Statement of Basis
Concrete Batch Plant General Permit

Permit to Construct No. P-2018.0020
Project ID 62015

Knife River Corporation - Northwest
Idaho Falls, Idaho

Facility ID 019-00102

Final

April 26, 2018
Christina Boulay CB
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
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
CO_2	carbon dioxide
CO_2e	CO_2 equivalent emissions
COMS	continuous opacity monitoring systems
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EL	screening emission levels
EPA	U.S. Environmental Protection Agency
FEC	Facility Emissions Cap
GHG	greenhouse gases
gph	gallons per hour
gpm	gallons per minute
gr	grains (1 lb = 7,000 grains)
HAP	hazardous air pollutants
HHV	higher heating value
HMA	hot mix asphalt
hp	horsepower
hr/yr	hours per consecutive 12 calendar month period
ICE	internal combustion engines
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
iwg	inches of water gauge
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
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

O_2	oxygen
PAH	polyaromatic hydrocarbons
PC	permit condition
PCB	polychlorinated biphenyl
PERF	Portable Equipment Relocation Form
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
POM	polycyclic organic matter
ppm	parts per million
ppmw	parts per million by weight
PSD	Prevention of Significant Deterioration
psig	pounds per square inch gauge
PTC	permit to construct
PTC/T2	permit to construct and Tier II operating permit
PTE	potential to emit
PW	process weight rate
RAP	recycled asphalt pavement
RFO	reprocessed fuel oil
RICE	reciprocating internal combustion engines
Rules	*Rules for the Control of Air Pollution in Idaho*
scf	standard cubic feet
SCL	significant contribution limits
SIP	State Implementation Plan
SM	synthetic minor
SM80	synthetic minor facility with emissions greater than or equal to 80% of a major source threshold
SO_2	sulfur dioxide
SO_X	sulfur oxides
T/day	tons per calendar day
T/hr	tons per hour
T/yr	tons per consecutive 12 calendar month period
T2	Tier II operating permit
TAP	toxic air pollutants
TEQ	toxicity equivalent
T-RACT	Toxic Air Pollutant Reasonably Available Control Technology
ULSD	ultra-low sulfur diesel
U.S.C.	United States Code
VOC	volatile organic compounds
yd^3	cubic yards
$\mu g/m^3$	micrograms per cubic meter

FACILITY INFORMATION

Description

Knife River Corporation – Northwest, Facility Number 019-00102, has proposed a new stationary truck mix concrete batch plant consisting of aggregate stockpiles, a cement storage silo, a cement supplement (fly ash) storage silo, a weigh batcher, and conveyors. The facility combines aggregate, sand, fly ash, and cement and then transfers the mixture into a truck mixer, along with water, for in-transit mixing of the concrete.

The concrete batch plant will be fed a mixture of aggregates from a collocated crusher. The rock crusher will be permitted independently from the concrete batch plant. In the case of collocation of a concrete batch plant with an additional rock crushing plant (secondary to the one rock crushing plant allowed by the permit), the modeling completed by DEQ requires a minimum separation distance of 1,000 ft.

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

Particulate emissions will be controlled by maintaining the moisture content at 1.5% by weight for all ¼ in and smaller aggregate feed materials via water sprays.

The Applicant has proposed concrete production rate throughput limits of 180 cubic yards per hour, 4,320 cubic yards per day, and 150,000 cubic yards per year.

The Applicant has proposed that line power will be used exclusively at the facility. Therefore, no IC engines powering electrical generators were included in the application.

Permitting History

This is the initial Permit to Construct (PTC) for a new facility thus there is no permitting history.

Application Scope

This is the initial PTC for a new facility.

Application Chronology

February 20, 2018	DEQ received an application and an application and processing fee.
February 27 – March 14, 2018	DEQ provided an opportunity to request a public comment period on the application and proposed permitting action.
March 12, 2018	DEQ determined that the application was complete.
March 21 – April 20, 2018	DEQ provided a public comment period on the proposed action.
April 26, 2018	DEQ issued the final permit and statement of basis.

TECHNICAL ANALYSIS

Emissions Units and Control Equipment

Table 1 EMISSIONS UNIT AND CONTROL EQUIPMENT INFORMATION

Source ID No.	Sources	Control Equipment	Emission Point ID No.
Materials Handling	Material Transfer Points: Materials handling Concrete aggregate transfers Truck unloading of aggregate Aggregate conveyor transfers Aggregate handling	Maintaining the moisture content in ¼" or smaller aggregate material at 1.5% by weight, using water sprays, using shrouds, or other emissions controls	N/A
Concrete Mixer	Concrete Batch Plant – Truck Mix: Manufacturer: Stephens Model: Thoroughbred Manufacture Date: July 2007 Max. production: 180 yd^3/hr, 4,320 yd^3/day, and 150,000 yd^3/yr Cement Storage Silo: Bin Vent Filter/Baghouse Manufacturer[a]: Stephens Model: SOS-1020 Fly Ash Storage Silo: Bin Vent Filter/Baghouse Manufacturer[a]: Stephens Model: SOS-1020	Weigh Batcher Baghouse: Manufacturer: Stephens Model: SV-20 $PM_{10}/PM_{2.5}$ control efficiency: 99.6% Cement Storage Silo Bin Vent Filter/Baghouse: Manufacturer: Stephens Model: SOS-1020 $PM_{10}/PM_{2.5}$ control efficiency: 99.95% Fly Ash Storage Silo Bin Vent Filter/Baghouse: Manufacturer: Stephens Model: SOS-1020 $PM_{10}/PM_{2.5}$ control efficiency: 95.0% Truck Load-out: Control: Shroud with water ring spray $PM_{10}/PM_{2.5}$ control efficiency: 80.0% Material Transfer Points: Control: Water sprays $PM_{10}/PM_{2.5}$ control efficiency: 75.0%	N/A
Boiler	Boiler: Manufacturer: Sioux Model: HM1.7G Manufacture Date: October 26, 2015 Heat input rating: 2 MMBtu/hr Fuel: Natural gas/LNG and LPG/propane	N/A	Boiler Exhaust: Exit height: 10.0 ft (3.05 m) Exit diameter: 0.83 ft (0.25 m) Exit flow rate: 33.33 cfm Exit temperature: 340 °F (171.1 °C)

a. Both the storage silo baghouse and supplement storage silo fly ash baghouse are considered process equipment and therefore there is no associated control efficiency. Controlled PM_{10} emission factors were used when determining PTE and for modeling purposes.

Emissions Inventories

Potential to Emit

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

Using this definition of Potential to Emit an emission inventory was developed for the concrete batch plant operations at the facility associated with this proposed project using the DEQ developed CBP EI spreadsheet (see Appendix A). Emissions estimates of criteria pollutant PTE were based on the following assumptions:

- Maximum concrete throughput does not exceed 180 yd^3/hour, 4,320 yd^3/day, and 150,000 yd^3/year (per the Applicant).
- The Weigh Batcher Baghouse control efficiency is 99.6%.
- Fugitive emissions of particulate matter (PM), PM_{10}, and $PM_{2.5}$ from the concrete batch plant material transfer points were assumed to be controlled by manual water sprays, sprinklers, or spray bars, or an equivalent method that reduce PM emissions by an estimated 75%. The assumed 75% control efficiency is based on the Western Regional Air Partnership Fugitive Dust Handbook. According to the Handbook, water suppressant of material handling can range from 50-90% control. Assuming the average of 70% and including another 5% due to Best Management Practices required by the permit allow for 75% control to be a conservative estimate.
- Aggregate is washed before delivery to the concrete batch plant site, and water is used on-site to control the temperature of the aggregate. Particulate matter and PM_{10} emissions from the weigh batcher transfer point are controlled by a baghouse, and truck mix load-out emissions are controlled by a shroud with water ring. Capture efficiency of the truck mix load-out or equivalent was estimated at 95%.
- Controlled emissions of particulate toxic air pollutants (TAPs) were estimated based on the presence of bin vent filters/baghouse controlling emissions from the cement/cement supplement silos, a baghouse controlling emissions from the weigh batcher, and 95% control for truck load-out emissions. Hexavalent chromium content was estimated at 20% of total chromium for cement, and 30% of total chromium for the cement supplement/fly ash. The hexavalent chromium percentages were taken from a University of North Dakota study, by the Energy and Environmental Research Center, Center for Air Toxic Metals. Detailed emissions calculations can be found in Appendix A of this document.
- Determining emissions from a concrete batch plant also includes transfer emissions from the number of drop points throughout the process. The PM_{10} emissions from truck-mix loading operations are defined by an equation which includes the wind speed at each drop point and the moisture content of cement and cement supplement and a number of exponents and constants defined by AP-42 Equation 11.12-1 (6/06). An average value of wind speed and moisture content are 7 mph, 4.17%, and 1.77%, respectively[1]. The following equation of particulate emissions is specific to PM_{10}. The resulting emissions were used to determine a factor to help evaluate wind speed variations in AERMOD modeling.

[1] 7 mph was the average wind speed obtained from an average of 19 Idaho airports throughout the state from 1996-2006. This data is from the Western Regional Climate Center (http://www.wrcc.dri.edu/htmlfiles/westwind.final.html#IDAHO). 4.17 % and 1.77% were the average percentages for sand and aggregate respectively. These values are based on EPA tests conducted at Cheney Enterprises. The percentages used in AP-42 are typical for most concrete batching operations.

$$E = k(0.0032) * \left[\frac{U^a}{M^b} \right] + c$$

Where:
k = particle size multiplier
a = exponent
b = exponent
c = constant
U = mean wind speed
M = moisture content

- The second transfer emissions calculations were used to determine conveyor emissions. For both coarse and fine aggregate to a conveyor. It was assumed that 82%, which for this facility is 147.6 yd^3/hr (0.82 x 180 yd^3/hr), of the concrete produced was aggregate. This percentage was based on 1,865 lb coarse aggregate, 1,428 lb sand, 564 lb cement/supplement and 167 lb water for a total of 4,024 lb concrete as defined by AP-42 Table 11.12-5 (06/06). The fine and coarse aggregate contributions were separated into 36% and 46% of the total concrete production[2]. Employing emission factors from AP-42 Table 11.12-5 (6/06) for conveyor transfer and assuming 75% control efficiency as stated earlier for conveyor transfer PM_{10} emissions were calculated for each transfer point. For both fine and coarse aggregate the facility has 4 transfer points.
- Emissions from a portable rock crusher were included in the emissions modeling analysis with the assumption that when the collocated rock crusher is operating, the concrete batch plant is operating at half its maximum capacity.
- Any emissions unit outside a 1,000 ft radius from the concrete batch plant was not included in the emissions modeling analysis for this project.

Uncontrolled Potential to Emit

Using the definition of Potential to Emit, uncontrolled Potential to Emit is then defined as the maximum capacity of a facility or stationary source to emit an air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the facility or source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed, shall **not** be treated as part of its design **since** the limitation or the effect it would have on emissions **is not** state or federally enforceable.

The uncontrolled Potential to Emit is used to determine if a facility is a "Synthetic Minor" source of emissions. Synthetic Minor sources are facilities that have an uncontrolled Potential to Emit for regulated air pollutants or HAP above the applicable Major Source threshold without permit limits.

The following table presents the uncontrolled Potential to Emit for regulated air pollutants from all emissions units at the facility as determined by DEQ staff using the DEQ Concrete Batch Plant EI spreadsheet. See Appendix A for a detailed presentation of the calculations and the assumptions used to determine emissions for each emissions unit. For this operation uncontrolled Potential to Emit is calculated with 0% control efficiency for the Concrete Batch Plant itself.

[2] The percentages of coarse and fine aggregate are based on the AP-42 concrete composition. One cubic yard of concrete as defined by AP-42 is 4024 total pounds. Similarly, coarse aggregate is 1865 pounds or 46% of the total and sand (fine) aggregate is 1428 pounds or 36%.

Table 2 UNCONTROLLED POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS

Source	$PM_{10}/PM_{2.5}$	SO_2	NO_X	CO	VOC
	T/yr	T/yr	T/yr	T/yr	T/yr
Point Sources					
Concrete batch plant[a]	0.32	N/A	N/A	N/A	N/A
Boiler	0.14	0.15	2.29	1.53	0.15
Total, Point Sources	**0.46**	**0.15**	**2.29**	**1.53**	**0.15**

a) $PM_{10}/PM_{2.5}$ emissions from the concrete batch plant are considered "fugitive emissions" and therefore are not included in the Potential to Emit.

The following table presents the uncontrolled Potential to Emit for HAP pollutants from all emissions units at the facility as determined by DEQ staff using the DEQ Concrete Batch Plant EI spreadsheet. See Appendix A for a detailed presentation of the calculations and the assumptions used to determine emissions for each emissions unit. For this operation uncontrolled Potential to Emit is calculated with 0% control efficiency for the Concrete Batch Plant itself.

Table 3 UNCONTROLLED POTENTIAL TO EMIT FOR HAZARDOUS AIR POLLUTANTS

IDAPA Listing	Hazardous Air Pollutants	PTE (T/yr)
585	Barium	3.78E-05
	Chromium metal (II and III)	2.62E-03
	Cobalt metal dust, and fume	7.21E-07
	Copper	7.30E-06
	Hexane	1.55E-02
	Manganese as Mn (fume)	1.36E-02
	Mercury (alkyl compounds as Hg)	2.23E-06
	Molybdenum	9.45E-06
	Naphthalene	1.91E-03
	Pentane	1.37E-02
	Phosphorous	1.09E-02
	Selenium	5.85E-04
	Toluene	2.92E-05
	Vanadium	1.98E-05
	Zinc	2.49E-04
586	Arsenic	2.74E-03
	Benzene	4.12E-06
	Benzo(a)pyrene	2.35E-09
	Beryllium and compounds	5.69E-05
	Cadmium and compounds	5.29E-05
	Chromium (VI)	5.52E-04
	Formaldehyde	1.47E-04
	3-Methylcholanthrene	3.53E-09
	Nickel	2.72E-03
Not listed	Acenaphthene	3.53E-09
	Acenaphthylene	3.53E-09
	Anthracene	4.71E-09
	Benzo(b)fluoranthene	3.53E-09
	Benzo(k)fluoranthene	3.53E-09
	Benzo(g,h,i)perylene	2.35E-09
	Chrysene	3.53E-09
	Dibenzo(a,h)anthracene	2.35E-09
	2-Methylnaphthalene	4.71E-08
	7,12-Dimethylbenz(a)anthracene	1.37E-07
	Benzo(a)anthracene	3.53E-09
	Dichlorobenzene	2.35E-06
	Fluoranthene	5.88E-09
	Fluorene	5.49E-09
	Indeno(1,2,3-cd)pyrene	3.53E-09
	Phenanathrene	3.33E-08
	Pyrene	9.80E-09
	Polycyclic Organic Matter (POM)	2.24E-08
	Pentane	1.37E-02
	Total	**0.0654**

Pre-Project Potential to Emit

Pre-project Potential to Emit is used to establish the change in emissions at a facility as a result of this project.

This is a new facility. Therefore, pre-project emissions are set to zero for all criteria pollutants.

The following table presents the pre-project potential to emit for all criteria pollutants from all emissions units at the facility/for the one unit being modified 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 4 PRE-PROJECT POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS

Source	$PM_{10}/PM_{2.5}$		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]
Concrete batch plant	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Boiler	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Project Totals	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**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.

Post Project Potential to Emit

Post project Potential to Emit is used to establish the change in emissions at a facility and to determine the facility's classification as a result of this project. Post project Potential to Emit includes all permit limits resulting from this project.

The following table presents the post project Potential to Emit for criteria pollutants from all emissions units at the facility as determined by DEQ staff using the DEQ Concrete Batch Plant EI spreadsheet. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit.

Table 5 POST PROJECT POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS

Source	$PM_{10}/PM_{2.5}$		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]
Concrete batch plant	3.59	0.32	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Boiler	0.03	0.14	0.03	0.15	0.52	2.29	0.35	1.53	0.03	0.15
Post Project Totals	**3.62**	**0.46**	**0.03**	**0.15**	**0.52**	**2.29**	**0.35**	**1.53**	**0.03**	**0.15**

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.

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 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 6 CHANGES IN POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS

Source	$PM_{10}/PM_{2.5}$		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
Pre-Project Potential to Emit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Post Project Potential to Emit	3.62	0.46	0.03	0.15	0.52	2.29	0.35	1.53	0.03	0.15
Changes in Potential to Emit	**3.62**	**0.46**	**0.03**	**0.15**	**0.52**	**2.29**	**0.35**	**1.53**	**0.03**	**0.15**

Non-Carcinogenic TAP Emissions

Pre- and post-project, as well as the change in, non-carcinogenic TAP emissions are presented in the following table:

Table 7 PRE- AND POST PROJECT POTENTIAL TO EMIT FOR NON-CARCINOGENIC TOXIC AIR POLLUTANTS

Non-Carcinogenic Toxic Air Pollutants	Pre-Project 24-hour Average Emissions Rates for Units at the Facility (lb/hr)	Post Project 24-hour Average Emissions Rates for Units at the Facility (lb/hr)	Change in 24-hour Average Emissions Rates for Units at the Facility (lb/hr)	Non-Carcinogenic Screening Emission Level (lb/hr)	Exceeds Screening Level? (Y/N)
Barium	0.0	8.63E-06	0.000009	**2**	No
Chromium metal (II and III)	0.0	1.74E-04	0.00017	**0.033**	No
Cobalt metal dust, and fume	0.0	1.65E-07	0.0000002	**0.0033**	No
Copper (fume)	0.0	1.67E-06	0.00000167	**0.013**	No
Hexane	0.0	3.53E-03	0.0035	**12**	No
Manganese as Mn (fume)	0.0	6.39E-04	0.0006	**0.067**	No
Mercury (alkyl compounds as Hg)	0.0	5.10E-07	0.0000005	**0.001**	No
Molybdenum (soluble)	0.0	2.16E-06	0.000002	**0.333**	No
Naphthalene (24-hour)	0.0	4.37E-04	0.0004	**3.33**	No
Pentane	0.0	3.14E-03	0.0031	**118**	No
Phosphorous	0.0	5.46E-04	0.0005	**0.007**	No
Selenium	0.0	2.71E-05	0.0000271	**0.013**	No
Toluene	0.0	6.67E-06	0.000007	**25**	No
Vanadium as V_2O_5, (respirable dust and fume)	0.0	4.51E-06	0.0000045	**0.003**	No
Zinc metal	0.0	5.69E-05	0.000057	**0.667**	No

None of the PTEs for non-carcinogenic TAP were exceeded as a result of this project. Therefore, modeling is not required for any non-carcinogenic TAP because none of the 24-hour average carcinogenic screening ELs identified in IDAPA 58.01.01.586 were exceeded.

Carcinogenic TAP Emissions

Pre- and post-project, as well as the change in, carcinogenic TAP emissions are presented in the following table:

Table 8 PRE- AND POST PROJECT POTENTIAL TO EMIT FOR CARCINOGENIC TOXIC AIR POLLUTANTS

Carcinogenic Toxic Air Pollutants	Pre-Project Annual Average Emissions Rates for Units at the Facility (lb/hr)	Post Project Annual Average Emissions Rates for Units at the Facility (lb/hr)	Change in Annual Average Emissions Rates for Units at the Facility (lb/hr)	Carcinogenic Screening Emission Level (lb/hr)	Exceeds Screening Level? (Y/N)
Arsenic	**0.00E-03**	**1.28E-05**	**1.28E-05**	**1.5E-06**	**Yes**
Benzene	0.00E-03	4.12E-06	4.12E-06	8.0E-04	No
Benzo(a)pyrene	0.00E-03	2.35E-09	2.35E-09	2.0E-06	No
Beryllium and compounds	0.00E-03	3.18E-07	3.18E-07	2.8E-05	No
Cadmium and compounds	0.00E-03	3.17E-06	3.17E-06	3.7E-06	No
Chromium (VI)	**0.00E-03**	**2.60E-06**	**2.60E-06**	**5.6E-07**	**Yes**
Formaldehyde	0.00E-03	1.47E-04	1.47E-04	5.1E-04	No
3-Methylcholanthrene	0.00E-03	3.53E-09	3.53E-09	2.5E-06	No
Nickel	0.00E-03	1.72E-05	1.72E-05	2.7E-05	No
PAHs Total	0.00E-03	2.24E-08	2.24E-08	2.0E-06	No
POM Total	0.00E-03	2.24E-08	2.24E-08	2.0E-06	No
Non-Listed (in 586) PAHs*					
2-Methylnaphthalene	0.00E-03	4.71E-08	4.71E-08	9.10E-05	No
Acenaphthene	0.00E-03	3.53E-09	3.53E-09	9.10E-05	No
Acenaphthylene	0.00E-03	3.53E-09	3.53E-09	9.10E-05	No
Anthracene	0.00E-03	4.71E-09	4.71E-09	9.10E-05	No
Benzo(g,h,i)perylene	0.00E-03	2.35E-09	2.35E-09	9.10E-05	No
Dichlorobenzene	0.00E-03	2.35E-06	2.35E-06	9.10E-05	No
Fluoranthene	0.00E-03	5.88E-09	5.88E-09	9.10E-05	No
Fluorene	0.00E-03	5.49E-09	5.49E-09	9.10E-05	No
Naphthalene (Annual)	0.00E-03	1.20E-06	1.20E-06	9.10E-05	No
Phenanathrene	0.00E-03	3.33E-08	3.33E-08	9.10E-05	No
Pyrene	0.00E-03	9.80E-09	9.80E-09	9.10E-05	No

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.

Some of the PTEs for carcinogenic TAP were exceeded as a result of this project. Therefore, modeling is required for arsenic and chromium (VI) because the annual average carcinogenic screening ELs identified in IDAPA 58.01.01.586 were 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 9 HAZARDOUS AIR POLLUTANTS EMISSIONS POTENTIAL TO EMIT SUMMARY

IDAPA Listing	Hazardous Air Pollutants	PTE (T/yr)
585	Barium	3.78E-05
	Chromium metal (II and III)	6.41E-05
	Cobalt metal dust, and fume	7.21E-07
	Hexane	1.55E-02
	Manganese as Mn (fume)	2.65E-04
	Mercury (alkyl compounds as Hg)	2.23E-06
	Molybdenum	9.45E-06
	Naphthalene	1.91E-03
	Pentane	1.37E-02
	Phosphorous	1.72E-04
	Selenium	1.15E-05
	Toluene	2.92E-05
	Vanadium	1.98E-05
	Zinc	2.49E-04
586	Arsenic	5.48E-05
	Benzene	4.12E-06
	Benzo(a)pyrene	2.35E-09
	Beryllium and compounds	1.31E-06
	Cadmium and compounds	6.61E-06
	Chromium (VI)	1.14E-05
	Formaldehyde	1.47E-04
	3-Methylcholanthrene	3.53E-09
	Nickel	6.15E-05
Not listed	Acenaphthene	3.53E-09
	Acenaphthylene	3.53E-09
	Anthracene	4.71E-09
	Benzo(b)fluoranthene	3.53E-09
	Benzo(k)fluoranthene	3.53E-09
	Benzo(g,h,i)perylene	2.35E-09
	Chrysene	3.53E-09
	Dibenzo(a,h)anthracene	2.35E-09
	2-Methylnaphthalene	4.71E-08
	7,12-Dimethylbenz(a)anthracene	1.37E-07
	Benzo(a)anthracene	3.53E-09
	Dichlorobenzene	2.35E-06
	Fluoranthene	5.88E-09
	Fluorene	5.49E-09
	Indeno(1,2,3-cd)pyrene	3.53E-09
	Phenanathrene	3.33E-08
	Pyrene	9.80E-09
	Polycyclic Organic Matter (POM)	2.24E-08
	Pentane	1.37E-02
	Total	**0.0323**

The estimated PTE for all federally listed HAPs combined is below 25 T/yr and no PTE for a federally listed HAP exceeds 10 T/yr. Therefore, this facility is not a Major Source for HAPs.

Ambient Air Quality Impact Analyses

As presented in the Modeling Memo in Appendix B, the estimated emission rates of, PM_{10}, $PM_{2.5}$, SO_2, NO_X, CO, VOC, HAP, and TAP, with the exception of Arsenic and Chromium VI, from this project were below 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[3]. 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 TAP is provided in Appendix B.

An ambient air quality impact analysis 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).

As a result of the ambient air quality impact analysis, as well as information submitted by the Applicant for specific operating scenarios, the following conditions (along with corresponding monitoring and record keeping requirements) were placed in the permit:

- The Emissions Limits permit condition,
- The Concrete Production Limits permit condition,
- The Reduced Concrete Production Limits permit condition,
- The Concrete Operation Setback Distance Requirements permit condition.

REGULATORY ANALYSIS

Attainment Designation (40 CFR 81.313)

The facility is located in Bonneville County, which is designated as attainment or unclassifiable for $PM_{2.5}$, PM_{10}, SO_2, NO_2, CO, Pb, and Ozone. Refer to 40 CFR 81.313 for additional information.

Facility Classification

The AIRS/AFS facility classification codes are as follows:

For HAPs (Hazardous Air Pollutants) Only:

A = Use when any one HAP has actual or potential emissions $\geq$ 10 T/yr or if the aggregate of all HAPS (Total HAPs) has actual or potential emissions $\geq$ 25 T/yr.

SM80 = Use if a synthetic minor (potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable limitations) and the permit sets limits $\geq$ 8 T/yr of a single HAP or $\geq$ 20 T/yr of THAP.

SM = Use if a synthetic minor (potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable limitations) and the potential HAP emissions are limited to < 8 T/yr of a single HAP and/or < 20 T/yr of THAP.

B = Use when the potential to emit without permit restrictions is below the 10 and 25 T/yr major source threshold

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

UNK = Class is unknown

For All Other Pollutants:

A = Actual or potential emissions of a pollutant are ≥ 100 T/yr.

SM80 = Use if a synthetic minor for the applicable pollutant (potential emissions fall below 100 T/yr if and only if the source complies with federally enforceable limitations) and potential emissions of the pollutant are ≥ 80 T/yr.

SM = Use if a synthetic minor for the applicable pollutant (potential emissions fall below 100 T/yr if and only if the source complies with federally enforceable limitations) and potential emissions of the pollutant are < 80 T/yr.

B = Actual and potential emissions are < 100 T/yr without permit restrictions.

UNK = Class is unknown.

Table 10 REGULATED AIR POLLUTANT FACILITY CLASSIFICATION

Pollutant	Uncontrolled PTE (T/yr)	Permitted PTE (T/yr)	Major Source Thresholds (T/yr)	AIRS/AFS Classification
PM	0.32	0.46	**100**	B
PM_{10}	0.32	0.46	**100**	B
$PM_{2.5}$	0.32	0.46	**100**	B
SO_2	0.15	0.15	**100**	B
NO_X	2.29	2.29	**100**	B
CO	1.53	1.53	**100**	B
VOC	0.15	0.15	**100**	B
HAP (single)	1.55E-02	1.55E-02	**10**	B
HAP (Total)	0.06	0.03	**25**	B
Pb (Total)	2.14E-05	2.14E-05	**100**	B

Permit to Construct (IDAPA 58.01.01.201)

IDAPA 58.01.01.201 Permit to Construct Required

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

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.

Visible Emissions (IDAPA 58.01.01.625)

IDAPA 58.01.01.624 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 3.4.

Fugitive Emissions (IDAPA 58.01.01.650)

IDAPA 58.01.01.650 Rules for the Control of Fugitive Emissions

The sources of fugitive emissions at this facility are subject to the State of Idaho fugitive emissions standards. These requirements are assured by Permit Conditions 2.1 and 2.2.

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

IDAPA 58.01.01.701 Particulate Matter – New Equipment Process Weight Limitations

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

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

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

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

For equipment that commenced prior to October 1, 1979, the PM allowable emission rate is based on one of the following equations:

IDAPA 58.01.01.702.01.a: If PW is $< 17{,}000$ lb/hr; $E = 0.045\ (PW)^{0.60}$

IDAPA 58.01.01.702.01.b: If PW is $\geq 17{,}000$ lb/hr; $E = 1.12\ (PW)^{0.27}$

As discussed previously in the Emissions Inventory Section, concrete has a density of 4,024 lb per cubic yard. Thus, for the new Concrete Batch Plant proposed to be installed as a result of this project with a proposed throughput of 180 y^3/hr, E is calculated as follows:

Proposed throughput = 4,024 lb per cubic yard x 180 y^3/hr = 724,320 lb/hr

Therefore, E is calculated as:

$E = 1.10 \times PW^{0.25} = 1.10 \times (724{,}320)^{0.25} = 32.09$ lb-PM/hr

As presented previously in the Emissions Inventories Section of this evaluation the post project PTE for this emissions unit is 1.47 lb-PM_{10}/hr. Assuming PM is 50% PM_{10} means that PM emissions will be 64.18 lb-PM/hr (32.09 lb-PM_{10}/hr ÷ 0.5 lb-PM_{10}/lb-PM). Therefore, compliance with this requirement has been demonstrated.

Rules for Control of Odors (IDAPA 58.01.01.775)

IDAPA 58.01.01.750 Rules for Control of Odors

Section 776.01 states that no person shall allow, suffer, cause, or permit the emission of odorous gases, liquids, or solids into the atmosphere in such quantities as to cause air pollution. These requirements are assured by Permit Conditions 2.4 and 2.7.

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 all criteria pollutants or 10 tons per year for any one HAP or 25 tons per year for all HAP 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 and the requirements of IDAPA 58.01.01.301 do not apply.

PSD Classification (40 CFR 52.21)

40 CFR 52.21 Prevention of Significant Deterioration of Air Quality

The facility is not a major stationary source as defined in 40 CFR 52.21(b)(1), 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 not subject to any NSPS requirements 40 CFR Part 60.

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 not subject to any MACT requirements 40 CFR Part 60.

Permit Conditions Review

This section describes the permit conditions for this initial permit.

Permit condition 1.1 establishes the permit to construct scope.

Permit condition, Table 1.1, provides a description of the purpose of the permit and the regulated sources, the process, and the control devices used at the facility.

FACILITY-WIDE CONDITIONS

As discussed previously, permit condition 2.1 establishes that the permittee shall take all reasonable precautions to prevent fugitive particulate matter (PM) from becoming airborne and provides examples of the controls in accordance with IDAPA 58.01.01.650-651.

As discussed previously, permit condition 2.2 establishes that the concrete batch plant shall employ efficient fugitive dust controls and provides examples of the controls in accordance with IDAPA 58.01.01.808.01 and 808.02.

Permit condition 2.3 establishes that the concrete batch plant may collocate with one rock crushing plant and if located within 1,000 ft. of another rock crushing plant or a concrete batch plant, only one concrete batch plant and one rock crushing plant may operate simultaneously as requested by the Applicant.

As discussed previously, permit condition 2.4 establishes that there are to be no emissions of odorous gases, liquids, or solids from the permit equipment into the atmosphere in such quantities that cause air pollution.

As discussed previously, permit condition 2.5 establishes that the permittee shall monitor fugitive dust emissions on a daily basis to demonstrate compliance with the facility-wide permit requirements.

Permit condition 2.6 establishes that the permittee record on a daily basis which concrete batch plant and rock crushing plant operate simultaneously, to ensure compliance with the Collocation Restrictions permit condition.

As discussed previously, permit condition 2.7 establishes that the permittee monitor and record odor complaints to demonstrate compliance with the facility-wide permit requirements.

Permit Condition 2.8 establishes that the permittee shall maintain records as required by the Recordkeeping General Provision.

CONCRETE BATCH PLANT EQUIPMENT

Permit condition 3.1 provides a process description of the concrete production process at this facility.

Permit condition 3.2 provides a description of the control devices used on the concrete production equipment at this facility.

Permit condition 3.3 establishes hourly and annual emissions limits for $PM_{10}/PM_{2.5}$, SO_2, NO_X, CO, and VOC emissions from the concrete production operation at this facility.

As discussed previously, Permit Condition 3.4 establishes a 20% opacity limit for the concrete batch plant baghouse and the boiler stacks or functionally equivalent openings associated with the concrete production operation.

Permit Condition 3.5 establishes a daily and an annual concrete production limit for the concrete production operation as proposed by the Applicant.

Permit Condition 3.6 establishes a daily concrete production limit for the concrete production operation when operated on days when a collocated portable rock crusher is operated. This requirement was based upon the air quality modeling analysis performed for this application.

Permit condition 3.7 establishes setback distance restrictions for the concrete production operation from the north, east, west, and south ambient air boundary to ensure compliance with Idaho Air Rules Section 586 for Arsenic and Chromium (VI) AACCs. The setback distance restrictions are based upon the results of the Ambient Air Quality Modeling Analysis performed for this project.

Permit condition 3.8 requires that the Applicant employ a baghouse filter to control emissions from the weigh batcher loadout operation as proposed by the Applicant.

Permit condition 3.9 requires that the Applicant employ a boot or shroud with a water ring to control emissions from the truck loadout operation as proposed by the Applicant.

Permit condition 3.10 requires that the Applicant employ a baghouse to control emissions from the fly ash silo operation as proposed by the Applicant.

Permit condition 3.11 requires that the Applicant employ a baghouse to control emissions from the cement storage silo operation as proposed by the Applicant.

Permit condition 3.12 requires that the Applicant employ industry specific water sprays on material transfer points to control fugitive emissions as proposed by the Applicant.

Permit condition 3.13 establishes that the Permittee monitor and record daily concrete production to demonstrate compliance with the Concrete Production Limits permit condition.

Permit condition 3.14 establishes that the Permittee measure and record concrete production equipment north, south, east, and west setback distances from the ambient air boundary to the stationary equipment to demonstrate compliance with the operating permit requirements.

Permit condition 3.15 establishes that the Permittee shall establish procedures for operating the weigh batcher, cement storage silo bin, and fly ash storage silo bin baghouses. This is a DEQ imposed standard requirement for operations using baghouses to control particulate emissions.

Permit Condition 3.16 establishes that the permittee shall maintain records as required by the Recordkeeping General Provision.

PUBLIC REVIEW

Public Comment Opportunity

An opportunity for public comment period on the application was provided in accordance with IDAPA 58.01.01.209.01.c or IDAPA 58.01.01.404.01.c. During this time, there were comments on the application and there was a request for a public comment period on DEQ's proposed action. Refer to the chronology for public comment opportunity dates.

Public Comment Period

A public comment period was made available to the public in accordance with IDAPA 58.01.01.209.01.c. During this time, comments were submitted in response to DEQ's proposed action. Refer to the chronology for public comment period dates.

A response to public comments document has been crafted by DEQ based on comments submitted during the public comment period. That document is part of the final permit package for this permitting action.

APPENDIX A – EMISSIONS INVENTORIES

NATURAL GAS COMBUSTION, AP-42 SECTION 1.4 (7/98)

Operating Assumptions: 2 MMBtu/hr / 1,020 MMBtu/MMscf = 1.96E-03 MMscf/hr
24 hr/day
8,760 hr/yr

Fuel Use:
0.047 MMscf/day
17.176 MMscf/year

Criteria Air Pollutants	Emission Factor	Emissions		CBP + Boiler Emissions	Modeling Threshold		Modeling Required?	Modeling Threshold		Modeling Required?
	lb/MMscf	lb/hr	T/yr	T/yr	2002 Guidance			Case-by-Case		
NO2	100	1.96E-01	8.59E-01	8.59E-01	1	T/yr	No	7	T/yr	No
CO	84	1.65E-01	7.21E-01	7.21E-01	14	lb/hr	No	70	lb/hr	No
PM10	7.6	1.49E-02	6.53E-02	3.81E-01	0.2	lb/hr	No	0.9	lb/hr	No
		1.49E-02	6.53E-02		1	T/yr	No	7	T/yr	No
PM2.5	7.6	1.49E-02	6.53E-02	1.60E-01						
		1.49E-02	6.53E-02							
SOx	0.6	1.18E-03	5.15E-03	5.15E-03	0.2	lb/hr	No	0.9	lb/hr	No
		1.18E-03	5.15E-03		1	T/yr	No	7	T/yr	No
VOC	5.5	1.08E-02	4.72E-02	4.72E-02	40	T/yr	No			
Lead	0.0005	9.80E-07	4.29E-06	3.39E-02	0.6	T/yr	No			
Lead, continued			5.37E-03	lb/quarter	10	lb/mo	No			
		TOTAL	1.70E+00	T/yr	Note: 100 lb/mo Pb in guidance reduced by factor of 10 based on latest Pb NAAQS (reduced in 2008 from 1.5 ug/m3 to 0.15 ug/m3)					

Hazardous Air Pollutants (HAPs) and Toxic Air Pollutants (TAPs)					Exceeds EL/ Modeling Required?
	lb/MMscf	lb/hr	T/yr	EL (lb/hr)	
PAH HAPs					
2-Methylnaphthalene	2.40E-05	**4.71E-08**	**4.71E-08**	9.10E-05	No
3-Methylchloranthrene	1.80E-06	**3.53E-09**	**3.53E-09**	2.50E-06	No
7,12-Dimethylbenz(a)anthrac	1.60E-05	3.14E-08	1.37E-07		
Acenaphthene	1.80E-06	**3.53E-09**	**3.53E-09**	9.10E-05	No
Acenaphthylene	1.80E-06	**3.53E-09**	**3.53E-09**	9.10E-05	No
Anthracene	2.40E-06	**4.71E-09**	**4.71E-09**	9.10E-05	No
Benzo(a)anthracene	1.80E-06	**3.53E-09**	**3.53E-09**	9.10E-05	See POM
Benzo(a)pyrene	1.20E-06	**2.35E-09**	**2.35E-09**	2.00E-06	See POM
Benzo(b)fluoranthene	1.80E-06	**3.53E-09**	**3.53E-09**		See POM
Benzo(g,h,i)perylene	1.20E-06	**2.35E-09**	**2.35E-09**	9.10E-05	No
Benzo(k)fluoranthene	1.80E-06	**3.53E-09**	**3.53E-09**		See POM
Chrysene	1.80E-06	**3.53E-09**	**3.53E-09**		See POM
Dibenzo(a,h)anthracene	1.20E-06	**2.35E-09**	**2.35E-09**		See POM
Dichlorobenzene	1.20E-03	**2.35E-06**	**2.35E-06**	9.10E-05	No
Fluoranthene	3.00E-06	**5.88E-09**	**5.88E-09**	9.10E-05	No
Fluorene	2.80E-06	**5.49E-09**	**5.49E-09**	9.10E-05	No
Indeno(1,2,3-cd)pyrene	1.80E-06	**3.53E-09**	**3.53E-09**		See POM
Naphthalene	6.10E-04	4.37E-04	1.91E-03	3.33	No
Naphthalene	6.10E-04	**1.20E-06**	**1.20E-06**	9.10E-05	No
Phenanathrene	1.70E-05	**3.33E-08**	**3.33E-08**	9.10E-05	No
Pyrene	5.00E-06	**9.80E-09**	**9.80E-09**	9.10E-05	No
Polycyclic Organic Matter (POM) 7-PAH Group		**2.24E-08**	**2.24E-08**	2.00E-06	No
Non-PAH HAPs					
Benzene	2.10E-03	**4.12E-06**	**4.12E-06**	8.00E-04	No
Formaldehyde	7.50E-02	**1.47E-04**	**1.47E-04**	5.10E-04	No
Hexane	1.80E+00	3.53E-03	1.55E-02	12	No
Toluene	3.40E-03	6.67E-06	2.92E-05	25	No
Non-HAP Organic Compounds					
Butane	2.10E+00	4.12E-03	1.80E-02		
Ethane	3.10E+00	6.08E-03	2.66E-02		
Pentane	2.60E+00	5.10E-03	2.23E-02	118	No
Propane	1.60E+00	3.14E-03	1.37E-02		
Metals (HAPs)					
Arsenic	2.00E-04	**3.92E-07**	**3.92E-07**	1.50E-06	No
Barium	4.40E-03	8.63E-06	3.78E-05	0.033	No
Beryllium	1.20E-05	**2.35E-08**	**2.35E-08**	2.80E-05	No
Cadmium	1.10E-03	**2.16E-06**	**2.16E-06**	3.70E-06	No
Chromium	1.40E-03	2.75E-06	1.20E-05	0.033	No
Cobalt	8.40E-05	1.65E-07	7.21E-07	0.0033	No
Copper	8.50E-04	1.67E-06	7.30E-06	0.013	No
Manganese	3.80E-04	7.45E-07	3.26E-06	0.067	No
Mercury	2.60E-04	5.10E-07	2.23E-06	0.003	No
Molybdenum	1.10E-03	2.16E-06	9.45E-06	0.333	No
Nickel	2.10E-03	**4.12E-06**	**4.12E-06**	2.70E-05	No
Selenium	2.40E-05	4.71E-08	2.06E-07	0.013	No
Vanadium	2.30E-03	4.51E-06	1.98E-05	0.003	No
Zinc	2.90E-02	5.69E-05	2.49E-04	0.667	No

NOTE: TAPs lb/hr emissions are 24-hour averages unless shown in bold. Bold emissions are annual averages for carcinogens.

Case-by-Case Modeling Thresholds may be used ONLY with DEQ Approval

TOTAL CBP + WATER HEATER EMISSIONS (POINT SOURCES, T/YR)	2.21

Data Input Tab

Note: All blue text is meant to be edited by the processing engineer.

1 Enter the facility information in the "Facilty Information" boxes.

2 Enter the concrete production rates that were applied for.

3 Enter the daily operating hours for the facility.

4 Select "T" or "C" as the type of facility. "T" represents truck mix and "C" represents central mix
The fugitive control efficiency can either be **75%** or **95%. 0%** is used to calculate uncontrolled emissions.
75% Fugitive Control assumes typical Best Management Practices like those identified in IDAPA 58.01.01.650-651.
95% Fugitive Control assumes typical control methods such as limiting dust from traffic, enclosed aggregate piles, and covering or suppressing piles.
This amount of control also assumes that no visible emissions will occur at the property boundary.
Truck loadout control efficiency can be either **70%, 95%,** or **99%. 0%** is used to calculate uncontrolled emissions.
75% Control Loadout assumes a boot shroud or enclosure with 70% control efficiency during truck loadout.
80% Control Loadout assumes a boot shroud and a water ring spray system.
99% Control Loadout assumes a boot shroud and a baghouse system.

5 Select the dropdown stating whether or not a water heater will be used onsite.
If the selected answer is "Yes", fill out the remainder of the section. The facility may have up to two water heaters up to a heating input rating less than 10 MMBtu/h
Select the appropriate fuel type for each heater and enter the rating of each unit. Remember to set all heaters not used to fuel type **"N/A"**
Enter the annual operating hours of the heaters. Note: It assumed that they will operate simultaneously.

6 Select the dropdown stating whether or not an engine will be used as an electrical power source at the facility.
If the selected answer is "Yes", enter the make, model, and the horsepower of the engine.
The EPA certification rating needs to be entered as well.
Enter a zero if there is only one engine. For example, if there is only a 1,000 bhp engine, enter "0" as the rating for the small engine.
Enter a negative one (-1) if there is only one engine. For example, if there is only a 1,000 bhp engine, enter -1 as the certification for the small engine.
The facility may have up to 2 small engines (<=600 bhp) and one large engine (>600 bhp).
Enter the number of operating hours for each engine.

7 Enter the number of transfer points at the facility; the default value is two (2).

CBP Criteria Tab

9 Daily and annual throughput is restricted to specific amounts defined in the pulldown menu.

10 Depending on the data inputs, emissions are calculated for all criteria and TAP emissions associated with the concrete batch plant.
Note that 20% Chromium VI is used for cement and 30% Cr 6+ is used for the supplement or flyash

EI-Nat Gas Water Heater Tab

11 Natural Gas Water Heater - Limited to only natural gas as a fuel source.
If two heaters are selected and both are natural gas, the rating will be additive.
If the water heater being used is not natural gas-fired the hr/day and hr/yr should both be set to zero

EI-Diesel Water Heater Tab

12 Diesel water heater - Limited to only 15 ppm sulfur content ASTM disillate fuel.
If two heaters are selected and both are diesel-fired, the rating will be additive.
If the water heater being used is not diesel-fired the hr/day and hr/yr should both be set to zero

Propane Water Heater Tab

13 Propane water heater - Limited to only propane as a fuel source
If two heaters are selected and both are propane, the rating will be additive.
If the water heater being used is not propane-fired the hr/day and hr/yr should both be set to zero

IC Engine Input Tab

14 This section reiterates the input parameters and makes a few calculations associated with the IC engine.

Large and Small IC Engine Emissions Tabs

15 This tab displays the emisions associated with the IC engines. These emissions assume worst case scenario. There is no user input here.

GHG Emissions

16 This tab displays the emisions associated with the generator. These emissions assume worst case scenario. There is no user input here.

Transfer Points Tab

17 The number of transfer points may be updated by the user and is highlighted in blue. The default assumes 2.

Final EI Tab

18 This tab provides the total emissions for the facility.

Data Input

1. Facility Information

Facility Name:	Knife River Corporation - Northwest
Facility ID:	019-00102
Permit and Project No.:	P-2018.0020 Project 62015
Source Type:	Portable Concrete Batch Plant
Manufacturer/Model:	Stephens/Thoroughbred

2. Concrete Production Rates

Maximum Hourly Concrete Production Rate:	180		
Proposed Daily Concrete Production Rate:	4,320	cy/day	24.00
Proposed Maximum Annual Concrete Production Rate:	150,000	cy/year	hr/day

3. Daily Operating Hours

Maximum daily hours of operation for facility?	24

4. Concrete Batch Plant Specifications

Is the facility type a truck mix (T) or central mix (C)?	T
What level of PM control is used for loadout, either Truck or Central?	80%
What level of PM control is used for fugitive emissions?	75%

5. Water Heater Usage

Does this facility use a water heater?	Yes		
How many units?	1	Heat Input Rating	
What type of fuel, Diesel, Natural Gas or Propane for unit 1?	Natural Gas	2	MMBtu/hr
If multiple units, what type of fuel, Diesel, Natural Gas or Propane for unit 2?	propane	2	MMBtu/hr
Are you assuming continual operations throughout the year?	No		
Maximum annual hours of water heater operation? (If assuming continual operation, enter 8,760)	8760		

6. Internal Combustion Engine(s)

Are internal combustion engines used to provide electrical power at the facility?	No
How many small engines (less than or equal to 600 bhp) are being used at the facility?	0
Horsepower rating of small engine #1 (<=600 bhp)? (If no engine enter 0)	0
Horsepower rating of small engine #2 (<=600 bhp)? (If no engine enter 0)	0
Horsepower rating of large engine (greater than 600 bhp)? (If no engine enter 0)	0

Note: If there is no small or large engine enter -1 for the certification	Small IC Engine #1	Small IC Engine #2	Large IC Engine
Select the EPA Certification:	-1	-1	-1
Not an EPA-certified IC engine: Enter "0" (zero)			
Certified Tier I, Tier 2, Tier 3, or Tier 4 IC engine: Enter 1, 2, 3, or 4			
Certified "BLUE SKY" IC engine: Enter 5			

Enter the annual operating hours for the small IC engine(s)	0
Enter the annual operating hours for the large IC engine	0

7. Transfer Points

Enter the total number of transfer points in the facility? (2 is the default)	4

CRITERIA POLLUTANT EMISSION INVENTORY for Portable Concrete Batch Plant

4/24/18 14:44

Facility Information

Company:	Knife River Corporation - Northwest
Facility ID:	019-00102
Permit and Project No:	P-2018.0020 Project 62015
Source Type:	Portable Concrete Batch Plant
Manufacturer/Model:	Stephens/Thoroughbred

Assumptions Implied or Stated in Application:

See control assumptions

Truck Mix (T) or Central Mix (C): T

Production Rates[1]

Maximum Hourly Production Rate:	180	cy/hr		Per manufacturer
Proposed Daily Production Rate:	4,320	cy/day	24.00	Hours of operation per day at max capacity
Proposed Maximum Annual Production Rate:	150,000	cy/year		
Cement Storage Silo Capacity:	4540	ft³ of aerated cement		
Cement Storage Silo Large Compartment Capacity for cement only:	65%	of the silo capacity		
Cement Storage Silo small Compartment Capacity for cement or ash:	35%	of the silo capacity		

PM_{10} Emissions due to this PTC

Emissions Point	$PM_{2.5}$ Emission Factor[1] (lb/cy)		PM_{10} Emission Factor[2] (lb/cy)		Controlled Emission Rate $PM_{2.5}$, Max.	Controlled Emission Rate PM_{10}, Max.	Controlled Emission Rate $PM_{2.5}$, 24-hour average		Controlled Emission Rate PM_{10}, 24-hour average		Controlled Emission Rate $PM_{2.5}$, annual average		Controlled Emission Rate PM_{10}, annual average		Control Assumptions:
	Controlled	Uncontrolled	Controlled	Uncontrolled	lb/hr[3]	lb/hr[3]	lb/hr[4]	lb/day[4]	lb/hr[4]	lb/day[4]	lb/hr[5]	T/yr[5]	lb/hr[5]	T/yr[5]	
Aggregate delivery to ground storage		0.00096		0.0031	0.04	0.14	0.04	1.04	0.140	3.35	4.11E-03	1.80E-02	0.013	0.058	75% Water Sprays at Operator's Discretion
Sand delivery to ground storage		0.000225		0.0007	0.01	0.03	1.01E-02	0.24	0.032	0.76	9.63E-04	4.22E-03	0.003	0.013	75% Water Sprays at Operator's Discretion
Aggregate transfer to conveyor		0.00096		0.0031	0.04	0.14	0.04	1.04	0.140	3.35	4.11E-03	1.80E-02	0.013	0.058	75% Water Sprays at Operator's Discretion
Sand transfer to conveyor		0.000225		0.0007	0.01	0.03	1.01E-02	0.24	0.032	0.76	9.63E-04	4.22E-03	0.003	0.013	75% Water Sprays at Operator's Discretion
Aggregate transfer to elevated storage		0.00096		0.0031	0.04	0.14	0.04	1.04	0.140	3.35	4.11E-03	1.80E-02	0.013	0.058	75% Water Sprays at Operator's Discretion
Sand transfer to elevated storage		0.000225		0.0007	0.01	0.03	1.01E-02	0.24	0.032	0.76	9.63E-04	4.22E-03	0.003	0.013	75% Water Sprays at Operator's Discretion
Cement delivery to Silo (controlled EF)	**0.00003**		**0.0001**		5.40E-03	1.50E-02	**5.40E-03**	1.30E-01	**1.50E-02**	3.61E-01	5.14E-04	2.25E-03	1.43E-03	**6.26E-03**	0.00% Baghouse is process equipment, use controlled EF
Cement supplement delivery to Silo (controlled EF)	**0.000045**		**0.0002**		8.10E-03	3.22E-02	**8.10E-03**	1.94E-01	**3.22E-02**	7.72E-01	7.71E-04	3.38E-03	3.06E-03	**1.34E-02**	0.00% Baghouse is process equipment, use controlled EF
Weigh hopper loading (sand & aggregate batcher loading)		**0.001185**		**0.00395**	2.13E-01	7.11E-01	**2.13E-01**	5.12E+00	**7.11E-01**	1.71E+01	2.03E-02	8.89E-02	6.77E-02	**2.96E-01**	0.0% Sealed boot (vents back to silo) or baghouse
Truck mix loading, Table 11.12-2, "0.310 lb-ton of cement+flyash" x ((491 lb cement + 73 lb flyash)/cy concrete)/ 2000 lb = 0.0874 lb/cy. PM2.5 was calculated as 15% of PM: "1.118 lb/ton of cement+flyash" x ((491 lb cement + 73 lb flyash)/cy concrete)*0.15/ 2000 lb = 0.0473 lb/cy		**0.0473**		**0.07874**	1.70E+00	2.83	**1.70**	40.87	**2.83**	68.03	1.62E-01	7.10E-01	0.27	**1.18**	80.0% Boot, enclosure, or equivalent or baghouse or boot w/water ring
Central mix loading, Table 11.12-2, "0.156 lb/ton of cement+flyash" x ((491 lb cement + 73 lb flyash)/cy concrete)/ 2000 lb = 0.0440 lb/cy. PM2.5 was calculated as 15% of PM: "0.572 lb/ton of cement+flyash" x ((491 lb cement + 73 lb flyash)/cy concrete)*0.15/ 2000 lb = 0.0242 lb/cy		**0.0000**		**0.0000**	0.00E+00	0.00	**0.00**	0.00	**0.00**	0.00	0.00E+00	0.00E+00	0.00	**0.00**	80.0% Baghouse control
Point Sources Total Emissions		**4.85E-02**		**8.30E-02**	**1.93E+00**	**3.59E+00**	**1.93E+00**	**4.63E+01**	**3.59E+00**	**8.62E+01**	**2.16E-02**	**9.45E-02**	**7.22E-02**	**3.16E-01**	
Process Fugitive Emissions		0.003555		0.0114	0.16	0.51	0.16	3.84	0.51	12.32	0.02	0.07	0.05	0.21	
Facility Wide Total: Point Sources + Process Fugitives (Except for Road Dust and Windblown Dust)				0.0944		4.11	2.09	50.15	4.11	98.56			0.12	0.53	

POINT SOURCE EMISSIONS for FACILITY CLASSIFICATION[6] Controlled EF at 1,576,800 cy/yr T/yr (controlled PTE @ 8,760)

Facility Classification Total PM[6]		**8.40E-03**		**6.62E+00**
Facility Classification Total PM10[6,8]		**4.21E-03**		**3.32E+00**

1 The EFs were calculated using EFs in lb/ton of material handled from Table 11.12-5, and a percentage of PM that is considered to be $PM_{2.5}$. The percentage used to establish the EFs were based on AP-42, Appendix B, Table B-2.2, Category 3. It was established that the fraction that is $PM_{2.5}$ is 15%. Note that the aggregate and sand handling are static EF's in this spreadsheet, but varies during modeling as the wind speed changes each hour.

2 The EFs were calculated using EFs in lb/ton of material handled from Table 11.12-2, typical composition per cubic yard of concrete (1865 lb aggregate, 1428 lbs sand, 491 lbs cement, 73 lbs cement supplement, and 20 gallons of water = 4024 lb/cy), and closely match Table 11.12-5 values (version 6/06) when rounded to the same number of figures. AP-42 lists the same EFs for uncontrolled and controlled emissions, so control estimates are based on the assumed control levels input on the right hand side of the table.

3 Max. hourly rate includes reductions associated with control assumptions.

4 Hourly emissions rate (24-hr average) = Max hourly emissions rate x (hrs per day) / 24.
Daily emissions rate = max emissions rate (1-hr average) x proposed hrs/day.

5 Annual average hourly emissions rate = EF (lb/cy) x proposed annual production rate (cy/yr) / (8760 hr/yr).
Annual emissions rate = EF (lb/cy) x proposed annual production rate (cy/yr) /(2000 lb/T)

6 Controlled EFs for PM = 0.0002 (cement silo) + 0.0003 (flyash silo) +0.0079(weigh batcher)
for PM10 = 0.0001 (cement silo) + 0.0002 (flyash silo) +0.0040 (weigh batcher)

7 Emissions for Facility Classification are based on baghouses as process equipment, 24-hr day, 8760 hr/yr = 4,320 cy/day, and 1,576,800 cy/yr

8 Emissions for Facility Classification do not include truck mix loading emissions; this is typically considered a fugitive emission source for concrete batch plants.

Lead emissions

Emissions Point	Lead Emission Factor[1] (lb/ton of material loaded)		Increase in Emissions from this PTC: Emission Rate, Max.	Emissions for Comparison with DEQ Modeling Threshold		Emission Rate, Quarterly	Emissions for Facility Classification	
	Controlled with fabric	Uncontrolled	lb/hr, 1-hr avg.[3]	lb/mo[4]/lb	T/yr[4]	lb/hr qtrly avg[5]		T/yr
Cement delivery to silo[7]	**1.09E-08**	7.38E-07	4.82E-07	3.52E-04	4.01E-04	4.82E-07	Point Source	2.11E-06
Cement supplement delivery to Silo[7]	**5.20E-07**	ND	3.42E-06	2.49E-03	2.85E-03	3.42E-06	Point Source	1.50E-05
Truck Loadout (with 99.9% control)[8]		**3.82E-06**	3.68E-05	2.68E-02	3.06E-02	3.68E-05	Fugitive	
Total			**4.06E-05**	**2.97E-02**	**0.034**		Point Sources	**1.71E-05**
DEQ Modeling Threshold				100	0.6			
Modeling Required?				No	No			

[1] The emissions factors are from AP-42, Table 11.12-8 (version 06/06)
[2] Max. hourly rate = EF x pound of cement/yd³ of concrete x max. hourly concrete production rate/(2000 lb/T)
[3] lb/mo = EF x pound of material/yd³ of concrete x max. daily concrete production rate x (365/12)/(2000 lb/T)
[4] T/yr = EF x pound of material/yd³ of concrete x max. annual concrete production rate/(2000 lb/T)
[5] lb/hr, qtrly avg = lb/mo x 3 months per qtr / (8760/4)hrs per qtr

Toxic Air Pollutant (TAPs) EMISSIONS INVENTORY, Concrete Batch Plant

4/24/2018 14:44

Facility Information

Company:	Knife River Corporation - Northwest
Facility ID:	019-00102
Permit No.:	P-2018.0020 Project 62015
Source Type:	Portable Concrete Batch Plant
Manufacturer:	Stephens/Thoroughbred

Emissions estimates are based on EFs in AP-42, Table 11.12-8 (version 06/06) and the following composition of one yard of concrete:

Coarse aggregate		1865 pounds
Sand		1428 pounds
Cement		491 pounds
Cement supplement		73 pounds
Water		20 gallons
Concrete		**4024 pounds**

Truck Mix Loadout Factor: 1

Central Mix Batching Factor: 0

DEQ EI VERIFICATION WORKSHEET Version 032007
Tip: Blue text or numbers are meant to be changed.
Black text or numbers indicates it's hard-wired or calculated.
Review these before you change them.

Concrete Production

Maximum Hourly Production Rate:	180	cy/hr	
Proposed Daily Production Rate:	4,320	cy/day	
Proposed Maximum Annual Production Rate:	150,000	cy/year	

Uncontrolled (Unlimited Production Rate)

	24 hrs/day,
4,320 cy/day	7 day/wk,
1,576,800 cy/year	52 wks/year

TAP Emission Factors from AP-42, Table 11.12-8 (Version 06/06)

Emissions Point	Arsenic EF (lb/ton of material loaded)		Beryllium EF (lb/ton of material loaded)		Cadmium EF (lb/ton of material loaded)		Chromium EF (lb/ton of material loaded)		Manganese EF (lb/ton of material loaded)		Nickel EF (lb/ton of material loaded)		Phosphorus EF (lb/ton of material loaded)		Selenium EF (lb/ton of material loaded)		Chromium VI
	Controlled with Fabric filter	Uncontrolled	Controlled with Fabric filter	Uncontrolled	Controlled with Fabric filter	Uncontrolled	Controlled with Fabric filter	Uncontrolled	Controlled with Fabric filter	Uncontrolled	Controlled with Fabric filter	Uncontrolled	Controlled with Fabric filter	Uncontrolled	Controlled with Fabric filter	Uncontrolled	Percent of total Cr that is Cr+6
Cement silo filling (with baghouse)	**4.24E-09**	1.68E-06	**4.86E-10**	1.78E-05	ND	2.34E-07	**2.90E-08**	2.52E-07	**1.17E-07**	2.02E-04	**4.18E-08**	1.75E-05	ND	**1.18E-05**	ND	ND	**20%**
Cement supplement silo filling (with baghouse)	**1.00E-06**	ND	**9.04E-08**	ND	**1.98E-10**	ND	**1.22E-06**	ND	**2.56E-07**	ND	**2.28E-06**	ND	**3.54E-06**	ND	**7.24E-08**	ND	**30%**
Truck loading (no boot or shroud)	5.02E-07	**1.22E-05**	1.04E-07	**2.44E-07**	9.06E-09	**3.42E-08**	4.10E-08	**1.14E-05**	2.08E-05	**6.12E-05**	4.78E-06	**1.19E-05**	1.23E-05	**3.84E-05**	1.13E-07	**2.62E-06**	**21.29%**
Central Mix Batching (NO boot or shroud)	0.00E+00	**0.00E+00**	ND	ND	0.00E+00	**0.00E+00**	0.00E+00	**0.00E+00**	0.00E+00	**0.00E+00**	0.00E+00	**0.00E+00**	0.00E+00	**0.00E+00**	ND	ND	**21.29%**

UNCONTROLLED TAP EMISSIONS **Note: Includes baghouses as process equipment.** **4,320 cy/day, and** **1,576,800 cy/yr**

Emissions Point	Arsenic		Beryllium		Cadmium		Chromium		Manganese		Nickel		Phosphorus		Selenium		Chromium VI		
	lb/hr annual avg.	T/yr[4]	lb/hr annual avg.	T/yr	lb/hr annual avg.	T/yr	lb/hr 24-hr avg.	T/yr[5]	lb/hr 24-hr avg.	T/yr	lb/hr annual avg.	T/yr	lb/hr 24-hr avg.	T/yr	lb/hr 24-hr avg.	T/yr	lb/hr annual avg.		
Cement silo filling (with baghouse)	1.87E-07	8.21E-07	2.15E-08	9.41E-08	1.03E-05	4.53E-05	1.28E-06	4.88E-05	5.17E-06	2.26E-05	1.85E-06	8.09E-06	5.21E-04	2.28E-03	ND	ND	2.56E-07		
Cement supplement silo filling (with baghouse)	6.57E-06	2.88E-05	5.94E-07	2.60E-06	1.30E-09	5.70E-09	8.02E-06	3.51E-05	1.68E-06	7.37E-06	1.50E-05	6.56E-05	2.33E-05	1.02E-04	4.76E-07	2.08E-06	2.40E-06		
Truck loading (no boot or shroud)	6.19E-04	2.71E-03	1.24E-05	5.42E-05	1.74E-06	7.60E-06	5.79E-04	2.53E-03	3.11E-03	1.36E-02	6.04E-04	2.65E-03	1.95E-03	8.54E-03	1.33E-04	5.83E-04	1.23E-04		
Sources Total	**6.26E-04**	2.74E-03	**1.30E-05**	5.69E-05	**1.21E-05**	5.29E-05	**5.86E-04**	2.62E-03	**3.11E-03**	1.36E-02	**6.21E-04**	2.72E-03	**2.49E-03**	1.09E-02	**1.33E-04**	5.85E-04	**1.26E-04**	**3.33E-02**	**Tons per year**
IDAPA Screening EL (lb/hr)	1.50E-06		2.80E-05		3.70E-06		3.30E-02		3.33E-01		2.70E-05		7.00E-03		1.30E-02		5.60E-07		
EXCEEDS EL?	**Yes**		No		Yes		No		No		**Yes**		No		No		**Yes**		

CONTROLLED TAP EMISSIONS **Note: Includes baghouses as process equipment.** **4,320 cy/day, and** **150,000 cy/year**

Emissions Point	Arsenic		Beryllium		Cadmium		Chromium		Manganese		Nickel		Phosphorus		Selenium		Chromium VI		
	lb/hr annual avg.	T/yr[4]	lb/hr annual avg.	T/yr	lb/hr annual avg.	T/yr	lb/hr 24-hr avg.	T/yr[5]	lb/hr 24-hr avg.	T/yr	lb/hr annual avg.	T/yr	lb/hr 24-hr avg.	T/yr	lb/hr 24-hr avg.	T/yr	lb/hr annual avg.		
Cement silo filling (with baghouse)[1]	1.78E-08	7.81E-08	2.04E-09	8.95E-09	9.84E-07	4.31E-06	1.28E-06	5.34E-07	5.17E-06	2.15E-06	1.76E-07	7.70E-07	ND	ND	ND	ND	2.44E-08		
Cement supplement silo filling (with baghouse)[2]	6.25E-07	2.74E-06	5.65E-08	2.47E-07	1.24E-10	5.42E-10	5.39E-05	3.34E-06	1.13E-05	7.01E-07	1.43E-06	6.24E-06	1.56E-04	9.69E-06	4.76E-07	1.98E-07	2.29E-07		
Truck loading (with baghouse)	1.18E-05	5.16E-05	2.36E-07	1.03E-06	3.30E-08	1.45E-07	1.16E-04	4.82E-05	6.21E-04	2.59E-04	1.15E-05	5.03E-05	3.90E-04	1.62E-04	2.66E-05	1.11E-05	2.34E-06	**80.00%**	Boot, enclosure, or equivalent or baghouse or boot w/water ring
Sources Total	**1.24E-05**	5.44E-05	**2.94E-07**	1.29E-06	**1.02E-06**	4.45E-06	**1.71E-04**	5.21E-05	**6.38E-04**	2.62E-04	**1.31E-05**	5.73E-05	**5.46E-04**	1.72E-04	**2.71E-05**	1.13E-05	**2.60E-06**	**6.15E-04**	**Tons per year**
IDAPA Screening EL (lb/hr)	1.50E-06		2.80E-05		3.70E-06		3.30E-02		3.33E-01		2.70E-05		7.00E-03		1.30E-02		5.60E-07		
Percent of EL	828.33%		1.05%		27.48%		0.52%		0.1915%		48.49%		7.80%		0.2083%		463.85%		
EXCEEDS EL?	**Yes**		No		No		No		No		No		No		No		**Yes**		

[1] lb/hr, annual average = EF x pound of cement / Yd[3] of concrete x annual concrete production rate / 2000lb/Ton / 8760 hr/yr; lb/hr, 24-hr = EF x pound of cement / Yd3 of concrete x daily concrete production rate / 2000lb/Ton / 24 hr/day

[2] lb/hr, annual average = EF x pound of cement supplement / Yd[3] of concrete x annual concrete production rate / 2000lb/Ton / 8760 hr/yr; lb/hr, 24-hr average = EF x pound of cement supplement / Yd3 of concrete x daily concrete production rate / 2000lb/Ton

[3] lb/hr, annual average = EF x pound of (cement + cement supplement) / Yd[3] of concrete x annual concrete production rate / 2000lb/Ton / 8760 hr/yr; lb/hr, 24-hr average = EF x pound of (cement + cement supplement) / Yd3 of concrete x daily concrete production

[4] T/yr = lb/hr, annual avg x 8760 hr/yr x (1T/2000 lb)

[5] T/yr = EF x pound of cement, or cement supplement, or cement + cement supplement x annual concrete production rate /2000 lb/ton / 2000 lb/ton

DIESEL COMBUSTION, AP-42 SECTION 1.3 (9/98)

Operating Assumptions: **0** MMBtu/hr / 140 MMBtu/10^3 gal = 0.00E+00 10^3 gal/hr **Fuel Use:**
0 hr/day **0.00** gal/day
0 hr/yr **0** gal/year
0.0015% sulfur

Criteria Air Pollutants	Emission Factor	Emissions		CBP + Boiler Emissions	Modeling Threshold		Modeling Required?	Modeling Threshold		Modeling Required?
	lb/10^3 gal	lb/hr	T/yr	T/yr	2002 Guidance			Case-by-Case		
NO2	20	0.00E+00	0.00E+00	0.00E+00	1	T/yr	No	7	T/yr	No
CO	5	0.00E+00	0.00E+00	0.00E+00	14	lb/hr	No	70	lb/hr	No
PM10 (filterable + condensable)	3.3	0.00E+00	0.00E+00	3.16E-01	0.2	lb/hr	No	0.9	lb/hr	No
		0.00E+00	0.00E+00		1	T/yr	No	7	T/yr	No
PM2.5 (filterable + condensable)	1.8	0.00E+00	0.00E+00	9.45E-02						
		0.00E+00	0.00E+00							
SOx (SO2 + SO3)	0.216	0.00E+00	0.00E+00	0.00E+00	0.2	lb/hr	No	0.9	lb/hr	No
		0.00E+00	0.00E+00		1	T/yr	No	7	T/yr	No
VOC (TOC)	0.556	0.00E+00	0.00E+00	0.00E+00	40	T/yr	No			
Lead EF = 9 lb/10^{12} Btu	9	0.00E+00	0.00E+00	3.39E-02	0.6	T/yr	No			
Lead, continued			0.00E+00	lb/quarter	10	lb/mo	No			
		TOTAL	0.00E+00	T/yr	Note: 100 lb/mo Pb in guidance reduced by factor of 10 based on latest Pb NAAQS (reduced in 2008 from 1.5 ug/m3 to 0.15 ug/m3)					

Hazardous Air Pollutants (HAPs) and Toxic Air Pollutants (TAPs)					Exceeds EL/ Modeling Required?
	lb/10^3 gal	lb/hr	T/yr	EL (lb/hr)	
PAH HAPs					
Acenaphthene	2.11E-05	0.00E+00	0.00E+00	9.10E-05	No
Acenaphthylene	2.57E-07	0.00E+00	0.00E+00	9.10E-05	No
Anthracene	1.22E-06	0.00E+00	0.00E+00	9.10E-05	No
Benzo(a)anthracene	4.01E-06	0.00E+00	0.00E+00	9.10E-05	See POM
Benzo(a)pyrene				2.00E-06	See POM
Benzo(b,k)fluoranthene	1.48E-06	0.00E+00	0.00E+00		See POM
Benzo(g,h,i)perylene	2.26E-06	0.00E+00	0.00E+00	9.10E-05	No
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00		See POM
Chrysene	2.38E-06	0.00E+00	0.00E+00		See POM
Dibenzo(a,h)anthracene	1.67E-06	0.00E+00	0.00E+00		See POM
Dichlorobenzene				9.10E-05	No
Fluoranthene	4.84E-06	0.00E+00	0.00E+00	9.10E-05	No
Fluorene	4.47E-06	0.00E+00	0.00E+00	9.10E-05	No
Indeno(1,2,3-cd)pyrene	2.14E-06	0.00E+00	0.00E+00		See POM
Naphthalene	1.13E-03	0.00E+00	0.00E+00	3.33	No
Naphthalene	1.13E-03	0.00E+00	0.00E+00	9.10E-05	No
Phenanathrene	1.05E-05	0.00E+00	0.00E+00	9.10E-05	No
Pyrene	4.25E-06	0.00E+00	0.00E+00	9.10E-05	No
Polycyclic Organic Matter (POM)	7-PAH Group	0.00E+00	0.00E+00	2.00E-06	No
Non-PAH HAPs					
Benzene	2.14E-04	0.00E+00	0.00E+00	8.00E-04	No
Ethyl benzene	6.36E-05	0.00E+00	0.00E+00	2.90E+01	No
Formaldehyde	3.30E-02	0.00E+00	0.00E+00	5.10E-04	No
Hexane	1.80E+00	0.00E+00	0.00E+00	12	No
Toluene	6.20E-03	0.00E+00	0.00E+00	25	No
o-Xylene	1.09E-04			0.007	
Metals (HAPs)	lb/10^{12} Btu				
Arsenic	4.00E+00	0.00E+00	0.00E+00	1.50E-06	No
Barium				0.033	No
Beryllium	3.00E+00	0.00E+00	0.00E+00	2.80E-05	No
Cadmium	3.00E+00	0.00E+00	0.00E+00	3.70E-06	No
Chromium	3.00E+00	0.00E+00	0.00E+00	0.033	No
Cobalt				0.0033	No
Copper	6.00E+00	0.00E+00	0.00E+00	0.013	No
Manganese	6.00E+00	0.00E+00	0.00E+00	0.067	No
Mercury	3.00E+00	0.00E+00	0.00E+00	0.003	No
Molybdenum				0.333	No
Nickel	3.00E+00	0.00E+00	0.00E+00	2.70E-05	No
Selenium	1.50E+01	0.00E+00	0.00E+00	0.013	No
Vanadium				0.003	No
Zinc	4.00E+00	0.00E+00	0.00E+00	0.667	No

NOTE: TAPs lb/hr emissions are 24-hour averages unless shown in bold. Bold emissions are annual averages for carcinogens.

1,1,1-Trichloroethane 2.36E-04 Not a HAP (1,1,2 TCA is a HAP). Not a 585 or 586 TAP.

Case-by-Case Modeling Thresholds may be used ONLY with DEQ Approval

TOTAL CBP + WATER HEATER EMISSIONS (POINT SOURCES, T/YR)	0.44

PROPANE/BUTANE COMBUSTION, AP-42 SECTION 1.5 (9/98)

Operating Assumptions: **2** MMBtu/hr / 91.5 MMBtu/10^3 gal = 2.19E-02 10^3 gal/hr **Fuel Use:**
24 hr/day **524.59** gal/day
8,760 hr/yr **191,475** gal/year

Criteria Air Pollutants	Emission Factor	Emissions		CBP + Boiler Emissions	Modeling Threshold		Modeling Required?	Modeling Threshold		Modeling Required?
	lb/10^3 gal	lb/hr	T/yr	T/yr	2002 Guidance			Case-by-Case		
NO2	15	3.28E-01	1.44E+00	1.44E+00	1	T/yr	YES	7	T/yr	No
CO	8.4	1.84E-01	8.04E-01	8.04E-01	14	lb/hr	No	70	lb/hr	No
PM10 (filterable + condensable)	0.8	1.75E-02	7.66E-02	3.93E-01	0.2	lb/hr	No	0.9	lb/hr	No
		1.75E-02	7.66E-02		1	T/yr	No	7	T/yr	No
PM2.5 (filterable + condensable)	0.8	1.75E-02	7.66E-02	1.71E-01						
		1.75E-02	7.66E-02							
SOx (SO2 + SO3)	1.479	3.23E-02	1.42E-01	1.42E-01	0.2	lb/hr	No	0.9	lb/hr	No
		3.23E-02	1.42E-01		1	T/yr	No	7	T/yr	No
VOC (TOC)	1.1	2.40E-02	1.05E-01	1.05E-01	40	T/yr	No			
Lead EF = 9 lb/10^{12} Btu	0	0.00E+00	0.00E+00	3.39E-02	0.6	T/yr	No			
Lead, continued			0.00E+00	lb/quarter	10	lb/mo	No			
		TOTAL	**2.56E+00**	T/yr	Note: 100 lb/mo Pb in guidance reduced by factor of 10 based on latest Pb NAAQS (reduced in 2008 from 1.5 ug/m3 to 0.15 ug/m3)					

Case-by-Case Modeling Thresholds may be used ONLY with DEQ Approval

TOTAL CBP + WATER HEATER EMISSIONS (POINT SOURCES, T/YR)	3.08

CURRENT PTC APPLICATION ESTIMATES

Do you have an internal combustion engine? **No**

Internal Combustion Engine(s) AP-42 Section 3.3 or 3.4 (diesel fueled)			
		Fuel Type(s)	**Generator Toggle**
Generator Make/Model	**Enter Info**	#2 Fuel Oil (Diesel)	1
Rating of Large Engine (hp)	**0.0**	Max Sulfur weight percent (w/o)	**0.0015%**
Rating of Small Engine #1 (hp)	**0.0**		
Rating of Small Engine #2 (hp)	**0.0**		
EF OPTIONS:		**Use EFs in lb/MMBtu fuel input**	
1 hp = 0.7456999 kW	0.7457	Calculated Max Fuel Use Rate, gal/hr (Large)	0.00
Avg brake-specific fuel consumption (BSFC) = 7000 Btu/hp-hr	7000	Calculated Max Fuel Use Rate, gal/hr (small #1)	0.00
Fuel Heating Value, Btu/gal	137,030	Calculated Max Fuel Use Rate, gal/hr (small #2)	0.00
		Calculated MMBtu/hr (Large)	0.00
		Calculated MMBtu/hr (Small #1)	0.00
		Calculated MMBtu/hr (Small #2)	0.00
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

EPA Certification for Large Engine:	-1
Not EPA-certified: Enter "0" (zero)	
Certified Tier I, Tier 2, Tier 3, or Tier 4: Enter 1, 2, 3, or 4	
Certified "BLUE SKY" engine: Enter 5	

EPA Certification for Small Engine #1:	-1	**EPA Certification for Small Engine #2:**	-1
Not EPA-certified: Enter "0" (zero)		Not EPA-certified: Enter "0" (zero)	
Certified Tier I, Tier 2, Tier 3, or Tier 4: Enter 1, 2, 3, or 4		Certified Tier I, Tier 2, Tier 3, or Tier 4: Enter 1, 2, 3, or 4	
Certified "BLUE SKY" engine: Enter 5		Certified "BLUE SKY" engine: Enter 5	

Facility: Knife River Corporation - Northwest

4/24/2018 14:44 **Permit/Facility ID:** **Project 62015** **019-00102**

User Input Weight % Sulfur = 0.0015% SO2 EF = 1.01 x S

Large Engine

Fuel Type Toggle = 0 0 hp Engine
Fuel Consumption Rate 0.00 gal/hr
Calculated MMBtu/hr 0.0000 MMBtu/hr
Max Daily Operation 0 hr/day
Max Annual Operation 0 hrs/yr

Pollutant	Emission Factor[a] (lb/MMBtu)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) **Annual** or 24-hr Average
PM [b]	0.1	0.000	0.00	
PM-10 (total) [d]	0.000	0.000	0.000	
P.M.-2.5	0.000	0.000	0.000	
CO [b]	0.00	0.000	0.00	
NOx[b]	0.000	0.000	0.00	
SO_2 [b] (total SOx presum	0.001515	0.000	0.000	
VOC [b] (total TOC--> VOC	0.000	0.000	0.000	
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	0.00E+00	0.00E+00	**0.00E+00**
Acrolein[c]	9.25E-05	0.00E+00	0.00E+00	0.00E+00
Benzene[c,e]	9.33E-04	0.00E+00	0.00E+00	**0.00E+00**
1,3-Butadiene[c,e]	3.91E-05	0.00E+00	0.00E+00	**0.00E+00**
Ethylbenzene[e]				
Formaldehyde[c,e]	1.18E-03	0.00E+00	0.00E+00	**0.00E+00**
Hexane[e]				
Isooctane				
Methyl Ethyl Ketone[e]				
Pentane[e]				
Propionaldehyde[e]				
Quinone[e]				
Methyl chloroform[e]				
Toluene[c,e]	4.09E-04	0.00E+00	0.00E+00	0.00E+00
Xylene[c,e]	2.85E-04	0.00E+00	0.00E+00	0.00E+00
PAH, Total		0.00E+00		**0.00E+00**
POM (7-PAH Group)		0.00E+00	0.00E+00	**0.00E+00**

Pollutant	Emission Factor[a] (lb/MMBtu)	Emissions (lb/hr)	Emissions (T/yr)	TAPs Emissions (lb/hr) **Annual** or 24-hr Average
PAH HAPs				
2-Methylnaphthalene				
3-Methylchloranthrene[e]				
Acenaphthene[c1]	1.42E-06	0.00E+00	0.00E+00	**0.00E+00**
Acenaphthylene[c1]	5.06E-06	0.00E+00	0.00E+00	**0.00E+00**
Anthracene[c1]	1.87E-06	0.00E+00	0.00E+00	**0.00E+00**
Benzo(a)anthracene[c1]	1.68E-06	0.00E+00	0.00E+00	**0.00E+00**
Benzo(a)pyrene[c1,e]	1.88E-07	0.00E+00	0.00E+00	**0.00E+00**
Benzo(b)fluoranthene[c1]	9.91E-08	0.00E+00	0.00E+00	**0.00E+00**
Benzo(e)pyrene				
Benzo(g,h,I)perylene[c1]	4.89E-07	0.00E+00	0.00E+00	**0.00E+00**
Benzo(k)fluoranthene[c1]	1.55E-07	0.00E+00	0.00E+00	**0.00E+00**
Chrysene[c1]	3.53E-07	0.00E+00	0.00E+00	**0.00E+00**
Dibenzo(a,h)anthracene[c1]	5.83E-07	0.00E+00	0.00E+00	**0.00E+00**
Dichlorobenzene				
Fluoranthene[c1]	7.61E-06	0.00E+00	0.00E+00	**0.00E+00**
Fluorene[c1]	2.92E-05	0.00E+00	0.00E+00	**0.00E+00**
Indeno(1,2,3-cd)pyrene[c1]	3.75E-07	0.00E+00	0.00E+00	**0.00E+00**
Naphthalene[c1,e]	8.48E-05	0.00E+00	0.00E+00	**0.00E+00**
Perylene				
Phenanthrene[c1]	2.94E-05	0.00E+00	0.00E+00	**0.00E+00**
Pyrene[c1]	4.78E-06	0.00E+00	0.00E+00	**0.00E+00**
Non-HAP Organic Compounds				
Acetone[e]				
Benzaldehyde				
Butane				
Butyraldehyde				
Crotonaldehyde[e]				
Ethylene				
Heptane				
Hexanal				
Isovaleraldehyde				
2-Methyl-1-pentene				
2-Methyl-2-butene				
3-Methylpentane				
1-Pentene				
n-Pentane				
Valeraldehyde				
Metals				
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.

Facility: Knife River Corporation - Northwest

Project

Permit/Facility ID

Small Engine #1

Small Engine #2

Combined Emissions of Small Engines

Facility: Knife River Corporation - Northwest

4/24/2018 14:44 Permit/Facility ID: P-2018.0020 Project 62015 019-00102

Greenhouse Gas Emissions when Combusting Natural Gas

Water Heater #1 Emissions	Emission Factor (EF)	EF Units	EF Source	T/yr	Global Warming Potential	CO_2e (T/yr)
CO_2	120000	lb/MMscf	AP-42 Table 1.4-2	1030.59	1	1030.59
Methane	2.3	lb/MMscf	AP-42 Table 1.4-2	1.98E-02	21	4.15E-01
N_2O	2.2	lb/MMscf	AP-42 Table 1.4-2	1.89E-02	310	5.86E+00

* Assumes a heating value of 1,020 Btu/scf and a heater with a rating of 2 MMBtu/hr.

Water Heater #2 Emissions	Emission Factor (EF)	EF Units	EF Source	T/yr	Global Warming Potential	CO_2e (T/yr)
CO_2	0	lb/MMscf	AP-42 Table 1.4-2	0.00	1	0.00
Methane	0	lb/MMscf	AP-42 Table 1.4-2	0.00E+00	21	0.00E+00
N_2O	0	lb/MMscf	AP-42 Table 1.4-2	0.00E+00	310	0.00E+00

* Water Heater #2 does not burn Natural Gas.

Greenhouse Gas Emissions when Combusting #2 Diesel

Water Heater #1 Emissions	Emission Factor (EF)	EF Units	EF Source	T/yr	Global Warming Potential	CO_2e (T/yr)
CO_2	Molecular conversion from C to CO_2			0.00	1	0.00
Methane	0	lb/10^3 gal	AP-42 Table 1.3-3	0.00E+00	21	0.00E+00
N_2O	0	lb/10^3 gal	AP-42 Table 1.3-8	0.00E+00	310	0.00E+00

* Water Heater #1 does not burn Diesel.

Water Heater #2 Emissions	Emission Factor (EF)	EF Units	EF Source	T/yr	Global Warming Potential	CO_2e (T/yr)
CO_2	Mocular conversion from C to CO_2			0.00	1	0.00
Methane	0	lb/10^3 gal	AP-42 Table 1.3-3	0.00E+00	21	0.00E+00
N_2O	0	lb/10^3 gal	AP-42 Table 1.3-8	0.00E+00	310	0.00E+00

* Water Heater #2 does not burn Diesel.

Greenhouse Gas Emissions when Combusting LPG

Water Heater #1 Emissions	Emission Factor (EF)	EF Units	EF Source	T/yr	Global Warming Potential	CO_2e (T/yr)
CO_2	0	lb/10^3 gal	AP-42 Table 1.5-1	0.00	1	0.00
Methane	0	lb/10^3 gal	AP-42 Table 1.5-1	0.00E+00	21	0.00E+00
N_2O	0	lb/10^3 gal	AP-42 Table 1.5-1	0.00E+00	310	0.00E+00

* Water Heater #1 does not burn Propane.

Water Heater #2 Emissions	Emission Factor (EF)	EF Units	EF Source	T/yr	Global Warming Potential	CO_2e (T/yr)
CO_2	14300	lb/10^3 gal	AP-42 Table 1.5-1	914.16	1	914.16
Methane	0.9	lb/10^3 gal	AP-42 Table 1.5-1	5.75E-02	21	1.21E+00
N_2O	0.2	lb/10^3 gal	AP-42 Table 1.5-1	1.28E-02	310	3.96E+00

* Assumes a fuel heating value of 137,030 gal/Btu and a heater with a rating of 2 MMBtu/hr.

Greenhouse Gas Emissions when Combusting Diesel Fuel

Small Engine #1 Emissions ≤ 600 bhp	Emission Factor (EF)	EF Units	EF Source	T/yr	Global Warming Potential	CO_2e (T/yr)
CO_2	1.15	lb/bhp-hr	AP-42 Table 3.3-1	0.00	1	0.00

* There are no engines at this facility.

Small Engine #2 Emissions ≤ 600 bhp	Emission Factor (EF)	EF Units	EF Source	T/yr	Global Warming Potential	CO_2e (T/yr)
CO_2	1.15	lb/bhp-hr	AP-42 Table 3.3-1	0.00	1	0.00

* There is no second small engine at this facility.

Large Engine #1 Emissions > 600 bhp	Emission Factor (EF)	EF Units	EF Source	T/yr	Global Warming Potential	CO_2e (T/yr)
CO_2	1.16	lb/bhp-hr	AP-42 Table 3.4-1	0.00	1	0.00

* There is no large engine at this facility.

Total Greenhouse Gas Emissions

	CO_2e (T/yr)
CO_2	1944.75
Methane	1.62
N_2O	9.82
Total	**1956.20**

Facility: **Knife River Corporation - Northwest**
4/24/2018 14:44 **Permit/Facility ID:** **019-00102** **P-2018.0020 Project 62015**

Max Hourly Production	180 cy/hr	**82%** T/hr is Aggregate =	**148 cy/hr**
Max Daily Production	4,320 cy/day	82% T/hr is Aggregate =	**3,542 cy/day**
Max Annual Production	150,000 cy/yr	82% T/hr is Aggregate =	**123,000 cy/yr**

Aggregate is considered both coarse and fine (sand).The 82% is based on 1,865 lb coarse aggregate, 1,428 lb sand, 564 lb cement/supplement and 167 lb water for a total of 4,024 lb concrete

Truck Mix Operations Drop Points, AP-42 11-12 (06/06)

$E = k\ (0.0032) \times (U^a / M^b) + c$ = 9.71E-02 3.88E-02 lb/ton for PM10 5.83E-03 lb/ton for PM2.5

k = particle size multiplier	0.8 for PM	0.32 for PM10	0.048 for PM2.5
a = exponent	1.75 for PM	1.75 for PM10	1.75 for PM2.5
b = exponent	0.3 for PM	0.3 for PM10	0.3 for PM2.5
c = constant	0.013 for PM	0.0052 for PM10	0.00078 for PM2.5
U = mean wind speed =	**10** mph		
M = moisture content =	**6** %		

Mean wind spped: 7 mph was the average wind speed obtained from an average of 19 Idaho airports throughout the state from 1996-2006. This data is from the Western Regional Climate Center (http://www.wrcc.dri.edu/htmlfiles/westwind.final.html#IDAHO)

Moisture Content: 4.17 % and 1.77% were the average percentages for sand and aggegate respectively. These values are based on EPA tests conducted at Cheney Enterprises Cement plant in Roanoke, VA, 1994. (AP-42 11-12 06/06).

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	mph/ E@10mph
Cat 1:	1.54	0.77	1.72	6.75E-03	0.1738	1.01E-03	0.1738
Cat 2:	3.09	2.32	5.18	1.58E-02	0.4077	2.38E-03	0.4077
Cat 3:	5.14	4.12	9.20	3.43E-02	0.8831	5.15E-03	0.8831
Cat 4:	8.23	6.69	14.95	7.32E-02	1.885	1.10E-02	1.885
Cat 5:	10.80	9.52	21.28	1.31E-01	3.382	1.97E-02	3.382
Cat 6:	14.00	12.40	27.74	2.06E-01	5.298	3.09E-02	5.298

Central Mix Operations Drop Points, AP-42 11-12 (06/06)

$E = k\ (0.0032) \times (U^a / M^b) + c$ = 2.08E-03 1.23E-03 lb/ton for PM10 2.54E-04 lb/ton for PM2.5

k = particle size multiplier	0.19 for PM	0.13 for PM10	0.03 for PM2.5
a = exponent	0.95 for PM	0.45 for PM10	0.45 for PM2.5
b = exponent	0.9 for PM	0.9 for PM10	0.9 for PM2.5
c = constant	0.001 for PM	0.001 for PM10	0.0002 for PM2.5
U = mean wind speed =	**10** mph		
M = moisture content =	**6** %		

Mean wind spped: 7 mph was the average wind speed obtained from an average of 19 Idaho airports throughout the state from 1996-2006. This data is from the Western Regional Climate Center (http://www.wrcc.dri.edu/htmlfiles/westwind.final.html#IDAHO)

Moisture Content: 4.17 % and 1.77% were the average percentages for sand and aggegate respectively. These values are based on EPA tests conducted at Cheney Enterprises

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	mph/ E@10mph
Cat 1:	1.54	0.77	1.72	1.11E-03	0.8964	2.24E-04	0.8838
Cat 2:	3.09	2.32	5.18	1.87E-03	1.5160	2.40E-04	0.9456
Cat 3:	5.14	4.12	9.20	2.13E-03	1.7261	2.52E-04	0.9922
Cat 4:	8.23	6.69	14.95	2.41E-03	1.949	2.65E-04	1.0422
Cat 5:	10.80	9.52	21.28	2.65E-03	2.146	2.76E-04	1.0860
Cat 6:	14.00	12.40	27.74	2.86E-03	2.315	2.85E-04	1.1238

Conveyor and Scalping Screen Emission Points

Moisture/Control %:

Aggregate for CBP typically stabilizes between 5-6% by weight--> Apply additional **25%** control to lb/hr, etc. for the higher moisture.

Sand aggregate for CBPs is **36%**

Coarse aggregate for CBPs is **46%**

Fine Aggegate (Sand) Transfer to Conveyor

Transfer from truck to conveyor: **148 cy/hr** **4** Transfer Points

Pollutant	Emission Factor Table 11.12-5 CONVEYOR TRANSFER PT CONTROLLED (lb/cy)	Emissions Per Transfer Point: Emissions (lb/hr) 1-hr Average	Emissions (lb/hr) 24-hr Average	Emissions (T/yr)	Emissions (lb/hr) Annual Average	Total Emissions: Emissions (lb/hr) 1-hr Average	Emissions (lb/hr) 24-hr Average	Emissions (T/yr)	Emissions (lb/hr) Annual Average
PM (total)	0.0015	0.072	0.072	3.00E-02	6.84E-03	0.288	0.288	1.20E-01	2.74E-02
PM-10 (total)	7.00E-04	0.034	0.034	1.40E-02	3.19E-03	0.134	0.134	5.59E-02	1.28E-02
PM-2.5 (total)	2.25E-04	0.011	0.011	4.49E-03	1.97E-02	0.043	0.043	1.80E-02	7.87E-02

0.166

1.256

Coarse Aggegate Transfer to Conveyor

Transfer from truck to conveyor: **148 cy/hr** **4** Transfer Points

Pollutant	Emission Factor Table 11.12-5 CONVEYOR TRANSFER PT CONTROLLED (lb/cy)	Emissions Per Transfer Point: Emissions (lb/hr) 1-hr Average	Emissions (lb/hr) 24-hr Average	Emissions (T/yr)	Emissions (lb/hr) Annual Average	Total Emissions: Emissions (lb/hr) 1-hr Average	Emissions (lb/hr) 24-hr Average	Emissions (T/yr)	Emissions (lb/hr) Annual Average
PM (total)	0.0064	0.397	0.397	1.66E-01	3.78E-02	1.590	1.590	6.62E-01	1.51E-01
PM-10 (total)	3.10E-03	0.193	0.193	8.02E-02	1.83E-02	0.770	0.770	3.21E-01	7.33E-02
PM-2.5 (total)	9.60E-04	0.060	0.060	2.48E-02	1.09E-01	0.238	0.238	9.94E-02	4.35E-01

Transfer Points

Metals	HAP	TAP	lb/hr	T/yr	Averaging Period	EL lb/hr	Exceeded?
Arsenic	X	X	1.28E-05	5.48E-05	Annual	1.50E-06	Yes
Barium		X	8.63E-06	3.78E-05	24-hour	3.30E-02	No
Beryllium	X	X	3.18E-07	1.31E-06	Annual	2.80E-05	No
Cadmium	X	X	3.17E-06	6.61E-06	Annual	3.70E-06	No
Cobalt	X	X	1.65E-07	7.21E-07	24-hour	3.30E-03	No
Copper		X	1.67E-06	7.30E-06	24-hour	1.30E-02	No
Chromium	X	X	1.74E-04	6.41E-05	24-hour	3.30E-02	No
Manganese	X	X	6.39E-04	2.65E-04	24-hour	3.33E-01	No
Mercury	X	X	5.10E-07	2.23E-06	24-hour	N/A	No
Molybdenum (soluble)		X	2.16E-06	9.45E-06	24-hour	3.33E-01	No
Nickel	X	X	1.72E-05	6.15E-05	Annual	2.70E-05	No
Phosphorus	X	X	5.46E-04	1.72E-04	24-hour	7.00E-03	No
Selenium	X	X	2.71E-05	1.15E-05	24-hour	1.30E-02	No
Vanadium		X	4.51E-06	1.98E-05	24-hour	3.00E-03	No
Zinc		X	5.69E-05	2.49E-04	24-hour	6.67E-01	No
Chromium VI	X	X	2.60E-06	1.14E-05	Annual	5.60E-07	Yes
Non PAH Organic Compunds							
Pentane		X	3.14E-03	1.37E-02	24-hour	118	No
Methyl Ethyl Ketone		X	0.00E+00	0.00E+00	24-hour	39.3	No
Non-PAH HAPs							
Acetaldehyde	X	X	0.00E+00	0.00E+00	Annual	3.00E-03	No
Acrolein	X	X	0.00E+00	0.00E+00	24-hour	1.70E-02	No
Benzene	X	X	4.12E-06	4.12E-06	Annual	8.00E-04	No
1,3 - Butadiene	X	X	0.00E+00	0.00E+00	Annual	2.40E-05	No
Ethyl Benzene	X	X	0.00E+00	0.00E+00	24-hour	29	No
Formaldehyde	X	X	1.47E-04	1.47E-04	Annual	5.10E-04	No
Hexane	X	X	3.53E-03	1.55E-02	24-hour	12	No
Isooctane	X		0.00E+00	0.00E+00	N/A	N/A	N/A
Methyl Chloroform	X	X	0.00E+00	0.00E+00	24-hour	127	No
Propionaldehyde	X	X	0.00E+00	0.00E+00	24-hour	2.87E-02	No
Quinone	X	X	0.00E+00	0.00E+00	24-hour	2.70E-02	No
Toluene	X	X	6.67E-06	2.92E-05	24-hour	25	No
o-Xylene	X	X	0.00E+00	0.00E+00	24-hour	29	No
PAH HAPs							
2-Methylnaphthalene	X	X	4.71E-08	4.71E-08	Annual	9.10E-05	No
3-Methylcholanthrene	X	X	3.53E-09	3.53E-09	Annual	2.50E-06	No
7,12-Dimethylbenz(a)anthracene	X		3.14E-08	1.37E-07	N/A	N/A	N/A
Acenaphthene	X	X	3.53E-09	3.53E-09	Annual	9.10E-05	No
Acenaphthylene	X	X	3.53E-09	3.53E-09	Annual	9.10E-05	No
Anthracene	X	X	4.71E-09	4.71E-09	Annual	9.10E-05	No
Benzo(a)anthracene	X	X	3.53E-09	3.53E-09	Annual	9.10E-05	No
Benzo(a)pyrene	X	X	2.35E-09	2.35E-09	Annual	2.00E-06	No

Benzo(b)fluoranthene	X	X	**3.53E-09**	**3.53E-09**	Annual	2.00E-06	**No**
Benzo(e)pyrene	X	X	**0.00E+00**	**0.00E+00**	Annual	2.00E-06	**No**
Benzo(g,h,i)perylene	X	X	**2.35E-09**	**2.35E-09**	Annual	9.10E-05	**No**
Benzo(k)fluoranthene	X	X	**3.53E-09**	**3.53E-09**	Annual	2.00E-06	**No**
Chrysene	X	X	**3.53E-09**	**3.53E-09**	Annual	2.00E-06	**No**
Dibenzo(a,h)anthracene	X	X	**2.35E-09**	**2.35E-09**	Annual	2.00E-06	**No**
Dichlorobenzene	X	X	**2.35E-06**	**2.35E-06**	Annual	9.10E-05	**No**
Fluoranthene	X	X	**5.88E-09**	**5.88E-09**	Annual	9.10E-05	**No**
Fluorene	X	X	**5.49E-09**	**5.49E-09**	Annual	9.10E-05	**No**
Indeno(1,2,3-cd)pyrene	X	X	**3.53E-09**	**3.53E-09**	Annual	2.00E-06	**No**
Naphthalene (24-hour)	X	X	**4.37E-04**	**1.91E-03**	24-hour	3.33	**No**
Naphthalene (Annual)	X	X	**1.20E-06**	**1.20E-06**	Annual	9.10E-05	**No**
Perylene	X		**0.00E+00**	**0.00E+00**	N/A	N/A	**N/A**
Phenanathrene	X	X	**3.33E-08**	**3.33E-08**	Annual	9.10E-05	**No**
Pyrene	X	X	**9.80E-09**	**9.80E-09**	Annual	9.10E-05	**No**
PAH HAPs Total	X	X	**2.24E-08**		Annual	2.00E-06	**No**
Polycyclic Organic Matter (POM)	X	X	**2.24E-08**	**2.24E-08**	Annual	2.00E-06	**No**

Uncontrolled Criteria Pollutants

Source	PM10/PM2.5		SO2		Nox		CO		VOC	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Concrete Batch Plat	7.22E-02	3.16E-01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Heater #1	1.49E-02	6.53E-02	1.18E-03	5.15E-03	1.96E-01	8.59E-01	1.65E-01	7.21E-01	1.08E-02	4.72E-02
Water Heater #2	1.75E-02	7.66E-02	3.23E-02	1.42E-01	3.28E-01	1.44E+00	1.84E-01	8.04E-01	2.40E-02	1.05E-01
Small Diesel Engine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Large Diesel Engine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		1.42E-01		1.47E-01		2.29E+00		1.53E+00		1.53E-01

Note: The emissions from the transfer drop points are the emissions from the material handling

Facility: Knife River Corporation - Northwest
4/24/2018 14:44 **Permit** P-2018.0020 Project 62015 **Facility ID:** 019-00102

Internal Combustion Engine > 600 hp (447 kW)

Fuel Type Toggle =	0	
Fuel Consumption Rate	0.00	gal/hr
Calculated MMBtu/hr	0.00	MMBtu/hr
Max Daily Operation	0	hr/day
Max Annual Operation	0	hrs/yr

Rated Power of Large (hp):	0
Not EPA Certified:	No
Certified EPA Tier 1:	No
Certified EPA Tier 2:	No
Certified EPA Tier 3:	No
Certified EPA Tier 4:	No
Blue Sky Engine:	No

Small Internal Combustion Engine #1 < 600 hp (447 kW)

Fuel Type Toggle =	0	
Fuel Consumption Rate	0.00	gal/hr
Calculated MMBtu/hr	0.00	MMBtu/hr
Max Daily Operation	24	hr/day
Max Annual Operation	0	hrs/yr

Rated Power of Small #1 (hp):	0
Not EPA Certified:	No
Certified EPA Tier 1:	No
Certified EPA Tier 2:	No
Certified EPA Tier 3:	No
Certified EPA Tier 4:	No
Blue Sky Engine:	No

Small Internal Combustion Engine #2 < 600 hp (447 kW)

Fuel Type Toggle =	0	
Fuel Consumption Rate	0.00	gal/hr
Calculated MMBtu/hr	0.00	MMBtu/hr
Max Daily Operation	24	hr/day
Max Annual Operation	0	hrs/yr

Rated Power of Small #2 (hp):	0
Not EPA Certified:	No
Certified EPA Tier 1:	No
Certified EPA Tier 2:	No
Certified EPA Tier 3:	No
Certified EPA Tier 4:	No
Blue Sky Engine:	No

Conversion Factors:

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

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

Pollutant:	NOx	VOC (total TOC--> VOCs)		CO	PM=PM10
EMISSION FACTORS USED FOR SMALL ENGINE (lb/MMBtu):	0.00	0.00		0.00	0.000
Pollutant:	**NOx**	**VOC (total TOC--> VOCs)**		**CO**	**PM=PM10**
EMISSION FACTORS USED FOR LARGE ENGINE (lb/MMBtu):	0.00	0.00		0.00	0.000

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

Pollutant:	NOx	VOC (total TOC--> VOCs)		CO	PM10
Emission Factor (lb/MMBtu)	0	0		0.00	0
Emission Factor (g/kW-hr))	0.00	0.00		0.00	0.00

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

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

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

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

Rated Power (kW)	Tier	Applicable?	Model Year[1]	NOx	HC	NMHC + NOx	CO	PM = PM10
kW < 8	1	0	2000	0.0	*0.36*	2.47	1.88	0.23
kW < 8	2	0	2005	0.00	*0.36*	1.76	1.88	0.19
kW < 8	4	0	2008	0.00	*0.36*	1.76	1.88	0.09
kW < 8	BlueSky	0	n/a	0.00	*0.36*	1.08	1.88	0.11
8 ≤ kW < 19	1	0	2000	0.00	*0.36*	2.23	1.55	0.19
8 ≤ kW < 19	2	0	2005	0.00	*0.36*	1.76	1.55	0.19
8 ≤ kW < 19	4	0	2008	0.00	*0.36*	1.76	1.55	0.09
8 ≤ kW < 19	BlueSky	0	n/a	0.00	*0.36*	1.06	1.55	0.11
19 ≤ kW < 37	1	0	1999	0.00	*0.36*	2.23	1.29	0.19
19 ≤ kW < 37	2	0	2004	0.00	*0.36*	1.76	1.29	0.14
19 ≤ kW < 37	4	0	2008	0.00	*0.36*	1.10	1.29	0.007
19 ≤ kW < 37	BlueSky	0	n/a	0.00	*0.36*	1.06	1.29	0.085
37 ≤ kW < 75	1	0	1998	2.16	*0.36*	0.00	---	---
37 ≤ kW < 75	2	0	2004	0.00	*0.36*	1.76	1.17	0.09
37 ≤ kW < 75	3	0	2008	0.00	*0.36*	1.10	1.17	0.09
37 ≤ kW < 75	4	0	2008	0.00	*0.36*	1.10	1.17	0.007
37 ≤ kW < 75	BlueSky	0	n/a	0.00	*0.36*	1.10	1.17	0.056
75 ≤ kW < 130	1	0	1997	2.16	*0.36*	0.00	---	---
75 ≤ kW < 130	2	0	2003	0.00	*0.36*	1.55	1.17	0.07
75 ≤ kW < 130	3	0	2007	0.00	*0.36*	0.94	1.17	0.07
75 ≤ kW < 130	4	0	2008	0.09	0.04	0.00	1.17	0.005
75 ≤ kW < 130	BlueSky	0	n/a	0.00	*0.36*	0.94	1.17	0.042
130 ≤ kW < 225	1	0	1996	2.16	0.31	0.00	2.68	0.13
130 ≤ kW < 225	2	0	2003	0.00	0.31	1.55	0.82	0.05
130 ≤ kW < 225	3	0	2006	0.00	0.31	0.94	0.82	0.05
130 ≤ kW < 560	4	0	2008	0.09	0.04	0.00	0.82	0.005
130 ≤ kW ≤ 560	BlueSky	0	n/a	0.00	0.31	0.94	0.82	0.028
225 ≤ kW < 450	1	0	1996	2.16	0.31	0.00	2.68	0.13
225 ≤ kW < 450	2	0	2001	0.00	0.31	1.50	0.82	0.05
225 ≤ kW < 450	3	0	2006	0.00	0.31	0.94	0.82	0.05
450 ≤ kW ≤ 560	1	0	1996	2.16	0.31	0.00	2.68	0.13
450 ≤ kW ≤ 560	2	0	2002	*0.00*	0.31	1.50	0.82	0.05
450 ≤ kW ≤ 560	3	0	2006	0.00	0.31	0.94	0.82	0.05
kW > 560	1	0	2000	2.16	0.31	0.00	2.68	0.13
kW > 560	2	0	2006	0.00	0.31	1.50	0.82	0.05
kW > 560	BlueSky	0	n/a	0.00	0.31	0.89	0.82	0.028

40 CFR 89 and 1039, EPA CERTIFIED GENERATOR EMISSION FACTORS FOR LARGE ENGINE (lb/MMBtu)

Rated Power (kW)	Tier	Applicable?	Model Year[1]	NOx	HC	NMHC + NOx	CO	PM10
kW< 8	1	0	2000	0.00	0.00	0.00	0.00	0.00
kW< 8	2	0	2005	0.00	0.00	0.00	0.00	0.00
kW< 8	4	0	2008	0.00	0.00	0.00	0.00	0.00
kW< 8	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
8 ≤ kW < 19	1	0	2000	0.00	0.00	0.00	0.00	0.00
8 ≤ kW < 19	2	0	2005	0.00	0.00	0.00	0.00	0.00
8 ≤ kW < 19	4	0	2008	0.00	0.00	0.00	0.00	0.00
8 ≤ kW < 19	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
19 ≤ kW < 37	1	0	1999	0.00	0.00	0.00	0.00	0.00
19 ≤ kW < 37	2	0	2004	0.00	0.00	0.00	0.00	0.00
19 ≤ kW < 37	4	0	2008	0.00	0.00	0.00	0.00	0.00
19 ≤ kW < 37	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	1	0	1998	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	2	0	2004	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	3	0	2008	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	4	0	2008	0.00	0.00	0.00	0.00	0.00
37 ≤ kW < 75	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	1	0	1997	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	2	0	2003	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	3	0	2007	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	4	0	2008	0.00	0.00	0.00	0.00	0.00
75 ≤ kW < 130	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
130 ≤ kW < 225	1	0	1996	0.00	0.00	0.00	0.00	0.00
130 ≤ kW < 225	2	0	2003	0.00	0.00	0.00	0.00	0.00
130 ≤ kW < 225	3	0	2006	0.00	0.00	0.00	0.00	0.00
130 ≤ kW < 560	4	0	2008	0.00	0.00	0.00	0.00	0.00
130 ≤ kW ≤ 560	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00
225 ≤ kW < 450	1	0	1996	0.00	0.00	0.00	0.00	0.00
225 ≤ kW < 450	2	0	2001	0.00	0.00	0.00	0.00	0.00
225 ≤ kW < 450	3	0	2006	0.00	0.00	0.00	0.00	0.00
450 ≤ kW ≤ 560	1	0	1996	0.00	0.00	0.00	0.00	0.00
450 ≤ kW ≤ 560	2	0	2002	0.00	0.00	0.00	0.00	0.00
450 ≤ kW ≤ 560	3	0	2006	0.00	0.00	0.00	0.00	0.00
kW > 560	1	0	2000	0.00	0.00	0.00	0.00	0.00
kW > 560	2	0	2006	0.00	0.00	0.00	0.00	0.00
kW > 560	BlueSky	0	n/a	0.00	0.00	0.00	0.00	0.00

APPENDIX B – AMBIENT AIR QUALITY IMPACT ANALYSES

MEMORANDUM DRAFT

DATE: March 12, 2018

TO: Christina Boulay, Permit Writer, Air Program

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

PROJECT: P-2018.0020 PROJ 62015, Permit to Construct for Knife River Corporation – Northwest Concrete Batch Plant, located near Idaho Falls, Idaho

SUBJECT: Demonstration of Compliance with IDAPA 58.01.01.203.02 (NAAQS) and 203.03 (TAPs) as it relates to air quality impact analyses.

Contents

Acronyms, Units, and Chemical Nomenclature

AAC	Acceptable Ambient Concentration of a non-carcinogenic TAP
AACC	Acceptable Ambient Concentration of a Carcinogenic TAP
acfm	Actual cubic feet per minute
AERMAP	The terrain data preprocessor for AERMOD
AERMET	The meteorological data preprocessor for AERMOD
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
Appendix W	40 CFR 51, Appendix W – Guideline on Air Quality Models
As	Arsenic
BPIP	Building Profile Input Program
BRC	Below Regulatory Concern
CBP	Concrete Batch Plant
CFR	Code of Federal Regulations
CMAQ	Community Multi-Scale Air Quality Modeling System
CO	Carbon Monoxide
Cr6+	Hexavalent Chromium
DEM	Digital Elevation Map
DEQ	Idaho Department of Environmental Quality
EL	Emissions Screening Level of a TAP
EPA	United States Environmental Protection Agency
GEP	Good Engineering Practice
hr	hours
Idaho Air Rules	Rules for the Control of Air Pollution in Idaho, located in the Idaho Administrative Procedures Act 58.01.01
ISCST3	Industrial Source Complex Short Term 3 dispersion model
K	Kelvin
Knife River	Knife River Corporation – Northwest
m	Meters
m/sec	Meters per second
MMBtu	Million British Thermal Units
NAAQS	National Ambient Air Quality Standards
NO	Nitrogen Oxide
NO_2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
NWS	National Weather Service
O_3	Ozone
Pb	Lead
PM_{10}	Particulate matter with an aerodynamic particle diameter less than or equal to a nominal 10 micrometers
$PM_{2.5}$	Particulate matter with an aerodynamic particle diameter less than or equal to a nominal 2.5 micrometers
ppb	parts per million
PRIME	Plume Rise Model Enhancement
PTC	Permit to Construct

PTE	Potential to Emit
SIL	Significant Impact Level
SO_2	Sulfur Dioxide
TAP	Toxic Air Pollutant
tpy	tons per year
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VOC	Volatile Organic Compounds
$\mu g/m^3$	Micrograms per cubic meter of air

1.0 Summary

Knife River Corporation – Northwest (Knife River) submitted a Permit to Construct (PTC) application for a proposed stationary concrete batch plant (CBP), located at a site near Idaho Falls, Idaho. Idaho Administrative Procedures Act 58.01.01.203.02 and 203.03 (Idaho Air Rules Section 203.02 and 203.03) requires that no permit be issued unless it is demonstrated that applicable emissions do not result in violation of a National Ambient Air Quality Standard (NAAQS) or Toxic Air Pollutant (TAP) increment. Emissions of criteria pollutants were below levels defined as Below Regulatory Concern (BRC), so no NAAQS compliance demonstrations were required for permit issuance. Emissions of some TAPs exceeded specific screening Emissions Levels (ELs), and associated air impact analyses were performed to demonstrate compliance with TAP increments. This memorandum provides a summary of the applicability assessment for analyses and air impact analyses used to demonstrate compliance with applicable NAAQS and TAP increments, as required by Idaho Air Rules Section 203.02 and 203.03.

DEQ review of submitted data and DEQ analyses summarized by this memorandum addressed only the rules, policies, methods, and data pertaining to the air impact analyses used to demonstrate that estimated emissions associated with operation of the facility will not cause or significantly contribute to a violation of any applicable air quality standard. This review did not address/evaluate compliance with other rules or analyses not pertaining to the air impact analyses. Evaluation of emissions estimates was the responsibility of the DEQ permit writer and is addressed in the main body of the DEQ Statement of Basis, and emissions calculation methods were not evaluated in this modeling review memorandum.

Table 1 presents key assumptions and results to be considered in the development of the permit. Idaho Air Rules require air impact analyses be conducted in accordance with methods outlined in 40 CFR 51, Appendix W *Guideline on Air Quality Models* (Appendix W). Appendix W requires that air quality impacts be assessed using atmospheric dispersion models with emissions and operations representative of design capacity or as limited by a federally enforceable permit condition.

The submitted information and DEQ analyses: 1) showed either a) that estimated potential/allowable emissions are at a level defined as BRC and do not require a NAAQS compliance demonstration, or b) that criteria pollutant emissions increases resulting from the proposed project are below site-specific modeling applicability thresholds, developed to assure that emissions below such levels will not result in ambient air impacts exceeding Significant Impact Levels (SILs); 2) showed that TAP emissions increases associated with the project will not result in increased emissions above ELs or ambient air impacts exceeding allowable TAP increments. This conclusion assumes that conditions in Table 1 are representative of facility design capacity or operations as limited by a federally enforceable permit condition. The DEQ permit writer should use Table 1 and other information presented in this memorandum to generate appropriate permit provisions/restrictions to assure the requirements of Appendix W are met regarding emissions representative of design capacity or permit allowable rates.

Summary of Submittals and Actions

- February 20, 2018: Application received by DEQ.
- March 12, 2018: Application determined complete by DEQ.

Table 1. KEY ASSUMPTIONS USED IN MODELING ANALYSES	
Criteria/Assumption/Result	**Explanation/Consideration**
General Emissions Rates. Total non-fugitive allowable emissions rates of all criteria pollutants are below levels defined as BRC.	A NAAQS compliance demonstration would be required for any criteria pollutant emissions above BRC levels.
TAP Emissions Sources. Allowable emissions of TAPs other than arsenic (As) and hexavalent chromium (Cr^{6+}) are below ELs.	A TAP increment compliance demonstration would be required for any other TAPs with emissions above ELs.
Location of CBP on the Site. The submitted information indicated the CBP would be located in the north-central area of the site, about 90 meters from the northern site boundary. At this location, impacts of arsenic (As) were at 99 percent of the Acceptable Ambient Concentration of a Carcinogen (AACC).	Compliance with TAP increments is not assured if the CBP is operated at a different location at the site than what was indicated on the plot plan submitted with the application. Impacts are highly dependent on the distance between the emissions source and the site boundary. The truck loadout source must not be closer than 90 meters (300 feet) from the northern boundary. Modeling also showed that the plant must not be closer than 150 meters (490 feet) from the nearest point of public access south of the plant (assumed to be the physical extent of the pit where the plant is located).
Public Access Exclusion. Public (anyone not under the control of the permittee) access is legally and effectively precluded from areas inside the ambient air boundary.	The boundary of the dairy was used as the ambient air boundary. Compliance with TAP increments is only assured if public access is precluded from areas inside this boundary. Roadways accessible by those not associated with the plant are considered as ambient air.

2.0 Background Information

This section provides background information applicable to the project and the site proposed for the facility. It also provides a brief description of the applicable air impact analyses requirements for the project.

2.1 Project Description

The proposed Knife River facility is a stationary concrete batch plant (CBP) to be located a site near Idaho Falls, Idaho. Pollutant-emitting processes conducted at the CBP will include material handling of cement and aggregate and combustion of natural gas or propane in a water heater. The PTC addresses all air pollutant emitting activities associated with the CBP.

2.2 Proposed Location and Area Classification

The facility is proposed for a location near Idaho Falls, Idaho, within Bonneville county. This area is designated as an attainment or unclassifiable area for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), lead (Pb), ozone (O_3), particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}), and particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$). The area is not classified as non-attainment for any criteria pollutants.

2.3 Air Impact Analyses Required for All Permits to Construct

Idaho Air Rules Sections 203.02 and 203.03:

> *No permit to construct shall be granted for a new or modified stationary source unless the applicant shows to the satisfaction of the Department all of the following:*

02. NAAQS. *The stationary source or modification would not cause or significantly contribute to a violation of any ambient air quality standard.*

03. Toxic Air Pollutants. *Using the methods provided in Section 210, the emissions of toxic air pollutants from the stationary source or modification would not injure or unreasonably affect human or animal life or vegetation as required by Section 161. Compliance with all applicable toxic air pollutant carcinogenic increments and toxic air pollutant non-carcinogenic increments will also demonstrate preconstruction compliance with Section 161 with regards to the pollutants listed in Sections 585 and 586.*

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

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

2.4 Significant Impact Level and Cumulative NAAQS Impact Analyses

If specific criteria pollutant increases associated with the proposed permitting project cannot qualify for a BRC exemption as per Idaho Air Rules Section 221, then the permit cannot be issued unless the application demonstrates that applicable emissions increases will not cause or significantly contribute to a violation of NAAQS, as required by Idaho Air Rules Section 203.02.

The first phase of a NAAQS compliance demonstration is to evaluate whether the proposed facility/project could have a significant impact to ambient air. Section 3.1.1 of this memorandum describes the applicability evaluation of Idaho Air Rules Section 203.02. The Significant Impact Level (SIL) analysis for a new facility or proposed modification to a facility involves modeling estimated criteria air pollutant emissions from the facility or modification to determine the potential impacts to ambient air. Air impact analyses are required by Idaho Air Rules to be conducted in accordance with methods outlined in 40 CFR 51, Appendix W (Guideline on Air Quality Models). Appendix W requires that facilities be modeled using emissions and operations representative of design capacity or as limited by a federally enforceable permit condition.

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

If modeled maximum pollutant impacts to ambient air from the emissions sources associated with a new facility or modification exceed the SILs, 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 assessing ambient impacts (typically the design values consistent with the form of the standard) from facility-wide potential/allowable emissions, and emissions from any nearby co-contributing sources, and then adding a DEQ-approved background concentration value to the modeled result that is appropriate for the criteria pollutant/averaging-period at the facility location and the area of significant impact. The resulting pollutant concentrations in ambient air are then compared to the NAAQS listed in Table 2. Table 2 also

lists SILs and specifies the modeled design value that must be used for comparison to the NAAQS. NAAQS compliance is evaluated on a receptor-by-receptor basis for the modeling domain.

If the cumulative NAAQS impact analysis indicates a violation of the standard, the permit may not be issued if the proposed project has a significant contribution (exceeding the SIL) to the modeled violation. If project-specific impacts are below the SIL, then the project does not have a significant contribution to the specific violations.

Table 2. APPLICABLE REGULATORY LIMITS

Pollutant	Averaging Period	Significant Impact Levels[a] ($\mu g/m^3$)[b]	Regulatory Limit[c] ($\mu g/m^3$)	Modeled Design Value Used[d]
PM_{10}[e]	24-hour	5.0	150[f]	Maximum 6th highest[g]
$PM_{2.5}$[h]	24-hour	1.2	35[i]	Mean of maximum 8th highest[j]
	Annual	0.3	12[k]	Mean of maximum 1st highest[l]
Carbon monoxide (CO)	1-hour	2,000	40,000[m]	Maximum 2nd highest[n]
	8-hour	500	10,000[m]	Maximum 2nd highest[n]
Sulfur Dioxide (SO_2)	1-hour	3 ppb[o] (7.8 $\mu g/m^3$)	75 ppb[p] (196 $\mu g/m^3$)	Mean of maximum 4th highest[q]
	3-hour	25	1,300[m]	Maximum 2nd highest[n]
	24-hour	5	365[m]	Maximum 2nd highest[n]
	Annual	1.0	80[r]	Maximum 1st highest[n]
Nitrogen Dioxide (NO_2)	1-hour	4 ppb (7.5 $\mu g/m^3$)	100 ppb[s] (188 $\mu g/m^3$)	Mean of maximum 8th highest[t]
	Annual	1.0	100[r]	Maximum 1st highest[n]
Lead (Pb)	3-month[u]	NA	0.15[r]	Maximum 1st highest[n]
	Quarterly	NA	1.5[r]	Maximum 1st highest[n]
Ozone (O_3)	8-hour	40 TPY VOC[v]	70 ppb[w]	Not typically modeled

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

Compliance with Idaho Air Rules Section 203.02 is generally demonstrated if: a) applicable specific criteria pollutant emissions increases are at a level defined as BRC, using the criteria established by DEQ regulatory interpretation[1]; or b) all modeled impacts of the SIL analysis are below the applicable SIL or other level determined to be inconsequential to NAAQS compliance; or c) modeled design values of the cumulative NAAQS impact analysis (modeling all emissions from the facility and co-contributing sources, and adding a background concentration) are less than applicable NAAQS at receptors where impacts from the proposed facility/modification exceeded the SIL or other identified level of consequence; or d) if the cumulative NAAQS analysis showed NAAQS violations, the impact of proposed facility/modification to any modeled violation was inconsequential (typically assumed to be less than the established SIL) for that specific receptor and for the specific modeled time when the violation occurred.

2.5 *Toxic Air Pollutant Analyses*

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

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

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

> *Using the methods provided in Section 210, the emissions of toxic air pollutants from the stationary source or modification would not injure or unreasonably affect human or animal life or vegetation as required by Section 161. Compliance with all applicable toxic air pollutant carcinogenic increments and toxic air pollutant non-carcinogenic increments will also demonstrate preconstruction compliance with Section 161 with regards to the pollutants listed in Sections 585 and 586.*

Per Section 210, if the total project-wide emissions increase of any TAP associated with a new source or modification exceeds screening emission levels (ELs) of Idaho Air Rules Section 585 or 586, then the ambient impact of the emissions increase must be estimated. If ambient impacts are less than applicable Acceptable Ambient Concentrations (AACs) for non-carcinogens of Idaho Air Rules Section 585 and Acceptable Ambient Concentrations for Carcinogens (AACCs) of Idaho Air Rules Section 586, then compliance with TAP requirements has been demonstrated.

Idaho Air Rules Section 210.20 states that if TAP emissions from a specific source are regulated by the Department or EPA under 40 CFR 60, 61, or 63, then a TAP impact analysis under Section 210 is not required for that TAP. The DEQ permit writer evaluates the applicability of specific TAPs to the Section 210.20 exclusion.

3.0 Analytical Methods and Data

This section describes the methods and data used in analyses to demonstrate compliance with applicable air quality impact requirements. The DEQ Statement of Basis provides a discussion of the methods and data used to estimate criteria and TAP emissions rates.

3.1 Emission Source Data

Emissions of criteria pollutants and TAPs resulting from operation of the Knife River CBP were calculated by DEQ for various applicable averaging periods. The calculation of potential emissions is the responsibility of the DEQ permit writer, and the representativeness and accuracy of emissions estimates is not addressed in this modeling memorandum. DEQ air impact analysts are responsible for assuring that potential emissions rates provided in the emissions inventory are properly used in the model. The rates listed must represent the maximum allowable rate as averaged over the specified period.

Emissions rates used in the dispersion modeling analyses, as listed in this memorandum, should be reviewed by the DEQ permit writer and compared with those in the final emissions inventory. All modeled criteria air pollutant and TAP emissions rates must be equal to or greater than the facility's potential emissions calculated in the PTC emissions inventory or proposed permit allowable emissions rates.

3.1.1 Modeling Applicability and Modeled Criteria Pollutant Emissions Rates

If project-specific emission increases for criteria pollutants would qualify for a below regulatory concern (BRC) permit exemption as per Idaho Air Rules Section 221 if it were not for potential emissions of one or more pollutants exceeding the BRC threshold of 10 percent of emissions defined by Idaho Air Rules as significant, then a NAAQS compliance demonstration may not be required for those pollutants with emissions below BRC levels. DEQ's regulatory interpretation policy of exemption provisions of Idaho Air Rules is that: "A DEQ NAAQS compliance assertion will not be made by the DEQ modeling group for specific criteria pollutants having a project emissions increase below BRC levels, provided the proposed project would have qualified for a Category I Exemption for BRC emissions quantities except for the emissions of another criteria pollutant.[1]" The interpretation policy also states that the exemption criteria of uncontrolled potential to emit (PTE) not to exceed 100 ton/year (Idaho Air Rules Section 220.01.a.i) is not applicable when evaluating whether a NAAQS impact analyses is required. A permit will be issued limiting PTE below 100 ton/year, thereby negating the need to maintain calculated uncontrolled PTE under 100 ton/year. The BRC exemption cannot be used to exempt a project from a pollutant-specific NAAQS compliance demonstration in most cases where a PTC is required for the action regardless of emissions quantities, such as the modification of an existing emissions or throughput limit.

A NAAQS compliance demonstration must be performed for pollutant increases that would not qualify for the BRC exemption from the requirement to demonstrate compliance with NAAQS. The Knife River CBP emissions inventory indicates that facility-wide controlled PTE emissions of specific non-fugitive criteria pollutants are below BRC levels, as listed in Table 3. Only non-fugitive emissions are considered in permit applicability (as specified in the definition of Stationary Source in Idaho Air Rules Section 006.121) and, correspondingly, in the applicability of NAAQS compliance demonstration requirements. Emissions from truck loadout, which are controlled by a boot/shroud and water ring, are considered as fugitive and were excluded from the BRC calculation. Therefore, emissions from cement storage silo filling, fly ash storage silo filling, the weigh hopper loading baghouse, and the water heater were the only emission sources considered in the evaluation of whether a NAAQS compliance demonstration is required for permit issuance. This inventory was based on the requested annual concrete production of 150,000 yard^3/year.

Table 3. CRITERIA POLLUTANT NAAQS COMPLIANCE DEMONSTRATION APPLICABILITY			
Criteria Pollutant	**BRC Level (ton/year)**	**Applicable Facility Wide PTE Emissions (ton/year)**	**Air Impact Analyses Required?**
PM_{10}[a]	1.5	<0.5	No
$PM_{2.5}$[b]	1.0	<0.3	No
Carbon Monoxide (CO)	10.0	<2.0	No
Sulfur Dioxide (SO_2)	4.0	<0.3	No
Nitrogen Oxides (NOx)	4.0	<3.0	No
Lead (Pb)	0.06	<0.03	No
Volatile Organic Compounds (VOCs)	4.0	<0.2	No

[a] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
[b] Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.

Site-specific air impact modeling analyses may not be necessary for some pollutants, even where such emissions do not qualify for the BRC exemption. DEQ has developed modeling applicability thresholds, below which a site-specific modeling analysis is not required. DEQ generic air impact modeling analyses that were used to develop the modeling thresholds provide a conservative SIL analysis for projects with emissions below identified threshold levels. Project-specific modeling applicability thresholds are provided in the *Idaho Air Modeling Guideline*[2]. These thresholds were based on assuring an ambient impact of less than the established SIL for specific pollutants and averaging periods.

If project-specific total emissions rate increases of a pollutant are below Level I Modeling Applicability Thresholds, then project-specific air impact analyses are not necessary for permitting. Use of Level II Modeling Applicability Thresholds are conditional, requiring DEQ approval. DEQ approval is based on dispersion-affecting characteristics of the emissions sources such as stack height, stack gas exit velocity, stack gas temperature, distance from sources to ambient air, presence of elevated terrain, and potential exposure to sensitive public receptors.

DEQ analyses performed by the permit writer concluded that facility-wide emissions of all criteria pollutants were below BRC thresholds at the originally requested production limit of 150,000 $yard^3$/year concrete production level, and a NAAQS compliance demonstration was therefore not required for permit issuance. A comparison of emissions with modeling applicability thresholds was not necessary since NAAQS compliance demonstrations were not required by Idaho Air Rules Section 203.02.

Ozone (O_3) differs from other criteria pollutants in that it is not typically emitted directly into the atmosphere. O_3 is formed in the atmosphere through reactions of VOCs, NOx, and sunlight. Atmospheric dispersion models used in stationary source air permitting analyses cannot be used to estimate O_3 impacts resulting from VOC and NOx emissions from an industrial facility. O_3 concentrations resulting from area-wide emissions are predicted by using more complex airshed models such as the Community Multi-Scale Air Quality (CMAQ) modeling system. Use of the CMAQ model is very resource intensive and DEQ asserts that performing a CMAQ analysis for a particular permit application is not typically a reasonable or necessary requirement for air quality permitting. Addressing secondary formation of O_3 within the context of permitting a new stationary source has been somewhat addressed in EPA regulation and policy. As stated in a letter from Gina McCarthy of EPA to Robert Ukeiley, acting on behalf of the Sierra Club (letter from Gina McCarthy, Assistant Administrator, United States Environmental Protection Agency, to Robert Ukeiley, January 4, 2012):

. . . footnote 1 to sections 51.166(I)(5)(I) of the EPA's regulations says the following: "No de minimis air quality level is provided for ozone. However, any net emission increase of 100 tons per year or more of volatile organic compounds or nitrogen oxides subject to PSD would be required to perform an ambient impact analysis, including the gathering of air quality data."

The EPA believes it unlikely a source emitting below these levels would contribute to such a violation of the 8-hour ozone NAAQS, but consultation with an EPA Regional Office should still be conducted in accordance with section 5.2.1.c. of Appendix W when reviewing an application for sources with emissions of these ozone precursors below 100 TPY."

DEQ determined it was not appropriate or necessary to require a quantitative source specific O_3 impact analysis because allowable emissions estimates of VOCs and NOx are below the 100 tons/year threshold. Additionally, both VOC and NOx emissions satisfied BRC exemption criteria.

3.1.2 Toxic Air Pollutant Emissions Rates

TAP emissions regulations under Idaho Air Rules Section 210 are only applicable for new or modified sources constructed after July 1, 1995. TAP compliance for the Knife River CBP was demonstrated on a facility-wide basis.

Facility-wide emissions of arsenic (As) and chromium 6+ (Cr6+) exceed the applicable emissions screening levels (ELs) of Idaho Air Rules Section 586. Air impact modeling analyses were then required to demonstrate that maximum impacts of As and Cr6+ are below applicable ambient increment standards expressed in Idaho Air Rules Section 585 and 586 as AACs and AACCs.

Emissions of As and CR6+ occur from the handling of both dry cement and any cement supplement such as fly ash. Trace quantities of As are also emitted from the natural gas combustion in the water heater. Emissions from the filling of storage silos are controlled by a filtration system and emissions from truck loadout are controlled by a shroud and water ring.

As and Cr6+ are carcinogenic TAPs that are regulated on a long-term averaging basis. Therefore, the appropriate emission rates for impact analyses are maximum annual emissions, expressed as an average pound/hour value over an 8,760-hour period.

Table 4 lists the TAP modeled emissions rates for As and Cr6+. Rates used in the model were increased by a factor of 1,000 to prevent truncation of small values in the model. Model output values were then divided by a factor of 1,000 to offset the increase in emissions (impacts are directly proportional to emissions).

Table 4. EMISSIONS RATES MODELED FOR TAP IMPACT ANALYSES

Source ID	Description	Annual Emission Rates (lb/hr[a])	
		Arsenic	Chromium 6+
SILO[b]	Cement storage silo filling	1.78E-8	2.44E-8
SUPSILO	Supplement storage silo filling	6.25E-7	2.29E-7
WATER	Water heater	1.50E-6	NA[b]
TRKLOUT	Truck loadout	1.18E-5	2.34E-6

a. Pounds per hour for listed averaging period.
b. No emissions listed.

3.1.3 Emissions Release Parameters

Table 5 lists emissions release parameters, including stack height, stack diameter, exhaust temperature, and exhaust velocity for emissions sources modeled in the air impact analyses. Equipment locations and release parameters were based on information provided by the applicant. Using the silo bin vent volumetric flow rate of 12,600 actual feet^3/minute (acfm) and an effective stack release diameter of 2.23 feet (square stack, 15.7 inches by 35.9 inches) as provided in the application, a stack exhaust flow velocity of 16.4 meters/second was calculated. The silo vents were modeled as a capped stack, thereby eliminating momentum induced plume rise. The vents were also modeled using an exhaust temperature of 0 Kelvin, which triggers the model to set the release temperature equal to the ambient air temperature. This eliminates thermal buoyancy of the plume. The accuracy of flow parameters (other than stack height) for these vents is not critical since they are modeled as a capped release at ambient temperature.

Emissions from truck loadout of dry concrete, fly ash, and aggregate were modeled as a volume source. The release height was set at 3.75 meters, the typical height of cement truck feed chutes. The initial horizontal dimension (σ_{yo}) was set at a value equal to the length of the source's side divided by 4.3, as directed by EPA guidance for AERMOD[3]. The length of side was set to 10 meters to represent the structure of the plant and any adjacent building, and σ_{yo} was calculated at 2.33 meters. The initial vertical dimension (σ_{zo}) was set at a value equal to the vertical extent of the source or the height of an adjacent building divided by 2.15, as directed by EPA guidance for AERMOD. The vertical extent was set at two times the release height or 7.5 meters, giving a σ_{zo} of 3.49 meters.

The heater exhaust release parameters of stack height, stack diameter, and exhaust temperature were provided by the applicant in the application forms. The flow velocity of 9.4 meters/second was calculated by assuming a conservative flow of 1,000 acfm for the exhaust.

Table 5. POINT SOURCE STACK PARAMETERS USED IN MODELING

Point Source Parameters

Release Point	Description	UTM[a] Coordinates		Stack Height (m)	Stack Gas Flow Temp. (K)[c]	Stack Flow Velocity (m/sec)[d]	Stack Dia. (m)
		Easting (m)[b]	Northing (m)				
SILO[e]	Cement storage silo filling	414509	4812482	17.4	0[f]	16.4	2.23
SUPSILO[e]	Supplement storage silo filling	414509	4812472	18.6	0[f]	16.4	2.23
WATER	Water heater	414519	4812482	3.0	444	9.4	0.83

Volume Source Parameters

Release Point	Description	UTM Coordinates		Release Height (m)	Int. Horz. Dimension σ_{yo}[g] (m)	Int. Vert. Dimension σ_{zo}[h] (m)
		Easting (m)[b]	Northing (m)[b]			
LOADOUT	Truck loadout	414514	4812477	3.75	2.33	3.49

a. Universal Transverse Mercator.
b. Meters.
c. Kelvin.
d. Meters per second.
e. The source was modeled as a capped stack.
f. Set to 0 to direct model to use a release temperature equal to the ambient air temperature specified in the meteorological data input file.
g. Initial horizontal dimension of plume.
h. Initial vertical dimension of plume.

The submitted application provided stack heights for the storage silo vents and the water heater stack. The submitted plot plan provided the general location of the proposed plant, but exact locations of the specific emission points at the site was not known. DEQ performed air impact modeling by using a generic layout that DEQ asserts reasonably represents the equipment configuration and will likely result in conservative estimates of impacts. A 10-meter square building, 10 meters tall, was used to represent structures at the plant and was positions on the site at the plant location indicated on the plot plan in the submitted application. The truck loadout source was positioned at the center of the building and the two silos and water heater stack were positioned at corners of the building. Since the truck loadout source overwhelmingly drives results of the analyses, positioning of the other sources relative to the truck loadout is rather inconsequential.

The distance between the truck loadout source and the nearest point of ambient air (area where public access is not precluded) is critical to results and assuring impacts are below AACCs. The results presented in Section 4 show that As impacts are at 99 percent of the AACC and the distance from the loadout source to the controlling modeled receptor is 90 meters (300 feet). There is substantially greater distance between the source and ambient air in other directions. Additional modeling showed that compliance with the AACC would not be assured for locations inside of 150 meters (490 feet) from the southern ambient air boundary. A 90-meter separation distance was demonstrated as adequate for the eastern and western boundaries.

3.2 Background Concentrations

Background concentrations are used if a cumulative NAAQS impact analysis is needed to demonstrate compliance with applicable NAAQS. Cumulative NAAQS analyses were not required for this project because emissions of all criteria pollutants were below levels defined as BRC, and as such, a NAAQS compliance demonstration was not required for these emissions.

3.3 Impact Modeling Methodology

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

3.3.1 General Overview of Impact Analyses

DEQ performed the project-specific air pollutant emissions inventory and air impact analyses based on information submitted from the applicant. The submitted information/analyses, in combination with results from DEQ's air impact analyses, demonstrate compliance with applicable air quality standards to DEQ's satisfaction, provided the facility is operated as described in the submitted application and in this memorandum.

Table 6 provides a brief description of parameters used in the modeling analyses.

3.3.2 Modeling Methodology

Project-specific modeling and other required impact analyses were generally conducted using data and methods described in the *Idaho Air Quality Modeling Guideline*[3].

Table 6. MODELING PARAMETERS		
Parameter	**Description/Values**	**Documentation/Addition Description**
General Facility Location	Idaho Falls, Idaho	The area is an attainment or unclassified area for all criteria pollutants.
Model	AERMOD	AERMOD with the PRIME downwash algorithm, version 16216r.
Meteorological Data	Idaho Falls surface data; Boise upper air data	See Section 3.3.4 of this memorandum for additional details of the meteorological data.
Terrain	Considered	Immediate area is effectively flat for dispersion effect consideration.
Building Downwash	Considered	There were no identified substantial structures that could cause plume downwash.
Receptor Grid	Grid 1	DEQ: 10-meter spacing along the property boundary out to 50 meters
	Grid 1	DEQ: 25-meter spacing along the property boundary out to 100 meters
	Grid 2	DEQ: 50-meter spacing out to 500 meters.
	Grid 3	DEQ: 100-meter spacing out to 1,000 meters.

3.3.3 Model Selection

Idaho Air Rules Section 202.02 requires that estimates of ambient concentrations be based on air quality models specified in Appendix W. 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 it includes more advanced algorithms to assess turbulent mixing processes in the planetary boundary layer for both convective and stable stratified layers.

AERMOD version 16216r was used by DEQ for the modeling analyses to evaluate impacts of the facility. This version was the current version at the time the application was received by DEQ.

3.3.4 Meteorological Data

DEQ used meteorological data collected at the National Weather Service (NWS) surface station KIDA, station ID 725785-24145. Raw data were downloaded from the NCDC website http://www.ncdc.noaa.gov in standard ISHD format for years 2012-2015. One-minute ASOS data in 6405 format were also downloaded in monthly files for 2012-2015. Upper air soundings from Boise, Idaho, Airport Station ID 24131 were downloaded from the http://www.ESRL.noaa.gov radiosonde data site in standard FSL format. DEQ determined these data were reasonably representative for the Knife River site near Idaho Falls, Idaho.

3.3.5 Effects of Terrain on Modeled Impacts

A National Elevation Dataset (NED) file, in "tif" format and NAD83 datum, was used to calculate elevations of receptors. The 1 arc second file provided 30-meter resolution of elevation data. The terrain preprocessor AERMAP version 11103 was used to extract the elevations from the NED file and assign them to receptors in the modeling domain in a format usable by AERMOD. AERMAP also determined the hill-height scale for each receptor. The hill-height scale is an elevation value based on the surrounding terrain which has the greatest effect on that individual receptor. AERMOD uses those heights to evaluate whether the emissions plume has sufficient energy to travel up and over the terrain or if the plume will travel around the terrain.

3.3.6 Facility Layout

The location of the Knife River CBP at the site facility, along with identification of the site ambient air boundary, was provided to DEQ by the applicant through an aerial photograph shown in Figure 1. DEQ used the submitted plot plan and aerial photographs on Google Earth, which uses the WGS84 datum, to establish model inputs of buildings, sources, and the ambient air boundary.

Figure 1: Site ambient air boundary and proposed position of the Knife River CBP.

3.3.7 Ambient Air Boundary

Ambient air is defined in Section 006 of the Idaho Air Rules as "that portion of the atmosphere, external to buildings, to which the general public has access." Ambient air was considered as areas external to the identified site boundary identified by Knife River and shown in Figure 1 above. To exclude areas of the site from consideration as ambient air, the permittee must have the legal and practical ability to control access to such areas of the site.

The plot plan submitted with the application included the agricultural fields south and east of the pit area as part of the site, thereby excluding them from what is considered ambient air. DEQ's impact analyses

did not exclude the agricultural fields from ambient air because it was uncertain whether Knife River could control access to these areas. Since compliance with the applicable TAPs increments could be demonstrated without excluding these areas from ambient air, resolution of this issue was not necessary.

3.3.8 Receptor Network

Table 6 describes the receptor grid used in the impact modeling analyses. The receptor grid used in DEQ's analyses met the minimum recommendations specified in the *Idaho Air Quality Modeling Guideline*[2] and DEQ determined that it was adequate to resolve maximum modeled impacts. A receptor grid extending out beyond 1,000 meters from the emissions sources was not necessary for these analyses because pollutants are emitted from relatively short stacks that will cause maximum impacts very close to the source, typically at or near the ambient air boundary. Also, the surrounding area is relatively free from complex terrain (terrain above stack height) that could cause a high ground-level impacts at a more distant location.

3.3.9 Good Engineering Practice Stack Height

An allowable good engineering practice (GEP) stack height may be established using the following equation in accordance with Idaho Air Rules Section 512.03.b:

$H = S + 1.5L$, where:

H = good engineering practice stack height measured from the ground-level elevation at the base of the stack.

S = height of the nearby structure(s) measured from the ground-level elevation at the base of the stack.

L = lesser dimension, height or projected width, of the nearby structure.

All Knife River CBP sources are below GEP stack height. Therefore, consideration of downwash caused by nearby buildings was required.

3.3.10 Effects of Building Downwash on Modeled Impacts

Potential downwash effects on emissions plumes were accounted for in the model by using building dimensions and locations (locations of building corners and building heights). A 10-meter-square building, 10 meters high, was used in the analysis to conservatively account for downwash. Dimensions and orientation of buildings were used as input to the Building Profile Input Program for the Plume Rise Model Enhancements downwash algorithm (BPIP-PRIME) to calculate direction-specific dimensions and Good Engineering Practice (GEP) stack height information for input to AERMOD. The primary source driving impacts in the analyses was the truck loadout, which was modeled as a volume source. Since downwash is not explicitly handled in AERMOD for volume sources, the accuracy of building parameters was not critical for model accuracy.

4.0 NAAQS and TAPs Impact Modeling Results

4.1 Results for NAAQS Analyses

A NAAQS impact analysis was not performed for the Knife River CBP facility. Idaho Air Rules Section 203.02, requiring air impact analyses demonstrating compliance with NAAQS, is not applicable to pollutants having project-emissions increase that are less than BRC levels, provided the project would have qualified for a BRC permitting exemption except for the emissions levels of another criteria pollutant exceeding the ton/year BRC threshold.

4.2 Results for TAPs Impact Analyses

Dispersion modeling was required to demonstrate compliance with TAP increments specified by Idaho Air Rules Section 585 and 586 for those TAPs with facility-wide emissions exceeding emissions screening levels (ELs). The results of the TAPs analyses are listed in Table 7. The predicted ambient TAPs impacts were below any TAPs increments for an allowable throughput of 150,000 yard^3/year of concrete produced.

Table 7. RESULTS OF TAPs ANALYSES

Toxic Air Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)[a]	AAC/AACC[b] ($\mu g/m^3$)	Percent of AAC/AACC
Carinogenic TAPs				
Arsenic	Annual	2.27E-4	2.3E-4	98.7
Chromium 6+	Annual	4.16E-5	8.3E-5	50

[a] Micrograms per cubic meter

[b] Acceptable ambient concentration for non-carcinogens/acceptable ambient concentration for carcinogens

5.0 Conclusions

The information submitted with the PTC application, combined with DEQ air impact analyses, demonstrated to DEQ's satisfaction that emissions from the IMC CBP facility will not cause or significantly contribute to a violation of any ambient air quality standard or TAP increment.

References

1. *Policy on NAAQS Compliance Demonstration Requirements.* Idaho Department of Environmental Quality Policy Memorandum. July 11, 2014.

2. State of Idaho Guideline for Performing Air Quality Impact Analyses. Idaho Department of Environmental Quality. September 2013. State of Idaho DEQ Air Doc. ID AQ-011. Available at http://www.deq.idaho.gov/media/1029/modeling-guideline.pdf.

3. *User's Guide for the AMS/EPA Regulatory Model – AERMOD.* U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Emissions Monitoring and Analysis Division. EPA-454/B-03-001. September 2004. (Section 3.3.2.2)

APPENDIX C – FACILITY DRAFT COMMENTS

The following comments were received from the facility on March, 2018:

Facility Comment: No Comments were received.

APPENDIX D – PROCESSING FEE

PTC Processing Fee Calculation Worksheet

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 Corporation - Northwest
Address: 4055 Professional Way
City: Idaho Falls
State: Idaho
Zip Code: 83402
Facility Contact: Keegan Hibbert
Title: Plant Manager
AIRS No.: 324121

Y	Does this facility qualify for a general permit (i.e. concrete batch plant, hot-mix asphalt plant)? Y/N
Y	Did this permit require engineering analysis? Y/N
N	Is this a PSD permit Y/N (IDAPA 58.01.01.205.04)

Emissions Inventory			
Pollutant	Annual Emissions Increase (T/yr)	Annual Emissions Reduction (T/yr)	Annual Emissions Change (T/yr)
NO_X	2.3	0	2.3
SO_2	0.1	0	0.1
CO	1.5	0	1.5
PM10	0.5	0	0.5
VOC	0.2	0	0.2
TAPS/HAPS	0.0	0	0.0
Total:	0.0	0	**4.6**
Fee Due	**$ 500.00**		

Comments: