Brad Broker
Sr. Env. Coord. - Air Quality

ConocoPhillips Alaska, Inc.
Env. Sustainability & Permitting
PO Box 100360
Anchorage AK 99510-0360
907-263-4874
AKAirPermittingCoord@Conocophillips.com

June 20, 2023

Submitted Electronically

ATTN: Permit Intake Clerk
Alaska Department of Environmental Conservation
Air Permit Program
555 Cordova Street
Anchorage, Alaska 99501
dec.aq.airreports@alaska.gov

Subject: Request for Air Quality Control Minor Source Specific (MSS) Permit for the ConocoPhillips Alaska, Inc. Willow Operations Center (WOC)

Dear Permit Intake Clerk:

ConocoPhillips Alaska, Inc. (CPAI) has enclosed with this letter an application for the construction and operation of the Willow Operations Center (WOC), which is located approximately 7 miles west-southwest of the Greater Mooses Tooth 2/Mooses Tooth 7 (GMT2/MT7) Drill Site and 24 miles west-southwest of the community of Nuiqsut. This permit application describes the construction, early operations, and permanent routine operations at the stationary source.

This application is being submitted under the following Alaska Department of Environmental Conservation (ADEC) Air Quality Control Regulations:

- **18 AAC 50.502(c)(1)** for a new minor stationary source with potential emissions greater than 40 tpy of NO_X, 15 tpy of PM_{10}, and 10 tpy of $PM_{2.5}$;
- **18 AAC 50.502(b)(3)** for a rock crusher with a rated capacity of at least five tons per hour; and
- **18 AAC 50.508(5)** for a source establishing an Owner Requested Limit (ORL) to avoid one or more permit classifications under Alaska Statutes (AS) 46.14.130.

Accordingly, this permit application contains the information required under 18 AAC 50.540(a), (b), (c), and (j), which is presented in the attachments enclosed with this letter.

We appreciate the Department's timely processing of this submittal. We also understand that CPAI will pay an hourly permit administrative fee for the regulatory services associated with our request for a minor permit. For billing to CPAI, pleases include the following on invoices:

Billing code: WCP.WLW.P002.DF95PM12
Reviewer: BROKEB
Approver: CPWROBE

If you have any questions or require additional information, please do not hesitate to contact me at (907) 263-4874 or AKAirPermittingCoord@Conocophillips.com.

Sincerely,

Brad Broker
Sr. Environmental Coordinator – Air Quality

Enclosures	Attachment A	Stationary Source Identification Form
	Attachment B	Project Description and Regulatory Review
	Attachment C	Emission Unit Information Form
	Attachment D	Emission Unit Information Supplementary Form
	Attachment E	Emissions Summary Form
	Attachment F	State Emission Standards Compliance Demonstration
	Attachment G	Ambient Air Quality Impact Analysis
	Attachment H	Emissions Calculations Spreadsheet (electronic)
	Attachment I	Modeling Files (electronic)

Electronic cc: Jesse Jack (jesse.jack@alaska.gov)
Grace Germain (grace.germain@alaska.gov)
Jim Plosay (jim.plosay@alaska.gov)

ATTACHMENT A
Stationary Source Identification Form

Alaska Department of Environmental Conservation
Air Quality Minor Permit Application

STATIONARY SOURCE IDENTIFICATION FORM

Section 1 Stationary Source Information

Name: Willow Operations Center (WOC)			SIC: 1311
Project Name (if different): WOC	Contact: Brad Broker		
Physical Address: Section 32, Township 9N, Range 1E	City: Anchorage	State: AK	Zip: 99510
	Telephone: (970) 263-4874		
	E-Mail Address: AkAirPermittingCoord@ConocoPhillips.com		
UTM Coordinates (m) or Latitude/Longitude:	Northing: 7782039.06	Easting: 538065.57	Zone: 5
	Latitude: N/A	Longitude: N/A	

Section 2 Legal Owner

Name: ConocoPhillips Alaska, Inc.		
Mailing Address: 700 G Street		
City: Anchorage	State: AK	Zip: 99501
Telephone #: N/A		
E-Mail Address: N/A		

Section 3 Operator *(if different from owner)*

Name: ConocoPhillips Alaska, Inc. (CPAI)		
Mailing Address: P.O. Box 100360		
City: Anchorage	State: AK	Zip: 99510-0360
Telephone #: N/A		
E-Mail Address: N/A		

Section 4 Designated Agent *(for service of process)*

Name: CT Corporation Systems		
Mailing Address: 9360 Glacier Highway, Suite 202		
City: Juneau	State: AK	Zip: 99801
Telephone #: (907) 586-3340		
E-Mail Address: N/A		

Section 5 Billing Contact Person *(if different from owner)*

Name: Brad Broker		
Mailing Address: P.O. Box 100360		
City: Anchorage	State: AK	Zip: 99510-0360
Telephone #: (907) 263-4874		
E-Mail Address: Brad.Broker@ConocoPhillips.com		

Section 6 Application Contact

Name: Brad Broker			
Mailing Address: P.O. Box 100360	City: Anchorage	State: AK	Zip: 99510-0360
	Telephone: (907) 263-4874		
	E-Mail Address: Brad.Broker@ConocoPhillips.com		

Section 7 Desired Process Method *(Check only one – see 18 AAC 50.542(a) for process descriptions and restrictions)*

☐ Fast track for a permit classification under 18 AAC 50.502 [18 AAC 50.542(b)]

☒ Public comment [18 AAC 50.542(d)]

Section 8 Source Classification(s) *(Check all that apply)*

[18 AAC 50.502(b)]

- ☐ Asphalt Plant [≥ 5 ton per hour]
- ☐ Thermal Soil Remediation Unit [≥ 5 ton per hour]
- ☒ Rock Crusher [≥ 5 ton per hour]
- ☐ Incinerator(s) [total rated capacity ≥ 1000 lb/hour]
- ☐ Coal Preparation Plant
- ☐ Port of Anchorage Facility

If you checked any of the above, is (are) the emission unit(s) ☐ new, ☒ relocated*, or ☐ existing?

[18 AAC 50.502(c)(1)]

New or relocated* stationary source with potential emissions greater than:

- ☒ 40 tons per year (tpy) NOx
- ☐ 40 tpy SO_2
- ☒ 15 tpy PM-10
- ☒ 10 tpy PM-2.5
- ☐ 0.6 tpy lead
- ☐ 100 tpy CO in a nonattainment area

[18 AAC 50.502(c)(2)]

Construction or relocation* of a:

- ☐ Portable oil and gas operation
- ☐ ≥ 10 MMBtu/hr fuel burning equipment in a SO_2 special protection area

* *Relocation does NOT include moving equipment from one place to another within your current stationary source boundary.*

Section 9 Modification Classification(s) (*Check all that apply)*

[18 AAC 50.502(c)(3)]

- ☐ NOx Increase > 10 tpy [and existing PTE > 40 tpy]
- ☐ SO_2 Increase > 10 tpy [and existing PTE > 40 tpy]
- ☐ PM-10 Increase > 10 tpy [and existing PTE > 15 tpy]
- ☐ PM-2.5 Increase > 10 tpy [and existing PTE > 10 tpy]
- ☐ CO Increase > 100 tpy [and existing PTE > 100 tpy in a nonattainment area]

[18 AAC 50.502(c)(4)]

- ☐ NOx Increase > 40 tpy [and existing PTE ≤ 40 tpy]
- ☐ SO_2 Increase > 40 tpy [and existing PTE ≤ 40 tpy]
- ☐ PM-10 Increase > 15 tpy [and existing PTE ≤ 15 tpy]
- ☐ PM-2.5 Increase > 10 tpy [and existing PTE ≤ 10 tpy]
- ☐ CO Increase > 100 tpy [and Existing PTE ≤ 100 tpy in a nonattainment area]

Basis for calculating modification:

- ☐ Projected actual emissions minus baseline actual emissions
- ☐ New potential emissions minus existing potential emissions

Section 10 Permit Action Request (*Check all that apply)*

[18 AAC 50.508]

- ☐ Establish Plant-wide Applicability Limitation (PAL)
- ☐ Establish emission reductions to offset nonattainment pollutant
- ☒ Owner Requested Limit* (ORL)
- ☐ Revise or Rescind Title I Permit Conditions *

Permit Number: Condition No.
Date:

**Which to use? See* http://www.dec.state.ak.us/air/ap/docs/orlrtc.pdf

Section 11 Existing Permits and Limits

For an existing stationary source, do you have an existing:
(Check all that apply)

- ☐ Air quality permit Number(s)*:
- ☐ Owner Requested Limit(s) Permit Number(s):
- ☐ Pre-Approved Emission Limit (PAEL) Number(s)**:

* *All active construction, Title V, and minor permit numbers.*
***Optional. Please provide this number if possible.*
http://dec.alaska.gov/Applications/Air/airtoolsweb/

Section 12 Project Description

Provide a short narrative describing the project. Discuss the purpose for conducting this project, what emission units/activities will be added/modified under this project (i.e., project scope), and the project timeline. If the project is a modification to an existing stationary source, describe how this project will affect the existing process. Include any other discussion that may assist the Department in understanding your project or processing your application. Include a schedule of construction.

Please use additional copies of this sheet if necessary.

See **Attachment B**.

Section 12 Project Description Continued

For **PALs under Section 10** of this application, include the information listed in 40 C.F.R. 52.21(aa)(3), adopted by reference in 18 AAC 50.040 [18 AAC 50.540(h)].

Not applicable to this application.

For a **limit to establish offsetting emissions under Section 10** of this application, specify the physical or operational limitations necessary to provide actual emission reductions of the nonattainment air pollutant; including [18 AAC 50.540(i)]:

- A calculation of the expected reduction in actual emissions; and

  Not applicable to this application.

- The emission limitation representing that quantity of emission reduction.

  Not applicable to this application.

Section 12 Project Description Continued

For **ORLs under Section 10** of this application [18 AAC 50.540(j)], include:

A description of each proposed limit, including for each air pollutant a calculation of the effect the limit will have on the stationary source's potential to emit and the allowable emissions [18 AAC 50.225(b)(4)];

See **Attachment B**.

A description of a verifiable method to attain and maintain each limit, including monitoring and recordkeeping requirements [18 AAC 50.225(b)(5)];

See **Attachment B**.

Citation to each requirement that the person seeks to avoid, including an explanation of why the requirement would apply in the absence of the limit and how the limit allows the person to avoid the requirement [18 AAC 50.225(b)(6)];

See **Attachment B**.

A statement that the owner or operator of the stationary source will be able to comply with each limit [18 AAC 50.225(b)(8)];

See **Attachment B**.

Section 12 Project Description Continued

For **revising or rescinding Title I permit conditions under Section 10** of this application [18 AAC 50.540(k)], include:

An explanation of why the permit term or condition should be revised or rescinded [18 AAC 50.540(k)(2)];

Not applicable to this application.

The effect of revising or revoking the permit term or condition on [18 AAC 50. 540 (k)(3)]:

- Emissions;

  Not applicable to this application.

- Other permit terms;

  Not applicable to this application.

- The underlying ambient demonstration, if any;

  Not applicable to this application.

- Compliance monitoring; and

  Not applicable to this application.

For revising a condition that allows avoidance of a permit classification, the information required for that type of permit, unless the revised condition would also allow the owner or operator to avoid the classification. [18 AAC 50.540(k)(4)]

Not applicable to this application.

Section 13 Other Application Material

The information listed below must be included in your air quality control minor permit application. *Note: These must be attached in order for your application to be complete.*

If required to submit an analysis of ambient air quality under 18 AAC 50.540(c)(2), or if otherwise requested by the Department:

☒ Attached are maps, plans, and/or aerial photographs as necessary to show the locations and distances of
- emissions units, buildings, emitting activities and boundaries of the associated with the stationary source, and
- nearby or adjacent residences, roads, other occupied structures and general topography within 15 kilometers.

(Indicate compass direction and scale on each.)

☒ Attached is a document (e.g., spreadsheet) showing coordinates and elevations of each modeled unit, along with parameters necessary to characterize each unit for dispersion modeling.

☒ Attached is an electronic copy of all modeling files.

Section 14 Certification

This certification applies to the Air Quality Control Minor Permit Application for the Willow Operations Center (WOC) (Stationary Source Name) submitted to the Department on: 06/20/2023

Type of Application

☒ Initial Application

☐ Change to Initial Application

The application is **NOT** complete unless the certification of truth, accuracy, and completeness on this form bears the signature of a **Responsible Official**. Responsible Official is defined in 18 AAC 50.990. (18 AAC 50.205)

CERTIFICATION OF TRUTH, ACCURACY, AND COMPLETENESS

"Based on information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete."

Signature: Connor DR	Date: 06/19/2023
Printed Name: Connor Dunn	Title: Vice President, Willow

Section 15 Attachments

☒ Attachments Included. List attachments:

Attachment B	Project Description and Regulatory Review
Attachment C	Emission Unit Information Form
Attachment D	Emission Unit Information Supplementary Form
Attachment E	Emissions Summary Form
Attachment F	State Emission Standards Compliance Demonstration
Attachment G	Ambient Air Quality Impact Analysis
Attachment H	Emissions Calculations Spreadsheet (electronic)
Attachment I	Modeling Files (electronic)

Section 16 Mailing Address

Submit the minor permit application to the Permit Intake Clerk in the Department's Anchorage office. Submitting to a different office will delay processing. The mailing address and phone number for the Anchorage office is:

Permit Intake Clerk
Alaska Department of Environmental Conservation
Air Permit Program
555 Cordova Street
Anchorage, Alaska 99501
(907) 269-6881

ATTACHMENT B
Project Description and Regulatory Review

B.1. PROJECT DESCRIPTION

ConocoPhillips Alaska, Inc. (CPAI) is submitting this application for a new minor source-specific air quality permit authorizing the construction and operation of the Willow Operations Center (WOC). The WOC, including an adjacent airstrip, is located in the Bear Tooth (BT) Unit on the Alaskan North Slope approximately 7 miles west-southwest of the Greater Mooses Tooth 2/Mooses Tooth 7 (GMT2/MT7) Drill Site and 24 miles west-southwest of Nuiqsut, Alaska, as shown in **Figure B.1-1**. The preliminary design for the main WOC pad is shown in **Figure B.1-2**.

The WOC is the first stationary source that CPAI plans to permit as part of the Willow Development, which will also include the Willow Central Facility (WCF) and several remote BT drill sites. To support these facilities, CPAI will also construct additional infrastructure supporting pipelines, utilities, and access across the project development area. The WOC serves as a support facility for the Willow Development serving initially as a staging area of activities and materials support construction and early development and in the long-term as the primary place for locating support activities including but not limited to worker housing, equipment servicing, airport, and waste disposal. The function of the WOC is secondary to the function of the WCF. Like other support facilities operated across the Alaskan North Slope oil production areas (e.g., Base Operations Center, Central Power Station, and Prudhoe Bay Operations Center/Main Construction Camp) the WOC exists because of the remote location of the Willow Development and is not inherent to oil and gas production. Furthermore, the service infrastructure of the WOC has a different purpose compared to the production aspect of the Willow Development WCF and BT drill sites. Therefore, the WOC and airstrip is considered a single stationary source and does not need to be aggregated with any other facilities planned in the Willow Development. This is primarily because all the stationary sources anticipated by CPAI are separated by half a mile or more at their closest points. Therefore, the WOC and other planned stationary sources within the Willow Development would not meet the contiguous and adjacent criteria defining a stationary source in 40 Code of Federal Regulations (C.F.R.) 51.166(b)(6).

The following sections describe the equipment and activities that CPAI plans to be a part of the WOC stationary source.

B.1.1 STATIONARY SOURCE CONSTRUCTION

Construction of infrastructure at and supporting the WOC will include equipment and activities for seasonal ice road and ice pad construction; gravel road, airstrip, and pad construction; facilities installation; vertical support member (VSM) and piling, pipeline, powerline, and fiber optic cable installation; and drilling of at least two Class I disposal wells. All these activities will involve the use of liquid fuel-fired, portable and mobile equipment and fall under Alaska Department of Environmental Conversation (ADEC) Policy and Procedure Number 04.02.104 for Construction Phase Air Emissions at Oil Fields (November 20, 2006). All construction equipment will combust Ultra-Low Sulfur Diesel (ULSD) fuel as committed to by CPAI in the Willow Master Development Plan Supplemental Environmental Impact Statement Record of Decision (BLM 2023), Appendix A, Table 2.1 - Design Features to Avoid and Minimize

Impacts number 80, and 81.[1] A detailed list of pollutant-emitting activities and equipment involved in construction phase activities at the WOC is included with the ambient air quality impact analysis (AQIA) in **Attachment G**.

B.1.2 EARLY OPERATIONS

CPAI plans the WOC to support the Willow Development in different ways throughout the operational life of the field. The early operations phase will include temporary camps, and telecommunications infrastructure on-site supporting construction and development of the other Willow Development facilities, including the WCF and BT drill sites. To support the camps and commissioning of other permanent infrastructure at the WOC, up to 13.5 megawatts electric (MWe) of diesel-fired engine-driven power generators will be brought on-site during early operations and setup as a temporary power plant until fuel gas is available and permanent power equipment is commissioned at the WOC. Current plans have gravel being placed beginning in the first quarter of 2024. By the end of the third quarter, the gravel will have been seasoned, and recompacted. By October 2024, installation of the construction camp and temporary utilities will begin. Based on a review of these activities the WOC will begin actual construction in October 2024 according to the current interpretation of 40 C.F.R. §52.21(b)(11).

B.1.3 ROUTINE OPERATIONS

Permanent infrastructure at the WOC would contain accommodation and utility buildings, maintenance and storage facilities, and additional support infrastructure for Willow Development operations. Permanent infrastructure at the WOC that will be a part of its routine operations would include:

- Airstrip and helipad
- Permanent Willow Operations Camp facilities, including living quarters, offices, meeting rooms, data center, dining facilities, central control room, medical clinic, and recreation area
- Water and wastewater treatment plants, pumphouse, associated tanks, lab, and chemical storage
- Class I underground injection control disposal wells and associated waste fluids injection facility
- Emergency Response Center, including spill response shop, fire department, and ambulance bay
- Emergency engine-driven firewater pump(s)
- Hazardous waste accumulation and storage
- Fleet maintenance shop
- Warehouse and maintenance shop
- Storage tents and laydown and/or staging areas
- Drilling chemical storage building
- Bulk cement plant and tank farm
- Waste injection facility, including drilling mud storage tanks

[1] Willow Master Development Plan Final Supplemental Environmental Impact Statement Record of Decision - Appendix A Mitigation Measures. Prepared by U.S. Department of the Interior Bureau of Land Management Anchorage, Alaska. DOI-BLM-AK-0000-2018-0004-EIS - BLM/AK/PL-22/032+1610+F010. Approved March 12, 2023.

- Solid waste incinerator
- Telecommunications tower and module
- Valve station
- Fuel storage tanks for diesel and jet fuel and associated pumphouse and fueling station
- Various chemical storage for equipment and operations
- Turbine-driven and reciprocating engine-driven primary and backup power generation

These permanent facilities are expected to be electrified with turbine-driven power generation at the WOC or highline power provided by the WCF, except for the firewater pumps, incinerator, and backup power generation.

In addition to these permanent facilities, CPAI will also conduct routine maintenance activities, as needed, at the WOC. These activities could include, but are not limited to, disposal well maintenance and testing, pipeline pigging, blowdowns and readiness testing of permanent equipment, turbine fuel gas skid blowdown and other infrastructure maintenance of gravel roads and pads, pipelines, and buildings. These activities may involve the limited use of well servicing equipment as defined in 18 AAC 50.990(125) and other liquid fuel-fired, portable (nonroad engines, heaters, and boilers) and mobile equipment that are described in ADEC Policy and Procedure Number 04.02.105 for Intermittently Used Oilfield Support Equipment (November 20, 2006). Consistent with that guidance and in accordance with the Willow Master Development Plan SEIS ROD (BLM 2023), CPAI will use ULSD fuel in all diesel-fueled vehicles and equipment at the WOC. A detailed list of pollutant-emitting activities and equipment involved in routine maintenance at the WOC is included with the AQIA in **Attachment G**.

An approximate timeline of activities and milestones associated with stationary source construction, early operations, and routine operations at the WOC is shown in **Figure B.1-3**.

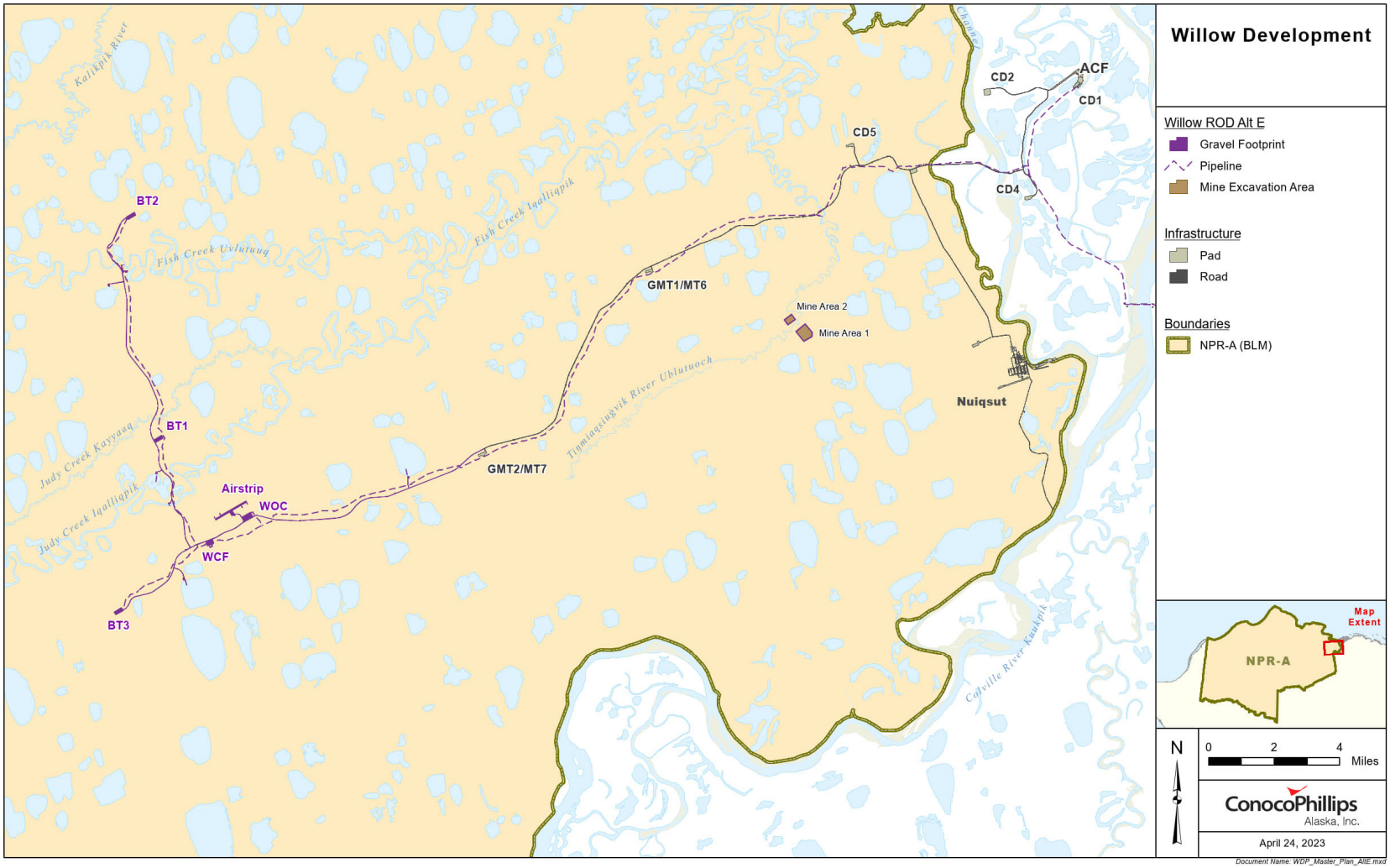


Figure B.1-1 Location of the WOC

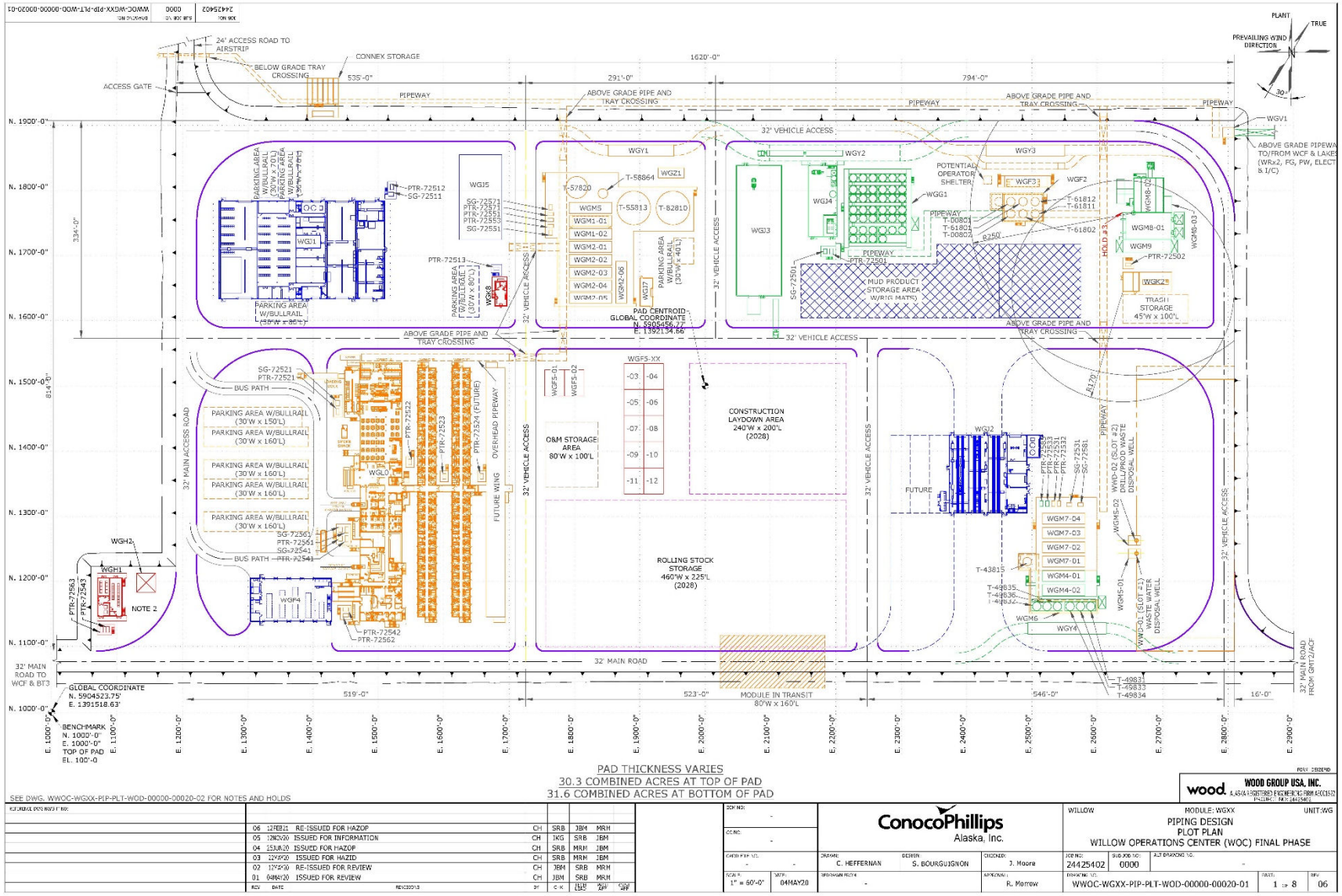


Figure B.1-2 Preliminary Design for the WOC

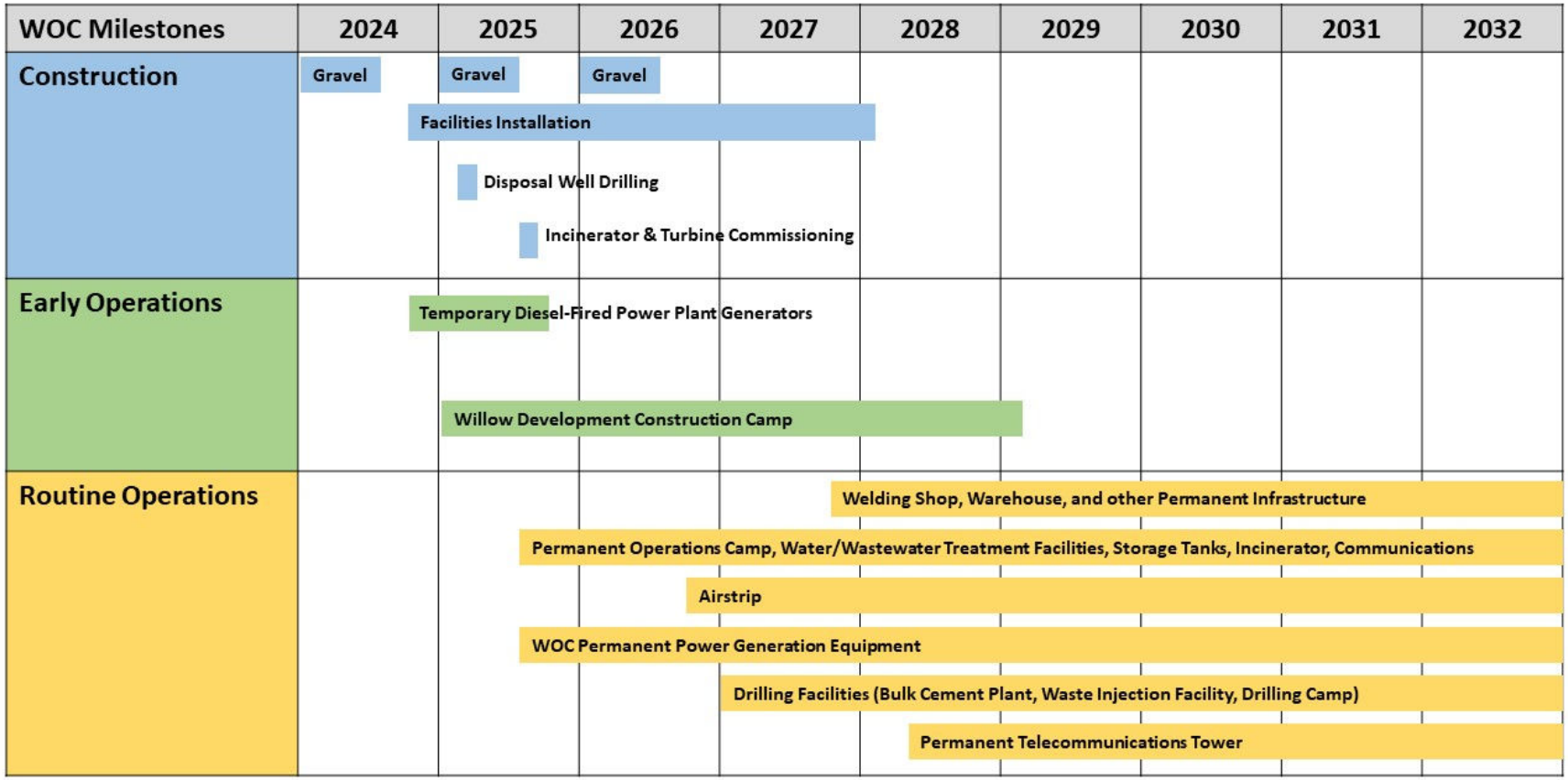


Figure B.1-3 Approximate WOC Project Timeline

B.2. PROJECT EMISSIONS

Emissions to be permitted for the WOC stationary source were estimated using emission factors from AP-42, applicable federal emissions standards, representative vendor data for expected or similar equipment, inherent physical limitations which restrict the potential emissions of individual units, or mass balance, as available. Emissions are estimated for all applicable regulated pollutants for the various permit classifications for which applicability is assessed in this application; these include:

- Nitrogen oxides (NO_X)
- Carbon monoxide (CO)
- Volatile organic compounds (VOC)
- Particulate matter less than or equal to a nominal 2.5 microns in diameter ($PM_{2.5}$)
- Particulate matter less than or equal to a nominal 10 microns in diameter (PM_{10})
- Sulfur dioxide (SO_2)
- Hazardous air pollutants (HAP), including lead (Pb)
- Greenhouse gases (GHG), expressed as carbon dioxide equivalents (CO_2e), including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O)

For the purposes of assessing permit applicability, CPAI has estimated the WOC potential-to-emit (PTE) and conducted the ambient air quality impact assessment assuming the early operations and routine operations phases at the WOC occur simultaneously. This is conservative given that many of the activities and equipment will not operate at the same time given the logistics of the project.

B.2.1 STATIONARY SOURCE CONSTRUCTION

A detailed list of pollutant-emitting activities and equipment involved in construction phase activities at the WOC is included with the AQIA in **Attachment G**.

To support construction of the Class I disposal wells, CPAI may require a ball mill or crushing unit (rock crusher) to process drilling slurry, which is expected to have a rated capacity of 200 tons per hour or less. Drilling the Class I disposal wells is expected to take no more than 60 days. All material handling and processing will be conducted under wet, saturated conditions within an enclosed space, a module or building. Therefore, emissions are negligible from this process and would be considered construction phase air emissions as this operation is portable and will only be used during stationary source construction. This operation is described in the Emission Unit Information Supplementary Form for special equipment in **Attachment D**. Any power needed for the ball mill will be provided by line power.

B.2.2 EARLY OPERATIONS

During the early operations phase, emissions are estimated from the following pollutant-emitting equipment and activities:

- Up to 13.5-MWe (cumulative rating based on 6 engines each rated at 2,250 kWe) of stationary power generation driven by diesel-fired (Tier 4) reciprocating internal combustion engines (RICE).
- Three 460-brake horsepower (bhp) firewater pumps driven by diesel-fired (Tier 2) RICE
- Two 50-kWe stationary power generators driven by diesel-fired (Tier 4) RICE (either single engines or combination totaling 50 kWe)
- One less than 833-lb/hr solid waste incinerator
- Various storage tanks for diesel, jet fuel, drilling muds, water, and other fluids
- Miscellaneous support equipment for operations and maintenance, which could include up to 10 MMBtu[HHV]/hr of various diesel-fired heaters and boilers
- Venting of particulate matter from the bulk cement plant blending system
- Fugitive emissions from equipment component leaks, pad-generated dust, and refueling from storage tanks containing hydrocarbon liquids

Calculated emissions from each Tier 4 RICE contributing to the 13.5 MWe of stationary power generation assume engine CO emissions will be 18 times lower than Tier 4 (i.e., 0.18 g/bhp-hr) based on typical vendor data. NO_x, $PM_{2.5}$, and PM_{10} Tier 4 based emission rates include a 50% safety factor to estimate not-to-exceed (NTE) emission rates in accordance with 40 C.F.R. 1039.

All firewater pump RICE will be for emergency use only and expected to operate no more than 500 hours per year. In addition, any venting of particulates from the bulk cement plant blending system will be controlled by a dust cyclone and sock filter.

All combustion equipment will burn liquid fuel with the representative fuel properties listed in **Attachment C**, which is based on ultra-low sulfur diesel (ULSD) with a maximum fuel sulfur content of 15 parts per million (ppm) or 0.0015 percent sulfur by weight.

Emission factors and references used to calculate emissions for each pollutant-emitting equipment and activity associated with the WOC are outlined in Section 7 of the Emission Unit Information Form in **Attachment C**. The PTE for the WOC, including the early operations activities, is summarized in the Emissions Summary Form in **Attachment E**. Additional details on emissions calculation methodology and assumptions are included in the emissions calculations spreadsheet electronically enclosed as **Attachment H**.

B.2.3 ROUTINE OPERATIONS

During the routine operations phase, emissions are estimated from the following pollutant-emitting equipment and activities:

- One 15.8-MWe stationary power generator driven by a dual fuel-fired turbine
- Two 2,250-kWe backup power generators driven by diesel-fired (Tier 2) RICE
- One 460-bhp firewater pump driven by diesel-fired (Tier2) RICE
- One less than 833-lb/hr solid waste incinerator
- Various storage tanks for diesel, jet fuel, drilling muds, water, and other fluids

- Miscellaneous support equipment for operations and maintenance, which could include up to 15 MMBtu[HHV]/hr of various diesel and fuel gas-fired heaters and boilers
- Venting of particulate matter from the bulk cement plant blending system
- Periodic venting of VOCs from the fuel gas skid as part of turbine startup operations
- Fugitive emissions from equipment component leaks, pad-generated dust, and refueling from storage tanks containing hydrocarbon liquids

The dual fuel-fired turbine will be equipped with a dry low NO_X emissions combustion control system designed to control NO_X to 9 ppmv and CO to 15 ppmv during normal operations on fuel gas and NO_X to 65 ppmv and CO to 25 ppmv during operations on emergency fuel (ULSD or unprocessed fuel gas). During normal operations on fuel gas, except during startup, shutdown and malfunction, the dry low emissions combustion control system will limit NO_X emissions to 9 ppmv provided the turbine is operated at 50% load or above and an intake air temperature of 0 °C or above. Therefore, the turbine will be equipped with intake air preheating and typically operated at loads above 50% except during startup, shutdown, and malfunction. However, since the turbine could drop below 50% load during transient and rapid unloading of the power grid, 120 hours per year of operation at loads below 50% has been included in the turbine PTE calculations as an upper end estimate of the time the turbine could operate during these unforeseen events. In addition, start-up and shutdown events are accounted for in the emissions estimates as an upper end estimate with 12 start-up/shutdown cycles per year. CPAI plans on operating the turbine for no more than 500 hours per year on emergency fuel. Emergency fuel could include unprocessed fuel gas, or ULSD fuel. Of these two fuel types, ULSD fuel operation will result in the highest emissions. Potential to emit calculated when operating on emergency fuel assumes the dry low NO_X emissions combustion controls are not operating.

All backup power generator and firewater pump RICE will also be for emergency use only and expected to operate no more than 500 hours per year. In addition, any venting of particulates from the bulk cement plant blending system will be controlled by a dust cyclone and sock filter.

Liquid fuel-fired combustion equipment will combust ULSD with a maximum fuel sulfur content of 15 parts per million (ppm) or 0.0015 percent sulfur by weight. Gaseous fuel-fired combustion equipment will burn processed field gas with a sulfur content not exceeding 200 parts per million by volume (ppmv) of hydrogen sulfide (H_2S). Representative fuel properties for liquid and gaseous fuels are summarized in **Attachment C**.

Emission factors and references used to calculate emissions for each pollutant-emitting equipment and activity associated with the WOC are outlined in Section 7 of the Emission Unit Information Form in **Attachment C**. The PTE for the WOC, including routine operations activities, is summarized in the Emissions Summary Form in **Attachment E**. Additional details on emissions calculation methodology and assumptions are included in the emissions calculation spreadsheet electronically enclosed as **Attachment H**.

B.3. PROJECT REGULATORY REVIEW

CPAI expects that construction and operation of the WOC will trigger several state and federal air quality regulations and permit classifications, which are evaluated in the following sections.

B.3.1 PERMIT APPLICABILITY BASED ON PTE

Based on CPAI's characterization of the WOC's early operations and routine operations phases, the WOC's estimated PTE, including, and excluding fugitives, is summarized in **Table B.3-1** in comparison to relevant permitting thresholds. Based on the evaluation in **Table B.3-1**, CPAI expects that operation of the WOC will require a Title I minor source-specific (MSS) permit for a new minor stationary source with potential emissions greater than 40 tpy of NO_X, 15 tpy of PM_{10}, and 10 tpy of $PM_{2.5}$ under 18 AAC 50.502(c)(1).

CPAI also expects that operation of the WOC will require a Title V permit based on the evaluation in **Table B.3-1**. CPAI will submit a timely and complete Title V application to ADEC under a separate cover letter for the WOC stationary source once that obligation is triggered in accordance with 40 C.F.R. 71.5(a).

Table B.3-1 WOC Emissions Summary and PTE for Permit Applicability, tons per year (tpy)

Parameter	NO_X	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	Pb	HAP [a]	CO_2e
WOC PTE (excluding fugitives) [b], [c]	**245**	**245**	**78.7**	**37.4**	**37.3**	**30.2**	**0.427**	**5.25/7.21**	**216,235**
[MSS] 18 AAC 50.502(c)(1) thresholds	**40**	NA	NA	**15**	**10**	40	0.6	NA	NA
[MSS] 18 AAC 50.502(c)(1) applicable?	**Yes**	NA	NA	**Yes**	**Yes**	No	No	NA	NA
[Title V] 40 C.F.R. 71 thresholds	**100**	**100**	100	100	100	100	NA	NA	NA
[Title V] 40 C.F.R. 71 applicable?	**Yes**	**Yes**	No	No	No	No	NA	NA	NA
[PSD] 40 C.F.R. 52.21 thresholds [d]	250	250	250	250	250	250	NA	NA	NA
[PSD] 40 C.F.R. 52.21 applicable?	No	No	No	No	No	No	NA	NA	NA
WOC PTE (including fugitives) [b], [c]	**245**	**245**	**79.5**	**41.1**	**37.9**	**30.2**	**0.427**	**5.25/7.31**	**216,295**
[HAP Major] 40 C.F.R. 71 thresholds	NA	NA	NA	NA	NA	NA	10	10 / 25	NA
[HAP Major] 40 C.F.R. 71 applicable?	NA	NA	NA	NA	NA	NA	No	No	NA
Assessable Emissions by Pollutant	245	245	80	41	NA	30	NA	NA	NA
WOC Total Assessable Emissions	**641**								

(a) Maximum individual HAP / total HAP.

(b) Emissions from nonroad engines are not included when determining the classification of a stationary source or modification [18 AAC 50.100, 42 U.S.C. § 7602(z)].

(c) Fugitive emissions are not included when determining the classification of a new stationary source unless the source belongs to one of the listed source categories or is a HAP listed in 42 U.S.C. § 7412(b) [18 AAC 50.502(i); 40 C.F.R. 71.2; 40 C.F.R. 52.21(b)(1)(iii)].

(d) For PSD, once it is determined that a non-listed source is major for at least one regulated new source review (NSR) pollutant based on non-fugitive emissions and disregarding CO_2e, then fugitive emissions and CO_2e are considered in comparison to significant emission rates [40 C.F.R. 52.21(b)(49)(iv); 40 C.F.R. 52.21(i)(1)(vii)].

B.3.2 STATE REGULATORY REQUIREMENTS AND EMISSION STANDARDS

Based on the types of equipment and estimated emissions from the WOC, CPAI will be required to comply with the following Alaska emission standards:

- 18 AAC 50.050: Incinerator Emission Standards
- 18 AAC 50.055: Industrial Processes and Fuel-Burning Equipment Emission Standards

Applicable state emission standards in 18 AAC 50.050 and 50.055 are summarized in Section 8 of the Emission Unit Information Form in **Attachment C**. A compliance demonstration with applicable state emission standards is included in **Attachment F**. In addition, while not a part of normal operations, CPAI may also be required to comply with the following requirements if engaged in applicable activities:

- 18 AAC 50.065: Open Burning

Under the state's minor source permitting program, a ball mill or crushing unit (rock crusher) used to support drilling the Class I disposal wells will also require a permit under 18 AAC 50.502(b)(3) for a rock crusher with a rated capacity of at least five tons per hour.

B.3.3 FEDERAL REGULATORY REQUIREMENTS AND EMISSION STANDARDS

Specific operations at the WOC will also be subject to several federal regulatory requirements, such as new source performance standards (NSPS) in 40 C.F.R. 60, national emission standards for hazardous air pollutants (NESHAP) in 40 C.F.R. 61 and 63, and potentially other air programs if engaged in applicable activities. These are outlined in the following sections. In addition to those requirements specifically outlined, applicability of a number of these regulations will also make the affected facilities subject to the general provisions in Subpart A of each 40 C.F.R. 60, 61, and/or 63 and may also require CPAI to obtain a Title V operating permit for the affected facilities.

B.3.3.1 DUAL FUEL-FIRED TURBINE (EU ID 001)

40 C.F.R. 60 Subpart KKKK: NSPS for Stationary Combustion Turbines

The dual fuel-fired turbine (EU ID 001) will be an affected facility subject to NSPS Subpart KKKK as a stationary combustion turbine with a peak load heat input greater than or equal to 10 MMBtu(HHV)/hr for which construction commenced after February 18, 2005. As an affected facility, the turbine will be subject to NO_X and SO_2 emission limits while operating on fuel gas and ULSD, initial and annual/periodic performance testing or continuous emissions monitoring, and associated recordkeeping and reporting requirements.

B.3.3.2 STATIONARY COMPRESSION IGNITION RICE (EU IDS 201 THROUGH 208)

40 C.F.R. 60 Subpart IIII: NSPS for Stationary Compression Ignition Internal Combustion Engines

All diesel-fired RICE (EU IDs 201 through 208) for stationary power generation or in mechanical service that will be located at the WOC for over 12 months are expected to be affected facilities subject to NSPS Subpart IIII as either non-emergency or emergency engines. As affected facilities, these units will require

compliance with emission standards and fuel requirements, appropriate engine manufacturer certifications, operating in accordance with manufacturer's specifications, performance testing if applicable, and associated recordkeeping and reporting requirements for either non-emergency or emergency engines. Emergency engines will be limited to 100 hours per year of operations for maintenance and readiness testing, 50 hours per year of which can be for other defined non-emergency use. There is no limit on operations during emergency situations. Units may also comply with the Alaska-specific requirements in 40 C.F.R. 60.4216. CPAI will make individual applicability determinations to determine the specific compliance requirements for each affected facility.

40 C.F.R. 63 Subpart ZZZZ: NESHAP for Stationary Reciprocating Internal Combustion Engines

All diesel-fired RICE (EU IDs 201 through 208) for stationary power generation or in mechanical service that will be located at the WOC for over 12 months are expected to be affected facilities subject to NESHAP Subpart ZZZZ as either non-emergency or emergency engines at an area source of HAP. Like NSPS Subpart IIII, affected facilities require compliance with emissions and operating limitations, fuel requirements, performance testing if applicable, and associated recordkeeping and reporting requirements for either non-emergency or emergency engines. CPAI will make individual applicability determinations to determine the specific compliance requirements for each affected facility and/or comply with NSPS Subpart IIII requirements, as appropriate, for new or reconstructed stationary RICE located at an area source of HAP.

B.3.3.3 INCINERATOR (EU ID 301)

40 C.F.R. 60 Subpart Ec: NSPS for Hospital/Medical/Infectious Waste Incinerators

40 C.F.R. 60 Subpart Ec applies to hospital/medical/infectious waste incinerators for which construction commenced after June 20, 1996. Because the incinerator (EU ID 301) may incinerate waste from the medical clinic facilities at the Permanent Willow Operations Camp, this is a potentially applicable rule. However, based on CPAI's operations of other incinerators supporting their ongoing operations on the North Slope, CPAI expects the hospital, medical, and infectious waste combusted to be only a small fraction of the overall waste combusted by EU ID 301. Therefore, CPAI is requesting an owner-requested limit (ORL) to maintain the incinerator's classification as a "co-fired combustor" (defined in 40 C.F.R. 60.51c) by limiting the unit to combusting a fuel feed stream, 10 percent or less of the weight of which is comprised, in aggregate, of hospital waste and medical/infectious waste as measured on a calendar quarter basis.

40 C.F.R. 60 Subpart O: NSPS for Sewage Treatment Plants

40 C.F.R. 60 Subpart O applies to incinerators combusting wastes containing more than 10 percent sewage sludge (dry basis) produced by a municipal sewage treatment plant. Because the incinerator (EU ID 301) will incinerate filter cake (dry sludge) from the wastewater treatment plant at the WOC, this is a potentially applicable rule. However, based on CPAI's operations of other incinerators supporting their ongoing operations on the North Slope, CPAI does not expect to combust more than 10 percent sewage sludge (dry basis). Therefore, CPAI is requesting an ORL to limit the sewage sludge combusted by EU ID 301 to no more than 10 percent (dry basis) to avoid classification as a Sewage Treatment Plant in 40 C.F.R. 60.150(a) and the requirements in 40 C.F.R. 60 Subpart O.

40 C.F.R. 60 Subpart EEEE: NSPS for Other Solid Waste Incineration (OSWI) Units

CPAI expects the incinerator (EU ID 301) at the WOC to meet the definition of a "small OSWI unit" with a capacity less than or equal to 10 tons/day (833 lb/hr) and be an affected facility subject to NSPS Subpart EEEE, as proposed by EPA on August 31, 2020. Based on the timing of this application, these rules may be finalized by the time the WOC MSS permit is issued by ADEC. If this is the case, CPAI will make any adjustments needed to the WOC permit application or operations, if needed once the rule is finalized.

As a small OSWI unit, EU ID 301 is expected to require preparation of a siting analysis and waste management plan, initial notifications prior to commencing construction and initial startup, compliance with emission limitations and established operating parameters, initial and annual/periodic performance testing and continuous emissions monitoring for CO and O_2 (or substitute compliance method), and associated recordkeeping and reporting requirements for each activity.

40 C.F.R. 61 Subpart E: NESHAP for Mercury

40 C.F.R. 61 Subpart E applies to stationary sources which incinerate or dry wastewater treatment plant sludge. Because the incinerator (EU ID 301) will incinerate filter cake (sludge dried by a dehydrator) from the wastewater treatment plant at the WOC, this is an applicable rule. As an affected facility, the incinerator at the WOC will require compliance with mercury emission standards, stack sampling, sludge sampling, and additional monitoring of emissions and operations, if applicable.

B.3.3.4 BALL MILL (EU ID 804)

40 C.F.R. 60 Subpart OOO: NSPS for Nonmetallic Mineral Processing Plants

40 C.F.R. 60 Subpart OOO applies to fixed or portable nonmetallic mineral processing plants, including each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, and enclosed truck or railcar loading station. Therefore, Subpart OOO would apply to any portable ball mill or crushing units needed at the WOC for stationary source construction. However, because the processing of drilling slurry would meet the definition of a "wet material processing operation" under 40 C.F.R. 60.671, the only applicable requirement would be a notification to USEPA if the process no longer meets the definition of a wet material processing operation.

B.3.3.5 WOC STATIONARY SOURCE-WIDE REQUIREMENTS

Based on the types of equipment and estimated emissions from the WOC, CPAI will also be required to comply with the following requirements:

- 40 C.F.R. 98: Mandatory Greenhouse Gas Reporting

While not a part of normal operations, CPAI may also be required to comply with the following standards if engaged in applicable activities:

- 40 C.F.R. 61 Subpart M: NESHAP for Asbestos – Standards for Demolition and Renovation
- 40 C.F.R. 68 Subpart G: Chemical Accident Prevention Provisions – Risk Management Plan
- 40 C.F.R. 82 Subpart B: Protection of Stratospheric Ozone – Servicing of Motor Vehicle Air Conditions

- 40 C.F.R. 82 Subpart F: Protection of Stratospheric Ozone – Recycling and Emissions Reduction
- 40 C.F.R. 82 Subpart G: Protection of Stratospheric Ozone – Significant New Alternatives Policy Program
- 40 C.F.R. 82 Subpart H: Protection of Stratospheric Ozone – Halon Emissions Reduction

CPAI will continue to make specific applicability determinations for potential affected facilities and activities, as needed.

B.3.4 PERMIT APPLICATION REQUIREMENTS

Based on the evaluations presented in **Sections B.3.1** through **B.3.3**, CPAI expects that operation of the WOC will require a Title I minor source-specific (MSS) permit based on the following permit classifications:

- A new minor stationary source with potential emissions greater than 40 tpy of NO_X, 15 tpy of PM_{10}, and 10 tpy of $PM_{2.5}$ under 18 AAC 50.502(c)(1).
- A rock crusher with a rated capacity of at least five tons per hour under 18 AAC 50.502(b)(3).
- A source establishing an Owner-Requested Limit (ORL) under 18 AAC 50.508(5) to avoid one or more permit classifications under AS 46.14.130.

Based on these permit classifications, the WOC MSS permit application must include the following elements under 18 AAC 50.540(a), (b), (c), and (j), which are addressed in this application package:

- For all permit classifications, the information prescribed in ADEC's:
    - Stationary Source Identification Form (**Attachment A**)
    - Emission Unit Information Form (**Attachment C**)
    - Emission Unit Information Supplementary (Special Equipment) Form (**Attachment D**)
    - Emission Summary Form (**Attachment E**)

- For a minor stationary source with PTE greater than 40 tpy of NO_X, 15 tpy of PM_{10}, and 10 tpy $PM_{2.5}$, an AQIA (**Attachment G**) demonstrating that the proposed potential emissions from the project will not interfere with the attainment or maintenance of the following ambient air quality standards:
    - NO_2 (annual average)
    - $PM_{2.5}$ (24-hour and annual average)
    - PM_{10} (24-hour average)

- For a source establishing a minor permit for an ORL under 18 AAC 50.508(5), the following components prescribed in 18 AAC 50.225(b) and outlined in **Attachment A**:
    - Completed stationary source identification form (**Attachment A**)
    - List of all emission units at the stationary source (**Attachment C**)
    - Calculation of the stationary source's actual emissions and potential to emit air pollutants (Emission Summary Form in **Attachment E** and detailed emissions calculations in **Attachment H**)
    - Description of each proposed limit, including for each air pollutant a calculation of the effect the limit will have on the stationary source's potential to emit (**Attachment B**)

- Description of a verifiable method to attain and maintain each limit, including monitoring and recordkeeping requirements (**Attachment B**)
- Citation to each requirement that the person seeks to avoid, including an explanation of why the requirement would apply in the absence of the limit and how the limit allows the person to avoid the requirement (**Attachment B**)
- Statement that the owner or operator of the stationary source will be able to comply with each limit (**Attachment B**)
- Certification of truth, accuracy, and completeness (**Attachment A**)

Note that for a Title I MSS permit required under 18 AAC 50.502(c)(1), it is assumed that ADEC will not require a 1-hour NO_2 AQIA for the WOC per 18 AAC 50.540(l).

B.4. SUMMARY OF PERMIT REQUESTS AND PROPOSED LIMITS

Based on the results of the AQIA and CPAI's permitting objectives, CPAI is proposing the ORLs and ambient air protection limits in **Table B.4-1** for operations at the WOC. CPAI expects to comply with these limits at all times **except during periods of emergency, start-up, shutdown, or malfunction**.

Table B.4-1 Description of Proposed Limits

EU ID(s)	Description	Limit	Basis for Proposed Limit
001	Power Generator Turbine (Dual Fuel)	Operate with an intake air temperature at 0 °C or above when operating on fuel gas. [(a)]	AQIA – ambient air protection limit ORL – to avoid permit classifications
		Operate on emergency fuel (ULSD or unprocessed gas) with or without dry low NO_X emissions combustion controls for no more than 500 hours per year.	AQIA – ambient air protection limit ORL – to avoid permit classifications
201 through 205	Emergency RICE	Operate no more than 500 hours per year.	AQIA – ambient air protection limit
301	Incinerator	Burn no more than 10% hospital/medical/ infectious waste on a quarterly basis to maintain classification as a "co-fired combustor" in 40 C.F.R. 60.5c(c).	ORL – to avoid NSPS requirements
		Burn no more than 10% sewage sludge on a dry basis.	ORL – to avoid NSPS requirements
801	Bulk Cement Blending System	Any venting of particulates must be controlled by a dust cyclone/filter sock at all times when operating.	AQIA – ambient air protection limit
804	Ball Mill	All material processing shall be performed under wet, saturated conditions in an enclosed space.	AQIA – ambient air protection limit
001, 201 through 208, 802	All Diesel-Fired Equipment	Combust only liquid fuel that meets ULSD specifications (diesel fuel with a maximum sulfur content of 0.0015 percent by weight).	ORL – to avoid permit classifications
001 and 803	All Fuel Gas-Fired Equipment	Combust gaseous fuel with a sulfur content of no greater than 200 ppmv H_2S.	ORL – to avoid permit classifications

(a) The turbines operate in dry low emissions combustion control mode from 50% to 100% load when firing fuel gas and from 65% to 100% load when firing liquid fuel provided the intake air temperature is 0 °C or above. However, when firing liquid fuel, potential to emit calculations assume no operation with dry combustion control mode active.

B.5. INFORMATION REQUIRED FOR ORLS

CPAI is submitting a minor source permit application for a source requiring an Owner-Requested Limit (ORL) under 18 AAC 50.508(5) to avoid one or more permit classifications under AS 46.14.130. The following narrative details the requirements and information necessary to establish ORLs under 18 AAC 50.225(b)(1) through (b)(9).

18 AAC 50.225(b)(1) Stationary Source Identification Form

The Stationary Source Identification Form is included as **Attachment A** of this application.

18 AAC 50.225(b)(2) Inventory of Source Emission Units

The Stationary Source Identification Form is included as **Attachment C** of this application.

18 AAC 50.225(b)(3) Stationary Source Actual and Potential to Emit

The WOC is a proposed new stationary source. Therefore, there are no existing permanent emission units, and actual emissions are zero. Detailed emissions calculations for proposed emissions sources are included in spreadsheet format in **Attachment H** of this application. The WOC's PTE is also summarized the Emission Summary Form in **Table B.3-1** and **Attachment E** of this application.

18 AAC 50.225(b)(4) Description of Proposed ORLs

CPAI is proposing ORLs to avoid Title V and PSD permit classifications and avoid applicability of certain NSPS requirements. A description of each proposed ORL is presented in **Table B.5-1**. The analysis in **Table B.5-2** describes the effect that the proposed ORLs will have on the project PTE and presents the numerical difference between the controlled PTE (with ORLs) and uncontrolled PTE (without ORLs) for the WOC.

Table B.5-1 Description of Proposed ORLs

EU ID(s)	Description	Limit	Target Pollutant(S)	Effect of Limit on Stationary Source PTE
001	Power Generator Turbine (Dual Fuel)	Operate the turbine with an intake air temperature of 0 C or above.	NO_X, CO, VOC	NO_X < 250 tpy CO < 250 tpy VOC < 100 tpy
001	Power Generator Turbine (Dual Fuel)	Operate on emergency fuel (ULSD or unrefined fuel gas) (with or without dry combustion controls) for no more than 500 hours per year.	NO_X, CO	NO_X < 250 tpy CO < 250 tpy
301	Incinerator	Burn no more than 10% hospital/medical/ infectious waste on a quarterly basis to maintain classification as a "co-fired combustor" in 40 C.F.R. 60.5c(c).	NO_X, CO, PM, SO_2, HAP	None
301	Incinerator	Burn no more than 10% sewage sludge on a dry basis.	PM	None
001, 201 through 208, 802	All Diesel-Fired Equipment	Combust only liquid fuel that meets ULSD specifications (diesel fuel with a maximum sulfur content of 0.0015 percent by weight).	SO_2	SO_2 < 40 tpy SO_2 < 100 tpy SO_2 < 250 tpy
001 and 803	All Fuel Gas-Fired Equipment	Burn gaseous fuel with a sulfur content of no greater than 200 ppmv H_2S.	SO_2	SO_2 < 40 tpy

Table B.5-2 Effect of ORLs on Potential Emissions

Description [(a)]	NO_X	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2	Pb	HAP	CO_2e
PTE without ORLs	533	1,455	149	54.0	53.9	402	0.438	11.1	242,028
PTE with ORLs	245	245	78.7	37.4	37.3	30.2	0.427	7.21	216,235
Effect of ORLs on PTE	-288	-1,210	-69.9	-16.6	-16.6	-372	-0.0102	-3.89	-25,794

(a) Except for HAP, PTE does not include fugitives emissions for the ORL demonstration. "HAP" refers to total HAP.

18 AAC 50.225(b)(5) Method to Attain and Maintain Limits

A description of a verifiable method to attain and maintain each limit, including monitoring and recordkeeping requirements, is described in **Table B.5-3**.

Table B.5-3 Methods to Attain and Maintain each ORL

EU ID(s)	Description	Method	Monitoring	Recordkeeping
001	Power Generator Turbine (Dual Fuel)	Instrument – Hour Meter	While combusting fuel gas, operating hours and turbine intake air temperature will be monitored using an hour meter.	Record hour meter reading on the last day of each month and retained in an operator logbook.
001	Power Generator Turbine (Dual Fuel)	Instrument – Hour Meter	Operating hours on emergency fuel will be monitored using an hour meter.	Record hour meter reading on the last day of each month and retained in an operator logbook.
301	Incinerator	Instrument – Scale	Estimate the relative weight of hospital/medical/infectious waste and the weight of all fuels and wastes (total waste) combusted for each batch incinerated.	Record estimated hospital/medical/ infectious waste and total waste charging rates for each batch incinerated and calculate percentage of hospital/medical/infectious waste incinerated on quarterly basis.
301	Incinerator	Instrument – Scale	Estimate the relative weight of dry sewage sludge and the weight of all fuels and wastes (total waste) combusted for each batch incinerated.	Record estimated dry sewage sludge and total waste charging rates for each batch incinerated and calculate percentage of dry sewage sludge incinerated on quarterly basis.
001, 201 through 208, 802	All Diesel-Fired Equipment	Certified Receipts	Obtain and keep certified receipts from fuel suppliers that confirm that the diesel fuel combusted meets the specifications of ULSD.	These records can be retained electronically and provided to the Department upon request.
001 and 803	All Fuel Gas-Fired Equipment	Periodic Testing	Determine the fuel gas H_2S content of the fuel gas burned monthly, using ASTM D4084, D5504, D4810, D4913, D6228 or GPA Standard 2377, or a listed method approved in 18 AAC 50.035(b)-(c) or 40 C.F.R. 60.17 incorporated by reference in 18 AAC 50.040(a)(1), or an alternative analytical method approved by the Administrator.	Keep records of each required H_2S analysis conducted.

18 AAC 50.225(b)(6) Citations for Each Requirement Avoided

Table B.5-4 presents a citation to each requirement that is being avoided, including an explanation of why the requirement would apply in the absence of the limit and how the limit allows avoiding the requirements.

Table B.5-4 Requirements Being Avoided Through the ORLs

EU ID(s)	Description	Regulatory Citation	Avoided Requirement
001	Power Generator Turbine (Dual Fuel)	40 C.F.R. 70 [18 AAC 50.326] 40 C.F.R. 52.21 [18 AAC 50.306; 18 AAC 50.302(a)(1)]	Title V permit classification (VOC) PSD permit classification (NO_X and CO)
001	Power Generator Turbine (Dual Fuel)	40 C.F.R. 52.21 [18 AAC 50.306; 18 AAC 50.302(a)(1)]	PSD permit classification (NO_X and CO)
301	Incinerator	40 C.F.R. 60 Subpart Ec [18 AAC 50.040(a)(2)(G)]	40 C.F.R. 60 Subpart Ec requirements
301	Incinerator	40 C.F.R. 60 Subpart O [18 AAC 50.040(a)(2)(Q)]	40 C.F.R. 60 Subpart O requirements
001, 201 through 208, 802	All Diesel-Fired Equipment	18 AAC 50.502(c)(1)(C) 40 C.F.R. 70 [18 AAC 50.326] 40 C.F.R. 52.21 [18 AAC 50.306; 18 AAC 50.302(a)(1)]	MSS permit classification (SO_2) Title V permit classification (SO_2) PSD permit classification (SO_2)
001 and 803	All Fuel Gas-Fired Equipment	18 AAC 50.502(c)(1)(C)	MSS permit classification (SO_2)

18 AAC 50.225(b)(7) Repealed 10/6/2013

No longer applicable.

18 AAC 50.225(b)(8) Statement of Compliance with ORLs

CPAI will comply with each ORL being sought under 18 AAC 50.508(5) using the monitoring and recordkeeping methods identified in **Table B.5-3**.

18 AAC 50.225(b)(9) Certification Statement (Truth, Accuracy, and Completeness)

A certification statement, include signature of a CPAI responsible official, is included in **Attachment A** of this application.

ATTACHMENT C
Emission Unit Information Form

Alaska Department of Environmental Conservation
Air Quality Control Minor Permit Application

MINOR PERMIT APPLICATION – EMISSION UNIT INFORMATION

FOR A NEW STATIONARY SOURCE: Complete this form for all emissions units.

FOR A MODIFICATION TO AN EXISTING STATIONARY SOURCE:
IF YOU HAVE A TITLE V PERMIT: Complete this form for each emissions unit that is new or that is affected by a physical change or change in the method of operation.
IF YOU DO NOT HAVE A TITLE V PERMIT or APPLICATION CLASSIFIED UNDER 18 AAC 50.508(5): Complete this form for all emissions units.

Section 1 Stationary Source Information

Stationary Source Name: Willow Operations Center (WOC)

Section 2 Emissions Unit (EU) Identification (ID) and Description

Note: Do not use this section for emission units associated with asphalt plants, soil remediation, and rock crushers. Use the Supplementary Forms for these units.

EU ID No.	Description	Construction Date	Make / Model		Serial No.	Requested Limit* (specify units)	Max. Rated Capacity (kW, MMBtu), Horsepower (hp) or. Design Throughput
001	Power Generator Turbine (Dual Fuel)	TBD	TBD	TBD	TBD	500 hr/yr on Emergency Fuel (8,760 hr/yr on Fuel Gas)	15,780 kWe (ISO)
201	Backup Power Generator (Tier 2) RICE #1	TBD	TBD	TBD	TBD	500 hr/yr	2,250 kWe
202	Backup Power Generator (Tier 2) RICE #2	TBD	TBD	TBD	TBD	500 hr/yr	2,250 kWe
203	Firewater Pump (Tier 2) RICE	TBD	TBD	TBD	TBD	500 hr/yr	460 bhp
204	Temporary Firewater Pump (Tier 2) RICE #1	TBD	TBD	TBD	TBD	500 hr/yr	460 bhp
205	Temporary Firewater Pump (Tier 2) RICE #2	TBD	TBD	TBD	TBD	500 hr/yr	460 bhp

206	Small Temporary Power Generator (Tier 4) RICE #1	TBD	TBD	TBD	TBD	N/A	50 kWe (cumulative)
207	Small Temporary Power Generator (Tier 4) RICE #2	TBD	TBD	TBD	TBD	N/A	50 kWe (cumulative)
208	Large Temporary Power Generator (Tier 4) RICE	TBD	TBD	TBD	TBD	N/A	13,500 kWe (cumulative)
301	Incinerator	TBD	TBD	TBD	TBD	N/A	< 833 lb/hr
801	Bulk Cement Blending System	TBD	TBD	TBD	TBD	N/A	15 dscfm (vent)
802	Small Miscellaneous Portable Heaters and Boilers (ULSD)	TBD	TBD	TBD	TBD	N/A	10 MMBtu(HHV)/hr (cumulative)
803	Small Miscellaneous Stationary Heaters and Boilers (Fuel Gas)	TBD	TBD	TBD	TBD	N/A	5 MMBtu(HHV)/hr (cumulative)
805	Fuel Gas Skid Venting	TBD	TBD	TBD	TBD	N/A	12 Startups/year
901	Storage Tanks	TBD	TBD	TBD	TBD	N/A	Varies by Tank
1001	Equipment Component Leaks	TBD	TBD	TBD	TBD	N/A	N/A
1002	Refueling and Spillage from Storage Tanks	TBD	TBD	TBD	TBD	N/A	N/A
1003	Pad-Generated Fugitive Dust	TBD	TBD	TBD	TBD	N/A	N/A

**If no annual limit is applicable (e.g., hours, fuel), then specify not applicable (N/A).*
Please use additional copies of this sheet if necessary.

Have you identified each emission unit (if you do not have a Title V permit), or each new or affected emission unit (if you have an existing Title V permit) in Section 2 above? ☒ Yes ☐ No
If not, please explain:

Section 3 Emissions Unit Use

EU ID No.	Is unit portable?		Is the unit:					Is this unit a:		If limited operation, is the unit:		
[List same EUs as in Section 2.]	Yes	No	a nonroad engine? Yes	No	an intermittently used oil field support equipment per Policy 04.02.105? Yes	No	an oil field construction unit per Policy 04.02.104? Yes	No	primary (base load) unit?	or limited operation unit?	emergency or black start unit?	subject to a permit limit?	or other (specify)?
001	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐
201	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐
202	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐
203	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐
204	☒	☐	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐
205	☒	☐	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐
206	☒	☐	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐
207	☒	☐	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐
208	☒	☐	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐
301	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐
801	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐
802	☒	☐	☐	☒	☒	☐	☐	☒	☒	☐	☐	☐	☐
803	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐
805	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐
901	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐
1001	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐
1002	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐
1003	☐	☒	☐	☒	☐	☒	☐	☒	☒	☐	☐	☐	☐

Please use additional copies of this sheet if necessary.

Have you specified the use of each emission unit in Section 3 above? ☒ Yes ☐ No

If not, please explain:

Section 4 Fuel Information

Complete Section 4a or 4b for each emissions unit, as appropriate.

Section 4a Fuel Burning Equipment not Including Flares

EU ID No.	Fuel type(s)	Maximum fuel sulfur content	Fuel density (lb/gal) (if liquid fuel)	Higher heating value*	Maximum fuel consumption rate (gallons/hour or MMscf/hour)
001	Fuel Gas	200 ☐ wt. % S ☒ ppmv H_2S	N/A	1,151 ☐ Btu/gal ☒ Btu/dscf Other	0.168 MMscf/hr
	ULSD	0.0015 ☒ wt. % S ☐ ppmv H_2S	6.8 lb/gal	132,165 ☒ Btu/gal ☐ Btu/dscf Other	1,340 gal/hr
201	ULSD	0.0015 ☒ wt. % S ☐ ppmv H_2S	6.8 lb/gal	132,165 ☒ Btu/gal ☐ Btu/dscf Other	168 gal/hr
202	ULSD	0.0015 ☒ wt. % S ☐ ppmv H_2S	6.8 lb/gal	132,165 ☒ Btu/gal ☐ Btu/dscf Other	168 gal/hr
203	ULSD	0.0015 ☒ wt. % S ☐ ppmv H_2S	6.8 lb/gal	132,165 ☒ Btu/gal ☐ Btu/dscf Other	24.4 gal/hr
204	ULSD	0.0015 ☒ wt. % S ☐ ppmv H_2S	6.8 lb/gal	132,165 ☒ Btu/gal ☐ Btu/dscf Other	24.4 gal/hr
205	ULSD	0.0015 ☒ wt. % S ☐ ppmv H_2S	6.8 lb/gal	132,165 ☒ Btu/gal ☐ Btu/dscf Other	24.4 gal/hr
206	ULSD	0.0015 ☒ wt. % S ☐ ppmv H_2S	6.8 lb/gal	132,165 ☒ Btu/gal ☐ Btu/dscf Other	3.74 gal/hr (cumulative)
207	ULSD	0.0015 ☒ wt. % S ☐ ppmv H_2S	6.8 lb/gal	132,165 ☒ Btu/gal ☐ Btu/dscf Other	3.74 gal/hr (cumulative)
208	ULSD	0.0015 ☒ wt. % S ☐ ppmv H_2S	6.8 lb/gal	132,165 ☒ Btu/gal ☐ Btu/dscf Other	1,042 gal/hr (cumulative)
301	Fuel Gas Waste/Refuse	NA	NA	9.95 MMBtu/(short ton of waste/refuse)	<833 lb waste/refuse/hr
802	ULSD	0.0015 ☒ wt. % S ☐ ppmv H_2S	6.8 lb/gal	132,165 ☒ Btu/gal ☐ Btu/dscf Other	75.7 gal/hr (cumulative)
803	Fuel Gas	200 ☐ wt. % S ☒ ppmv H_2S	N/A	1,151 ☐ Btu/gal ☒ Btu/dscf Other	0.00434 MMscf/hr (cumulative)

**Use British thermal unit (Btu) per gallon (gal) for liquid fuels. Use Btu per dry standard cubic foot (dscf) for gaseous fuels.*
Please use additional copies of this sheet if necessary.

Have you provided the fuel details for each fuel-burning emission unit (excluding flares) in Section 4a above? ☒ Yes ☐ No
If not, please explain:

EU ID 301 (Incinerator) is a fuel assisted waste/refuse incinerator and may combust fuel gas as a supplemental fuel to maintain constant combustion temperatures. Incinerator emissions estimates are based on the solid fuel feed rate and not the supplemental fuel rate.

Section 4b Flares

Complete this section if the project/stationary source contains a flare.

Do you own or operate a flare? ☐ Yes ☒ No *(If not skip this section)*

EU ID No:	Heat release rate for pilot / purge operation (MMBtu/hr)	Maximum heat release rate (MMBtu/hr)	Flare gas heat content (Btu/scf)	Flare gas H_2S content (ppmv)

Please use additional copies of this sheet if necessary

Include additional notes as warranted.

Have you provided the fuel use details for all flares in Section 4b above? ☐ Yes ☐ No

If not, please explain:

Section 5 Materials Processed and Methods of Operation

Complete this section if the project/stationary source contains a materials-handling process.

Do you own or operate a materials-handling process ~~flare~~? ☒ Yes ☐ No *(If not, skip this section)*

EU ID No.	Materials processed	Maximum material processing rate	Describe method of operation
801	Cement Slurry	TBD (Batch Unit)	The bulk cement batch blending system is a mixing unit to combine and create homogenous cement slurries with aggregates, sand, and cement. Dust is collected from the blending system using a dust cyclone and dust collection tank. Any residual dust in the collection system may be vented and captured by a sock filter.
804	Drilling Slurry	< 200 tons/hour	Wet drilling materials are collected and passed through shakers and/or agitators to screen and separate the material by size. These materials are then directed to a ball or hammer mill for grinding into smaller and more homogenous material slurry.

Please use additional copies of this sheet if necessary

Include additional notes as warranted.

Have you specified the material processing details in Section 5 above? ☒ Yes ☐ No

If not, please explain:

Section 6 Emission Control Information (if applicable)

Complete this section if the project/stationary source contains emission control equipment.

Do you own or operate emission control equipment? ☒ Yes ☐ No *(If not, note below and skip this section.)*

EU ID No.	Control equipment	Pollutant(s) controlled:	Description of the control equipment	Description of significant operating parameters and set points for the control equipment	The control equipment is necessary:		
					To comply with an emission standard	To avoid a project classification	Other – give purpose of control equipment
001	Dry Low Emissions Combustion Controls	NO_X	Lean pre-mixed/low emissions combustion control system	Operates at ≥ 50% load while firing fuel gas	☐	☒	
801	Dust Cyclone and Sock Filter	PM	Control Efficiency = 99.999%+ for PM > 2.5 µm; Emissions < 0.0000167 g/dscf for PM < 2.5 µm.	N/A	☐	☐	Dust Control

Please use additional copies of this sheet if necessary

Include additional notes as warranted.

Have you specified the details of any emission controls in Section 6 above? ☒ Yes ☐ No

If not, please explain:

Section 7 Emission Factors

Give exact citations of emission factor sources.

EU ID No.	Emission Factors								
	NOx	**CO**	**PM-2.5**	**PM-10**	**PM**	**SO_2**	**VOC**	**HAPs**	**Lead**
001	12 ppmvd (FG) 65 ppmvd (D)	15 ppmvd (FG) 25 ppmvd (D)	0.03 lb/MMBtu(HHV) (FG) 0.06 lb/MMBtu(HHV) (D)			0.029 lb/MMBtu(HHV)	5 ppmvd (FG) 25 ppmvd (D)	$3.20x10^{-3}$ lb/MMBtu(HHV)	$1.40x10^{-5}$ lb/MMBtu(HHV)
201, 202	8.0 g/bkW-hr	4.4 g/bkW-hr	0.3 g/bkW-hr			0.0015 lb/MMBtu(HHV)	$6.42x10^{-4}$ lb/bhp-hr	$1.57x10^{-3}$ lb/MMBtu(HHV)	N/A
203, 204, 205	8.0 g/bkW-hr	4.4 g/bkW-hr	0.3 g/bkW-hr			0.0015 lb/MMBtu(HHV)	$2.51x10^{-3}$ lb/bhp-hr	$3.87x10^{-3}$ lb/MMBtu(HHV)	N/A
206, 207	5.9 g/bkW-hr	6.9 g/bkW-hr	0.04 g/bkW-hr			0.0015 lb/MMBtu(HHV)	$2.51x10^{-3}$ lb/bhp-hr	$3.87x10^{-3}$ lb/MMBtu(HHV)	N/A
208	0.749 g/bhp-hr	0.18 g/bhp-hr	0.045 g/bhp-hr			0.0015 lb/MMBtu(HHV)	$6.42x10^{-4}$ lb/bhp-hr	$1.57x10^{-3}$ lb/MMBtu(HHV)	N/A
301	3.16 lb/ton waste	2 * (69 ppmvd)	2 * (210 µg/dscm)			3.23 lb/ton waste	3.0 lb/ton	Varies by type of component (**see Attachment H**)	26,000 µg/dscm
801	N/A	N/A	$1.67x10^{-5}$ g/dscf			N/A	N/A	N/A	N/A
802	20 lb/kgal	5 lb/kgal	2.1 lb/kgal	2.4 lb/kgal		0.0015 lb/MMBtu(HHV)	0.34 lb/kgal	1.34 lb/kgal	$8.30x10^{-3}$ lb/kgal
803	100 lb/MMscf	84 lb/MMscf	7.6 lb/MMscf			33.8 lb/MMscf	5.5 lb/MMscf	1.97 lb/MMscf	$5.00x10^{-4}$ lb/MMscf
804	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
805	N/A	N/A	N/A	N/A	N/A	N/A	723 lb/startup	0.391 lb/startup	N/A
901	N/A	N/A	N/A	N/A	N/A	N/A	187 lb/yr	29.4 lb/yr	N/A
1001	N/A	N/A	N/A	N/A	N/A	N/A	Varies by type of component and service (see **Attachment H**)		N/A
1002	N/A	N/A	N/A	N/A	N/A	N/A	0.057 lb/kgal	0.158 lb HAP/lb VOC	N/A
1003	N/A	N/A	68 lb/disturbance	456 lb/disturbance		N/A	N/A	N/A	N/A

EU ID No.	Sources and References for Emission Factors								
	NOx	**CO**	**PM-2.5**	**PM-10**	**PM**	**SO_2**	**VOC**	**HAPs**	**Lead**
001	Representative Vendor Data	Representative Vendor Data	Representative Vendor Data			Sulfur Content Mass Balance	Representative Vendor Data	AP-42 Tables 3.1-3 and 3.1-4; OAR-2002-0060 IV-B-09	AP-42 Table 3.1-4
201, 202	40 CFR 1039 Appendix I, Table 2 (Tier 2) with 1.25 NTE	40 CFR 1039 Appendix I, Table 2 (Tier 2) with 1.25 NTE	40 CFR 1039 Appendix I, Table 2 (Tier 2) with 1.25 NTE			Sulfur Content Mass Balance	AP-42 Table 3.4-1	AP-42 Tables 3.4-3 and 3.4-4	N/A
203, 204, 205	40 CFR 1039 Appendix I, Table 2 (Tier 2) with 1.25 NTE	40 CFR 1039 Appendix I, Table 2 (Tier 2) with 1.25 NTE	40 CFR 1039 Appendix I, Table 2 (Tier 2) with 1.25 NTE			Sulfur Content Mass Balance	AP-42 Table 3.3-1	AP-42 Table 3.3-2	N/A
206, 207	40 CFR 1039.101, Table 1 (Tier 4) with 1.25 NTE	40 CFR 1039.101, Table 1 (Tier 4) with 1.25 NTE	40 CFR 1039.101, Table 1 (Tier 4) with 1.5 NTE			Sulfur Content Mass Balance	AP-42 Table 3.3-1	AP-42 Table 3.3-2	N/A
208	40 CFR 1039.101, Table 1 (Tier 4), with 1.5 NTE	Representative Vendor Data	40 CFR 1039.101, Table 1 (Tier 4), with 1.5 NTE			Sulfur Content Mass Balance	AP-42 Table 3.4-1	AP-42 Tables 3.4-3 and 3.4-4	N/A
301	AP-42 Table 2.1-9	40 CFR 60 Subpart EEEE, Table 1b (as proposed 8/31/2020)	40 CFR 60 Subpart EEEE, Table 1b (as proposed 8/31/2020)			AP-42 Table 2.1-9	AP-42 Table 2.1-12	AP-42 Table 2.1-9; 40 CFR 60 Subpart EEEE, Table 1b (as proposed 8/31/2020)	40 CFR 60 Subpart EEEE, Table 1b (as proposed 8/31/2020)
801	N/A	N/A	Representative Vendor Data			N/A	N/A	N/A	N/A
802	AP-42 Table 1.3-1	AP-42 Table 1.3-1	AP-42 Tables 1.3-2 and 1.3-7	AP-42 Tables 1.3-2 and 1.3-7		Sulfur Content Mass Balance	AP-42 Table 1.3-3	AP-42 Tables 1.3-9 and 1.3-10; VCAPCD AB 2588	VCAPCD AB 2588
803	AP-42 Table 1.4-1	AP-42 Table 1.4-1	AP-42 Table 1.4-2	AP-42 Table 1.4-2	AP-42 Table 1.4-2	Sulfur Content Mass Balance	AP-42 Table 1.4-2	AP-42 Tables 1.4-2, 1.4-3, and 1.4-4; VCAPCD AB 2588	AP-42 Table 1.4-2
804	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
901	N/A	N/A	N/A	N/A	N/A	N/A	Mitchell Scientific, Inc. Emission Master Tanks	Mitchell Scientific, Inc. Emission Master Tanks	N/A
1001	N/A	N/A	N/A	N/A	N/A	N/A	EPA-453/R-95-017, Table 2-4 and Component Weight Fractions		N/A
1002	N/A	N/A	N/A	N/A	N/A	N/A	AP-42 Tables 5.2-5 and 5.2-6	AP-42 Tables 5.2-5 and 5.2-6; HAP Weight Fractions	N/A
1003	N/A	N/A	AP-42 Section 13.2.5	AP-42 Section 13.2.5		N/A	N/A	N/A	N/A

Please use additional copies of this sheet if necessary.

Include additional notes as warranted.

1) For EU ID 001: emission factors summarized in ppmvd are based on normal operations and adjusted to 15% O_2 for operations on fuel gas (FG) and diesel (D).

Have you specified all emission factors and reference sources in Section 7 above? ☒ Yes ☐ No

If not, please explain:

Section 8 Applicable State Emission Limits (listed in 18 AAC 50.050 through 18 AAC 50.090)

Complete this section for emissions units that are new or are affected by the physical change or change in operation.

EU ID No.	Emission Limit or Standard	Regulation Citation	Compliance Method
301	Visible Emissions (Incinerators)	18 AAC 50.050(a)	See Attachment F
301	Particulate Matter (Incinerators)	18 AAC 50.050(b)	No Limit < 1,000 lb/hr
001, 201 – 208, 801 – 804	Visible Emissions (Industrial Processes and Fuel-Burning Equipment)	18 AAC 50.055(a)(1)	See Attachment F
001, 201 – 208, 801 – 804	Particulate Matter (Industrial Processes and Fuel-Burning Equipment)	18 AAC 50.055(b)(1)	See Attachment F
001, 201 – 208, 801 – 804	Sulfur Compound Emissions (Industrial Processes and Fuel-Burning Equipment)	18 AAC 50.055(c)	See Attachment F

Please use additional copies of this sheet if necessary.

Have you specified all applicable state emission limits in Section 8 above? ☒ Yes ☐ No

Have you specified a demonstration of compliance for each emission limit or standard? ☒ Yes ☐ No

If you answered "no" to either question, please explain:

Section 9 Incinerators

Complete this section if the project/stationary source contains an incinerator.
Do you own or operate an incinerator? ☒ Yes ☐ No *(If not, skip this section.)*

EU ID No.	Fuels Burned (type and consumption rate)	Rated capacity in pounds per hour	Type of waste burned
301	Fuel Gas; Waste/Refuse (9.95 MMBtu/short ton of waste/refuse)	<833 lb/hr	Primary: waste/refuse Secondary: sewage sludge, hospital/medical waste

Please use additional copies of this sheet if necessary

Include additional notes as warranted.

Have you specified the details of all incinerators in Section 9 above? ☒ Yes ☐ No
If not, please explain:

ATTACHMENT D
Emission Unit Information Supplementary Form

Alaska Department of Environmental Conservation
Air Quality Control Minor Permit Application

MINOR PERMIT APPLICATION – EMISSION UNIT INFORMATION SUPPLEMENTARY FORMS FOR ASPHALT PLANTS, SOIL REMEDIATION UNITS & ROCK CRUSHERS

FOR A NEW STATIONARY SOURCE: Complete this form for all emission units.

FOR A MODIFICATION TO AN EXISTING STATIONARY SOURCE:
IF YOU HAVE A TITLE V PERMIT: Complete this form for each emissions unit that is new or that is affected by the project.
IF YOU DO NOT HAVE A TITLE V PERMIT: Complete this form for all emissions units.

Section 1 Stationary Source Information

Stationary Source Name: Willow Operations Center (WOC)
Owner/Operator: ConocoPhillips Alaska, Inc.
Physical Address: Section 32, Township 9N, Range 1E
City and Zip Code: Anchorage 99510

☐ Asphalt Plants (Section 2)

☐ Soil Remediation (Section 3)

☒ Rock Crusher (Section 4)

Have you completed Section 1, above? ☒ Yes ☐ No
If not, please explain:

Section 2: Asphalt Plant

If the stationary source contains an asphalt plant(s), complete this section instead of Section 2 of Emission Unit Information Form.

Type of Equipment	Make and Model	Primary burner size (Btu per hour)	Plants Production Rate (maximum and rated)	Maximum Fuel Feed Rate: ☐ Gallon/hr ☐ Scf/hr
☐ Dryer:				
☐ Afterburner :				
☐ Dryer:				
☐ Afterburner :				

Identify each piece of installed equipment by placing an "x" in the box beside the piece of equipment. If the equipment listed has a place to provide the size and capacity, provide that additional information. List only diesel engines that are stationary.

Material handling devices:
- ☐ Conveyors,
- ☐ Loaders,
- ☐ Bins,
- ☐ Elevators,
- ☐ Screens, or
- ☐ Chutes

Dryer control devices:
- ☐ Baghouse
- ☐ Cyclone
- ☐ Scrubber
- ☐ Knockout box

Any of the following:
- ☐ Asphalt cement heaters,
- ☐ Fuel fired silo heaters
- ☐ Mixers
- ☐ Pug mills
- ☐ Other emission control equipment. List:

_____

_____

☐ Diesel engines:

Make & model _____, Size _____hp, Max fuel rate_____gal/hr
Make & model _____, Size _____hp, Max fuel rate_____gal/hr
Make & model _____, Size _____hp, Max fuel rate _____gal/hr

Nearest distance from dryer exhaust outlet to:

Residence _____ miles

Other occupied structure _____ miles

Building use:_____

Was the asphalt plant constructed, modified, or reconstructed before June 11, 1973? If so, check appropriate box.
- ☐ Constructed
- ☐ Modified
- ☐ Reconstructed

If requested by the Department:
- ☐ Attached is a copy of the operation and maintenance plan for the unit.
- ☐ Attached is
  - ☐ a copy of the most recent particulate matter source test conducted within the last five years; or
  - ☐ a schedule for conducting the test.
- ☐ For an asphalt plant within one mile of the nearest residence or occupied structure, a fugitive dust control plan is attached.

Have you completed Section 2, above? ☐ Yes ☐ No

If not, please explain:

Section 3: Soil Remediation Unit

If the stationary source contains a soil remediation unit(s), complete this section instead of Section 2 of Emission Unit Information Form.

Type of Equipment	Make and model	Plants Production Rate (maximum and rated)	Maximum fuel feed: ☐ Gallon/hr ☐ Scf/hr
☐ Dryer, rotary kiln, combustion device in fluidized bed, etc.:			
☐ Afterburner :			
☐ Dryer, rotary kiln, combustion device in fluidized bed, etc.:			
☐ Afterburner :			

Identify each piece of installed equipment by placing an "x" in the box beside the piece of equipment. If the equipment listed has a place to provide the size and capacity, provide that additional information. List only diesel engines that are stationary.

Material handling devices:
- ☐ Conveyors,
- ☐ Loaders,
- ☐ Bins,
- ☐ Elevators,
- ☐ Screens, or
- ☐ Chutes

Dryer control devices:
- ☐ Baghouse
- ☐ Cyclone
- ☐ Scrubber
- ☐ Knockout box

☐ Other emission control equipment. List:

_____
_____
_____

☐ Diesel engines:

Make & model _____, Size _____hp, Max fuel rate_____gal/hr
Make & model _____, Size _____hp, Max fuel rate_____gal/hr
Make & model , Size hp, Max fuel rate gal/hr

Storage areas for
- ☐ Untreated soils (Describe)
  If storage bin provide the date installed:
- ☐ Treated soils (Describe)
  If storage bin provide the date installed:

☐ Enclosed truck loading station Date Installed:
☐ Railcar loading station Date Installed:

Nearest distance from emission unit outlet to:
Residence _____miles
Other occupied structure _____miles
Building Use:_____

☐ Attached is a VOC and dust control plan.

☐ Attached is a carbon monoxide continuous emission monitor performance test report, or schedule for conducting the test.

If requested by the Department:

☐ Attached is a copy of the operation and maintenance plan for the unit.

☐ Attached is
- ☐ a copy of the most recent particulate matter source test if conducted within the last five years; or
- ☐ a schedule for conducting the particulate matter source test.

Have you completed Section 3, above? ☐ Yes ☐ No

If not, please explain:

Section 4 Rock Crushers

If the stationary source contains a rock crusher(s), complete this section for emission units related to rock crushing.

Initial Crushers			**Other Crushers**	
Equipment ID.	Rated capacity (tons per hour)		Equipment ID.	Rated capacity (tons per hour)
N/A	N/A		N/A	N/A

Other Grinding Mills			**Screening Operations**	
Equipment ID.	Rated capacity (tons per hour)		Equipment ID.	Rated capacity (tons per hour)
[Ball/Hammer Mill(s)]	< 200 tons/hr		[Screening/Shaker(s)]	< 200 tons/hr

Belt Conveyors			**Belt Conveyors**	
Equipment ID.	Rated capacity (tons per hour)		Equipment ID.	Rated capacity (tons per hour)
N/A	N/A		N/A	N/A

Bucket Elevators			**Storage Bins**	
Equipment ID.	Rated capacity (tons per hour)		Equipment ID.	Rated capacity (tons per hour)
N/A	N/A		[Cuttings Tank(s)]	< 200 tons/hr
			[Fine/Coarse Pit(s)/Tank(s)]	< 200 tons/hr
Bagging Operations			**Enclosed Truck or Railcar Loading Stations**	
Equipment ID.	Rated capacity (tons per hour)		Equipment ID.	Rated capacity (tons per hour)
N/A	N/A		[Loading/Transfer Station]	< 200 tons/hr

Nearest distance from equipment listed above to: Residence 0.03 miles Other occupied structure 0.03 miles Building Use: Temporary Drilling/Construction Camps	If requested by the Department: ☐ For a rock crusher, a fugitive dust control plan is attached. **N/A – operation with wet, saturated process.**

NOTE: Rock crushers and asphalt plants may be subject to federal New Source Performance Standards (40 C.F.R. 60, Subparts I, LL, and OOO.) The Department no longer enforces these standards through air quality minor permits. Address all correspondence about compliance with these standards to EPA.

Have you completed Section 4, above? ☒ Yes ☐ No

If not, please explain:

ATTACHMENT E
Emissions Summary Form

Alaska Department of Environmental Conservation
Air Quality Control Minor Permit Application

EMISSIONS SUMMARY FORM
NEW STATIONARY SOURCE

Section 1 Stationary Source Information

Stationary Source Name: Willow Operations Center (WOC)

Section 2 Potential to Emit (PTE) for the Entire Stationary Source

EU ID No.	PTE (tpy)									
	CO	**NOx[4]**	**PM-2.5[1]**	**PM-10[1]**	**PM**	**SO_2**	**VOC[2]**	**Fugitive VOC[3]**	**Fugitive PM[3]**	**Lead**
001	182	55.4	27.1	27.1	27.1	22.6	9.84	N/A	N/A	6.19E-04
201	6.01	11.0	0.344	0.344	0.344	8.57E-03	0.509	N/A	N/A	0.00
202	6.01	11.0	0.344	0.344	0.344	8.57E-03	0.509	N/A	N/A	0.00
203	0.827	1.51	0.0473	0.0473	0.0473	1.24E-03	0.289	N/A	N/A	0.00
204	0.827	1.51	0.0473	0.0473	0.0473	1.24E-03	0.289	N/A	N/A	0.00
205	0.827	1.51	0.0473	0.0473	0.0473	1.24E-03	0.289	N/A	N/A	0.00
206	3.68	3.14	0.0241	0.0241	0.0241	3.34E-03	0.777	N/A	N/A	0.00
207	3.68	3.14	0.0241	0.0241	0.0241	3.34E-03	0.777	N/A	N/A	0.00
208	34.4	142	8.50	8.50	8.50	0.930	55.3	N/A	N/A	----
301	2.62	5.77	6.85E-03	6.85E-03	6.85E-03	5.89	5.48	N/A	N/A	0.424
801	0	0	1.45E-04	1.45E-04	1.45E-04	0	0	N/A	N/A	0.00
802	1.66	6.63	0.706	0.789	0.789	0.0676	0.113	N/A	N/A	0.00275
803	1.80	2.15	0.163	0.163	0.163	0.642	0.118	N/A	N/A	1.07E-05
804	0	0	0	0	0	0	0	N/A	N/A	0.00
805	0	0	0	0	0	0	4.34	N/A	N/A	0.00
901	0	0	0	0	0	0	0.0934	N/A	N/A	0.00
1001	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.153	0.00	N/A
1002	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.657	0.00	N/A
1003	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	3.65	N/A
Total tpy	**245**	**245**	**37.3**	**37.4**	**37.4**	**30.2**	**78.7**	**0.810**	**3.65**	**0.427**

☒ Detailed Excel spreadsheet emissions calculations are attached. *These must be attached in order for your application to be complete. Include multiple copies of this page if more space is required.*

☐ *Check this box if fugitive emissions are included in permit applicability under 18 AAC 50.502(i).*

Brief description of why fugitive emissions are included in permit applicability:

Notes:

[1] Include condensable particulate matter for PM-10 and PM-2.5.

[2] If total PTE for volatile organic compounds (VOCs) is at least 10 tpy, include a separate Excel spreadsheet that shows the HAP emissions.

[3] Fugitive VOC and PM emissions are included as assessable emissions regardless of permit applicability.

[4] Fugitive NOx emissions from blasting should be included in the PTE column for NOx.

Have you completed Section 2, above? ☒ Yes ☐ No

If not, please explain:

ATTACHMENT F
State Emission Standards Compliance Demonstration

F.1. DEMONSTRATION OF COMPLIANCE WITH STATE EMISSION STANDARDS IN 18 AAC 50.050 AND 50.055

18 AAC 50.050(a) – Visible Emissions Standards for Incinerators

18 AAC 50.050(a) applies to the incinerator at the WOC and states that visible emissions, excluding condensed water vapor, from an incinerator may not reduce visibility through the exhaust effluent by more than 20 percent averaged over any 6 consecutive minutes.

Visible emissions, excluding condensed water vapor, emitted from the incinerator at the WOC will comply with the opacity standard with Method 9 observations.

18 AAC 50.050(b) – Particulate Matter (PM) Emissions Standards for Incinerators

18 AAC 50.050(b) applies to the incinerator at the WOC and states that PM emissions may not exceed the particulate matter standard listed in Table 4. According to Table 4, for incinerators with a rated capacity of less than 1,000 pounds per hour, there is no limit.

18 AAC 50.055(a)(1) – Visible Emissions Standards for Industrial Processes and Fuel-Burning Equipment

18 AAC 50.055(a)(1) applies to all fuel burning equipment and industrial processes at the WOC and states that visible emissions, excluding condensed water vapor, not reduce visibility through the exhaust effluent by more than 20 percent averaged over any 6 consecutive minutes.

Visible emissions, excluding condensed water vapor, emitted from the project emission units at the WOC will comply with the opacity standard with Method 9 observations.

18 AAC 50.055(b)(1) – Particulate Matter (PM) Emissions Standards for Industrial Processes and Fuel-Burning Equipment

18 AAC 50.055(b)(1) applies to all fuel burning equipment and industrial processes at the WOC and states that PM emissions may not exceed 0.05 gr/dscf of exhaust corrected to standard conditions and averaged over 3 hours. Compliance with the standard for the project emission units is demonstrated by calculating PM emissions at dry standard conditions using the following equation:

$$\mathrm{PM}\left[\frac{gr}{dscf}\right] = \frac{\mathrm{PM}\left[\frac{gr}{hr}\right]}{\mathrm{F_d}\left[\frac{dscf}{MMBtu(HHV)}\right]} = \frac{\mathrm{EF}\left[\frac{lb\ PM}{MMBtu(HHV)}\right] x \left(\frac{7{,}000\ gr}{lb}\right)}{\mathrm{F_d}\left[\frac{dscf}{MMBtu(HHV)}\right] x \left(\frac{20.9}{20.9 - \%O_2}\right)}$$

This relation is applied to calculate the PM emission rate from all fuel-burning equipment in the WOC emission inventory. This analysis is summarized in **Table F.1-1**. As shown, all PM emissions are well below the 0.05 gr/dscf PM emission limit.

Table F.1-1 Demonstration of Compliance with Particulate Matter Standard for Industrial Processes and Fuel-Burning Equipment

EU ID	Fuel	Classification	PM Emission Factor (EF)	F_d Factor [(a)]	O_2 in Exhaust (%O_2)	PM Emission Rate
			lb/MMBtu(HHV)	dscf/MMBtu(HHV)	%	gr/dscf
001	Fuel Gas	Fuel-Burning Equipment	0.0300	8,710	15	0.0068
	ULSD	Fuel-Burning Equipment	0.0600	9,190	15	0.0129
201	ULSD	Fuel-Burning Equipment	0.0587	9,190	10	0.0233
202	ULSD	Fuel-Burning Equipment	0.0587	9,190	10	0.0233
203	ULSD	Fuel-Burning Equipment	0.0587	9,190	10	0.0233
204	ULSD	Fuel-Burning Equipment	0.0587	9,190	10	0.0233
205	ULSD	Fuel-Burning Equipment	0.0587	9,190	10	0.0233
206	ULSD	Fuel-Burning Equipment	0.0106	9,190	10	0.0042
207	ULSD	Fuel-Burning Equipment	0.0106	9,190	10	0.0042
208	ULSD	Fuel-Burning Equipment	0.0141	9,190	10	0.0056
801	–	Industrial Process	–	–	–	0.0003
802	ULSD	Fuel-Burning Equipment	0.0180	9,190	5	0.0104
803	Fuel Gas	Fuel-Burning Equipment	0.0066	8,710	5	0.0040
804	–	Industrial Process	–	–	–	0.0000

(a) Method 19-based approach from 40 CFR 60 Appendix A-7. Fd factor from Table 19-2. Standard conditions at 20°C (68°F) and 760 mm Hg (29.92 in Hg).

18 AAC 50.055(c) – Sulfur Compound Emissions Standards for Industrial Processes and Fuel-Burning Equipment

18 AAC 50.055(c) applies to all fuel burning equipment and industrial processes at the WOC and states that SO_2 emissions may not exceed 500 ppmv averaged over 3 hours.

There are no industrial processes at the WOC that emit any sulfur compound emissions. For the fuel-burning equipment at the WOC, compliance with the 500 ppmv sulfur compound emissions standard is determined using the following calculation methodology:

$$SO_2[\text{ppmv}] = \frac{SO_2\left[\frac{scf}{hr}\right]}{\text{Exhaust}\left[\frac{MMscf}{hr}\right]} = \frac{\text{Fuel}\left[\frac{MMBtu(HHV)}{hr}\right] x\ \text{EF}\ x\ \left(\frac{lb\text{-}mole}{64.066\ lb\ SO_2}\right)\ x\ \left(\frac{379.5\ scf}{lb\text{-}mole}\right)}{\text{Fuel}\left[\frac{MMBtu(HHV)}{hr}\right]\ x\ F_d\left[\frac{dscf}{MMBtu(HHV)}\right]\ x\ \left(\frac{1\ MMscf}{10^6\ scf}\right)\ x\ \left(\frac{20.9}{20.9\ -\ \%O_2}\right)}$$

For gaseous fuels:

$$\mathrm{EF}\left[\frac{lb\ SO_2}{MMBtu(HHV)}\right] = (ppmv\ H_2S)\ x\left(\frac{1\ scf/10^6 scf}{1\ ppmv}\right) x\left(\frac{10^6 scf}{1\ MMscf}\right) x\left(\frac{lb\text{-}mole}{379.5\ scf H_2S}\right) x\left(\frac{lb\text{-}mole\ SO_2}{lb\text{-}mole\ H_2S}\right) x\left(\frac{64.066\ lb\ SO_2}{lb\text{-}mole}\right) x\left(\frac{MMscf}{1{,}151\ MMBtu}\right)$$

For liquid fuels:

$$\mathrm{EF}\left[\frac{lb\ SO_2}{MMBtu(HHV)}\right] = (\%\ wt\ S)\ x\left(\frac{64.066\ lb\ SO_2/lb\text{-}mol}{32.065\ lb\ S/lb\text{-}mol}\right) x\left(\frac{6.8\ lb/gal}{132{,}165\ Btu/gal}\right) x\left(\frac{10^6 Btu}{1\ MMBtu}\right)$$

where:

Fuel HHV =	1,151 MMBtu/MMscf for gaseous fuel 132,165 Btu/gal for liquid fuel
F_d =	8,710 dscf/MMBtu(HHV) for gaseous fuel (USEPA Method 19, Table 19-2) 9,190 dscf/MMBtu(HHV) for liquid fuel (USEPA Method 19, Table 19-2)
$\%O_2$ =	0 % (most conservative assumption)
SO_2 (ppmv) =	500 ppmv [max sulfur exhaust emissions allowed under 18 AAC 50.055(c)]

Based on these assumptions, the maximum sulfur content of liquid and gaseous fuels combusted by equipment at the WOC that would not exceed the state sulfur compound emissions standard is summarized in **Table F.1-2**. As shown, all fuel combusted by project emission units will be well below the maximum fuel sulfur content that would comply with the 500 ppmv sulfur exhaust standard.

Table F.1-2 Demonstration of Compliance with Sulfur Compound Standard for Industrial Processes and Fuel-Burning Equipment

Fuel Combusted	Classification	Max Sulfur Content in Fuel Combusted at the WOC	Max Fuel Sulfur Content Complying with Sulfur Compound Standard	State Sulfur Compound Exhaust Standard
Fuel Gas	Fuel-Burning Equipment	200 ppmv H_2S	5,000 ppmv H_2S	500 ppmv SO_2
ULSD	Fuel-Burning Equipment	0.0015 % wt S	0.75 % wt S	500 ppmv SO_2

ATTACHMENT G
Ambient Air Quality Impact Analysis

WILLOW OPERATIONS CENTER (WOC)

Cumulative Ambient Air Quality Impact Assessment

Prepared for:

ConocoPhillips Alaska, Inc.

June 2023

CONTENTS

FIGURES

TABLES

G.1. INTRODUCTION

This document presents the methodologies and results of a near-field cumulative ambient air quality impact assessment (AQIA) for applicable criteria pollutants and averaging periods conducted for the ConocoPhillips Alaska, Inc. (CPAI) Willow Operations Center (WOC) minor source-specific permit application. **Attachment B** of the permit application package summarizes CPAI's proposed operations at the WOC and requested limits on those operations. Based on this evaluation, the WOC will trigger the following permit classifications for:

- A new minor stationary source with potential emissions greater than 40 tpy of NO_X, 10 tpy of $PM_{2.5}$, and 15 tpy PM_{10} under 18 AAC 50.502(c)(1).
- A rock crusher with a rated capacity of at least five tons per hour under 18 AAC 50.502(b)(3).
- A source establishing an Owner-Requesting Limit (ORL) under 18 AAC 50.508(5) to avoid permit classifications under AS 46.14.130.

In accordance with 18 AAC 50.540(c)(2)(A), the permit application must include an ambient analysis demonstrating that the proposed potential emissions from the stationary source will not interfere with the attainment or maintenance of the ambient air quality standards for each pollutant for which a permit is required under 18 AAC 50.502(c)(1). There are no specific ambient analysis requirements for the other triggered permit classification.

G.2. PROJECT INFORMATION AND DESCRIPTION OF THE TECHNICAL APPROACH

This AQIA involved the execution of a steady-state dispersion model to predict pollutant concentrations in ambient air based on stack parameters, emissions, and structures representative of WOC sources. Unless otherwise noted, the AQIA comports with guidelines and methodologies articulated in the following documents:

- Guideline on Air Quality Models [published as 40 CFR 51, Appendix W] (USEPA 2017).
- Alaska Department of Environmental Conservation (ADEC) Modeling Review Procedures Manual (ADEC 2018a).

Standard modeling approaches are described in **Table G.2-1.** The ADEC Air Quality Modeling Submittal Checklist for Minor Permit Applications (ADEC 2017) was used as the foundation for developing this table. Each applicable element from the ADEC checklist was developed into a row in **Table G.2-1** that includes a column indicating how each checklist item has been addressed.

Table G.2-1 Modeling Approach

Checklist Element	Remarks
1. Background Information	
Map Showing the Source Location	See **Attachment B, Figure B.1-1**.
Air Quality Control Region Containing the Source	The project is in the Northern Alaska Intrastate Air Quality Control Region.
Location Attainment Classification	The project location is attainment/unclassifiable and not located near a non-attainment area.
Requirements for an Ambient Assessment	Project classification under 18 AAC 50.502(c)(1) for a minor stationary source with PTE greater than 40 tpy of NO_X, 10 tpy of $PM_{2.5}$, and 15 tpy PM_{10}, requires an ambient assessment to demonstrate compliance with the following ambient air quality standards: • NO_2 (annual average) • $PM_{2.5}$ (24-hour and annual average) • PM_{10} (24-hour average) Note that for a permit required under 18 AAC 50.502(c)(1), it is assumed that ADEC will not require a 1-hour NO_2 AQIA for the WOC per 18 AAC 50.540(l).
Modeling Protocol	A modeling protocol was not submitted.

Checklist Element	Remarks
2. Approach	
General Approach	It was assumed that this project was too complex for a screening analysis and that impacts would be greater than the Significant Impact Levels (SILs); therefore, only cumulative impact analyses were conducted.
Modeled Operating Scenario Description	One worst-case operating scenario was modeled with all sources from the early operations and routine operations phases, operating concurrently at loads and emission rates that are consistent with or higher than requested permit limits. As described in Section G.4.1 a separate air quality impact assessment specifically designed to predict construction phase impacts was not conducted because CPAI has committed to combusting ULSD in the construction equipment, and the impacts predicted from the single worst-case operating scenario are representative of impacts that will occur during construction.
2.1 Model Selection	
Model Source Code	• AERMOD version 22112 • AERMET version 22112 • BPIPPRM version 04274 • AERSURFACE: Not required to be used because the meteorological data was generated with North Slope default values.
Model Source Code Modifications	All codes were used without modification.
Alternative Modeling Techniques	Alternative modeling techniques were not used.
Model Options	All modeling options were set to default settings.
2.2 Modeling Domain	
Modeling Domain Description	The receptor grid extended to at least 1 kilometer in all directions from the WOC facility. All grids are at sufficient density to ensure maximum impact locations were predicted by the modeling. Receptor grid details are provided under the **2.12 Receptor Grid** section of this table.

Checklist Element	Remarks
2.3 Meteorological Data	
Description of Meteorological Data and Data Processing	This analysis relied on the same meteorological input data used to support the recently approved CPF-2 H_2S increase project described in Technical Analysis Report supporting Permit AQ0267MSS01 (November 24, 2021). Because of the proximity of the WOC and Nuiqsut, this data is representative of plume transport conditions in the WOC project area. That data set was built from the following: • Approved site-specific, PSD-quality surface data collected at the Nuiqsut monitoring site located in Nuiqsut, Alaska during calendar years 2016, 2017, and 2019. • National Weather Service (NWS) upper air data collected near Utqiaġvik, Alaska which is the nearest upper air station. AERMET settings followed those approved for modeling. Surface based inputs utilized in Stage 2 AERMET processing were standard North Slope seasonal and surface characteristic assignments specified in the ADEC Modeling Review Procedures Manual (ADEC 2018a). See **Section G.3** for additional discussion on the selection, representativeness, and processing of the meteorological data.
2.4 Coordinate System	
Coordinate System Used	Universal Transverse Mercator (UTM) Zone 5, NAD83.
2.5 Land Use Analysis	
Description of Surrounding Land Use	Surrounding land use is rural.
Land use Classification Methodology	Auer land classification procedure recommended in 40 CFR Part 51 Appendix W, Section 7.2.1.1(b)(i).
2.6 Terrain	
Handling of Terrain	The ground level elevation throughout the entire modeling domain was set to 0 meters to simulate the flat terrain surrounding the project location. This is a practice common for new source review modeling on the Alaskan North Slope coastal plain. Building and source base elevations were set to 1.52 meters (5 feet) because they are located on a typical elevated gravel pad.

Checklist Element	Remarks
Map Showing Local Topography	As described, the local terrain is essentially flat. Therefore, a topographic map has not been provided.
2.7 Emission Unit (EU) Inventory	
List of Project EUs	See **Table G.2-2**.
Characterization of Project Sources	Almost all project sources were modeled as point sources because the modeled emissions will pass through an exhaust stack. The only project source modeled as a volume source emits particulate matter vented from the cement blending system (EU ID 801). This source was modeled as a volume source given the lack of information on release parameters. Modeled parameters for all modeled project sources are found in **Table G.2-3**.
Cross Reference between EU Names and Model IDs	See **Table G.2-2**.
Description of Operating Scenarios	A single scenario was modeled with all sources operating concurrently at the maximum emission rates detailed in permit application in **Attachment E** (Emissions Summary Form) and **Attachment H** (Emissions Calculations Spreadsheet) and further described in **Table G.2-4**.
List of Modeled and Non-Modeled Sources	Modeled sources are listed in **Table G.2-2**. Non-modeled sources are listed in **Section G.4**.
Description and Justification for Non-Modeled Sources	Non-modeled sources include nearby sources that are not explicitly modeled, natural sources, other unidentified sources in the vicinity of the project (e.g., construction equipment, oilfield maintenance equipment, drilling activity and mobile activities, etc.), and regional transport contributions from more distant sources (i.e., domestic, and international). The ambient contributions from these sources were accounted for through use of ambient monitoring data as described in **Section G.5**.
2.8 EU Release Parameters	
Source Parameter Identification	See **Table G.2-3**.
Modeled Emission Rates are Described	A list of modeled emission rates and their bases are found in **Table G.2-4**. These are provided in addition to calculations provided in permit application **Attachment E** (Emissions Summary Form) and **Attachment H** (Emissions Calculations Spreadsheet).

Checklist Element	Remarks
Restrictions to Modeled Emission Rates are Described	Restrictions are consistent with those found in **Attachment B** of the permit application.
Modeled Stack Parameters are Described	See **Table G.2-3** and **Table G.2-4**.
The Basis for the Modeled Stack Parameters are Described	See **Table G.2-3** and **Table G.2-4**.
Stack Heights do not Exceed GEP	All stacks were evaluated to determine if heights are Good Engineering Practice (GEP) as defined in 40 CFR 51.100. The current version of BPIPPRM was used for this analysis.
Restricted (non-vertical, capped, etc.) Stack Parameters are Described	With the exceptions noted in **Table G.2-3**, all stacks were assumed to be non-capped with vertical releases.
Description of Modeled Source Types	Almost all project sources were modeled as point sources because the modeled emissions will pass through an exhaust stack. The only project source modeled as a volume source emits particulate matter vented from the cement blending system (EU ID 801). This source was modeled as a volume source given the lack of information on release parameters.
2.9 Pollutant Specific Modeling Issues	
PM Modeling – Description of Deposition Approach	Deposition modeling was not required or conducted.
$PM_{2.5}$ Modeling – Discussion of Secondary Impacts	Secondary $PM_{2.5}$ impacts were not required or assessed.
NO_2 Modeling – Description of NO_x to NO_2 Chemical Transformation Technique used.	The Tier 2 Ambient Ratio Method (ARM) was used by specifying the ARM2 keyword in AERMOD. The default upper and lower ambient ratio limits of 0.9 and 0.5, respectively, were used without modification.

Checklist Element	Remarks
2.10 Building Downwash	
Description of How Building Downwash was Accounted for	The effects of plume downwash were considered for all point sources. Direction-specific building dimensions were calculated using the current version of the USEPA-approved Building Profile Input Program BPIPPRM. Dimensions of all buildings are based on preliminary designs for source and structure configurations. For the large temporary power generators (EU ID 208; Model ID TEMP_03) expected to be located at the WOC during the early operations phase, many potential configurations could exist. Therefore, these units were simulated using a conservatively representative approach, which includes the following: • The structure is set at the height of a typical generator module configuration with standard Conex shipping container. • All large temporary power generator emission units were collocated to maximize plume overlap and reduce simulation reliance on structure and source-specific geometries. • The release points of these units were all modeled just above the height of the module, which is the lowest possible stack height for typical North Slope units. • All modeled stacks were placed in the center of a module, which ensure building downwash will affect the plumes in all wind directions. • The large temporary power generators were also located on the WOC pad near the other largest emission sources (turbine [EU ID 001], incinerator [EU ID 301], and backup power generators [EU IDs 201 and 202]) and aligned in the prevailing wind direction to simulate potential plume overlap with these sources.
Scaled Plot of the Stationary Source	See **Figure G.2-1**.

Checklist Element	Remarks
2.11 Ambient Air Boundary	
Description of the Ambient Boundary	The ambient boundary was set at the gravel pad edge of the WOC and airstrip, including the road connecting the two pads, consistent with ADEC guidance (ADEC 2018a). See **Figure G.2-1**. Given the project's remote location, CPAI will need to house their workers on-site. All worker housing areas were included within the ambient boundary, consistent with the conditions laid out in ADEC Policy and Procedure Number 04.02.108 for *Worker Housing Aggregation and Modeling* (ADEC 2021). These areas were not treated as ambient air given that: • The worker housing area is located within a secure or remote site; • The worker housing is for official business/worker use only; and • The operator has a written policy stating that the on-site workers are on 24-hour call.
2.12 Receptor Grid	
Description of the Modeled Receptor Grid	See **Figure G.2-3**. Cartesian receptor grids were used with the following resolution: • 25-meter receptor spacing along the ambient boundary (WOC pad, airstrip, and connecting road); • 25-meter receptor spacing from the ambient boundary out to 100 meters in each cardinal direction from the WOC pad only; and • 100-meter receptor spacing from the 25-meter receptor grid spacing out to at least 1 kilometer in each cardinal direction. Maximum project impacts were predicted to occur on the ambient boundary in the highest density grid spacing surrounding the WOC pad and decreased in all directions away from the modeled facility. At the edge of the 100-m receptor grid, project impacts were below 10% of the maximum impact. This demonstrates that the modeling domain is large enough to show that the project impacts will not cause or contribute to a violation.

Checklist Element	Remarks
Description of How Modeled Receptor Elevations were Determined	The ground level elevation throughout the entire modeling domain was set to 0 meters to simulate the flat terrain in the project impact area. This is common practice for new source review modeling on the North Slope coastal plain.
Scaled Map Depicting Receptors Relative to the Ambient Boundary	See **Figure G.2-3**.
2.13 Offsite Impacts	
Description of How Offsite Sources were Accounted for in the Analysis	All offsite/other sources are represented in the cumulative impact analysis through the addition of a representative ambient background concentration. Like other CPAI facilities on the North Slope, the WOC is located in a remote part of Alaska. While there are some existing sources many kilometers away, none of them are expected to create a significant concentration gradient near the WOC and can be adequately represented through background concentrations. See **Section G.5** for additional discussion regarding representativeness of the background data selected for this AQIA.
Description of Modeled Offsite Source Exhaust Parameters	No offsite sources were modeled explicitly.
Description of Ambient Monitoring Data Demonstrating it is Representative and meets Applicable Quality Assurance Requirements	Representative ambient background concentrations utilized were obtained from data collected by CPAI at the Nuiqsut monitoring site during calendar year 2022. This dataset meets EPA PSD-quality requirements for data capture and has been submitted to ADEC for review and approval for this project. Additional details regarding data representativeness and quality can be found in **Section G.5** of the AQIA.
Description of Measurements Culled from the Ambient Monitoring Dataset	No measurements were culled from the ambient monitoring dataset.
Listing of Background Concentrations used to Represent Non-Modeled Sources	See **Table G.5-2**.
2.14 Design Concentrations	
Description of Modeled Output Compared to Applicable Thresholds	See **Section G.6** of the AQIA.

Checklist Element	Remarks
2.15 Post-Processing	
Description of Post-Processing	No post-processing was conducted.
2.16 Results and Discussion	
Tables of Model-Predicted Impacts	See **Table G.6-1**.
Conclusions	See **Section G.6** of the AQIA.
2.17 Electronic Data	
Has Digital Data been Transmitted?	Modeling files (both input and output) have been transmitted electronically (**Attachment I**) in a package separate from this analysis.

Table G.2-2 Description of Project Emission Units and Their Model Identifier (ID)

EU ID	Tag No.	AERMOD ID	Source Description	Notes	Early Ops	Routine Ops
001	TB-70801	TB70801	Power Generator Turbine (Dual Fuel)	N/A		X
201	G-70810	G70810	Backup Power Generator (Tier 2) RICE #1	N/A		X
202	G-70820	G70820	Backup Power Generator (Tier 2) RICE #2	N/A		X
203	P-82803	P82803	Firewater Pump (Tier 2) RICE	N/A	X	X
204	–	FWP_01	Temporary Firewater Pump (Tier 2) RICE #1	N/A	X	
205	–	FWP_02	Temporary Firewater Pump (Tier 2) RICE #2	N/A	X	
206	–	TEMP_01	Small Temporary Power Generator (Tier 4) RICE #1	N/A	X	
207	–	TEMP_02	Small Temporary Power Generator (Tier 4) RICE #2	N/A	X	
208	–	TEMP_03	Large Temporary Power Generator (Tier 4) RICE	N/A	X	
301	U-59801	U59801	Incinerator	N/A	X	X
801	U-95866	U95866	Bulk Cement Blending System	N/A	X	X
802	–	–	Small Miscellaneous Portable Heaters and Boilers	Not modeled. See **Sections G.4** and **G.5**.	X	X
803	–	–	Small Miscellaneous Stationary Heaters and Boilers	Not modeled. See **Sections G.4** and **G.5**.		X
804	–	–	Ball Mill	Not modeled. Does not emit a modeled pollutant.	X	
805	–	–	Fuel Gas Skid Venting	Not modeled. Does not emit a modeled pollutant.		X
901	–	–	Storage Tanks	Not modeled. Does not emit a modeled pollutant.	X	X
1001	–	–	Equipment Component Leaks	Not modeled. Does not emit a modeled pollutant.	X	X
1002	–	–	Refueling and Spillage from Storage Tanks	Not modeled. Does not emit a modeled pollutant.	X	X
1003	–	–	Pad-Generated Fugitive Dust	Not modeled. See **Sections G.4** and **G.5**.	X	X

Table G.2-3 Modeled Source Parameters

AERMOD ID	Stack Exit Configuration	AERMOD Source Type	Stack Location (UTM Zone 5, NAD83)			Modeled Stack Parameters [(a)]					
			Easting (m)	Northing (m)	Base Elevation (m)	Release Height (m)	Exit Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)	Initial Y Dimension (m)	Initial Z Dimension (m)
TB70801	Vertical / Uncapped	POINT	538183.88	7782237.98	1.52	20	700	16	2.6	–	–
G70810	Vertical / Uncapped	POINT	538186.05	7782209.70	1.52	5.5	750	51	0.46	–	–
G70820	Vertical / Uncapped	POINT	538189.31	7782204.53	1.52	5.5	750	51	0.46	–	–
P82803	Horizontal	POINTHOR	538000.95	7782118.20	1.52	1.0	750	16	0.30	–	–
FWP_01	Horizontal	POINTHOR	538065.44	7782019.35	1.52	1.0	750	16	0.30	–	–
FWP_02	Horizontal	POINTHOR	538065.44	7782019.35	1.52	1.0	750	16	0.30	–	–
TEMP_01	Vertical / Uncapped	POINT	537902.06	7781823.50	1.52	3.0	750	5.7	0.20	–	–
TEMP_02	Vertical / Uncapped	POINT	537902.06	7781823.50	1.52	3.0	750	5.7	0.20	–	–
TEMP_03	Vertical / Uncapped	POINT	538176.92	7782186.99	1.52	3.0	750	48	0.46	–	–
U59801	Vertical / Uncapped	POINT	538219.85	7782197.31	1.52	12	970	5.6	0.66	–	–
U95866	N/A	VOLUME	538060.26	7782156.82	1.52	3.0	–	–	–	0.23	0.47

(a) Stack parameters for equipment based on the following:

- Turbine (Model ID: TB70801) stack parameters based on representative vendor data for Solar T-130 or similar.
- Engine (Model IDs: G70810, G70820, P82803, FWP_01, FWP_02, TEMP_01, TEMP_02, and TEMP_03) exit temperature and stack diameters based on a survey of parameters for other similarly sized units on the Alaskan North Slope. Exit velocity is estimated using a Method 19 Fd approach (40 CFR 60, Appendix A-7). The release height for the backup generators (Model IDs G70810 and G70820) are based on similar units on the Alaskan North Slope. Release heights for all other engines are conservatively assumed to be near or below the height of their modules, which are the lowest height possible for these types of units.
- Incinerator (Model ID: U59801) stack parameters based on representative vendor data.
- Bulk Cement Blending System (Model ID: U95866) stack parameters based on generic 1-m x 1-m x 1-m volume source to represent the vent exit.

Table G.2-4 Modeled Emission Rates

AERMOD ID	Basis for Emission Rate [a]	NO_X Emissions [a]		$PM_{2.5}$ Emissions [a]		$PM_{2.5}$ Emissions [a]		PM_{10} Emissions [a]	
		Annual		24-hour		Annual		24-hour	
		(tpy)	(g/s)	(lb/hr)	(g/s)	(tpy)	(g/s)	(lb/hr)	(g/s)
TB70801	Short-term (24-hour) emission rates for turbine operating in the worst-case mode: (1) fuel gas with controls, (2) Ultra-Low Sulfur Diesel (ULSD) with controls, or (3) ULSD without controls. Long-term (annual) emission rates based on operation on fuel gas with up to 500 hours per year on ULSD (with or without controls).	55.4	1.59	10.0	1.26	27.1	7.79E-01	10.0	1.26
G70810	Emergency use only. Short-term (24-hour) emission rates are the max emission rate. Long-term (annual) emission rates are based on 500 hours per year of operation.	11.0	3.16E-01	1.37	1.73E-01	0.344	9.88E-03	1.37	1.73E-01
G70820		11.0	3.16E-01	1.37	1.73E-01	0.344	9.88E-03	1.37	1.73E-01
P82803	Emergency use only. Short-term (24-hour) emission rates are the max emission rate. Long-term (annual) emission rates are based on 500 hours per year of operation.	1.51	4.35E-02	0.189	2.38E-02	0.0473	1.36E-03	0.189	2.38E-02
FWP_01		1.51	4.35E-02	0.189	2.38E-02	0.0473	1.36E-03	0.189	2.38E-02
FWP_02		1.51	4.35E-02	0.189	2.38E-02	0.0473	1.36E-03	0.189	2.38E-02
TEMP_01	Max short-term and long-term emission rates.	3.14	9.04E-02	0.00550	6.93E-04	0.0241	6.93E-04	0.00550	6.93E-04
TEMP_02		3.14	9.04E-02	0.00550	6.93E-04	0.0241	6.93E-04	0.00550	6.93E-04
TEMP_03	Max short-term and long-term emission rates.	142	4.10E+00	1.94	2.45E-01	8.50	2.45E-01	1.94	2.45E-01
U59801	Max short-term and long-term emission rates.	5.77	1.66E-01	0.00156	1.97E-04	0.00685	1.97E-04	0.00156	1.97E-04
U95866	Max short-term and long-term emission rates.	0	0	3.31E-05	4.18E-06	1.45E-04	4.18E-06	3.31E-05	4.18E-06

(a) lb/hr and ton/yr emission rates are detailed in permit application **Attachment E** (Emissions Summary Form) and **Attachment H** (Emissions Calculations Spreadsheet). The emissions rates used in the modeling are provided in g/s.

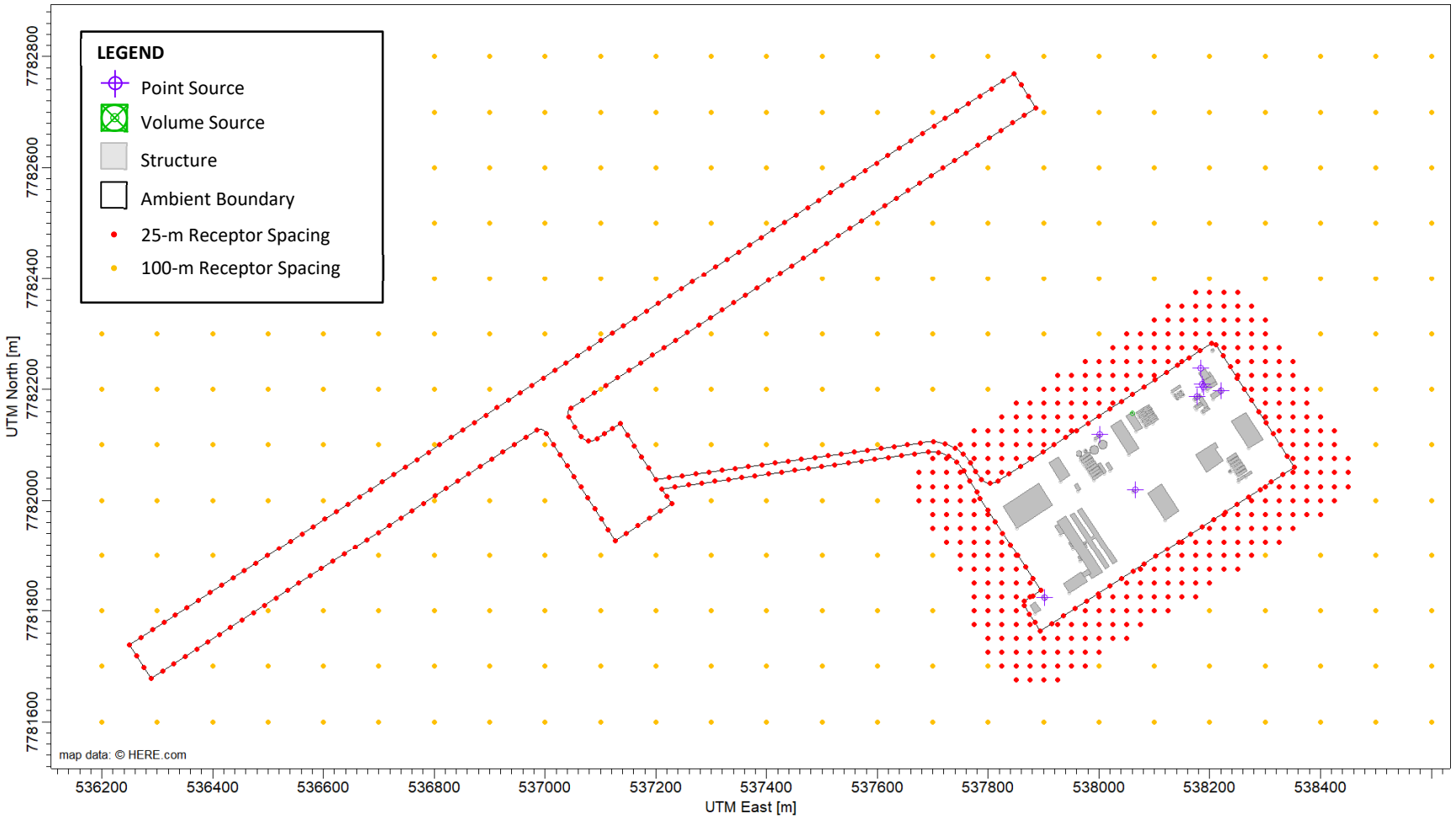
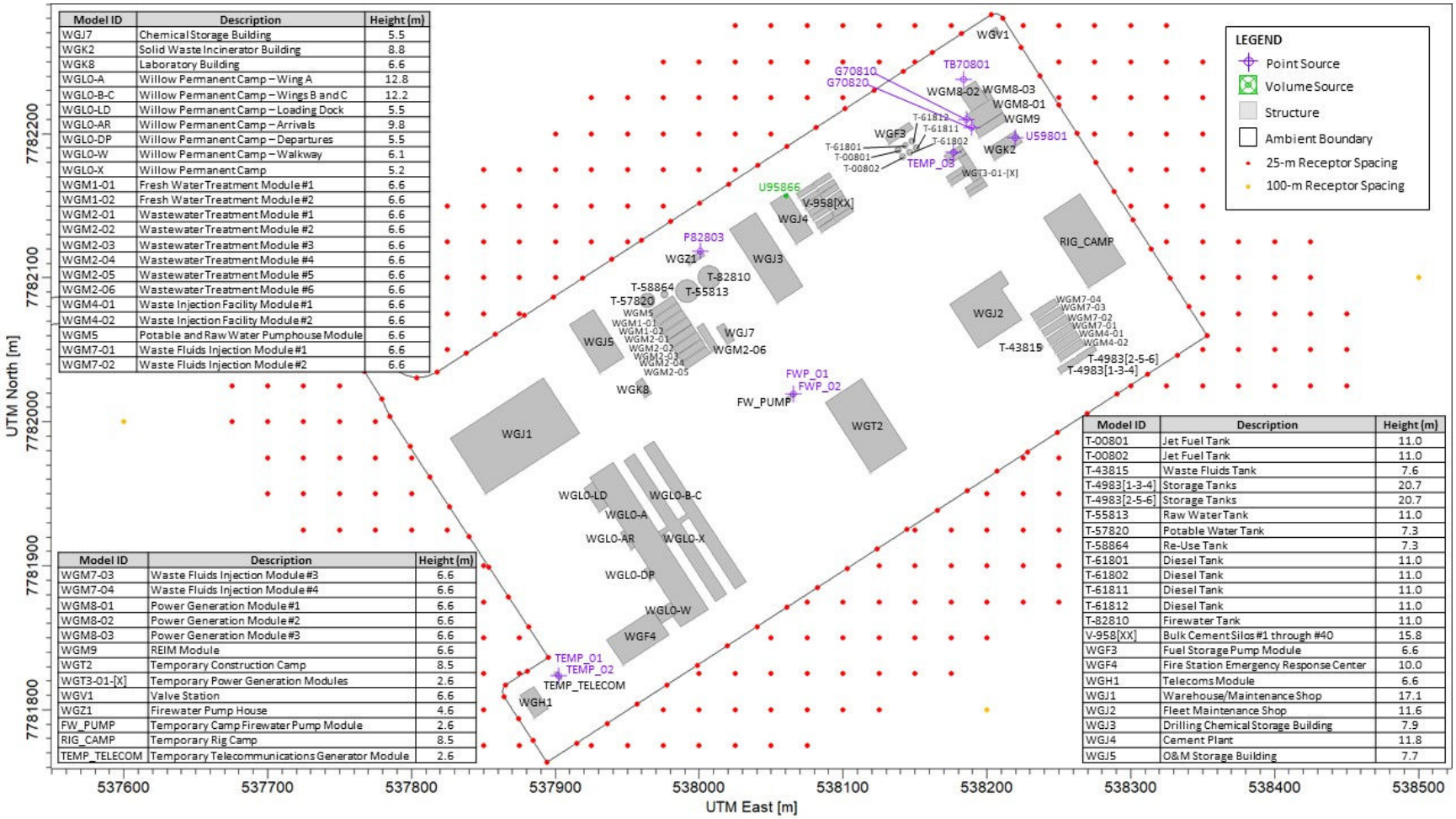


Figure G.2-1 WOC and Airstrip Source and Building Configuration (UTM Zone 5, NAD83)



Model ID	Description	Height (m)
WGJ7	Chemical Storage Building	5.5
WGK2	Solid Waste Incinerator Building	8.8
WGK8	Laboratory Building	6.6
WGL0-A	Willow Permanent Camp – Wing A	12.8
WGL0-B-C	Willow Permanent Camp – Wings B and C	12.2
WGL0-LD	Willow Permanent Camp – Loading Dock	5.5
WGL0-AR	Willow Permanent Camp – Arrivals	9.8
WGL0-DP	Willow Permanent Camp – Departures	5.5
WGL0-W	Willow Permanent Camp – Walkway	6.1
WGL0-X	Willow Permanent Camp	5.2
WGM1-01	Fresh Water Treatment Module #1	6.6
WGM1-02	Fresh Water Treatment Module #2	6.6
WGM2-01	Wastewater Treatment Module #1	6.6
WGM2-02	Wastewater Treatment Module #2	6.6
WGM2-03	Wastewater Treatment Module #3	6.6
WGM2-04	Wastewater Treatment Module #4	6.6
WGM2-05	Wastewater Treatment Module #5	6.6
WGM2-06	Wastewater Treatment Module #6	6.6
WGM4-01	Waste Injection Facility Module #1	6.6
WGM4-02	Waste Injection Facility Module #2	6.6
WGM5	Potable and Raw Water Pumphouse Module	6.6
WGM7-01	Waste Fluids Injection Module #1	6.6
WGM7-02	Waste Fluids Injection Module #2	6.6

Model ID	Description	Height (m)
WGM7-03	Waste Fluids Injection Module #3	6.6
WGM7-04	Waste Fluids Injection Module #4	6.6
WGM8-01	Power Generation Module #1	6.6
WGM8-02	Power Generation Module #2	6.6
WGM8-03	Power Generation Module #3	6.6
WGM9	REIM Module	6.6
WGT2	Temporary Construction Camp	8.5
WGT3-01-[X]	Temporary Power Generation Modules	2.6
WGV1	Valve Station	6.6
WGZ1	Firewater Pump House	4.6
FW_PUMP	Temporary Camp Firewater Pump Module	2.6
RIG_CAMP	Temporary Rig Camp	8.5
TEMP_TELECOM	Temporary Telecommunications Generator Module	2.6

Model ID	Description	Height (m)
T-00801	Jet Fuel Tank	11.0
T-00802	Jet Fuel Tank	11.0
T-43815	Waste Fluids Tank	7.6
T-4983[1-3-4]	Storage Tanks	20.7
T-4983[2-5-6]	Storage Tanks	20.7
T-55813	Raw Water Tank	11.0
T-57820	Potable Water Tank	7.3
T-58864	Re-Use Tank	7.3
T-61801	Diesel Tank	11.0
T-61802	Diesel Tank	11.0
T-61811	Diesel Tank	11.0
T-61812	Diesel Tank	11.0
T-82810	Firewater Tank	11.0
V-958[XX]	Bulk Cement Silos #1 through #40	15.8
WGF3	Fuel Storage Pump Module	6.6
WGF4	Fire Station Emergency Response Center	10.0
WGH1	Telecoms Module	6.6
WGJ1	Warehouse/Maintenance Shop	17.1
WGJ2	Fleet Maintenance Shop	11.6
WGJ3	Drilling Chemical Storage Building	7.9
WGJ4	Cement Plant	11.8
WGJ5	O&M Storage Building	7.7

Figure G.2-2 WOC Pad Source and Building Configuration (Zoom to WOC) (UTM Zone 5, NAD83)

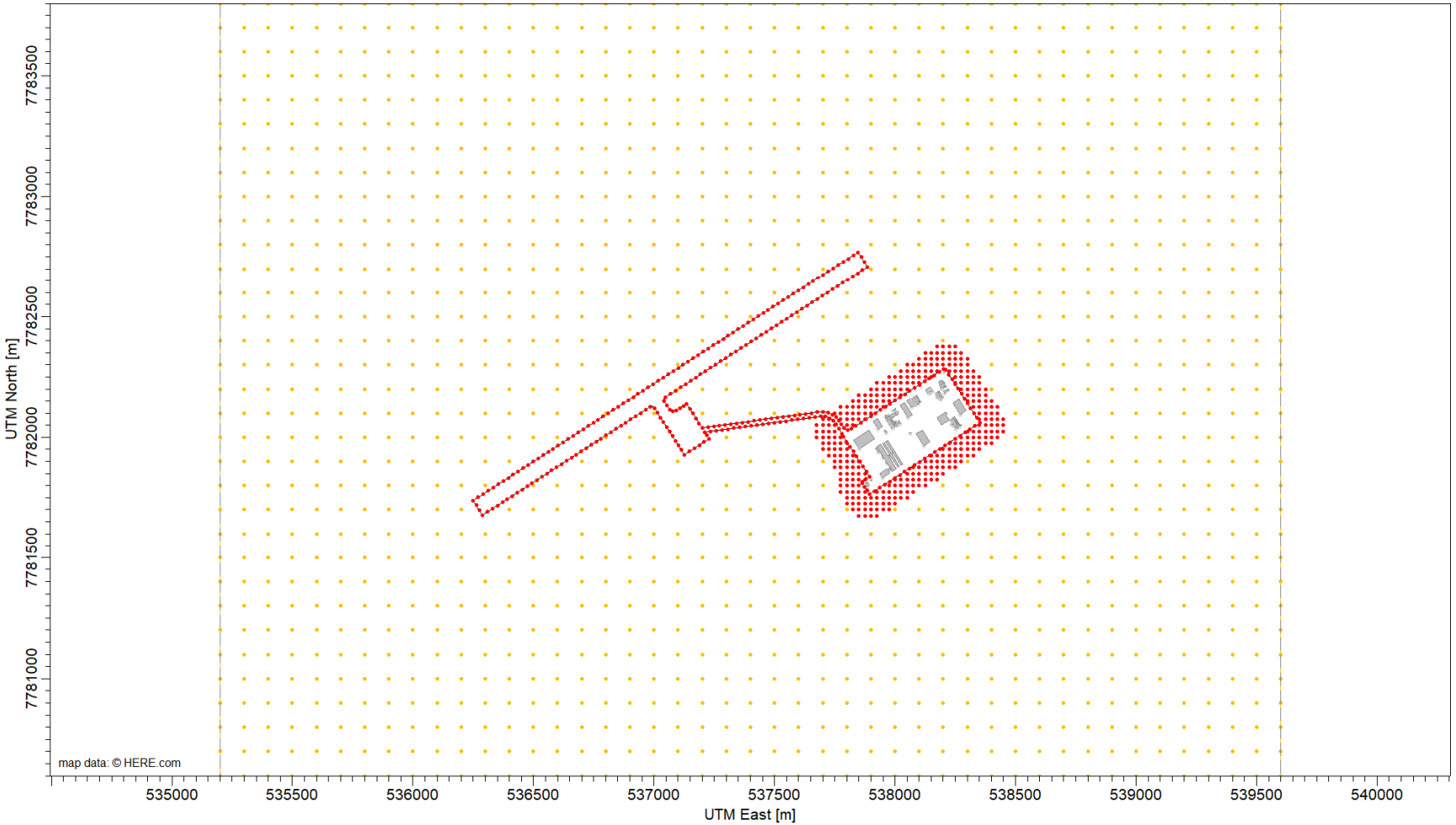


Figure G.2-3 Full Modeling Domain and Receptor Grid (UTM Zone 5, NAD83)

G.3. DESCRIPTION OF METEOROLOGICAL DATA

Three years (2016, 2017, and 2019) of surface meteorological data collected from Nuiqsut, Alaska, combined with concurrent upper air data from Utqiaġvik, Alaska, were used to develop AERMOD-ready meteorological data for the WOC AQIA.

G.3.1 SURFACE DATA – MONITORING STATION BACKGROUND

The Nuiqsut Ambient Air Quality and Meteorological Monitoring Program is comprised of one station located at the northern edge of the community of Nuiqsut on the Alaskan North Slope that has been operated by CPAI since April 9, 1999. **Figure G.3-1** shows the location of the monitoring station in Nuiqsut, Alaska. The station is designed to collect PSD-quality meteorological data measurements for horizontal wind speed and wind direction, vertical wind speed, 2-meter and 10-meter air temperature, and solar radiation in accordance with its approved QAPP and calculate horizontal wind direction standard deviation, vertical wind speed standard deviation, and temperature difference from these meteorological parameters. The current version of the Quality Assurance Project Plan (QAPP) for the Nuiqsut Ambient Air Quality and Meteorological Monitoring Program was approved by ADEC in September 2012. The three years of Nuiqsut surface meteorological station data used for the WOC AQIA were reviewed and approved as PSD-quality by ADEC on June 25, 2020.

G.3.2 SURFACE DATA – MONITORING STATION REPRESENTATIVENESS

According to Section 8.4.1 of the Revisions to the Guideline on Air Quality Models (USEPA 2017), the meteorological data used as input to a dispersion model should be selected based on spatial and climatological (temporal) representativeness, as well as the ability of the individual parameters selected to characterize the transport and dispersion conditions in the area of concern. Therefore, representativeness of the meteorological data selected will include consideration of the following factors:

- Proximity of the monitoring site to the area under consideration
- Complexity of the terrain
- Exposure of the monitoring site
- Period of time during which data are collected (year-to-year variations in weather conditions represented by 5 years of nearby National Weather Service [NWS] data, at least 1 year on site-specific data, or at least 3 years of prognostic data)

Meteorological data collected at the Nuiqsut monitoring site were used for surface data input into AERMOD because it best meets these criteria for representativeness near the WOC project area. The specific factors contributing to representativeness are discussed in further detail throughout the rest of this section.

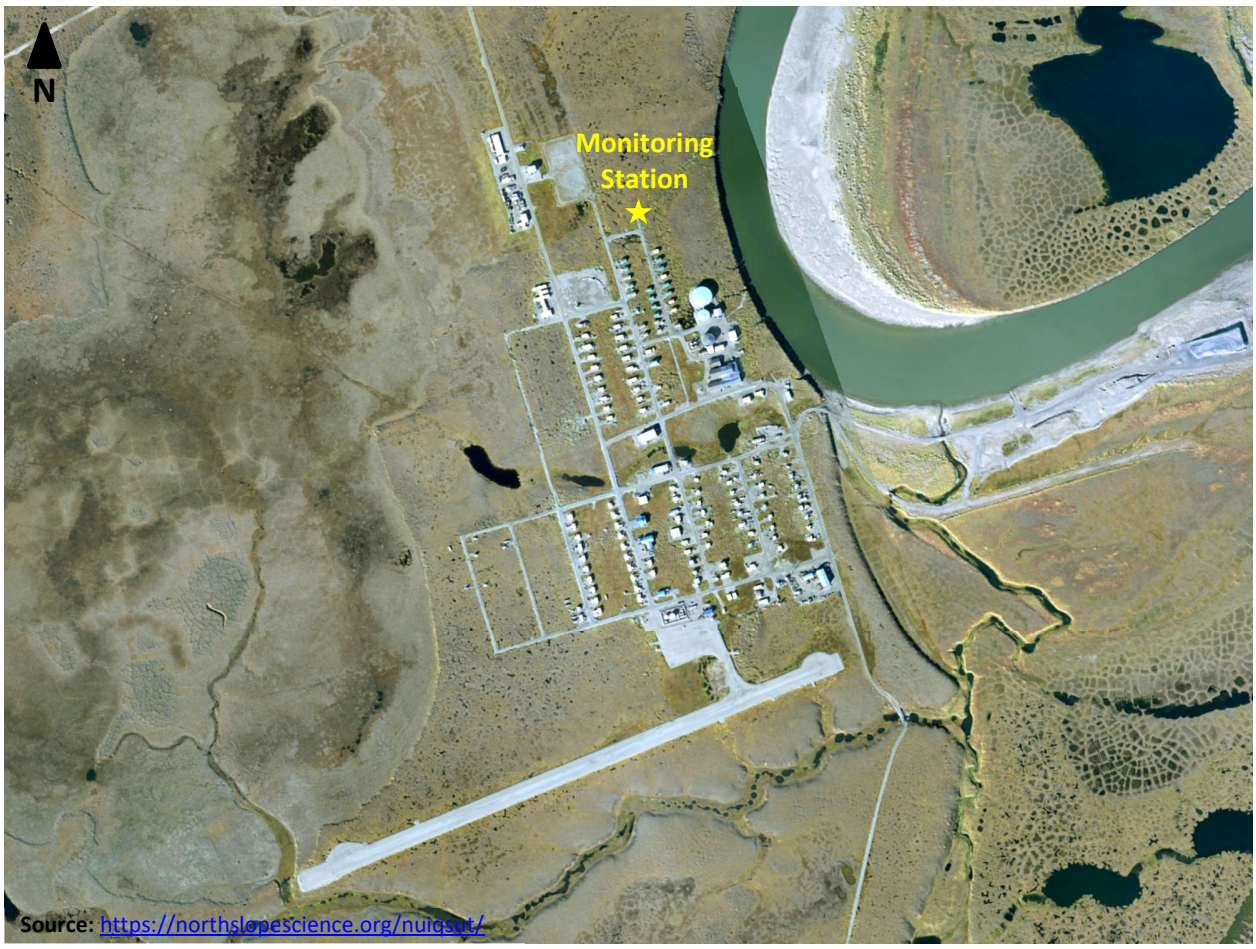


Figure G.3-1 Location of Monitoring Station in the Community of Nuiqsut

Proximity of the Monitoring Site

The Nuiqsut monitoring site is located approximately 24 miles (39 kilometers) east-northeast of the project area and is the closest meteorological dataset available. The location of Nuiqsut monitoring site relative to the WOC is shown in **Figure B.1-1** in **Attachment B** of this permit application and in **Figure G.3-2**.

Complexity of the Terrain and Exposure of the Monitoring Site

The project area and surface station are both located on the Alaskan North Slope 20 or more kilometers inland from the Beaufort Sea. This places both sites within the coastal plain between the near-shore coastal ecosystem to the north and elevated terrain and small-scale topographic influences to the southeast associated with the Brooks Range foothills. As such, the wind speed and direction climatology are similarly influenced by the arctic sea breeze and Brooks Range orographic effects which dominate North Slope wind patterns.

Figure G.3-2 Project Location Relative to the Community of Nuiqsut and Utqiaġvik (formerly Barrow)

In 2007, the Hoefler Consulting Group released a report (HCG 2007) that analyzed many years of meteorological data collected on the Beaufort Sea coast. The report confirmed that the orographic effect of the Brooks Range has a large-scale influence on the region and is responsible for winds roughly parallel to the 600-meter terrain contour, while the strong presence of winds from the northeast are due to the more localized coastal, or sea-breeze effect which results in predominantly onshore winds. The dominance and speed of onshore winds is pronounced in the nearshore coastal area and diminish rapidly inland, with the sea-breeze effect changing little when moving parallel to the coast. A review of data presented in HCG (2007), shows that neither the project site nor Nuiqsut are close enough to the coast to be strongly influenced by the higher speeds experienced in the nearshore area from the sea breeze effect.

The orographic effect caused by the Brooks Range extends over a region of hundreds of kilometers and results in a general rotation and flattening of the wind rose moving west to east parallel to the coast over 300 kilometers and an increase in wind speeds moving toward the high elevations. As shown in the information and data presented in HCG 2007, the project location and Nuiqsut are both located far enough from the high elevation of the Brooks Range and close enough together that they will be similarly influenced by the Brooks Range orographic effect. Based on lack of local topography, similar distances inland from the Beaufort Sea, and large distance from the high elevation of the Brooks Range, the meteorology at the project site and Nuiqsut are expected to be very similar.

The area surrounding both locations can be characterized as flat terrain, predominantly surrounded by the sedge/herbaceous and open water land use categories. **Figure G.3-2** shows an aerial image over both locations. As evident in these images, both sites consist of flat coastal plains surrounded by smaller scattered bodies of water resulting in very similar surface roughness, Bowen ratio, and Albedo.

Period of Time During which Data is Collected

The Nuiqsut monitoring data are the most recent meteorological dataset reviewed and approved by ADEC for permitting applications that is also representative of the project area. The Nuiqsut monitoring data are considered site-specific data and using three years of site-specific data that should provide representative conditions reflecting the potential for year-to-year variability.

Other Considerations

Model-predicted impacts are generally most sensitive to wind climatology because of building downwash, source receptor geometry, and source to source geometry. The wind data from the Nuiqsut monitoring site was collected at a height of 10 meters. A 10-meter monitor has typically been used for modeling stacks at various stationary sources on the North Slope ranging from 10 to 50 meters in height and is generally considered conservative for that range of stack heights. Given this, for the WOC AQIA, this data should be representative or conservative for WOC equipment stack heights ranging from approximately 1 to 20 meters.

G.3.3 UPPER AIR DATA – MONITORING STATION BACKGROUND

The NWS has been collecting upper air observations from Utqiaġvik (formerly Barrow), Alaska, since 1941. The location of Utqiaġvik relative to the WOC and Nuiqsut is shown in **Figure G.3-2**.

G.3.4 UPPER AIR DATA – MONITORING STATION REPRESENTATIVENESS

The NWS upper air data station in Utqiaġvik, Alaska is located approximately 216 kilometers northwest of the project area. This station is the only upper air data collected regionally, and therefore, the most representative of the project location. The most recent and available three years of upper air data was paired with the same three years of representative surface data for processing with AERMET. Due to low data capture, upper air data in 2018 cannot be used for modeling applications.

G.3.5 RAW DATA AND AERMET PROCESSING

The three most recent years with available surface and upper air data used in this modeling analysis were 2016, 2017, and 2019. The meteorological data was processed with most recent version of AERMET (version 22112) using the same raw data processing approach reviewed and approved by ADEC for CPF-1 H_2S increase project described in Technical Analysis Report supporting Permit AQ0267MSS01 (November 24, 2021). However, one revision was made in the AERMET processing to correct the height at which the wind-related meteorological parameters were processed. The joint data recovery for parameters necessary for modeling these years can be found in **Table G.3-1**. Calendar year 2018 was not used in this or previous analyses because of missing upper air data. A wind rose developed from this processed data is provided in **Figure G.3-3**.

Table G.3-1 Joint Data Recovery of the Model-Ready Meteorological Input Data

Period	1st Quarter (Jan – Mar)	2nd Quarter (Apr – Jun)	3rd Quarter (Jul – Sep)	4th Quarter (Oct – Dec)
2016	93.4	99.2	100	90.0
2017	100	94.6	97.7	98.9
2019	98.7	96.9	91.3	90.4

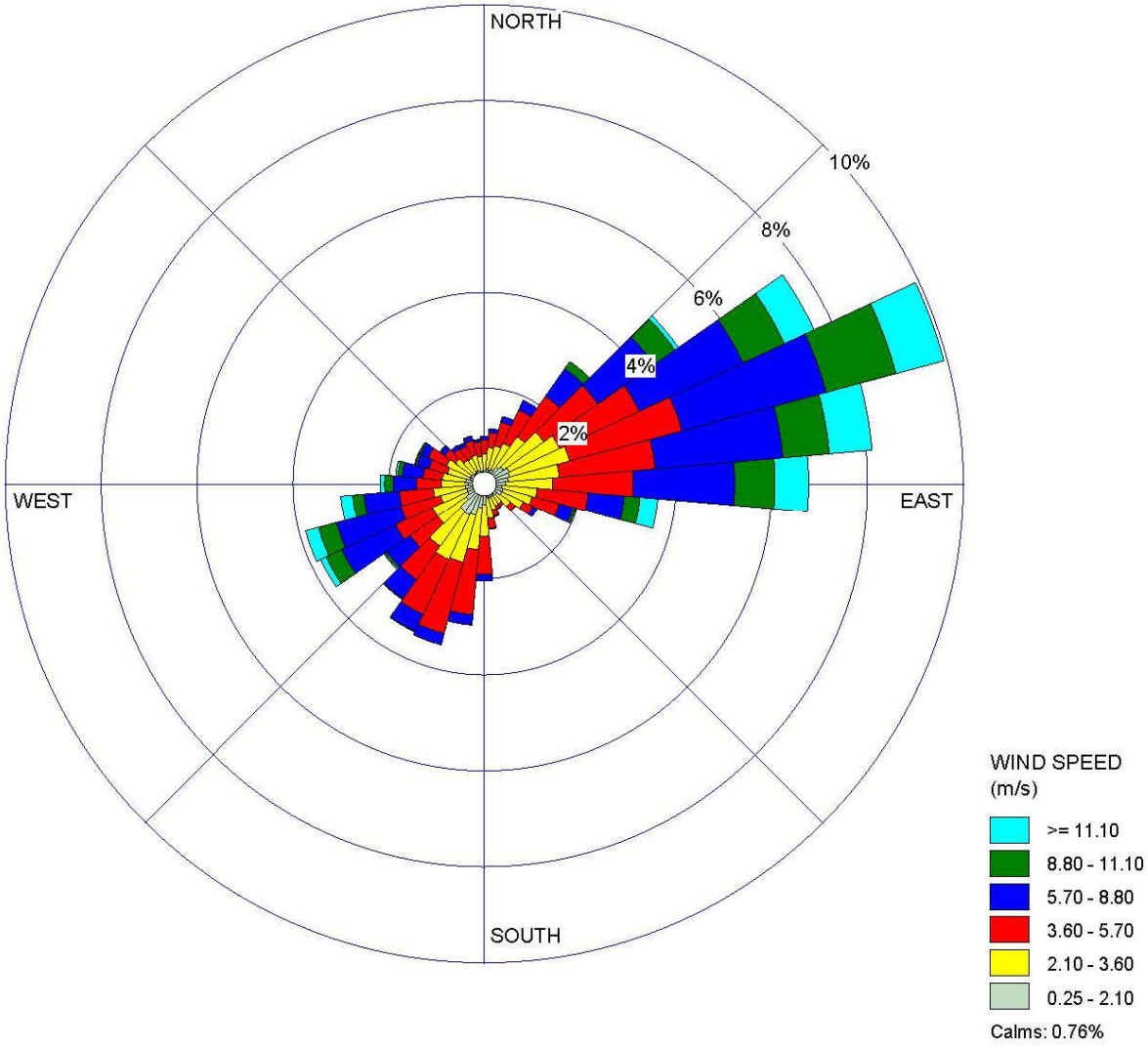


Figure G.3-3 Wind Rose of Data Collected at the Nuiqsut Monitoring Station

G.4. NON-MODELED SOURCES

Non-modeled sources potentially include equipment involved in construction activities and miscellaneous and mobile support equipment associated with maintenance of WOC infrastructure during the early operations and routine operations phases. These activities and equipment generally fall under ADEC's Policy and Procedure 04.02.104 for *Construction Phase Air Emissions at Oil Fields* (ADEC 2006a) and Policy and Procedure Number 04.02.105 for *Intermittently Used Oilfield Support Equipment* (ADEC 2006b) and are described in more detail in the following sections.

G.4.1 POLLUTANT-EMITTING CONSTRUCTION EQUIPMENT AND ACTIVITIES

Equipment and activities described in this section should not require pre-permit technical reviews mandated by ADEC, federal law, or rules. Therefore, large relatively stationary construction equipment such as the large temporary power generators (EU ID 208) which have been included explicitly in the dispersion modeling supporting the ambient air quality impact analysis are not the subject of this section. Emissions from the equipment and activities described in this section are considered construction phase air emissions at oil fields. Policy related to modeling and permitting of this equipment is described in ADEC Policy and Procedure Number 04.02.104 for Construction Phase Air Emissions at Oil Fields (ADEC 2006a). Based on the rationale provided, that policy indicates that it is appropriate to manage the air impacts from construction activities through fuel sulfur restrictions rather than explicit pre-permit modeling demonstrations, and ADEC will rely more upon in-field inspections, observation, and compliance verification for ambient air quality maintenance.

As described in Attachment B of the WOC permit application, construction of the WOC will last approximately 3 years. Most of these activities will last less than 2-years and none of the construction equipment described in this section is expected remain in a single location for more than a year. Furthermore, the equipment described in this section will combust Ultra-Low Sulfur Diesel (ULSD) fuel as committed to by CPAI in the Willow Master Development Plan Supplemental Environmental Impact Statement Record of Decision (BLM 2023b), Appendix A, Table 2.1 - Design Features to Avoid and Minimize Impacts number 80, and 81.

The activities and equipment described in this section should not need to be included in the ambient air quality impact assessment to understand their impacts because CPAI has committed to combusting ULSD in the construction equipment, and the impacts predicted from the single worst-case modeled scenario included in the cumulative impact assessment should be representative of those that will occur during construction.

Cumulative impacts were predicted assuming that emissions from routine operations will occur at the same time as those from the largest and most permanent equipment operated during construction and early operations. For example, emissions from the large temporary power generators (EU ID 208) are modeled operating continuously emitted through a single stack at full load at the same time as worst-case continuous emissions from the power generator turbine (EU ID 001) which will not occur except potentially during commissioning. These two sources were modeled within 100 meters of each other, within 200 meters of the northern corner of the pad which is a location perfectly suited to produce

maximum offsite impacts based on the prevailing winds. As such predicted cumulative concentrations represent the impacts from more emissions occurring at a single place in time this close to the ambient boundary than expected at any time during construction making their impacts representative of the more spatially disperse and intermittent construction phase air emissions. It is this worst-case combination of high emissions density (i.e., mass of emissions released per area of pad), proximity to the ambient boundary, and source receptor orientation during the prevailing winds that provides reasonable assurance that these impacts are representative of construction phase impacts even though modeled sources have the potential to produce lower impacts per mass emitted compared to some construction equipment due to more favorable dispersion characteristics.

This is supported by the cumulative ambient air quality impacts from the worst-case year of Willow Development construction predicted as part of the Willow Master Development Plan Supplemental Environmental Impact Statement (BLM 2023b) and fully described in Appendix E.3B.1 and Appendix E.3B.2. Consistent with the assertions made in this document, that cumulative impact analysis demonstrates predicted impacts from WOC emissions will be in compliance with all ambient air quality standards during construction and operation of the WOC.

Construction phase air emissions occurring as part of development of this infrastructure at the WOC will result from the use of equipment supporting:

- seasonal ice road and ice pad construction
- gravel road, airstrip, and pad construction
- facilities installation
- vertical support member (VSM) and piling construction
- pipeline, powerline, and fiber optic cable installation
- disposal well drilling activities

Some of these construction activities will be proximate to the WOC and some will be linear construction activities spanning miles from the WOC or also supporting other infrastructure construction throughout the development. The following types of pollutant-emitting equipment and sources are expected to be involved in or result from some or all these construction activities:

- mobile, on-road tailpipe combustion sources (e.g. vehicles)
- mobile, nonroad tailpipe combustion sources (e.g. mobile construction equipment)
- other small portable support equipment (e.g. heaters, boilers, and engines driving generators, pumps, welders, etc.)
- fugitive sources (e.g. fugitive dust from dirt moving and vapor venting from tanks)

All combustion sources related to construction activities will burn liquid fuel, and all diesel-fired combustion sources will combust ULSD in accordance with the Willow Master Development Plan SEIS ROD (BLM 2023). The descriptions in the following sections outline specific types of pollutant-emitting equipment associated with each construction activity expected to occur at the WOC.

G.4.1.1 ICE ROAD AND ICE PAD CONSTRUCTION

Ice roads will be used during the annual ice road season primarily to support gravel infrastructure and pipeline construction. Ice pads may also be constructed adjacent to the WOC to house temporary construction camps, stage construction equipment or materials, and support other construction activities. Ice roads and pads are constructed by smoothing or compacting the snow surface and/or placing water or ice on the ground surface. Then, water trucks apply water over the route or location until the ice pad or road surface is built up to the desired thickness. Ice roads and pads are maintained throughout the ice road season by monitoring litter, contamination, and degradation and cleaning or repairing, as necessary. Construction equipment associated with ice road and ice pad construction will include, but is not limited to:

- graders, loaders, pumpers, trimmers, and trucks
- other portable engine-driven equipment, such as pumps, welders, light plant generators, and compressors
- snow melters
- support equipment including snowblowers, all-terrain vehicles, and pumps
- portable air and water heaters to provide heat for personnel and equipment
- temporary fuel storage tanks
- associated mobile activity for transportation of personnel, supplies, and materials to and from the worksite

G.4.1.2 GRAVEL ROAD, AIRSTRIP, AND PAD CONSTRUCTION

Development of the WOC will necessitate the construction of gravel access roads and gravel pads for WOC facilities, including the airstrip and communications tower. Gravel is transported from the storage location and placed during winter construction seasons. The gravel is compacted to create road and pad surfaces during the summer season following gravel placement, which can be source of fugitive dust under certain conditions. These activities will require construction equipment including, but not limited to:

- B-70 bottom dump haul trucks or equivalent
- crushers, compactors, excavators, graders, bulldozers, loaders, cranes, trimmers, and trucks
- other portable engine-driven equipment, such as compressors, pumps, welders, light plant generators, and drilling equipment or augers
- snow melters
- portable air and water heaters to provide heat for personnel and equipment
- temporary fuel storage tanks
- associated mobile activity for transportation of personnel, supplies, and materials to and from the worksite

G.4.1.3 ON-PAD FACILITIES INSTALLATION

Facilities installation activities at the WOC will include construction of on-pad and airstrip facilities. This includes the temporary and permanent camps, personnel and utility buildings, maintenance and storage facilities, communications tower, and any other support infrastructure for temporary or permanent operations. Construction equipment associated facilities installation will include, but is not limited to:

- loaders, cranes, excavators, manlifts, and trucks
- other portable engine-driven equipment, such as compressors, welders, light plant generators, and small generators
- snow melters
- vacuum trucks
- portable air and water heaters to provide heat for personnel and equipment
- temporary fuel storage tanks
- associated mobile activity for transportation of personnel, supplies, and materials to and from the worksite

G.4.1.4 VSM AND PILING CONSTRUCTION

Vertical support members (VSMs) will be constructed to support horizontal support members (HSMs) for the suspension of pipelines, powerlines, and fiber optic cable infrastructure between different facilities within the Willow Development. Pilings will be constructed within the boundaries of the WOC to provide a foundation for larger modules and modules that will not be placed directly on the pad. VSMs and pilings are constructed by embedding a vertical steel pipe piling in holes drilled in the permafrost and adding a sand/water slurry surrounding the pipe pile to freeze it in place. Construction equipment associated with VSM and HSM construction will include, but is not limited to:

- trenchers, loaders, excavators, cranes, and trucks
- snow melters
- vacuum trucks
- other portable engine-driven equipment, such as small generators, compressors, welders, light plant generators, and drills
- portable air and water heaters to provide heat for personnel and equipment
- temporary fuel storage tanks
- associated mobile activity for transportation of personnel, supplies, and materials to and from the worksite

G.4.1.5 PIPELINE, POWERLINE, AND FIBER OPTIC CABLE INSTALLATION

Pipelines, powerlines, and fiber optic cable will be suspended on HSMs, which are supported by VSMs placed approximately 55 feet apart. Construction equipment required to install pipelines, powerlines, and fiber optic cables at and near the WOC will include, but are not limited to:

- loaders, excavators, cranes, manlifts, and trucks

- other portable engine-driven equipment, such as compressors, welders, light plant generators, drills, and small generators
- snow melters
- vacuum trucks
- portable air and water heaters to provide heat for personnel and equipment
- associated mobile activity for transportation of personnel, supplies, and materials to and from the worksite

G.4.1.6 DISPOSAL WELL DRILLING

At least two Class I disposal wells will be constructed at the WOC for disposal of treated wastewater, drilling waste, and grind and inject materials. Construction of these two wells is expected to take less than 60 days. Equipment associated with disposal well drilling activities will include, but is not limited to:

- a drill rig, including reciprocating engine-driven generators, air heaters, and boilers
- cement pumping units
- ball mill or crushing units for cuttings produced during drilling operations
- portable well flow-back and storage tanks
- light plant and portable power generators
- other small portable engine-driven equipment, such as welders and compressors
- portable air and water heaters to provide heat for personnel and equipment
- snow melters
- temporary storage tanks for fuel, chemicals, or other fluids
- associated mobile activity for transportation of personnel, supplies, and materials to and from the worksite

G.4.2 POLLUTANT-EMITTING INTERMITTENTLY USED OILFIELD SUPPORT EQUIPMENT AND MAINTENANCE ACTIVITIES

Equipment described in this section is considered intermittently used oilfield support equipment. Policy related to modeling and permitting of this equipment is described in ADEC Policy and Procedure Number 04.02.105 for Intermittently Used Oilfield Support Equipment (ADEC 2006b). Based on the rationale provided in that policy, ADEC believes that emissions and impacts from intermittently used oilfield support equipment can be managed through fuel sulfur levels, rather than ambient air quality assessments. In the case of the WOC, this equipment will combust ULSD fuel as committed to by CPAI in the Willow Master Development Plan Supplemental Environmental Impact Statement Record of Decision (BLM 2023a), Appendix A, Table 2.1 - Design Features to Avoid and Minimize Impacts number 80, and 81.

As a support facility, the WOC lacks large oil and gas processing and power generation equipment, and oil and gas wells; therefore, the intermittently used oilfield support equipment at the WOC will be limited in scope and transient. Because of this and a commitment to combust only ULSD, after a reasonable inquiry

we believe ADEC will agree that impacts from these emission units are most appropriately managed through fuel sulfur levels, rather than ambient air quality assessments.

Long-term routine maintenance activities at the WOC could include:

- maintenance and testing of the Class I disposal wells
- maintenance and testing of permanent combustion equipment, such as the turbine, incinerator, and emergency equipment
- general maintenance of buildings, roads, pads, pipelines, and other existing infrastructure

The following types of pollutant-emitting equipment and sources are expected to be involved in or result from some or all these construction activities:

- mobile, on-road tailpipe combustion sources (e.g. vehicles)
- mobile, nonroad tailpipe combustion sources (e.g. mobile construction/maintenance equipment)
- other small portable support equipment (e.g. heaters, boilers, and engines driving generators, pumps, welders, etc.)
- fugitive sources (e.g. fugitive dust from dirt moving and vapor venting from tanks)

The descriptions in the following sections outline specific types of pollutant-emitting equipment associated with each routine maintenance activity expected to occur at the WOC.

G.4.2.1 MAINTENANCE AND TESTING OF DISPOSAL WELLS

The Class I disposal wells at the WOC will require regular maintenance on a quarterly, annual, and multi-year basis and monthly testing of associated safety systems that may result in venting small amounts of gas from the wells or associated infrastructure. Each of these activities are expected to last from as little as one-half hour (safety testing) to a few days (well servicing and workover activities). Equipment associated with disposal well maintenance activities will include, but is not limited to:

- well servicing equipment, including coiled tubing units, slickline units, and e-line units (also defined as “well servicing activities” in 18 AAC 50.990(125))
- a workover rig, including reciprocating engine-driven generators, air heaters, and boilers
- portable well flow-back and storage tanks
- light plant and portable power generators
- other small portable engine-driven equipment, such as welders and compressors
- snow melters
- portable air and water heaters to provide heat for personnel and equipment
- temporary storage tanks for fuel, chemicals, or other fluids
- associated mobile activity for transportation of personnel, supplies, and materials to and from the worksite

It is important to note that the disposal wells are not oil and gas wells. Therefore, none of these activities should be considered part of a portable oil and gas operation as defined in

18 AAC 50.990(124). As such the scope of this activity is considerably smaller than developmental associated with oil and gas development.

G.4.2.2 MAINTENANCE AND TESTING OF PERMANENT COMBUSTION EQUIPMENT

The primary permanent combustion equipment to be located at the WOC includes a turbine, incinerator, and emergency equipment, such as engines driving firewater pumps and back-up power generators. Annual operations of the emergency equipment for maintenance and readiness testing are assessed in the WOC PTE and modeled explicitly. Other non-modeled routine maintenance of the permanent equipment would include annual blowdowns of the turbine for inspection and/or core replacement and routine venting from the turbine fuel gas skid to prevent accumulations of liquids. If highline power from another source is not available during turbine maintenance, then portable nonroad engine-driven generators may be used to provide temporary power to the WOC during these activities.

G.4.2.3 GENERAL MAINTENANCE OF EXISTING INFRASTRUCTURE

On an ongoing basis, CPAI will provide general maintenance of buildings, roads, pads, pipelines, and other existing infrastructure at or near the WOC and may construct temporary ice pads or roads to support these activities as needed. Equipment associated with these maintenance activities will include similar equipment to that described in **Sections G.4.1.1** through **G.4.1.5**, including but not limited to:

- crushers, compactors, excavators, trenchers, graders, bulldozers, loaders, cranes, trimmers, pumpers, manlifts, and trucks
- B-70 bottom dump haul trucks or equivalent
- vacuum trucks
- snow melters, snowblowers, and all-terrain vehicles
- portable air and water heaters to provide heat for personnel and equipment
- temporary fuel storage tanks
- other portable engine-driven equipment, such as small generators, compressors, pumps, welders, light plant generators, and drilling equipment or augers
- associated mobile activity for transportation of personnel, supplies, and materials to and from the worksite

G.5. DESCRIPTION OF AMBIENT BACKGROUND DATA

One year of ambient monitoring data collected during calendar year 2022 at CPAI's Nuiqsut Monitoring Station was used to develop representative background concentrations to combine with model-predicted impacts for the WOC AQIA.

G.5.1 MONITORING STATION BACKGROUND

The Nuiqsut Ambient Air Quality and Meteorological Monitoring Program is comprised of one station located at the northern edge of the community of Nuiqsut on the Alaskan North Slope that has been operated by CPAI since April 9, 1999. The station is located approximately 400 meters north-northwest of the community electrical generators (power utility). During calendar year 2022, PSD-quality meteorological data and ambient concentration measurements of CO, NO_X, NO_2, NO, O_3, SO_2, $PM_{2.5}$, and PM_{10} were collected at the Nuiqsut Monitoring Station in accordance with the approved QAPP. The current version of the QAPP for the Nuiqsut Ambient Air Quality and Meteorological Monitoring Program was approved by ADEC in September 2012 (SLR 2021a, SLR 2021b).

Table G.5-1 summarizes the data capture for relevant ambient air concentration measurements collected from the Nuiqsut Monitoring Station during calendar year 2022. Note that the data reports for these periods indicate that data capture criteria were met for EPA PSD-quality ambient air monitoring standards (80% or greater for each calendar quarter).

Table G.5-1 Data Capture for Relevant Ambient Air Concentration Measurements

Pollutant	1st Quarter 2022 (a)	2nd Quarter 2022 (a)	3rd Quarter 2022 (a)	4th Quarter 2022 (a)	Data Capture Requirement
NO_2	95%	87%	95%	96%	80%
$PM_{2.5}$	98%	98%	96%	95%	80%
PM_{10}	99%	99%	96%	95%	80%

(a) Nuiqsut Ambient Air and Meteorological Monitoring Program 2022 Annual Report (SLR 2023).

Table G.5-2 summarizes the ambient background concentrations calculated from data collected by CPAI at the Nuiqsut Monitoring Station during calendar year 2022. No measurements were culled from the ambient monitoring dataset for the development of background concentrations. At the time of the application submittal, this data and associated data reports have been provided to ADEC for quality assurance review and approval for use in permitting applications.

Table G.5-2 Ambient Background Concentrations

Pollutant	Averaging Period	Background Concentration (µg/m³)	Rank of Background Value
NO_2	Annual	2.0	Annual average of hourly values
$PM_{2.5}$	24-hour	7.0	98th percentile (highest eighth high) of the 24-hour average values
	Annual	2.6	Annual average of quarterly averages of hourly values
PM_{10}	24-hour	60	Highest second high of hourly values

G.5.2 MONITORING STATION REPRESENTATIVENESS

For a cumulative impact analysis, representative ambient background concentrations must be developed to combine with model-predicted impacts to account for any non-modeled emission sources. According to Section 8.3.1 of the Guideline on Air Quality Models (USEPA 2017), background concentrations should be representative of the following in the vicinity of the source(s) under consideration:

- *Nearby sources*, other than the sources(s) currently under consideration and other source(s) that are explicitly modeled
- *Other sources*, including natural sources, unidentified sources, and regional transport

Concentrations derived from ambient data collected at the Nuiqsut Monitoring Station were used because these background concentrations are representative of the inventory of nearby and other non-modeled sources in the vicinity of and at the WOC. This is discussed in more detail in **Sections G.5.2.1** and **G.5.2.2**. Calendar year 2022 data was specifically selected because it represents the most current available PSD-quality data collected.

G.5.2.1 NEARBY SOURCES

The WOC is a greenfield source located more than 8 kilometers from the nearest permitted stationary source and more than 40 kilometers from substantial infrastructure. As a general "rule of thumb" in flat terrain, for estimating the distance to maximum impacts and the region of significant concentration gradients is approximately 10 times the source release height (USEPA 2011). Very few regional sources have release heights that exceed 40 meters; therefore, it is expected that the region of significant concentration gradient from regional sources will be within 0.5 kilometers of the source. As such, there are no existing facilities or emission sources expected to be near enough to cause a significant concentration gradient in the impact area of the WOC. Therefore, no existing nearby stationary sources have been explicitly modeled consistent with recommendations in Section 8.3 of the Guideline on Air Quality Models. **Table G.5-3** summarizes the existing stationary sources within 50 kilometers of the WOC and their distance from the WOC. 50 kilometers is the nominal distance considered applicable for Gaussian dispersion models and are outside the modeling domain and well beyond the expected WOC impact area (USEPA 2017); therefore, sources beyond that distance were not considered for inclusion in the modeling as Nearby Sources. The closest existing stationary source with a Minor Source-Specific (MSS)

Table G.5-3 Summary of All Permitting Sources within 50 kilometers of the WOC

Source Name	Title I Permit Type	Approximate Distance to WOC Pad	Direction Relative to the WOC	Sum of NO_X, SO_2, and PM_{10} Emissions, Q (ton per year)
Closest Existing Stationary Sources				
Greater Mooses Tooth 2/ Mooses Tooth 7 (GMT2/MT7) Drill Site	MSS	7.3 miles (12 kilometers)	east-northeast of the WOC	78.0 [(a)]
Greater Mooses Tooth 1/ Mooses Tooth 6 (GMT2/MT7) Drill Site	MSS	14 miles (23 kilometers)	northeast of the WOC	84.9 [(b)]
North Slope Borough Public Works Nuiqsut Power Plant	MSS	24 miles (39 kilometers)	east-northeast of the WOC	124 [(c)]
Alpine Central Facility (ACF) (includes aggregated well sites)	PSD	29 miles [to ACF] (46 kilometers)	northeast of the WOC	1,055 [(d)]
Closest Anticipated Stationary Sources Associated with the Willow Development				
Willow Central Facility (WCF)	MSS/PSD [(e)]	1.1 mile (1.7 kilometers)	southwest of the WOC	NA
Bear Tooth 1 (BT1) Drill Site	MSS [(e)]	3.4 miles (5.5 kilometers)	northwest of the WOC	NA
Other Future Bear Tooth (BT) Drill Sites	MSS [(e)]	> 4.6 miles (> 7.4 kilometers)	varies	NA

(a) Potential to emit documented in the Technical Analysis Report for the terms and conditions of Minor Permit AQ1503MSS01.

(b) Potential to emit documented in the Technical Analysis Report for the terms and conditions of Minor Permit AQ1484MSS02.

(c) Potential to emit documented in the Technical Analysis Report for the terms and conditions of Minor Permit AQ0352MSS02.

(d) Actual emissions documented in the US EPA 2022 National Emissions Inventory (NEI) https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data .

(e) Anticipated permit classifications based on other similar CPAI North Slope facilities.

permit is the Greater Mooses Tooth 2/Mooses Tooth 7 (GMT2/MT7) Drill Site, and the closest existing stationary source with a PSD construction permit is the Alpine Central Facility. However, there are other proposed stationary sources that will be closer to the WOC than any of the existing stationary sources. The proposed Willow Development stationary sources are expected to be closest to the WOC once constructed are also summarized in **Table G.5-3**.

The Nuiqsut Monitoring Station is within 50 kilometers and generally downwind of three PSD Major stationary sources (Alpine Central Facility, Central Processing Facility #2, and Central Processing Facility #3), more than 15 active drill sites, and at times the Nuiqsut Power Plant. Therefore, it is exposed to impacts from the existing stationary sources considered in **Table G.5-3** and closer to most of them than the WOC (except the GMT2/MT7 Drill Site). Therefore, ambient data collected at the Nuiqsut Monitoring Station will include impacts from those existing stationary sources closest to the WOC in addition to other large regional sources. As such, the Nuiqsut ambient data is expected to be representative of similar impacts experienced at the WOC from those existing stationary sources not included explicitly in the dispersion modeling.

The Nuiqsut ambient data does not include impacts from any of the proposed Willow Development stationary sources that have not yet been permitted or constructed. Any anticipated impacts from these future facilities in the near-field of the WOC are not addressed in this modeling demonstration because CPAI anticipates separate modeling demonstrations being be conducted for these future facilities when each are permitted with ADEC. This is especially the case when permitting the WCF, which will be closest to the WOC and will require at least an MSS or PSD construction permit, including another modeling demonstration, that will address any potential overlap of impacts from the WOC. Furthermore, it is important to note the two operational scenarios for the WOC (early operations and routine operations) are indicative of the phasing of construction activities for other Willow Development facilities. Equipment and activities specific to WOC early operations are planned largely to support early development when highline power is not yet available from the WCF. Therefore, impacts from the WCF would not overlap with impacts from the WOC early operations scenario, consistent with the logistics for the development of these facilities. WCF impacts could overlap with impacts during WOC routine operations.

In addition to impacts from existing stationary sources, the Nuiqsut ambient data also reflects near-field impacts from other local emission sources in the community of Nuiqsut. Ambient data collected from the Nuiqsut Monitoring Station is impacted by local mobile and aircraft activity, portable and temporary equipment and activities for local construction, maintenance, and improvement projects, residential and emergency sources, and windblown fugitive dust from silty deposits along the banks of the Nigliq (Nechelik) Channel in the Colville River Delta and anthropogenically-disturbed areas within the community. These impacts are in addition to the nearby permitted sources associated with the Nuiqsut Power Plant (including natural gas-fired and diesel-fired power generation) already discussed. All of these sources generating impacts in the near-field of the Nuiqsut Monitoring Station represent an additional level of background activity that could be similar to the background activity associated with many of the non-modeled sources described in **Section G.4** for the WOC AQIA. This is especially true for the naturally-occurring fugitive dust generated from the Nigliq Channel, which is frequently upwind of the monitoring station. Because the WOC has no similar natural features in its near-field, particulate

measurements at the Nuiqsut Monitoring Station are likely conservative for representing similar sources expected at the WOC.

G.5.2.2 OTHER SOURCES

The Nuiqsut Monitoring Station is centrally located among regional oil and gas development on the North Slope and is downwind of several major facilities within the Kuparuk River Unit, as well as more far-field sources in the Prudhoe Bay Unit and other North Slope operating units.

The location of the Nuiqsut Monitoring Station ensures that the station captures regional impacts from minor stationary, major stationary, and mobile transportation sources associated with regional oil and gas development, including impacts from processing facilities, power stations, drill rigs, well servicing activities, and other temporary and mobile sources supporting well pad development and maintenance.

Given the Nuiqsut Monitoring Station's location on the North Slope and near the Colville River Unit, the Nuiqsut ambient data should be impacted by the same types of regional non-modeled sources as the WOC. Therefore, the Nuiqsut ambient data is representative of impacts at the WOC from other non-modeled sources, including regional oil and gas development activity, biogenic, unidentified, and globally transported emissions throughout the North Slope.

G.6. RESULTS AND CONCLUSIONS

Cumulative model-predicted concentrations in the near-field of the WOC are presented in **Table G.6-1**. To calculate the total concentration, model-predicted concentrations were added to the background concentrations summarized in **Table G.5-2** and then compared to applicable AAAQS.

In all cases, the predicted impacts for all pollutants and averaging periods show compliance with all applicable standards. These impacts were all predicted to occur on the ambient boundary of the WOC pad.

At the edge of the modeling domain maximum project only:

- annual NO_2 design values are less than 1.6 µg/m^3,
- 24-hour $PM_{2.5}$ design values are less than 1.8 µg/m^3,
- annual $PM_{2.5}$ design values are less than 0.09 µg/m^3, and
- 24-hour PM_{10} design values are less than 3.1 µg/m^3.

These impacts are either below or minimally above the significant impact levels for these pollutants and averaging periods. This confirms that the modeling domain is sufficiently large to define the extent of the WOC impact area and supports accounting for the impacts from non-project sources by adding a representative background concentration to modeled concentrations when predicting cumulative impacts.

Table G.6-1 Modeled-Predicted Cumulative Concentrations Compared to the AAAQS

Pollutant and Averaging Period	Rank	AERMOD Predicted Concentration (µg/m^3)	Ambient Background Concentration (µg/m^3)	Total Concentration (µg/m^3)	AAAQS (µg/m^3)	% of AAAQS
Annual NO_2	Max Annual Mean [(a)]	27.5	2.0	29.5	100	30%
24-hour $PM_{2.5}$	98th %tile [(b)]	21.2	7.0	28.2	35	81%
Annual $PM_{2.5}$	Avg Annual Mean [(c)]	0.787	2.6	3.39	12	28%
24-hour PM_{10}	H4H [(d)]	45.2	60	105	150	70%

(a) Maximum annual mean concentration obtained from the 3 modeled years.

(b) 98th percentile of the annual distribution of daily average impacts, averaged over 3 years.

(c) Average of the annual mean concentration obtained from each of the 3 modeled years.

(d) Maximum of the highest-fourth-high concentration obtained from the 3-year period.

G.7. REFERENCES

Alaska Department of Environmental Conservation (ADEC), 2021. ADEC Policy and Procedure Number 04.02.108. Worker Housing Aggregation and Modeling. May 5, 2021.

Alaska Department of Environmental Conservation (ADEC), 2018a. ADEC. Modeling Review Procedures Manual. October 8, 2018.

Alaska Department of Environmental Conservation (ADEC), 2017. Air Quality Modeling Submittal Checklist Minor Permit Applications. Version 1.0. October 24, 2017.

Alaska Department of Environmental Conservation (ADEC), 2006a. ADEC Policy and Procedure Number 04.02.104. Construction Phase Air Emissions at Oil Fields. November 20, 2006.

Alaska Department of Environmental Conservation (ADEC), 2006b. ADEC Policy and Procedure Number 04.02.105. Intermittently Used Oil Field Support Equipment. November 20, 2006.

Bureau of Land Management (BLM), 2023a. Willow Master Development Plan Final Supplemental Environmental Impact Statement. Prepared by U.S. Department of the Interior Bureau of Land Management Anchorage, Alaska. DOI-BLM-AK-0000-2018-0004-EIS - BLM/AK/PL-22/032+1610+F010. Issued February 1, 2023.

Bureau of Land Management (BLM), 2023b. Willow Master Development Plan Final Supplemental Environmental Impact Statement Record of Decision - Appendix A Mitigation Measures. Prepared by U.S. Department of the Interior Bureau of Land Management Anchorage, Alaska. DOI-BLM-AK-0000-2018-0004-EIS - BLM/AK/PL-22/032+1610+F010. Approved March 12, 2023.

Hoefler Consulting Group (HCG), 2007. Study Final Report for the Beaufort Sea Meteorological Monitoring and Data Synthesis Project. prepared for U.S. Department of the Interior Minerals Management Service Alaska OCS Region. OCS Study MMS 2007-011. September 2007.

SLR International Corporation (SLR), 2023. Nuiqsut Ambient Air and Meteorological Monitoring Program 2022 Annual Report. Prepared for ConocoPhillips Alaska, Inc. March 2023.

U.S. Environmental Protection Agency (USEPA), 2017. Revisions to the Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and Fine Particulate Matter. 40 CFR 51. January 17, 2017.

U.S. Environmental Protection Agency (USEPA), 2011. Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Standard. Memorandum from Tyler Fox, Leader, Air Quality Modeling Group to Regional Air Division Directors. Page 15 and 16. March 1, 2011.

ATTACHMENT H
Emissions Calculations Spreadsheet
(electronic only)

ATTACHMENT I
Modeling Files
(electronic only)