-05	**6.42E-05**
Dibenzo(a,h)anthracene[e]	0.00E+00	0.00E+00	9.40E-07	7.20E-08	**1.01E-06**
Dichlorobenzene	0.00E+00	0.00E+00			**0.00E+00**
Fluoranthene	3.48E-05	0.00E+00	1.12E-05	3.15E-05	**7.75E-05**
Fluorene	6.28E-04	0.00E+00	3.73E-05	2.96E-04	**9.61E-04**
Indeno(1,2,3-cd)pyrene[e]	4.00E-07	0.00E+00	1.02E-06	9.15E-08	**1.51E-06**
Naphthalene[e]	3.71E-02	0.00E+00	3.09E-04	5.07E-04	**3.79E-02**
Perylene	5.02E-07	0.00E+00		8.63E-06	**9.13E-06**
Phenanthrene	1.31E-03	0.00E+00	9.78E-05	4.18E-04	**1.83E-03**
Pyrene	1.71E-04	0.00E+00	9.59E-06	9.30E-05	**2.74E-04**
Non-HAP Organic Compounds					
Acetone[e]	2.77E-01	0.00E+00		2.88E-03	2.80E-01
Benzaldehyde	3.67E-02	0.00E+00			3.67E-02
Butane	2.23E-01	0.00E+00			2.23E-01
Butyraldehyde	5.33E-02	0.00E+00			5.33E-02
Crotonaldehyde[e]	2.87E-02	0.00E+00			2.87E-02
Ethylene	2.33E+00	0.00E+00		5.45E-02	2.39E+00
Heptane	3.13E+00	0.00E+00			3.13E+00
Hexanal	3.67E-02	0.00E+00			3.67E-02
Isovaleraldehyde	1.07E-02	0.00E+00			1.07E-02
2-Methyl-1-pentene	1.33E+00	0.00E+00			1.33E+00
2-Methyl-2-butene	1.93E-01	0.00E+00			1.93E-01
3-Methylpentane	6.33E-02	0.00E+00			6.33E-02
1-Pentene	7.33E-01	0.00E+00			7.33E-01
n-Pentane	7.00E-02	0.00E+00			7.00E-02
Valeraldehyde[e]	2.23E-02	0.00E+00			2.23E-02
Metals					
Antimony[e]	6.00E-05	0.00E+00			6.00E-05
Arsenic[e]	3.20E-05	0.00E+00			**3.20E-05**
Barium[e]	1.93E-03	0.00E+00			1.93E-03
Beryllium[e]	0.00E+00	0.00E+00			**0.00E+00**
Cadmium[e]	2.34E-05	0.00E+00			**2.34E-05**
Chromium[e]	1.83E-03	0.00E+00			1.83E-03
Cobalt[e]	8.67E-06	0.00E+00			8.67E-06
Copper[e]	1.03E-03	0.00E+00			1.03E-03
Hexavalent Chromium[e]	2.57E-05	0.00E+00			**2.57E-05**
Manganese[e]	2.57E-03	0.00E+00			2.57E-03
Mercury[e]	8.67E-04	0.00E+00			8.67E-04
Molybdenum[e]	0.00E+00	0.00E+00			0.00E+00
Nickel[e]	3.60E-03	0.00E+00			**3.60E-03**
Phosphorus[e]	9.33E-03	0.00E+00			9.33E-03
Silver[e]	1.60E-04	0.00E+00			1.60E-04
Selenium[e]	1.17E-04	0.00E+00			1.17E-04
Thallium[e]	1.37E-06	0.00E+00			1.37E-06
Vanadium[e]	0.00E+00	0.00E+00			0.00E+00
Zinc[e]	2.03E-02	0.00E+00			2.03E-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

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 1,250 Hours/year 500,000 Tons/year HMA throughput 8,000 hrs/day
Maximum emission for each pollutant from any fuel-burning option selected. Fuels Selected = #2 Fuel Oil Used Oil Natural Gas
B. Tank Heater: 0.0000 MMBtu/hr 4,000 Hours/year 0 hrs/day
Maximum emission for each pollutant from any fuel-burning option selected. Fuels Selected =
C1. IC Engine 1: 11.80 gal/hour 1800 Hours/year #2 Fuel Oil Generator < 600hp 24 hrs/day
C2. IC Engine 2: 68.96 gal/hour 2000 Hours/year #2 Fuel Oil Generator > 600hp 20 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[a]					
Bromomethane[e]				3.32E-04	3.32E-04
2-Butanone (see Methyl Ethyl Ketone)					
Carbon disulfide[e]				8.30E-04	8.30E-04
Chloroethane (Ethyl chloride[e])				1.65E-04	1.65E-04
Chloromethane (Methyl chloride[e])				1.14E-03	1.14E-03
Cumene				1.52E-03	1.52E-03
n-Hexane					
Methylene chloride (Dichloromethane[e])				1.10E-05	1.10E-05
MTBE					
Styrene[e]				3.21E-04	3.21E-04
Tetrachloroethene (Tetrachloroethylene[e])				1.07E-04	1.07E-04
1,1,1-Trichloroethane (Methyl chloroform[e])					
Trichloroethene (Trichloroethylene[e])					
Trichlorofluoromethane				1.80E-05	1.80E-05
m-/p-Xylene[e]				1.38E-02	1.38E-02
o-Xylene[e]				1.34E-02	1.34E-02
Phenol[e,f]				1.34E-03	1.34E-03
Non-HAP Organic Compounds					
Methane				1.15E+00	1.15E+00

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.

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 1,250 Hours/year 500,000 Tons/year HMA throughput 8,000 hrs/day

Maximum emission for each pollutant from any fuel-burning options selected on "Facility Data" worksheet. Fuels Selected = #2 Fuel Oil Used Oil Natural Gas

B. Tank Heater: 0.0000 MMBtu/hr 4,000 Hours/year 0 hrs/day

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

C1. Generator G1: 11.80 gal/hour 1800 Hours/year IC Engine <600hp #2 Fuel Oil 24 hrs/day

C2. Generator G2: 68.96 gal/hour 2000 Hours/year IC Engine > 600hp #2 Fuel Oil 20 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 Fugitives (D)
PM (total)	8.25	0.00E+00	5.17E-01	2.77E-01	8.77
PM-10 (total)	5.75	0.00E+00	5.17E-01	2.77E-01	6.27
PM-2.5	5.58	0.00E+00	1.67E-01	2.77E-01	5.74
CO	32.50	0.00E+00	1.95E+00	6.32E-01	34.45
NOx	13.75	0.00E+00	2.05E+01		34.25
SO_2	3.85	0.00E+00	1.43E-02		3.86
VOC	8.00	0.00E+00	5.54E-01	1.01E+00	8.55
Lead	3.75E-03	0.00E+00	0.00E+00		3.75E-03
HCl [e]	5.25E-02	0.00E+00	0.00E+00		5.25E-02
Dioxins[e]					
2,3,7,8-TCDD	5.25E-11				5.25E-11
Total TCDD	2.33E-10				2.33E-10
1,2,3,7,8-PeCDD	7.75E-11				7.75E-11
Total PeCDD	5.50E-09				5.50E-09
1,2,3,4,7,8-HxCDD	1.05E-10	0.00E+00			1.05E-10
1,2,3,6,7,8-HxCDD	3.25E-10				3.25E-10
1,2,3,7,8,9-HxCDD	2.45E-10	0.00E+00			2.45E-10
Total HxCDD	3.00E-09				3.00E-09
1,2,3,4,6,7,8-Hp-CDD	1.20E-09	0.00E+00			1.20E-09
Total HpCDD	4.75E-09	0.00E+00			4.75E-09
Octa CDD	6.25E-09	0.00E+00			6.25E-09
Total PCDD[h]	1.98E-08	0.00E+00			1.98E-08
Furans[e]					
2,3,7,8-TCDF	2.43E-10				2.43E-10
Total TCDF	9.25E-10	0.00E+00			9.25E-10
1,2,3,7,8-PeCDF	1.08E-09				1.08E-09
2,3,4,7,8-PeCDF	2.10E-10				2.10E-10
Total PeCDF	2.10E-08	0.00E+00			2.10E-08
1,2,3,4,7,8-HxCDF	1.00E-09				1.00E-09
1,2,3,6,7,8-HxCDF	3.00E-10				3.00E-10
2,3,4,6,7,8-HxCDF	4.75E-10				4.75E-10
1,2,3,7,8,9-HxCDF	2.10E-09				2.10E-09
Total HxCDF	3.25E-09	0.00E+00			3.25E-09
1,2,3,4,6,7,8-HpCDF	1.63E-09				1.63E-09
1,2,3,4,7,8,9-HpCDF	6.75E-10				6.75E-10
Total HpCDF	2.50E-09	0.00E+00			2.50E-09
Octa CDF	1.20E-09	0.00E+00			1.20E-09
Total PCDF[h]	1.00E-08	0.00E+00			1.00E-08
Total PCDD/PCDF[h]	3.00E-08	0.00E+00			3.00E-08
Non-PAH HAPs					
Acetaldehyde[e]	3.25E-01		1.35E-03		3.26E-01
Acrolein[e]	6.50E-03		2.09E-04		6.71E-03
Benzene[e]	9.75E-02	0.00E+00	8.69E-03	1.52E-03	1.06E-01
1,3-Butadiene[e]	0.00E+00		5.69E-05		5.69E-05
Ethylbenzene[e]	6.00E-02			4.07E-03	6.00E-02
Formaldehyde[e]	7.75E-01	0.00E+00	2.46E-03	2.19E-02	7.77E-01
Hexane[e]	2.30E-01	0.00E+00		4.61E-03	2.30E-01
Isooctane	1.00E-02			2.82E-05	1.00E-02
Methyl Ethyl Ketone[e]	5.00E-03			1.70E-03	5.00E-03
Pentane[e]	0.00E+00	0.00E+00			0.00E+00
Propionaldehyde[e]	3.25E-02				3.25E-02
Quinone[e]	4.00E-02				4.00E-02
Methyl chloroform[e]	1.20E-02				1.20E-02
Toluene[e]	7.25E-01	0.00E+00	3.25E-03	4.07E-03	7.28E-01
Xylene[e]	5.00E-02	0.00E+00	2.24E-03	2.04E-02	5.22E-02
TOTAL Federal HAPs (T/yr)=					**2.71E+00**

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	4.25E-02	0.00E+00		5.37E-03	4.25E-02
3-Methylchloranthrene[e]	0.00E+00	0.00E+00			0.00E+00
Acenaphthene	3.50E-04	0.00E+00	4.63E-05	5.20E-04	3.96E-04
Acenaphthylene	5.50E-03	0.00E+00	9.46E-05	3.28E-05	5.59E-03
Anthracene	7.75E-04	0.00E+00	1.43E-05	1.42E-04	7.89E-04
Benzo(a)anthracene[e]	5.25E-05	0.00E+00	8.32E-06	5.17E-05	6.08E-05
Benzo(a)pyrene[e]	2.45E-06	0.00E+00	2.70E-06	1.96E-06	5.15E-06
Benzo(b)fluoranthene[e]	2.50E-05	0.00E+00	1.06E-05	6.48E-06	3.56E-05
Benzo(e)pyrene	2.75E-05	0.00E+00		1.27E-05	2.75E-05
Benzo(g,h,l)perylene	1.00E-05	0.00E+00	5.97E-06	1.62E-06	1.60E-05
Benzo(k)fluoranthene[e]	1.03E-05	0.00E+00	2.29E-06	1.88E-06	1.25E-05
Chrysene[e]	4.50E-05	0.00E+00	1.50E-05	2.21E-04	6.00E-05
Dibenzo(a,h)anthracene[e]	0.00E+00	0.00E+00	4.12E-06	3.15E-07	4.12E-06
Dichlorobenzene	0.00E+00	0.00E+00			0.00E+00
Fluoranthene	1.53E-04	0.00E+00	4.92E-05	1.38E-04	2.02E-04
Fluorene	2.75E-03	0.00E+00	1.63E-04	1.30E-03	2.91E-03
Indeno(1,2,3-cd)pyrene[e]	1.75E-06	0.00E+00	4.46E-06	4.01E-07	6.21E-06
Naphthalene[e]	1.63E-01	0.00E+00	1.35E-03	2.22E-03	1.64E-01
Perylene	2.20E-06	0.00E+00		3.78E-05	2.20E-06
Phenanthrene	5.75E-03	0.00E+00	4.28E-04	1.83E-03	6.18E-03
Pyrene	7.50E-04	0.00E+00	4.20E-05	4.07E-04	7.92E-04
Non-HAP Organic Compounds					
Acetone[e]	2.08E-01	0.00E+00		2.16E-03	2.08E-01
Benzaldehyde	2.75E-02	0.00E+00			2.75E-02
Butane	1.68E-01	0.00E+00			1.68E-01
Butyraldehyde	4.00E-02	0.00E+00			4.00E-02
Crotonaldehyde[e]	2.15E-02	0.00E+00			2.15E-02
Ethylene	1.75E+00	0.00E+00		4.09E-02	1.75E+00
Heptane	2.35E+00	0.00E+00			2.35E+00
Hexanal	2.75E-02	0.00E+00			2.75E-02
Isovaleraldehyde	8.00E-03	0.00E+00			8.00E-03
2-Methyl-1-pentene	1.00E+00	0.00E+00			1.00E+00
2-Methyl-2-butene	1.45E-01	0.00E+00			1.45E-01
3-Methylpentane	4.75E-02	0.00E+00			4.75E-02
1-Pentene	5.50E-01	0.00E+00			5.50E-01
n-Pentane[e]	5.25E-02	0.00E+00			5.25E-02
Valeraldehyde[e]	1.68E-02	0.00E+00			1.68E-02
Metals					
Antimony[e]	4.50E-05	0.00E+00			4.50E-05
Arsenic[e]	1.40E-04	0.00E+00			1.40E-04
Barium[e]	1.45E-03	0.00E+00			1.45E-03
Beryllium[e]	0.00E+00	0.00E+00			0.00E+00
Cadmium[e]	1.03E-04	0.00E+00			1.03E-04
Chromium[e]	1.38E-03	0.00E+00			1.38E-03
Cobalt[e]	6.50E-06	0.00E+00			6.50E-06
Copper[e]	7.75E-04	0.00E+00			7.75E-04
Hexavalent Chromium[e]	1.13E-04	0.00E+00			1.13E-04
Manganese[e]	1.93E-03	0.00E+00			1.93E-03
Mercury[e]	6.50E-04	0.00E+00			6.50E-04
Molybdenum[e]	0.00E+00	0.00E+00			0.00E+00
Nickel[e]	1.58E-02	0.00E+00			1.58E-02
Phosphorus[e]	7.00E-03	0.00E+00			7.00E-03
Silver[e]	1.20E-04	0.00E+00			1.20E-04
Selenium[e]	8.75E-05	0.00E+00			8.75E-05
Thallium[e]	1.03E-06				1.03E-06
Vanadium[e]	0.00E+00	0.00E+00			0.00E+00
Zinc[e]	1.53E-02	0.00E+00			1.53E-02

e) IDAPA Toxic Air Pollutant

Facility:	Knife River, Inc.			EMISSION INVENTORY
7/21/2011 11:37	Permit/Facility ID:	P-2011.0104	777-00514	TONS PER YEAR — Page 2 of 2

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	1,250 Hours/year	500,000 Tons/year	8,000 Tons/day
Maximum emission for each pollutant from any fuel-burning option selected. Fuels Selected =			#2 Fuel Oil Used Oil Natural Gas	
B. Tank Heater:	0.0000 MMBtu/hr	4,000 Hours/year		0 hrs/day
Maximum emission for each pollutant from any fuel-burning option selected. Fuels Selected =				
C1. Generator G1:	11.80 gal/hour	1800 Hours/year	#2 Fuel Oil IC Engine <600hp	24 hrs/day
C2. Generator G2:	68.96 gal/hour	2000 Hours/year	#2 Fuel Oil IC Engine > 600hp	20 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[e]					
Bromomethane[e]				2.49E-04	0.00E+00
2-Butanone (see Methyl Ethyl Ketone)					0.00E+00
Carbon disulfide[e]				6.23E-04	0.00E+00
Chloroethane (Ethyl chloride[e])				1.24E-04	0.00E+00
Chloromethane (Methyl chloride[e])				8.57E-04	0.00E+00
Cumene				1.14E-03	0.00E+00
n-Hexane				0.00E+00	0.00E+00
Methylene chloride (Dichloromethane[e])				8.23E-06	0.00E+00
MTBE					0.00E+00
Styrene[e]				2.40E-04	0.00E+00
Tetrachloroethene (Tetrachloroethylene[e])				8.01E-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				1.35E-05	0.00E+00
m-/p-Xylene[e]				1.04E-02	0.00E+00
o-Xylene[e]				1.01E-02	0.00E+00
Phenol[e,f]				1.01E-03	0.00E+00
Non-HAP Organic Compounds					
Methane				8.60E-01	0.00E+00

e) IDAPA Toxic Air Pollutant

9.12E+00

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	1,250 Hours/year	500,000 Tons/year	8,000 Tons/day
Maximum emission for each pollutant from any fuel-burning option selected. Fuels Selected =			#2 Fuel Oil Used Oil Natural Gas	
B. Tank Heater:	0.0000 MMBtu/hr	4,000 Hours/year		0 hrs/day
Maximum emission for each pollutant from any fuel-burning option selected. Fuels Selected =				
C1. Generator G1:	11.80 gal/hour	1800 Hours/year	#2 Fuel Oil IC Engine <600hp	24 hrs/day
C2. Generator G2:	68.96 gal/hour	2000 Hours/year	#2 Fuel Oil IC Engine > 600hp	20 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[e]					
Bromomethane[e]				2.49E-04	0.00E+00
2-Butanone (see Methyl Ethyl Ketone)					0.00E+00
Carbon disulfide[e]				6.23E-04	0.00E+00
Chloroethane (Ethyl chloride[e])				1.24E-04	0.00E+00
Chloromethane (Methyl chloride[e])				8.57E-04	0.00E+00
Cumene				1.14E-03	0.00E+00
n-Hexane				0.00E+00	0.00E+00
Methylene chloride (Dichloromethane[e])				8.23E-06	0.00E+00
MTBE					0.00E+00
Styrene[e]				2.40E-04	0.00E+00
Tetrachloroethene (Tetrachloroethylene[e])				8.01E-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				1.35E-05	0.00E+00
m-/p-Xylene[e]				1.04E-02	0.00E+00
o-Xylene[e]				1.01E-02	0.00E+00
Phenol[e,f]				1.01E-03	0.00E+00
Non-HAP Organic Compounds					
Methane				8.60E-01	0.00E+00

e) IDAPA Toxic Air Pollutant

9.12E+00

Facility:	Knife River, Inc.		
7/14/2011 12:09	Permit/Facility ID:	P-2011.0104	777-00514

TAPs EL Screen - ALL SOURCES

586 pollutants are shown in bold

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 1,250 Hours/year **500,000** Tons/year **8,000** Tons/day

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

B. Tank Heater: **0.0000** MMBtu Rated **4,000** Hours/year **D. Include all emissions from Load-out/Silo Filling? Yes**

Maximum emission for each pollutant for heater burning any fuel selected on "Facility Data" worksheet Short Term Source Factor 586 ELs? 1

C1. IC Engine G1: **11.80** gal/hour **1800** Hours/year IC Engine <600hp #2 Fuel Oil **24** hrs/day

C2. IC Engine G2: **68.96** gal/hour **2000** Hours/year IC Engine > 600hp #2 Fuel Oil **20** 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]	0.084	0.05	Exceeds	
Dioxins		Toxic Equivalency Factor[c]	Adjusted Emission Rate (lb/hr)	
2,3,7,8-TCDD	1.20E-11	1.0	1.20E-11	
Total TCDD	5.31E-11	n/a		
1,2,3,7,8-PeCDD	1.77E-11	1.0	1.77E-11	
Total PeCDD	1.26E-09	n/a		
1,2,3,4,7,8-HxCDD	2.40E-11	0.1	2.40E-12	
1,2,3,6,7,8-HxCDD	7.42E-11	0.1	7.42E-12	
1,2,3,7,8,9-HxCDD	5.59E-11	0.1	5.59E-12	
Total HxCDD	6.85E-10	n/a		
1,2,3,4,6,7,8-Hp-CDD	2.74E-10	0.01	2.74E-12	
Total HpCDD	1.08E-09	n/a		
Octa CDD	1.43E-09	0.0003	4.28E-13	
Total PCDD	4.51E-09	n/a		
Furans				
2,3,7,8-TCDF	5.54E-11	0.1	5.54E-12	
Total TCDF	2.11E-10	n/a		
1,2,3,7,8-PeCDF	2.45E-10	0.03	7.36E-12	
2,3,4,7,8-PeCDF	4.79E-11	0.3	1.44E-11	
Total PeCDF	4.79E-09	n/a		
1,2,3,4,7,8-HxCDF	2.28E-10	0.1	2.28E-11	
1,2,3,6,7,8-HxCDF	6.85E-11	0.1	6.85E-12	
2,3,4,6,7,8-HxCDF	1.08E-10	0.1	1.08E-11	
1,2,3,7,8,9-HxCDF	4.79E-10	0.1	4.79E-11	
Total HxCDF	7.42E-10	n/a		
1,2,3,4,6,7,8-HpCDF	3.71E-10	0.01	3.71E-12	
1,2,3,4,7,8,9-HpCDF	1.54E-10	0.01	1.54E-12	
Total HpCDF	5.71E-10	n/a		
Octa CDF	2.74E-10	0.0003	8.22E-14	
Total PCDF	2.28E-09	n/a		
Total PCDD/PCDF	6.85E-09	n/a		
TOTAL	Adjusted lb/hr	TAPs EL for 2,3,7,8 TCDD	**Exceeds TAPs EL?**	**Modeled?**
Dioxin/Furans[c]	1.69E-10	1.50E-10	Exceeds	
Non-PAH HAPs				
Acetaldehyde	7.45E-02	3.00E-03	Exceeds	
Acrolein	8.88E-03	0.017	No	
Benzene	2.46E-02	8.00E-04	Exceeds	
1,3-Butadiene				
Ethylbenzene	8.54E-02	29	No	
Formaldehyde	1.83E-01	5.10E-04	Exceeds	
Hexane	3.13E-01	12	No	
Isooctane	1.34E-02			
Methyl Ethyl Ketone	8.93E-03	39.3	No	
Pentane	0.00E+00	118	No	
Propionaldehyde	4.33E-02	0.0287	Exceeds	
Quinone	5.33E-02	0.027	Exceeds	
Methyl chloroform	1.60E-02	127	No	
Toluene	9.75E-01	25	No	
Xylene	9.59E-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	1.09E-02	9.10E-05	Exceeds	
3-Methylchloranthrene	0.00E+00	2.50E-06	No	
Acenaphthene	2.09E-04	9.10E-05	Exceeds	
Acenaphthylene	1.28E-03	9.10E-05	Exceeds	
Anthracene	2.13E-04	9.10E-05	Exceeds	
Benzo(a)anthracene	2.57E-05			see POM
Benzo(a)pyrene	1.62E-06	2.00E-06	No	see POM
Benzo(b)fluoranthene	9.61E-06			see POM
Benzo(e)pyrene	9.17E-06	9.10E-05	No	
Benzo(g,h,l)perylene	4.01E-06	9.10E-05	No	
Benzo(k)fluoranthene	3.29E-06			see POM
Chrysene	6.42E-05			see POM
Dibenzo(a,h)anthracene	1.01E-06			see POM
Dichlorobenzene	0.00E+00	9.10E-05	No	
Fluoranthene	7.75E-05	9.10E-05	No	
Fluorene	9.61E-04	9.10E-05	Exceeds	
Indeno(1,2,3-cd)pyrene	1.51E-06			see POM
Naphthalene[e]	3.79E-02	9.10E-05	Exceeds	
Perylene	9.13E-06	9.10E-05	No	
Phenanthrene	1.83E-03	9.10E-05	Exceeds	
Pyrene	2.74E-04	9.10E-05	Exceeds	
PolycyclicOrganicMatter[d]	1.07E-04	2.00E-06	Exceeds	
Non-HAP Organic Compounds				
Acetone	2.80E-01	119	No	
Benzaldehyde	3.67E-02			
Butane	2.23E-01			
Butyraldehyde	5.33E-02			
Crotonaldehyde	2.87E-02	0.38	No	
Ethylene	2.39E+00			
Heptane	3.13E+00	109	No	
Hexanal	3.67E-02			
Isovaleraldehyde	1.07E-02			
2-Methyl-1-pentene	1.33E+00			
2-Methyl-2-butene	1.93E-01			
3-Methylpentane	6.33E-02			
1-Pentene	7.33E-01			
n-Pentane[e]	7.00E-02	118	No	
Valeraldehyde (n-Valeraldehyde)	2.23E-02	11.7	No	
Metals				
Antimony[e]	6.00E-05	0.033	No	
Arsenic	3.20E-05	1.50E-06	Exceeds	
Barium	1.93E-03	0.033	No	
Beryllium	0.00E+00	2.80E-05	No	
Cadmium	2.34E-05	3.70E-06	Exceeds	
Chromium	1.83E-03	0.033	No	
Cobalt	8.67E-06	0.0033	No	
Copper	1.03E-03	0.013	No	
Hexavalent Chromium	2.57E-05	5.60E-07	Exceeds	
Manganese	2.57E-03	0.067	No	
Mercury	8.67E-04	0.003	No	
Molybdenum	0.00E+00	0.333	No	
Nickel	3.60E-03	2.70E-05	Exceeds	
Phosphorus	9.33E-03	0.007	Exceeds	
Silver	1.60E-04	0.007	No	
Selenium	1.17E-04	0.013	No	
Thallium	1.37E-06	0.007	No	
Vanadium	0.00E+00	0.003	No	
Zinc	2.03E-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.

7/14/2011 12:09 Permit/Facility ID: P-2011.0104 777-00514

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 1,250 Hours/year 500,000 Tons/year 8,000 Tons/day

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

B. Tank Heater: 0.0000 MMBtu Rated 4,000 Hours/year

D. Include all emissions from Load-out/Silo Filling? Yes

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

C1. IC Engine G1: 11.80 gal/hour 1800 Hours/year #2 Fuel Oil 24 hrs/day

C2. IC Engine G2: 68.96 gal/hour 2000 Hours/year #2 Fuel Oil 20 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])	3.32E-04	1.27	No	
2-Butanone (see Methyl Ethyl Ketone)				
Carbon disulfide[e]	8.30E-04	2	No	
Chloroethane (Ethyl chloride[e])	1.65E-04	176	No	
Chloromethane (Methyl chloride[e])	1.14E-03	6.867	No	
Cumene[e]	1.52E-03	16.3	No	
n-Hexane[a] (see Hexane[e])				
Methylene chloride (Dichloromethane[e])	1.10E-05	1.60E-03	No	
MTBE	0.00E+00			
Styrene[e]	3.21E-04	6.67	No	
Tetrachloroethene (Tetrachloroethylene[e])	1.07E-04	1.30E-02	No	
1,1,1-Trichloroethane (see Methyl chloroform[e])				
Trichloroethene (Trichloroethylene[e])	0.00E+00	17.93	No	
Trichlorofluoromethane	1.80E-05			
m-/p-Xylene[e] (added into Xylene[e])				
o-Xylene[e] (added into Xylene[e])				
Phenol[e,f]	1.34E-03	1.27	No	
Non-HAP Organic Compounds				
Methane	1.15E+00			

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

APPENDIX B – AMBIENT AIR QUALITY IMPACT ANALYSES

MEMORANDUM

DATE: July 22, 2011

TO: Eric Clark, Air Program

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

PROJECT: P-2011.0104 PROJ60874 PTC Application for the Knife River 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 hot mix asphalt (HMA) plant initially to be operated near Grangeville, 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]). Knife River and 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 were used to establish minimum setback distances between emissions points and the property boundary of the site. The submitted information, in combination with DEQ's air quality analyses: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data; 3) adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed 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 HMA/hour and 500,000 ton HMA/year.	Short-term and annual modeling was performed assuming these rates.
Daily throughput does not exceed 5,000 ton HMA/day or 8,000 ton HMA/day, depending on the available minimum setback at the site.	Setback distances were determined for both 5,000 and 8,000 ton HMA/day.
Maintain the following setback distances between the drum dryer and the nearest property boundary: 1) 750 feet (230 meters) when processing 8,000 ton HMA/day and operating with a diesel-fired generator; 2) 740 feet (225 meters) when processing 8,000 ton HMA/day and operating without a diesel-fired generator; 3) 590 feet (180 meters) when processing 5,000 ton HMA/day and operating with a diesel-fired generator; 4) 490 feet (150 meters) when processing 5,000 ton HMA/day and operating without a diesel-fired generator	This setback distance is necessary to assure compliance with applicable air quality standards at ambient air locations.
HMA production is half the stated value for the winter season (December 1 through March 31).	Substantially greater setback distances would be needed if full 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 located 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 engines powering generators: powered by engines rated at >175 brake horsepower (bph), have a combined power rating of less than 1,350 bhp, and have an EPA Tier 2 certification.	Different combinations can be used if it is demonstrated that total emissions from generators are less than those modeled for these sources.
Small diesel engines powering generators: powered by engines having a combined power rating of less than 231 bhp.	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. Note that stack heights of the drum dryer (60 feet), large generator (22.2 feet), and small generator (21.9 feet) were increased to allow a shorter setback requirement.	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 temperature and flow rate 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.
T-RACT is used for all TAP emissions sources.	Setback distances would be substantially greater if DEQ does not concur that T-RACT was used to control TAP emissions.

2.0 Background Information

2.1 Applicable Air Quality Impact Limits and Modeling Requirements

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

2.1.1 Area Classification

The HMA plant will be a portable facility. The HMA plant will only locate in areas designated as attainment or unclassifiable for all criteria pollutants.

2.1.2 Significant and Cumulative NAAQS Impact Analyses

If estimated maximum pollutant impacts to ambient air from the emissions sources associated with the proposed facility exceed the significant impact levels (SILs) of Idaho Air Rules Section 006 (referred to as a significant contribution in Idaho Air Rules), then a cumulative NAAQS impact analysis is necessary to demonstrate compliance with NAAQS and Idaho Air Rules Section 203.02. A cumulative NAAQS impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions, and emissions from any nearby co-contributing sources, to DEQ-approved background concentration values that are appropriate for the criteria pollutant/averaging-time at the facility location and the area of significant impact. The resulting maximum pollutant concentrations in ambient air are then compared to the NAAQS listed in Table 2. Table 2 also lists SILs and specifies the modeled value that must be used for comparison to the NAAQS.

New NO_2 and SO_2 short-term standards have recently been promulgated by EPA. The standards became applicable for permitting purposes in Idaho when they were incorporated by reference *sine die* into Idaho Air Rules (Spring 2011). The analyses performed accounted for the new standards.

DEQ used non-site-specific full impact analyses to demonstrate compliance with Idaho Air Rules Section 203.02. Established setback distances are minimal distances between emissions points and the ambient air boundary (usually the property boundary) needed to assure compliance with standards, considering the impact of the HMA, any co-contributing sources, and a conservative background value.

2.1.3 Toxic Air Pollutant Analyses

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

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

Permit requirements for toxic air pollutants 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.

Table 2. APPLICABLE REGULATORY LIMITS				
Pollutant	**Averaging Period**	**Significant Impact Levels[a] (μg/m³)[b]**	**Regulatory Limit[c] (μg/m³)**	**Modeled Value Used[d]**
PM_{10}[e]	24-hour	5.0	150[f]	Maximum 6th highest[g]
$PM_{2.5}$[h]	Annual	0.3	15[i]	Mean of maximum 1st highest[j]
	24-hour	1.2	35[k]	Mean of maximum 1st highest[j]
Carbon monoxide (CO)	8-hour	500	10,000[l]	Maximum 2nd highest[m]
	1-hour	2,000	40,000[l]	Maximum 2nd highest[m]
Sulfur Dioxide (SO_2)	Annual	1.0	80[n]	Maximum 1st highest[m]
	24-hour	5	365[l]	Maximum 2nd highest[m]
	3-hour	25	1,300[l]	Maximum 2nd highest[m]
	1-hour	3 ppb[o] (7.8 μg/m³)	75 ppb[p] (196 μg/m³)	Mean of maximum 4th highest[q]
Nitrogen Dioxide (NO_2)	Annual	1.0	100[n]	Maximum 1st highest[m]
	1-hour	4 ppb[o] (7.5 μg/m³)	100 ppb[r] (188 μg/m³)	Mean of maximum 8th highest[s]
Lead (Pb)	Quarterly	NA	1.5[n]	Maximum 1st highest[m]
	3-month[t]	NA	0.15[n]	Maximum 1st highest[m]

a. Idaho Air Rules Section 006 (definition for significant contribution).
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.
e. Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers.
f. Never expected to be exceeded more than once in any calendar year.
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 average of annual concentration.
j. Mean (of 5 years of data) of the maximum of 1st highest maximum modeled concentrations at any modeled receptor for each year of meteorological data modeled. The monitoring design value is used for background concentrations for $PM_{2.5}$ analyses. This approach is also used for the significant impact analysis.
k. 3-year average of the upper 98th percentile of 24-hour concentrations.
l. Not to be exceeded more than once per year.
m. Concentration at any modeled receptor.
n. Not to be exceeded in any calendar year.
o. Interim SIL established by EPA policy memorandum.
p. 3-year average of the upper 99th percentile of the annual distribution of maximum daily 1-hour concentrations.
q. Mean (of 5 years of data) of the maximum of 4th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year average of maximum modeled 1-hour impacts for each year is used.
r. 3-year average of the upper 98th percentile of the annual distribution of maximum daily 1-hour concentrations.
s. Mean (of 5 years of data) of the maximum of 8th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year average of maximum modeled 1-hour impacts for each year is used.
t. 3-month rolling average.

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. If DEQ determines T-RACT is used to control emissions of carcinogenic TAPs, then modeled concentrations of 10 times the AACC are considered acceptable, as per Idaho Air Rules Section 210.12.

2.2 Background Concentrations

Background concentrations are used in the cumulative NAAQS impact analyses to account for impacts from sources not explicitly modeled. Table 3 lists appropriate background concentrations for rural Idaho areas for all pollutants except 1-hour NO_2.

Table 3. BACKGROUND CONCENTRATIONS

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)[a]
PM_{10}[b]	24-hour	73
$PM_{2.5}$[c]	24-hour	21.3
	Annual	7.12
Carbon monoxide (CO)	1-hour	3,600
	8-hour	2,300
Sulfur dioxide (SO_2)	1-hour	34
	24-hour	26
	Annual	8
Nitrogen dioxide (NO_2)	Annual	17
Lead (Pb)	Quarterly	0.03

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

Background concentrations, other than $PM_{2.5}$, 1-hour NO_2, and 1-hour SO_2, were revised for all areas of Idaho by DEQ in March 2003[1]. Background concentrations in areas where no monitoring data are available were based on monitoring data from areas with similar population density, meteorology, and emissions sources. Background concentrations in the DEQ non-site-specific analyses were based on DEQ default values for rural/agricultural areas for all pollutants except for $PM_{2.5}$ and 1-hour averaged NO_2.

Background $PM_{2.5}$ concentrations were based on monitoring performed throughout Idaho. The monitoring 24-hour and annual design value was used for background values. The design value is the 98th percentile of the 24-hour monitored values. The average of design values monitored from areas determined to be reasonably representative of rural or small town areas was used as a background value.

Background concentrations for 1-hour NO_2 were based on monitoring data collected between June 2009 and June 2010, in Meridian, Idaho. A separate background value was used for each hour of the day, based on the 2nd highest value monitored for that hour. Hourly 1-hour NO_2 background concentrations are given in Table 4.

Table 4. BACKGROUND 1-HOUR NO_2 CONCENTRATIONS

Hour	Concentration ($\mu g/m^3$)[a]	Hour	Concentration ($\mu g/m^3$)[a]	Hour	Concentration ($\mu g/m^3$)[a]
1	50.0	9	54.9	17	49.8
2	48.1	10	48.1	18	61.8
3	45.7	11	39.5	19	70.4
4	46.2	12	32.6	20	85.9
5	46.7	13	34.3	21	79.0
6	54.9	14	34.3	22	75.5
7	56.7	15	37.8	23	63.5
8	60.1	16	46.4	24	49.8

a. micrograms per cubic meter.

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

3.0 Modeling Impact Assessment

3.1 Modeling Methodology

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

3.1.1 Overview of 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.

Because of the portable nature of an HMA plant, DEQ performed general non-site-specific modeling analyses to establish setback distances between locations of emissions points and the property boundary of the HMA plant.

Table 5 provides a brief description of general parameters used in the DEQ modeling analyses.

Table 5. MODELING PARAMETERS

Parameter	Description/Values	Documentation/Addition Description
General Facility Location	Portable	Initial location west of Grangeville
Model	AERMOD	AERMOD with the PRIME downwash algorithm, version 11103
Meteorological Data	Multiple Data Sets	See Section 3.1.5
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

3.1.2 Modeling protocol and Methodology

A modeling protocol was not submitted to DEQ prior to the application because DEQ staff performed general non-site-specific air quality impact analyses rather than the applicant. The uncertainty associated with both the general geographical location and specific locations of equipment at the site of the HMA dictated the general 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*.

3.1.3 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 was used for the DEQ analyses to evaluate impacts of the HMA plant.

DEQ set AERMOD to use the Plume Volume Molar Ratio Method (PVMRM) program to better account for NO/NO_2/ozone chemistry. Section 3.1.4 provides a description of parameters and data used for PVMRM.

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

PVMRM was used with AERMOD to provide a more refined estimate of 1-hour NO_2 concentrations at specific receptors. Table 6 lists the data and parameters used for PVMRM. Hourly ozone data were used in PVMRM to estimate the conversion of NO to NO_2. Ozone data from the 2007 study, *Ozone and its Precursors in the Treasure Valley, Idaho*, were used for modeling (Final Report, May 2008, Desert Research Institute). Hourly data from Parma, Idaho, were collected from June 27, 2007 through October 12, 2007. These data were sorted by hour and then the mean and standard deviation was calculated for each hour across all days. For each hour modeled, a background ozone value equal to the mean plus one standard deviation was used as input to PVMRM. This method is reasonably conservative because it does not account for seasonal variation in ozone concentrations, and the Parma data were collected during the time of year when maximum ozone concentrations are expected.

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

Table 6. PARAMETERS AND DATA FOR PVMRM

Parameter	Value	Source/Comments
NO_2/NOx ratio for Emissions	0.5 for dryer, 0.256 for the large generator, and 0.2 for the small generator	0.5 is an EPA suggested default when source-specific data are not available.
Ambient Equilibrium for NO_2/NOx	0.90	Default value.
Ozone Concentrations	Value specified for each hour modeled	Based on values from Parma, Idaho, during a 2007 ozone study.

3.1.5 Meteorological Data

Because of the portable nature of HMA plants, DEQ used seven different meteorological datasets from various locations in Idaho to assure compliance with applicable standards for the non-site-specific analyses. Table 7 lists the meteorological datasets used in the air impact analyses.

Table 7. METEOROLOGICAL DATA SETS USED IN MODELING ANALYSES

Surface Data	Upper Air Data	Years
Boise	Boise	2001-2005
Aberdeen	Boise	2001-2005
Idaho Falls	Boise	2000-2004
Minidoka	Boise	2000-2004
Soda Springs	Boise	2004-2008
Lewiston	Spokane, Wa	1992-1995, 1997
Sandpoint	Spokane, Wa	2002-2006

Use of representative meteorological data is a concern since the HMA plant may locate anywhere in Idaho and seven meteorological datasets may not capture worst-case conditions for all potential sites. To account for this uncertainty, the following measures were taken:

- Use the maximum of 2^{nd} high modeled concentration to evaluate compliance with the 24-hour PM_{10} standard, rather than the maximum of 6^{th} high modeled concentration typically used when modeling a five-year meteorological dataset to demonstrate that the standard will not be exceeded more than once per year on average over a three year period.

- Use the maximum of 1^{st} high modeled concentration to evaluate compliance with all pollutants and averaging times, except for 24-hour PM_{10}, 1-hour NO_2, and 1-hour SO_2.

- The standard design value was used for 1-hour NO_2. The design value is the 5-year average of the 98^{th} percentile of the annual distribution of daily maximum 1-hour modeled concentrations. The background NO_2 concentrations were conservatively based on monitoring data collected from Meridian, Idaho, near an interstate highway.

- The standard design value was used for 1-hour SO_2. The design value is the 5-year average of the 99^{th} percentile of the annual distribution of daily maximum 1-hour modeled concentrations. The background SO_2 concentrations were based on the DEQ default 3-hour background concentration for rural-agricultural areas.

3.1.6 Terrain Effects

Terrain effects on dispersion were not considered in the non-site-specific analyses. 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.

3.1.7 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.

3.1.8 Building Downwash

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

3.1.9 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. The issued permit will specify throughput restrictions and an emissions point setback from ambient air.

3.1.10 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 drum dryer stack at 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 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) Trigger values for the modeling analyses were determined. Trigger values are the applicable standards, and the modeled impacts plus the applicable background concentration must be below these values.

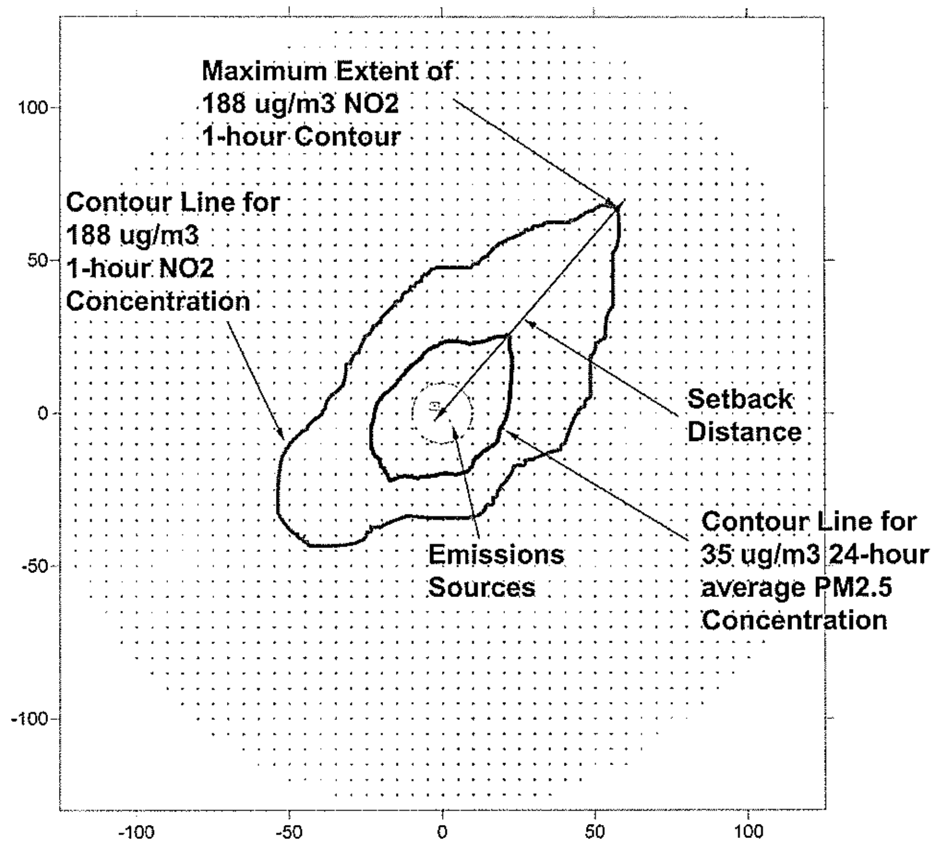
2) For the operational configuration, pollutant, averaging period, and meteorological data set, all receptors with concentrations (modeled value plus background) equal or greater than the trigger value were plotted. This effectively gave a plot of receptors where the standard could be exceeded for that 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 trigger value that was the furthest from the drum dryer stack 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 dryer stack 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.

Figure 1 - Determination of Setback Distance for a Modeling Run



3.2 Emission Rates

Emissions rates of criteria pollutants and TAPs were calculated for the HMA plant production rate and operational configuration for various applicable averaging periods.

3.2.1 Criteria Pollutant Emissions Rates

Table 8 lists criteria pollutant emissions rates used in the DEQ non-site-specific modeling analyses for the HMA plant production rate, operational configuration, and for all applicable averaging periods. Attachment 1 provides additional details of DEQ emissions calculations used in the modeling analyses.

Setback distances were calculated for four daily operational scenarios: 1) 5,000 ton HMA/day with diesel-fired generators; 2) 5,000 ton HMA/day without diesel-fired generators; 3) 8,000 ton HMA/day with diesel-fired generators; 4) 8,000 ton HMA/day without diesel-fired generators. An hourly production rate of 400 ton HMA/hour and an annual production rate of 500,000 ton HMA/year was used with the four daily production scenarios.

Table 8. EMISSIONS USED IN DEQ ANALYSES				
Emissions Point in Model	**Pollutant**	**Averaging Period**	**Emissions Rate (lb/hr)**	
			400 ton/hr 5,000 ton/day[a] 500,000 ton/yr	**8,000 ton/day[a]**
DRYER – drum dryer/mixer - emissions controlled by a baghouse	$PM_{2.5}$	24-hour	4.646[a]	7.433[a]
		Annual	1.273	
	PM_{10}	24-hour	4.792[a]	7.667[a]
	CO	1-hour 8-hour	52.0	
	SO_2	1-hour	6.160	
		24-hour	3.208[a]	5.133[a]
		Annual	0.8790	
	NOx	1-hour	22.00	
		Annual	3.139	
SILO – asphalt storage silo	$PM_{2.5}$	24-hour	0.1221[a]	0.1953[a]
		Annual	0.03344	
	PM_{10}	24-hour	0.1221[a]	0.1953[a]
LOAD – asphalt loadout	$PM_{2.5}$	24-hour	0.1087[a]	0.1740[a]
		Annual	0.02979	
	PM_{10}	24-hour	0.1087[a]	0.1740[a]
GEN1 – electrical generator - 1350 hp diesel engine - 20 hr/day, 2,000 hr/yr - 0.0015% sulfur diesel - Tier 2 certified	$PM_{2.5}$	24-hour	0.03410[b]	
		Annual	0.01495	
	PM_{10}	24-hour	0.03410[b]	
	CO	1-hour 8-hour	0.5655[c]	
	SO_2	1-hour	0.01432[c]	
		24-hour	0.009545[d]	
		Annual	0.003269	
	NOx	1-hour	14.08[c]	
		Annual	3.214	
GEN2 – electrical generator - 231 hp diesel engine - 24 hr/day, 1,800 hr/yr - 0.0015% sulfur diesel - no certification	$PM_{2.5}$	24-hour	0.05424[b]	
		Annual	0.02326	
	PM_{10}	24-hour	0.2402[b]	
	CO	1-hour 8-hour	0.0[c]	
	SO_2	1-hour	0.0[c]	
		24-hour	0.001407[d]	
		Annual	2.891E-4	
	NOx	1-hour	0.0[c]	
		Annual	1.465	
HOTOIL – asphalt oil heater[b] electric powered – no emissions	All	All	0.0000	
LOADCONV – aggregate handling by frontend loader and conveyor transfers	$PM_{2.5}$	24-hour	0.05326[a,e]	0.8522[a,e]
		annual	0.01459[e]	
	PM_{10}	24-hour	0.3517[a,e]	0.5628[a,e]
SCREEN – scalping screen	$PM_{2.5}$	24-hour	0.02634[a]	0.04214[a]
		annual	0.007216	
	PM_{10}	24-hour	0.1740[a]	0.2784[a]

a. During December 1 through March 31 throughput and resulting emissions levels will be half that listed.

b. Maximum daily emissions from generators are based on 12.5 hr/day for the large generator (minimum hours needed for 5,000 ton/day production) and 11.5 hr/day for the smaller, higher PM emitting generator.

c. Hourly emissions based on operation of only the large generator and the drum dryer. The small generator will not operate when the drum dryer is operating.

d. Emissions conservatively based on 16 hr/day for the large generator and 24 hr/day for the small generator.

e. Emissions are varied in the model according to wind speed category. Emissions listed are based on a 10 mph wind speed.

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 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. 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 daily HMA throughput and resulting daily emissions during the period of December 1 through March 31 were at half those otherwise listed for the throughput specified at the top of Table 8. The reductions in emissions were only applied to sources where emissions are a direct function of throughput. Reductions were not applied to the generator engines.

3.2.2 TAP Emissions Rates

The proposed HMA plant will emit TAPs. Table 9 lists the increase in TAPs modeled for the proposed plant. 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.

Table 9. TAP EMISSIONS USED IN DEQ ANALYSES

Emissions Point in Model	Pollutant	Averaging Period	Emissions Rate for 8,000 ton HMA/day or 500,000 ton HMA/year (lb/hr)
DRYER – drum dryer/mixer - emissions controlled by a baghouse	Propioaldehyde	24-hour	4.333 E-2
	Quinone	24-hour	5.333 E-2
	Hydrogen Chloride (HCl)	24-hour	7.000 E-2
	Phosphorus	24-hour	9.333 E-3
	Arsenic	period	3.196 E-5
	Cadmium	period	2.340 E-5
	Chromium 6+	period	2.568 E-5
	Nickel	period	3.596 E-3
	Acetaldehyde	period	7.420 E-2
	Benzene	period	2.226 E-2
	Dioxins/furans	period	1.693 E-10
	Formaldehyde	period	1.769 E-1
	PAH (naphthalene)	period	3.710 E-2
	POM	period	3.127 E-5
SILO – asphalt storage silo	Benzene	period	2.226 E-4
	Formaldehyde	period	4.800 E-3
	PAH(naphthalene)	period	2.637 E-4
	POM	period	3.855 E-5
LOAD – asphalt loadout	Benzene	period	1.234 E-4
	Formaldehyde	period	2.089 E-4
	PAH(naphthalene)	period	2.432 E-4
	POM	period	2.626 E-5
GEN1 – large generator	Acetaldehyde	period	5.437 E-5
	Benzene	period	1.674 E-3
	Formaldehyde	period	1.702 E-4
	PAH (naphthalene)	period	2.805 E-4
	POM	period	9.702 E-6
GEN2 – small generator	Acetaldehyde	period	2.548 E-4
	Benzene	period	3.100 E-4
	Formaldehyde	period	3.921 E-4
	PAH (naphthalene)	period	2.818 E-5
	POM	period	1.141 E-6

Table 10 is a summary of TAP emissions and a comparison to the applicable ELs.

Table 10. SUMMARY OF FACILITY-WIDE TAP EMISSIONS USED FOR MODELING				
TAP	**Averaging Period**	**Emissions**	**EL**	**Modeling Required**
Propioaldehyde	24-hour	4.333 E-2	2.87 E-2	Yes
Quinone	24-hour	5.333 E-2	2.7 E-2	Yes
Hydrogen Chloride (HCl)	24-hour	7.000 E-2	5.0 E-2	Yes
Phosphorus	24-hour	9.333 E-3	7.0 E-3	Yes
Acetaldehyde	period	7.451 E-2	3.0E-3	Yes
Arsenic	period	3.196 E-5	1.5E-6	Yes
Benzene	period	2.459 E-2	8.0E-4	Yes
Cadmium	period	2.340 E-5	3.7E-6	Yes
Chromium 6+	period	2.568 E-5	5.6E-7	Yes
Dioxins/furans	period	1.693 E-10	1.5E-10	No
Formaldehyde	period	1.825 E-1	5.1E-4	Yes
Nickel	period	3.596 E-3	2.7E-5	Yes
PAH(naphthalene)	period	3.792 E-2	9.1E-5	Yes
POM	period	1.069 E-4	2.0E-6	Yes

Section 2.1.3 of this memorandum describes how carcinogenic TAP impacts of 10 times the AACC are allowed if the source utilizes T-RACT for controls. DEQ determined that T-RACT was demonstrated so modeled impacts must remain below 10 times the AACCs.

3.3 Emission Release Parameters and Plant Criteria

Table 11 lists the characteristics of the Knife River HMA plant used in DEQ's non-site-specific air impact analyses.

Table 12 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 silo filling and asphalt loadout were modeled as point sources, rather than volume sources, to account for thermal buoyancy of the emissions plume. Release parameters for silo filling and asphalt loadout were based on the following:

- Release point of silo filling was established as the top of the storage silo and the release point of asphalt loadout operations was set to correspond to the top of a truck bed.
- Stack diameter of 3.0 meters was used to approximately correspond to a typical silo. Model-calculated stack tip downwash will account for downwash affects potentially caused by the silo.
- Stack gas temperature of 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 11. CHARACTERISTIC OF HMA PLANT USED IN DEQ ANALYSES	
Parameter	**Value or Description**
HMA Throughput Rates	400 ton/hr, 5,000 ton/day or 8,000 ton/day[a], 500,000 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, diesel, or RFO, with a baghouse for emissions control.
Electrical Power	Line power or diesel-fired generators with the following characteristics: 1) a large generator powered by a 1,350 bhp, EPA Tier 2 certified engine, burning 0.0015% sultur fuel, operating less than 20 hr/day; 2) a small generator powered by a engine of less than 231 bhp, burning 0.0015% sulfur fuel, operating up to 24 hr/day.
Large Generator Stack Parameters	Stack height ≥22.2 ft, stack diameter ≈ 1.09 ft, gas temp ≥770 K, flow velocity ≥44.6 m/sec.
Small Generator Stack Parameters	Stack height ≥21.9 ft, stack diameter ≈ 0.45 ft, gas temp ≥616 K, flow velocity ≥44.6 m/sec.
Dryer Stack Parameters	Stack height ≥60 ft, stack diameter ≈4.9 ft, gas temp ≥ 471 K, flow velocity ≥13.5 m/sec.
Asphalt Silo Filling	Model as a point source. Stack height = 9 m, stack diameter = 3.0 m, gas temp = 346 K (163° F), flow velocity = 0.1 m/sec. These parameters were developed by the modeling group to represent the nature of released emissions from this source in most all applications.
Asphalt Loadout	Model as a point source. Stack height = 5 m, stack diameter = 3.0 m, gas temp = 346 K (163° F), flow velocity = 0.1 m/sec. These parameters were developed by the modeling group to represent the nature of released emissions from this source in most all applications.
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	Throughput is restricted to half allowable rates during the period between December 1 and March 31.

[a] Half the listed value for December 1 through March 31. Allowable daily throughput will depend on the available setback distance at the site.

Table 12. 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	18.3	1.5	471	13.5
GEN1	Point	6.77	0.33	770	44.6
GEN2	Point	6.68	0.137	616	44.6
SILO	Point	9.0	3.0	346	0.1
LOADOUT	Point	5.0	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	2.5	0.93	2.33	

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

3.4 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 13 lists controlling setback distances for each operational scenario. Setback distances are the closest distance between the property boundary and the drum dryer stack. Attachment 2 provides calculated setback distances for individual impact analyses.

Table 13. SETBACK DISTANCES AS A FUNCTION OF THROUGHPUT AND OPERATIONAL CONFIGURATION

HMA Configuration Scenario	Setback (ft (m))	Controlling Pollutant
400 ton HMA/hr, 5,000 ton HMA/day, 500,000 ton HMA/year operating with two generator engines	591 (180)	1-hr NO_2
400 ton HMA/hr, 8,000 ton HMA/day, 500,000 ton HMA/year operating with two generator engines	755 (230)	24-hr $PM_{2.5}$
5,000 ton HMA/day without operation of a generator engine	492 (150)	24-hr $PM_{2.5}$
8,000 ton HMA/day without operation of a generator engine	738 (225)	24-hr $PM_{2.5}$

3.5 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 24-hour $PM_{2.5}$ impacts are the governing criteria in the absence of 1-hour NO_2 impacts for the Knife River facility (governing for criteria pollutants – contributions of TAPs from other facilities are not considered in permitting analyses for the HMA plant), 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 co-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 for that day of the HMA plant is half that assumed for the modeling analyses used to generate setback distances for the scenario of no co-location.

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 co-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.

4.0 Conclusions

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

An HMA plant emissions calculation spreadsheet was used to generate emissions quantities for applicable averaging periods. Emissions calculations assume worst-case fuels of either RFO, diesel, or natural gas. Emissions also assume control by a baghouse.

SO_2 emissions were calculated from the fuel usage and 0.1% allowable sulfur content of the fuel.

Asphalt Loadout

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

Asphalt Silo Filling

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

Asphalt Tank Heater Emissions

The asphalt tank heater is electric powered, so there will be no direct emissions from operation of this unit.

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 1,350 bhp diesel engine operating up to 20 hr/day and 2,000 hr/year; 2) a 231 bhp diesel engine operating up to 24 hr/day and 1,800 hr/year. Emissions estimates were calculated assuming the engines will combust diesel with a maximum 0.0015% sulfur content.

The two generators will not be operating at the same time. 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 small generator has larger emissions per hour, but other emissions sources will not be operating when the small generator is operating (drum dryer, fugitive emissions from material handling, etc). At a processing rate of 400 ton HMA/hour, it would take 12.5 hours minimum to process 5,000 ton HMA. Therefore maximum daily generator PM emissions associated with processing 5,000 ton HMA/day would be from 12.5 hours operation of the large generator and 11.5 hours operation of the small generator. This same emissions profile was conservatively (since PM emissions from the small generator are larger) used for the case of processing 8,000 ton HMA/day.
- 24-hour SO_2: Emissions were conservatively calculated assuming 24 hour/day operation of the small generator and 16 hour/day operation of the large generator, even though this operational configuration will not occur.
- Annual emissions and carcinogenic TAPs: Calculated using specified annual operating hours of

2,000 hour/year for the large generator and 1,800 hour/year for the small generator.

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} 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	=	5% for aggregate
U	=	wind speed (mph)

A moisture content of 3% to 7% was estimated as a typical moisture content of aggregate entering the dryer, per STAPPA-ALAPCO-EPA, Emission Inventory Improvement Program, Volume II, Chapter 3, Preferred and Alternative Methods for Estimating Air Emissions from Hot Mix Asphalt Plants, Final Report, July 1996. 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: $0.053(0.0032)\frac{(10/5)^{1.3}}{(5/2)^{1.4}} = 1.158\text{ E}-4$ lb/ton

Adjustment factors to put in the model:

Cat 1: $(1.72/5)^{1.3}$ (4.702 E-5) = 1.174 E-5 lb/ton
Factor = 1.174 E-5/1.158 E-4 = 0.1014

Cat 2: $(5.18/5)^{1.3}$ (4.702 E-5) = 4.924 E-5 lb/ton
Factor = 4.924 E-5/1.158 E-4 = 0.4253

Cat 3: $(9.20/5)^{1.3}$ (4.702 E-5) = 1.039 E-4 lb/ton
Factor = 1.039 E-4/1.158 E-4 = 0.8974

Cat 4: $(14.95/5)^{1.3}$ (4.702 E-5) = 1.953 E-4 lb/ton
Factor = 1.953 E-4/1.158 E-4 = 1.687

Cat 5: $(21.28/5)^{1.3}$ (4.702 E-5) = 3.090 E-4 lb/ton
Factor = 3.090 E-4/1.158 E-4 = 2.669

Cat 6: $(27.74/5)^{1.3}$ (4.702 E-5) = 4.362 E-4 lb/ton
Factor = 4.362 E-4/1.158 E-4 = 3.768

For the operational scenario for 5,000 ton/day HMA and 500,000 ton/year HMA, emissions from the loader are as follows:

Daily $PM_{2.5}$:

1.158 E-4 lb $PM_{2.5}$	4,800 ton	day	2 transfers	=	0.04632 lb
ton	day	24 hr			hr

Annual $PM_{2.5}$:

1.158 E-4 lb $PM_{2.5}$	480,000 ton	yr	2 transfers	=	0.01269 lb
ton	yr	8,760 hour			hr

Emissions from the three conveyor transfers are as follows:

Daily $PM_{2.5}$:

1.158 E-4 lb $PM_{2.5}$	4,800 ton	day	3 transfers	(1-0.90)	=	0.006948 lb
ton	day	24 hr				hr

Annual $PM_{2.5}$:

1.158 E-4 lb $PM_{2.5}$	480,000 ton	yr	3 transfers	(1-0.90)	=	0.001904 lb
ton	yr	8,760 hour				hr

Total aggregate handling emissions:

Daily $PM_{2.5}$: 0.04632 lb/hr + 0.006948 lb/hr = 0.05327 lb/hr
Annual $PM_{2.5}$: 0.01269 lb/hr + 0.001904 lb/hr = 0.01459 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 source includes one scalping screen. A $PM_{2.5}$ factor was not available in AP42. A $PM_{2.5}$ factor was calculated from the PM_{10} factor by multiplying the factor by a ratio of the $PM_{2.5}/PM_{10}$ particle size multipliers used for the aggregate handling emissions factor. 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 4,800 ton/day HMA and 480,000 ton/year HMA, emissions are as follows:

Scalping Screen (controlled emissions):

Daily $PM_{2.5}$:

0.0087 lb PM_{10}	0.053 $PM_{2.5}$	4,800 ton	day	(1-0.90)	=	0.02635 lb
ton	0.35 PM_{10}	day	24 hour			hr

Annual $PM_{2.5}$:

0.0087 lb PM_{10}	0.053 $PM_{2.5}$	480,000 ton	yr	(1-0.90)	=	0.007219 lb
ton	0.35 PM_{10}	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 2.5 meters. The initial dispersion coefficients are calculated as follows:

σ_{yo} = 4 m / 4.3 = 0.93 m

σ_{zo} = 5 m / 2.15 = 2.33 m

HMA Plant Modeling Parameters

Dryer baghouse Stack

To obtain a shorter setback distance, Knife River elected to raise the baghouse stack to 60 ft (18.3 m).

Release height = 18.3 meters; effective diameter of release area = 1.5 meters;
typical stack gas temperature = 471 K; typical flow velocity = 13.5 meters/second

Asphalt Silo Filling

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

Asphalt Loadout

DEQ modeled this source as a point source.
- release height of 5 meters (equal to height of silo)
- stack diameter of 3 meters, corresponding to the approximate diameter of the silo
- gas temperature was estimated at half the AP42 default asphalt temperature: 325° 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

No emissions – electric powered

Power Generator

To obtain a shorter setback distance, Knife River elected to raise stack height of the large generator (GEN1) to 22.2 ft (6.77 m) and the stack height of the small generator (GEN2) to 21.9 ft (6.68 m).

Stack gas temperatures and flow rates are often overestimated by permit applicants, likely because values reported by manufacturers are often based on values measured at the exhaust manifold rather than at the point of release to the atmosphere.

DEQ modeled all generator emissions at an exit gas temperature of 700 K. Exhaust flows were calculated using the following formula from the State of Washington Department of Ecology (Washington State Department of Ecology. *Suitability of Diesel-Powered Emergency Generators for Air Quality General Order of Approval: Evaluation of Control Technology, Ambient Impacts, and Potential Approval Criteria.* June 23, 2006):

$$\text{Flow} = 0.284\ \text{m}^3/(\text{sec}\cdot 100\ \text{hp})$$

The stack diameter was set such that the flow velocity was 44.6 meters/second (as per WA guidance).

The final point source parameters for the1350 hp engine (GEN1) were as follows:

Stack height = 6.77 m; stack diameter = 0.331 meters; stack gas temperature = 770K; flow velocity = 44.6 meters/second.

The final point source parameters for the231 hp engine (GEN2) were as follows:

Stack height = 6.68 m; stack diameter = 0.137 meters; stack gas temperature = 616 K; flow velocity = 44.6 meters/second.

ATTACHMENT 2

CALCULATED SETBACK DISTANCES FOR

DEQ'S AIR IMPACT ANALYSES

Setback Distances for Specific Pollutants, Averaging Periods, and Meteorological Datasets		
Meteorological Data	**Setback with generator (ft (m))**	**Setback without generator (ft (m))**
NO_2 Short-Term Modeling Results for 400 ton/hr throughput		
Minidoka	591 (180)	None (max 110 μg/m^3)
Sandpoint	None (max 184 μg/m^3)	
Idaho Falls	None (max 142 μg/m^3)	
Boise	None (max 170 μg/m^3)	
Soda Springs	None (max 185 μg/m^3)	
Aberdeen	None (max 178 μg/m^3)	
Lewiston	None (max 134 μg/m^3)	
SO_2 Short-Term Modeling Results for 400 ton/hr throughput		
Minidoka	None (max 53 μg/m^3)	
$PM_{2.5}$ 24-hour Modeling Results for 5,000 ton/day throughput		
Minidoka	525 (160)	492 (150)
Sandpoint	492 (150)	
Idaho Falls	394 (120)	
Boise	459 (140)	
Soda Springs	492 (150)	
Aberdeen	459 (140)	
Lewiston	<328 (<100)	
PM_{10} 24-hour Modeling Results for 5,000 ton/day throughput		
Minidoka	394 (120)	
$PM_{2.5}$ 24-hour Modeling Results for 8,000 ton/day throughput		
Minidoka	722 (220)	722 (220)
Sandpoint	689 (210)	
Idaho Falls	591 (180)	
Boise	656 (200)	
Soda Springs	755 (230)	738 (225)
Lewiston	492 (150)	
PM_{10} 24-hour Modeling Results for 8,000 ton/day throughput		
Minidoka	558 (170)	
Sandpoint	558 (170)	
Idaho Falls	492 (150)	
Boise	427 (130)	
Soda Springs	558 (170)	
Aberdeen	525 (160)	
Lewiston	427 (130)	
$PM_{2.5}$ Annual Modeling Results for 500,000 ton/yr throughput		
Minidoka	None (max 8.16 μg/m^3)	None (max 8.07 μg/m^3)
Idaho Falls	None (max 8.46 μg/m^3)	None (max 8.42 μg/m^3)
Boise	None (max 9.06 μg/m^3)	None (max 8.99 μg/m^3)
TAPs Modeling Results for 8,000 ton/day, 500,000 ton/yr throughput		
	Setback not considering T-RACT	
Minidoka Met		
POM AACC = 3.0 E-4	525 (160)	<328 (<100)
PAH AACC = 1.4 E-2	Max = 5.4E-3	
formaldehyde AACC = 7.7 E-2	Max = 4.7E-2	
arsenic AACC = 2.3 E-4	Max = 3.7E-6	

Chromium 6+ AACC = 8.3 E-5	Max = 3.0E-6	
nickel AACC = 4.2 E-3	Max = 4.2E-4	
benzene AACC = 1.2 E-1	Max = 3.4E-3	
acetaldehyde AACC = 4.5 E-1	Max = 8.9E-3	
Dioxins/furans AACC = 2.2E-8	Max = 2E-11	
Propionaldehyde AAC = 2.15E+1	Max = 6.5E-2	
Quinone AAC = 2.0E+1	Max = 8.0E-2	
HCl AAC = 3.75E+1	Max = 1.1E-1	
Phosphorus AAC = 5.0 E+0	Max = 1.4E-2	

APPENDIX C – FACILITY DRAFT COMMENTS

The following comments were received from the facility on July 11, 2011:

Facility Comment #1: Knife River, Inc. would like the flexibility to include both 5,000 and 8,000 ton/day throughput into the permit.

DEQ Response #1: DEQ modeling analysis had previous included both throughput amounts and therefore both were added into the permit. Each throughput includes a specific setback distance when internal combustion engines are used or line power is available.

Facility Comment #2: We would like to eliminate the "Compression Ignited Internal Combustion Engine" section and go exclusively with non-road engines for the gen-set.

DEQ Response #2: Because Knife River, Inc. has requested to exclusively utilize non-road engines when operating this HMA plant when line power is not available, the requirements of Stationary RICE has been eliminated from the permit. The permittee should be made aware if the engines ever fail to meet the definition of non-road than NESHAP Subpart ZZZZ would be applicable.

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: **Zac O'Kellley**
Title: **Operations Manager**
AIRS No.: **777-00514**

N	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	34.3	0	34.3
SO_2	3.9	0	3.9
CO	34.5	0	34.5
PM10	6.3	0	6.3
VOC	8.6	0	8.6
TAPS/HAPS	9.1	0	9.1
Total:	96.5	0	**96.5**
Fee Due	**$ 5,000.00**		

Comments: The processing fee of $5000 is is accordance with IDAPA 58.01.01.225.