APPENDIX I – UNANTICIPATED DISCOVERIES PLAN

Unanticipated Discoveries Plan

North Dakota CarbonSAFE: Project Tundra
Oliver County, North Dakota

Prepared for
Minnkota Power Cooperative, Inc.

June 2023

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Unanticipated Discoveries Plan

Tundra Pipeline Project

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Abbreviations

APE	Area of Potential Effects
MPC	Minnkota Power Cooperative, Inc.
NDCC	North Dakota Century Code
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
Project	North Dakota CarbonSAFE: Project Tundra
SHPO	State Historic Preservation Officer
UDP	Unanticipated Discoveries Plan

1 Introduction

This Unanticipated Discoveries Plan (UDP) provides the procedures that Minnkota Power Cooperative, Inc. (MPC) will implement in the event cultural resources and/or human remains are identified during construction of the Tundra Pipeline Project (Project).

Unanticipated discoveries typically occur when previously undetected cultural resources are exposed during construction or other permitted surface disturbing activities, but after the federal agency has completed the Section 106 process.

The purpose of this UDP is to properly identify and protect any cultural resource materials such as artifacts, sites, human skeletal remains, or any other cultural resources eligible, or potentially eligible, for listing in the National Register of Historic Places (NRHP) that are discovered during construction of the Project. This UDP provides guidance to MPC and their contractors so they can:

- Comply with any applicable federal and state laws regarding cultural resources;
- Describe to regulatory agencies, review agencies, and Tribal Historic Preservation Offices (THPOs) the procedures MPC will follow to prepare for and deal with unanticipated discoveries; and
- Provide direction and guidance to Project personnel for the proper procedures to be followed should an unanticipated discovery occur.

2 Roles and Responsibilities

The following roles and responsibilities have been defined for this UDP.

- **MPC Environmental Specialist**: MPC Representative. Responsible for Notifying the State Historic Preservation Office (SHPO) in the event of an accidental discovery.
- **State Historic Preservation Officer (SHPO)**: State-appointed official responsible for consulting with Federal, State, and local governments in matters of historic preservation and NRHP eligibility pursuant to Section 106 of the NHPA.
- **SHPO-permitted Archaeological Consultant**: Qualified archaeologist as defined in 36 CFR Part 61 and in receipt of the Annual Archaeological Permit required by North Dakota Century Code (NDCC) section 55-03-01.
- **Archaeological Monitor**: SHPO-permitted Archaeological Consultant on-site during construction to monitor ground disturbing activities for the presence of cultural resources. Has authority to stop construction to further investigate potential resources.
- **Supervisor**: Supervisory construction personnel. Responsible for ensuring that any unanticipated discoveries are promptly reported to the MPC Environmental Specialist and further disturbance halts as required in this plan. Supervisors are also responsible for confirming that workers under their direction are familiar with and adhere to the requirements of this plan.

3 Protocol for the Unanticipated Discovery of Cultural Resources

Cultural resources typically consist of archaeological and historic architectural resources. Archaeological resources are defined as any site location that contains material remains of past human life or activities, or other places and/or items that possess cultural importance to individuals or a group. They are typically identified on the surface or below ground. Historic architectural resources include "buildings, bridges, tunnels, statues, and other structures that create tangible links to the American past, whether in relation to historical events and people, traditional ways of life, architectural design, or methods of construction"[1]. Historic architectural resources are above ground resources.

3.1 Recognizing Cultural Resources

A cultural resource discovery could be precontact (i.e., from a time period that predates Native American contact with Europeans) or historic in nature. Examples include, but are not limited to:

- An accumulation of shell, burned rocks, or other food-related materials.
- Bones, intact or in small pieces and burned or unburned.
- An area of charcoal or very darkly stained soil, with or without artifacts.
- Stone tools or waste flakes (for example, an arrowhead or stone chips), or precontact ceramics.
- Modified natural features, such as rock drawings.
- Agricultural or industrial materials that appear older than 50 years. These could include equipment, fencing, canals, derelict buildings, tools, and many other items.
- Clusters of tin cans, bottles, or other debris that appear older than 50 years.
- Old munitions casings. **Always assume these are live and never touch or move**.
- Railroad tracks, decking, foundations, or other industrial materials.
- Foundation remnants, cisterns, and wells.
- Remnants of homesteading. These could include bricks, nails, household items, toys, food containers, and other items associated with homes or farming sites.

The above list does not cover every possible cultural resource. When in doubt, assume the material is a cultural resource. Example photographs of cultural resources that could be encountered during the Project are included in Attachment 1.

[1] https://www.nps.gov/orgs/1027/architecture.htm

3.2 Protocol

If an archaeological monitor, employee, contractor, or subcontractor believes that they have uncovered cultural resources or human remains at any point in the Project, take the following steps to **Stop-Notify-Protect**. If you suspect that the discovery includes **human remains**, follow the protocol outlined in **Section 4**. A flow chart with additional information regarding the procedures to be followed in the event that cultural resources are inadvertently discovered is included in Attachment 2.

STEP 1: Stop Work

All work must stop within the immediate vicinity, defined as within 100 feet of the discovery.

STEP 2: Notify the Appropriate Personnel

Either the Archaeological Monitor (if present) or the Supervisor will notify the MPC Environmental Specialist of the accidental discovery. The MPC Environmental Specialist then has 48 hours to notify the SHPO and THPOs by email or telephone.

During the discovery, the Supervisor in charge is responsible for informing persons in the area who are associated with the Project that they will be subject to prosecution for knowingly disturbing historic or archaeological sites or collecting artifacts.

STEP 3: Protect the Discovery

Leave the discovery and the surrounding area untouched and create a clear, identifiable, and wide boundary of 100 feet or larger with temporary fencing, flagging, stakes, or other clear markings. Provide protection of the discovery until cleared by the MPC Environmental Specialist.

Do not permit vehicles, equipment, or unauthorized personnel to traverse the discovery site. Do not allow work to resume within the boundary until clearance is received from the MPC Environmental Specialist.

STEP 4: Archaeological Investigation

The SHPO-permitted archaeological consultant or Archaeological Monitor will determine if the discovery is cultural and, if so, record and evaluate the discovery and make a recommendation of eligibility and effect. The archaeological investigation and evaluation will follow North Dakota SHPO standards.

STEP 5: Clearance

Following the appropriate archaeological investigation and eligibility determination for the cultural resource(s), the SHPO will issue a written letter of concurrence and construction will be allowed to resume in the area of the discovery. Work may not resume within the 100-foot buffer until SHPO concurrence and the the Supervisor in charge has received authorization to proceed from the MPC Environmental Specialist.

3.3 Points of Contact, Unanticipated Discovery of Cultural Resources

The following points of contact have been identified for the Project in the event that cultural resources are discovered.

Table 3-1 Points of Contact, Unanticipated Discovery of Cultural Resources

Position	Name	Phone Number
MPC Environmental Specialist	Samantha Roberts	(701) 795-4289
SHPO	Andrew Robinson	(701) 328-3575
SHPO-permitted Archaeological Consultant	John Morrison	(701) 400-3575
Archaeological Monitor	Pending	
Supervisor	Pending	
Chairman, Apache Tribe of Oklahoma	Durell Cooper or Bobby Komardley	(405) 247-9493
THPO, Fort Belknap Indian Community of the Fort Belknap Reservation of Montana	Michael Blackwolf	(406) 353-2295
THPO, Three Affiliated Tribes of the Forth Berthold Reservation, North Dakota	Allan Demaray	(701) 421-6640

4 Protocol for the Unanticipated Discovery of Human Remains

Any human remains or suspected human remains, regardless of antiquity or ethnic origin, will always be treated with dignity and respect. Human remains or suspected human remains may be associated with any of the following: funerary objects, sacred objects, or objects of cultural patrimony. Follow these steps to **Stop-Notify-Protect**. A flow chart with additional information regarding the procedures to be followed in the event that human remains are inadvertently discovered is included in Attachment 3.

STEP 1: Stop Work

All work must stop within the immediate vicinity, defined as within **300 feet** of the discovery. It is very important for law enforcement personnel and the SHPO or North Dakota Department of Health to examine the location as it was found.

STEP 2: Notify the Appropriate Personnel

Notify the Supervisor and Archaeological Monitor (if present) of the accidental discovery and suspected human remains. In turn, the Supervisor will **immediately** notify the MPC Environmental Specialist by telephone with follow-up written confirmation. The MPC Environmental Specialist will contact and coordinate with the appropriate Law Enforcement Agency and the SHPO. The SHPO will notify the North Dakota Department of Health.

During the time of the discovery, the Supervisor in charge is responsible for informing persons in the area who are associated with the Project that they will be subject to prosecution for knowingly disturbing human remains or collecting artifacts.

STEP 3: Protect the Discovery

Leave the discovery and the surrounding area untouched and create a clear, identifiable, and wide boundary of **300 feet** or larger with temporary fencing, flagging, stakes, or other clear markings. Provide protection of the discovery until cleared by the MPC Environmental Specialist.

Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection and shield them from being photographed by others or disturbed.

Do not permit vehicles, equipment, or unauthorized personnel to traverse the discovery site or 300-foot buffer area. Do not allow work to resume within this boundary until clearance is received from the MPC Environmental Specialist.

DO NOT speak with the media, allow photography or disturbance of the remains, or release any information about the discovery on social media.

STEP 4: Investigation of Human Remains

If the Law Enforcement Agency determines the human remains are not part of a crime scene, the SHPO will determine if the human remains are Native American in origin. If it is determined that the human remains are not Native American and the remains cannot be avoided by Project activities, the SHPO-permitted Archaeological Consultant will proceed in a similar manner to the Unanticipated Discovery procedures listed in Step 4, Section 3.2 above. If it is determined that the human remains are Native American, or if the discovery includes funerary objects, sacred objects, or objects of cultural patrimony, the SHPO will notify the North Dakota Intertribal Reinterment Committee and consultation with tribes will need to occur regarding avoidance or disinterment.

STEP 5: Clearance

Construction activities will not be allowed to resume within 300 feet of the discovery until the MPC Environmental Specialist provides authorization.

4.1 Points of Contact, Unanticipated Discovery of Human Remains

The following points of contact have been identified for the Project in the event that human remains are discovered.

Table 4-1 Points of Contact, Unanticipated Discovery of Human Remains

Position	Name	Phone Number
MPC Environmental Specialist	Samantha Roberts	(701) 795-4289
SHPO	Andrew Robinson	(701) 328-3575
SHPO-permitted Archaeological Consultant	John Morrison	(701) 400-3575
Archaeological Monitor	Pending	
Supervisor	Pending	
Local Law Enforcement	Center Police Department	(701) 794-3591
County Law Enforcement	Oliver County Sheriff	(701) 794-3450 (office)
County Coroner/Medical Examiner	Thomas Kaspari	(701) 873-4445
Chairman, Apache Tribe of Oklahoma	Durell Cooper or Bobby Komardley	(405) 247-9493
THPO, Fort Belknap Indian Community of the Fort Belknap Reservation of Montana	Michael Blackwolf	(406) 353-2295
THPO, Three Affiliated Tribes of the Forth Berthold Reservation, North Dakota	Allan Demaray	(701) 421-6640

Attachment 1

Example Cultural Resources

Photographs

Stone Tool

Stone Tool and Waste Flakes

Precontact Ceramics

Precontact Ceramics

Darkly Stained Soil; Accumulation of Burned Rocks

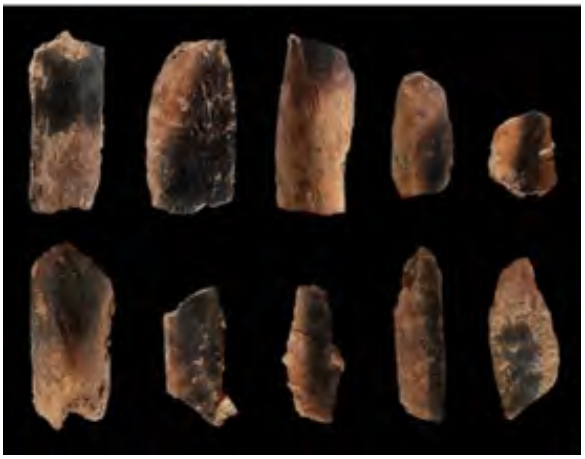
Stone Circle[2]

[2] Ed Horner, Fratermanor (https://commons.wikimedia.org/wiki/File:Teepee_rings.jpg), https://creativecommons.org/licenses/by-sa/4.0/legalcode

Derelict Building

Agricultural/Industrial Tool

Cluster of Historic Cans and Bottles



Burned and Unburned Bone[3]

Foundation Remnant

[3]Ruth Blasco (https://commons.wikimedia.org/wiki/File:Qesem_Cave_burned_animal_bones.jpg), https://creativecommons.org/licenses/by/4.0/legalcode

Foundation Remnant

Remnant Well

Homesteading Remnants (Historic Artifacts)

Homesteading Remnants (Historic Artifacts)

Abandoned Historic Vehicle[4]

[4] Jim Choate (https://www.flickr.com/photos/jimchoate/51532927587), https://creativecommons.org/licenses/by-nc/2.0/legalcode

Attachment 2

Flow Chart for Unanticipated Discoveries

Cultural Resources


Accidental Discovery Occurs
Halt all work within 100 ft radius (Stop Work Order)
Notify the MPC Environmental Specialist
Flag off the avoidance area
Within 24 hours, the SHPO-permitted archaeological consultant will examine the discovery and determine if a cultural resource has been identified
The SHPO-permitted archaeological consultant determines the discovery is NOT a cultural resource
The SHPO-permitted archaeological consultant determines the discovery IS a cultural resource
The SHPO-permitted archaeologist notifies the MPC Environmental Specialist
The SHPO-permitted archaeologist notifies the MPC Environmental Specialist
MPC Environmental Specialist notifies the Supervisor that the Stop Work Order is lifted
The MPC Environmental Specialist notifies the SHPO within 24 hours of the determination
Construction activities can resume
The SHPO-permitted archaeological consultant finds the resource to be NOT SIGNIFICANT
The SHPO-permitted archaeo-logical consultant finds the resource MAY BE SIGNIFICANT
The SHPO-permitted archaeological consultant prepares a written summary of findings
Scope-of-work for evaluating the significance of the resource and potential project effects on the resource (Evaluation Plan) prepared and submitted to the SHPO
MPC Environmental Specialist submits findings to SHPO for permission for construction to recommence
Evaluation Plan approved by the SHPO
Additional archaeological testing com-pleted pursuant to the Evaluation Plan
SHPO permission received
SHPO permission NOT received
Resource determined to be SIGNIFICANT
MPC Environmental Specialist notifies the Supervisor that the Stop Work Order is lifted
Additional consultation occurs between the MPC Environmental Specialist, the SHPO-permitted archaeological consultant, and the SHPO
Finding Report and Treatment Plan prepared and submitted to the SHPO
Construction activities can resume
SHPO agrees with the Findings and Treatment Plan
SHPO does not agree with the Findings and/or Treatment Plan
Treatment measures completed
Additional consultation occurs between the MPC Environmental Specialist, the SHPO-permitted archaeological consultant, and the SHPO
Treatment Report prepared and submitted to SHPO
SHPO approves Treatment Report
SHPO does not approve Treatment Report
MPC Environmental Specialist notifies the Supervisor that the Stop Work Order is lifted
Additional consultation occurs between the MPC Environmental Specialist, the SHPO-permitted archaeological consultant, and the SHPO
Construction activities can resume

Attachment 3

Flow Chart for Unanticipated Discoveries

Human Remains


Accidental Discovery Occurs
Discovery determined to be human remains
Halt all work within 300 ft radius (Stop Work Order)
Notify the MPC Environmental Specialist
Flag off the avoidance area
MPC Environmental Specialist will notify the appropriate law enforcement agency and SHPO
The human remains are forensic in nature
Law enforcement coordinates with the Supervisor and the MPC Environmental Specialist regarding removal of the remains
MPC Environmental Specialist notifies the Supervisor that the Stop Work Order is lifted
Construction activities can resume
The human remains are archaeological in nature
The human remains can be avoided by Project activities
SHPO notifies the North Dakota Intertribal Reinterment Com-mittee (if remains are precontact)
The SHPO-permitted archaeological consultant prepares a Finding Report and Avoidance Plan for submittal to SHPO
SHPO approves the Report and Avoidance Plan
MPC Environmental Specialist notifies the Supervisor that the Stop Work Order is lifted
Construction activities can resume
The human remains cannot be avoided by Project activities
Historic Burial
Consultation occurs between the SHPO, the SHPO-permitted archaeological consultant and MPC to determine disinterment methodology and reinterment location
The SHPO-permitted archaeological consultant prepares a Disinterment Plan for submittal to SHPO
Disinterment Plan approved
Disinterment occurs
The SHPO-permitted archaeological consultant prepares a Finding Report and for submittal to SHPO
SHPO approves the Report
MPC Environmental Specialist notifies the Supervisor that the Stop Work Order is lifted
Construction activities can resume
Precontact Burial
SHPO notifies the North Dakota Intertribal Reinterment Committee
Consultation occurs between the SHPO, the North Dakota Intertribal Reinterment Committee, Native American tribes, the SHPO-permitted archaeological consultant and MPC to determine disinterment methodology and reinterment location
The SHPO-permitted archaeological consultant prepares a Disinterment Plan for submittal to SHPO and tribes
Disinterment Plan approved
Disinterment occurs
The SHPO-permitted archaeological consultant prepares a Finding Report and for submittal to SHPO and tribes
SHPO and tribes approve the Report
MPC Environmental Specialist notifies the Supervisor that the Stop Work Order is lifted
Construction activities can resume

APPENDIX J – AIR PERMIT TO CONSTRUCT, AIR QUALITY EMISSIONS ANALYSIS, AND AIR QUALITY IMPACT ANALYSIS

NORTH Dakota | Environmental Quality
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December 29, 2023

Mr. Robert McLennan
President and CEO
DCC East Project LLC
5301 32nd Avenue South
Grand Forks, ND 58201

Re: Air Pollution Control
Permit to Construct No. ACP-18194 v1.0

Dear Mr. McLennan,

Pursuant to the Air Pollution Control Rules of the State of North Dakota, the Department of Environmental Quality (Department) has completed its final review of your permit application dated June 2, 2023, to obtain a Permit to Construct for initial construction and operation of the Dakota Carbon Center CO2 Separation and Purification Plant to be located in Oliver County, North Dakota.

Based on the results of the documents reviewed, the Department hereby issues the enclosed North Dakota Air Pollution Control Permit to Construct No. ACP-18194 v1.0. A public comment period was held regarding this project from September 21, 2023, through October 21, 2023. Comments were received from three parties which consisted of two individual commentors and Region 8 of the Environmental Protection Agency. This information is included in Appendix A – Public Record. The Department provided written response to each applicable comment, also included in Appendix A. The Department made logical-outgrowth changes from the draft Permit to Construct and Air Quality Effects Analysis that do not depart from the terms or substance of the proposed action. Therefore, the Department hereby issues the final permit to construct for the project.

Please notify the Department within 15 days after completing the project to allow for an inspection by the Department.

Note that the above-referenced permit addresses only air quality requirements applicable to your facility. Other divisions (Water Quality, Waste Management and Municipal Facilities) within the Department of Environmental Quality may have additional requirements. Contact information for the various divisions is listed at the bottom of this letter.

If you have any questions regarding air quality, please contact me at (701)328-5229 or destroh@nd.gov.

Sincerely,

David Stroh
Manager, Permit Program
Division of Air Quality

DS:
Enc:
xc: Adam Eisele, EPA Region 8 (email - eisele.adam@epa.gov)

AIR POLLUTION CONTROL PERMIT TO CONSTRUCT

Pursuant to Chapter 23.1-06 of the North Dakota Century Code, and the Air Pollution Control Rules of the State of North Dakota (Article 33.1-15 of the North Dakota Administrative Code), and in reliance on statements and representations heretofore made by the owner designated below, a Permit to Construct is hereby issued authorizing such owner to construct and initially operate the source unit(s) at the location designated below. This Permit to Construct is subject to all applicable rules and orders now or hereafter in effect of the North Dakota Department of Environmental Quality (Department) and to any conditions specified below:

I. General Information:

A. **Permit to Construct Number**: ACP-18194 v1.0

B. **Source**:

1. Name: Dakota Carbon Center CO_2 Separation and Purification Plant

2. Location: 3401 24th Street SW
NE ¼ of Section 5, T.141N, R.83W
Lat/Long: 47.0648/-101.2178
Oliver County, ND

3. Source Type: Carbon dioxide (CO_2) separation and purification plant

4. Facility Emission Units:

Emission Unit Description	Emission Unit (EU)	Emission Point (EP)	Air Pollution Control Equipment
Carbon dioxide (CO_2) absorber column	D01	D01	N/A [A]
Cooling tower	D02	D02	Drift eliminators
Emergency diesel fire pump engine rated at 460 brake horsepower	D03	D03	None
Haul roads [B]	D04	D04	None
Storage tanks [B]	D05	D05	None
Fugitive components	FUG	FUG	None

[A] Process design and controls (i.e., construction material selection and intermediate cooling). No add-on controls.

[B] Insignificant unit

5. Storage Tanks (Insignificant Units):

Emission Unit Description	Emission Unit (EU)
Diesel fire pump storage tank	D05A
Solvent tank	D05B
Solvent sump tank	D05C
Reclaimed waste tank	D05D
Wash water tank	D05E
Dilute wash water tank	D05F
Fresh solvent tank	D05G
Triethylene glycol tank	D05H

C. **Owner/Operator (Permit Applicant)**:

1. Name: DCC East Project LLC

2. Address: 3401 24th Street SW
Center, ND 58530

3. Application Date: June 2, 2023
August 25, 2023 (Revised modeling analysis)

II. **Conditions**:
This Permit to Construct allows the construction and initial operation of the above-mentioned new or modified equipment at the source. The source may be operated under this Permit to Construct until a Permit to Operate is issued unless this permit is suspended or revoked. The source is subject to all applicable rules, regulations, and orders now or hereafter in effect of the North Dakota Department of Environmental Quality and to the conditions specified below.

A. **Emission Limits**: Emission limits from the operation of the new source unit(s) identified in Item I.B of this Permit to Construct (hereafter referred to as "permit") are as follows. Source units not listed are subject to the applicable emission limits specified in the North Dakota Air Pollution Control Rules.

Emission Unit Description	Emission Unit (EU)	Emission Point (EP)	Pollutant / Parameter	Emission Limit
Cooling tower	D02	D02	PM/PM_{10}/$PM_{2.5}$	Condition II.E

Emission Unit Description	Emission Unit (EU)	Emission Point (EP)	Pollutant / Parameter	Emission Limit
Emergency diesel fire pump engine	D03	D03	Various SO_2	NSPS IIII, Table 4 Condition II.B

B. **Fuel Restrictions**: The emergency fire pump engine (EU D03) is restricted to combusting only distillate oil containing no more than 0.0015 percent sulfur by weight.

C. **New Source Performance Standards (NSPS)**: The permittee shall comply with all applicable requirements of the following NSPS subparts, in addition to Subpart A, as referenced in Chapter 33.1-15-12 of the North Dakota Air Pollution Control Rules and 40 CFR 60.

1. 40 CFR 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (EU D03).

D. **National Emissions Standards for Hazardous Air Pollutants (NESHAP)**: The permittee shall comply with all applicable requirements of the following NESHAP subparts, in addition to Subpart A, as referenced in Chapter 33.1-15-22 of the North Dakota Air Pollution Control Rules and 40 CFR 63.

1. 40 CFR 63, Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (EU D03).

E. **Cooling tower (EU D02)**: The cooling tower shall be equipped with and operated with mist eliminators that are guaranteed to limit drift to 0.0005% or less of the circulating flow.

F. **Emissions Testing**: All initial testing will require a minimum of 3 runs, one hour each, unless otherwise specified in a federal subpart.

Emission Unit Description	Emission Point (EP)	Contaminant	Method
CO_2 absorber column	D01	Acetaldehyde [A]	Method 320 [C]
		Formaldehyde [A, B]	Method 320 [C]

[A] Acetaldehyde is projected to account for approximately 93% of all HAPs and is expected to be a surrogate for HAPs. Formaldehyde is projected to account for approximately 5%, meaning aldehyde HAPs are projected to account for 98% of all HAPs.

[B] If testing formaldehyde indicates results below Method detection limits, they will be considered insignificant by the Department.

[C] An equivalent reference method approved by the Department may be used.

A signed copy of the test results shall be furnished to the Department within 60 days of the test date. The basis for this condition is NDAC 33.1-15-01-12 which is hereby incorporated into this permit by reference. To facilitate preparing for and conducting such tests, and to facilitate reporting the test results to the Department, the permittee shall follow the procedures and formats in the Department's Emission Testing Guideline[1].

1. Initial Testing: Within 180 days after initial startup, the permittee shall conduct emissions tests at the emission units listed above using an independent testing firm. Emissions testing shall be conducted for the pollutant(s) listed above in accordance with EPA Reference Methods listed in 40 CFR 60, Appendix A and/or 40 CFR 63, Appendix A. Test methods other than those listed above may be used upon approval by the Department.

2. Notification: The permittee shall notify the Department using the form in the Emission Testing Guideline, or its equivalent, at least 30 calendar days in advance of any tests of emissions of air contaminants required by the Department. If the permittee is unable to conduct the performance test on the scheduled date, the permittee shall notify the Department at least five days prior to the scheduled test date and coordinate a new test date with the Department.

3. Sampling Ports/Access: Sampling ports shall be provided downstream of all emission control devices and in a flue, conduit, duct, stack or chimney arranged to conduct emissions to the ambient air.

   The ports shall be located to allow for reliable sampling and shall be adequate for test methods applicable to the facility. Safe sampling platforms and safe access to

[1] See February 7, 2020, North Dakota Department of Environmental Quality Division of Air Quality Emissions Testing Guidelines. Available at: https://www.deq.nd.gov/publications/AQ/policy/PC/Emission_Testing_Guide.pdf

the platforms shall be provided. Plans and specifications showing the size and location of the ports, platform and utilities shall be submitted to the Department for review and approval.

4. Other Testing:

a) The Department may require the permittee to have tests conducted to determine the emission of air contaminants from any source, whenever the Department has reason to believe that an emission of a contaminant not addressed by the permit applicant is occurring, or the emission of a contaminant in excess of that allowed by this permit is occurring. The Department may specify testing methods to be used in accordance with good professional practice. The Department may observe the testing. All tests shall be conducted by reputable, qualified personnel. A signed copy of the test results shall be furnished to the Department within 60 days of the test date.

All tests shall be made available, and the results calculated in accordance with test procedures approved by the Department. All tests shall be made under the direction of persons qualified by training or experience in the field of air pollution control as approved by the Department.

b) The Department may conduct tests of emissions of air contaminants from any source. Upon request of the Department, the permittee shall provide necessary holes in stacks or ducts and such other safe and proper sampling and testing facilities, exclusive of instruments and sensing devices, as may be necessary for proper determination of the emission of air contaminants.

G. **Best Management Practices**: At all times, including periods of startup, shutdown, and malfunction, the permittee shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions.

1. Intermediate cooling in the CO_2 absorber column (EU D01) by cooling over the packing shall be always operated when the unit is in operation.

2. Periodic monitoring and recordkeeping demonstrating compliance with the CO_2 absorber column operations in accordance with the original equipment manufacturers specifications and good engineering practices.

3. Recordkeeping that demonstrates compliance with the MACT determination for materials selection in the CO_2 absorber column.

H. **Stack Heights**: Emissions from D01 shall be vented through stacks that meet the following height requirements. Stack heights may be no less than those listed in the table below without prior approval from the Department.

Emission Unit (EU)	Emission Point (EP)	Stack Height (Feet)
Carbon dioxide (CO_2) absorber column	D01	335

I. **Construction**: Construction of the above described facility shall be in accordance with information provided in the permit application as well as any plans, specifications and supporting data submitted to the Department. The Department shall be notified ten days in advance of any significant deviations from the specifications furnished. The issuance of this Permit to Construct may be suspended or revoked if the Department determines that a significant deviation from the plans and specifications furnished has been or is to be made.

Any violation of a condition issued as part of this permit to construct as well as any construction which proceeds in variance with any information submitted in the application, is regarded as a violation of construction authority and is subject to enforcement action.

J. **Startup Notice**: A notification of the actual date of initial startup shall be submitted to the Department within 15 days after the date of initial startup.

K. **Like-Kind Engine Replacement**: This permit allows the permittee to replace an existing engine with a like-kind unit. Replacement is subject to the following conditions:

1. The Department must be notified within 10 days after change-out of the unit.

2. The replacement unit shall operate in the same manner, provide no increase in throughput and have equal or less emissions than the unit it is replacing.

3. The date of manufacture of the replacement unit must be included in the notification. The facility must comply with any applicable federal standards (e.g. NSPS, MACT) triggered by the replacement.

4. The replacement unit is subject to the same state emission limits as the existing unit in addition to any NSPS or MACT emission limit that is applicable. Testing shall be conducted to confirm compliance with the emission limits within 180 days after start-up of the unit.

L. **Organic Compounds Emissions**: The permittee shall comply with all applicable requirements of NDAC 33.1-15-07 – Control of Organic Compounds Emissions.

M. **Permit Invalidation**: This permit shall become invalid if construction is not commenced within eighteen months after issuance of such permit, if construction is discontinued for a period of eighteen months or more; or if construction is not completed within a reasonable time, unless an extension is granted by the Department.

N. **Title V Permit to Operate**: Within one year after startup of the units covered by this Permit to Construct, the permittee shall submit a permit application for a Title V Permit to Operate for the facility.

O. **Fugitive Emissions**: The release of fugitive emissions shall comply with the applicable requirements in NDAC 33.1-15-17.

P. **Annual Emission Inventory/Annual Production Reports**: The permittee shall submit an annual emission inventory report and/or an annual production report upon Department request, on forms supplied or approved by the Department.

Q. **Source Operations**: Operations at the installation shall be in accordance with statements, representations, procedures and supporting data contained in the initial application, and any supplemental information or application(s) submitted thereafter. Any operations not listed in this permit are subject to all applicable North Dakota Air Pollution Control Rules.

R. **Alterations, Modifications or Changes**: Any alteration, repairing, expansion, or change in the method of operation of the source which results in the emission of an additional type or greater amount of air contaminants or which results in an increase in the ambient concentration of any air contaminant, must be reviewed and approved by the Department prior to the start of such alteration, repairing, expansion or change in the method of operation.

S. **Air Pollution from Internal Combustion Engines**: The permittee shall comply with all applicable requirements of NDAC 33.1-15-08-01 – Internal Combustion Engine Emissions Restricted.

T. **Recordkeeping**: The permittee shall maintain any compliance monitoring records required by this permit or applicable requirements. The permittee shall retain records of all required monitoring data and support information for a period of at least five years from the date of the monitoring sample, measurement, report or application. Support information may include all calibration and maintenance records and all original strip-chart recordings/computer printouts for continuous monitoring instrumentation, and copies of all reports required by the permit.

U. **Nuisance or Danger**: This permit shall in no way authorize the maintenance of a nuisance or a danger to public health or safety.

V. **Malfunction Notification**: The permittee shall notify the Department of any malfunction which can be expected to last longer than twenty-four hours and can cause the emission of air contaminants in violation of applicable rules and regulations.

W. **Operation of Air Pollution Control Equipment**: The permittee shall maintain and operate all air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions.

X. **Transfer of Permit to Construct**: The holder of a permit to construct may not transfer such permit without prior approval from the Department.

Y. **Right of Entry**: Any duly authorized officer, employee or agent of the North Dakota Department of Environmental Quality may enter and inspect any property, premise or place at which the source listed in Item I.B of this permit is located at any time for the purpose of ascertaining the state of compliance with the North Dakota Air Pollution Control Rules. The Department may conduct tests and take samples of air contaminants, fuel, processing material, and other materials which affect or may affect emissions of air contaminants from any source. The Department shall have the right to access and copy any records required by the Department's rules and to inspect monitoring equipment located on the premises.

Z. **Other Regulations**: The permittee of the source unit(s) described in Item I.B of this permit shall comply with all State and Federal environmental laws and rules. In addition, the permittee shall comply with all local burning, fire, zoning, and other applicable ordinances, codes, rules and regulations.

AA. **Permit Issuance**: This permit is issued in reliance upon the accuracy and completeness of the information set forth in the application. Notwithstanding the tentative nature of this information, the conditions of this permit herein become, upon the effective date of this permit, enforceable by the Department pursuant to any remedies it now has, or may in the future have, under the North Dakota Air Pollution Control Law, NDCC Chapter 23.1-06.

BB. **Odor Restrictions**: The permittee shall not discharge into the ambient air any objectionable odorous air contaminant which is in excess of the limits established in NDAC 33.1-15-16.

CC. **Sampling and Testing**: The Department may require the permittee to conduct tests to determine the emission rate of air contaminants from the source. The Department may observe the testing and may specify testing methods to be used. A signed copy of the test results shall be furnished to the Department within 60 days of the test date. The basis for this condition is NDAC 33.1-15-01-12 which is hereby incorporated into this permit by reference. To facilitate preparing for and conducting such tests, and to facilitate reporting the test results to the Department, the permittee shall follow the procedures and formats in the Department's Emission Testing Guideline.

FOR THE
NORTH DAKOTA DEPARTMENT
OF ENVIRONMENTAL QUALITY

Date: 12/29/2023 By: _____

James L. Semerad
Director
Division of Air Quality

AIR QUALITY EFFECTS ANALYSIS
FOR
PERMIT TO CONSTRUCT
ACP-18194 v1.0

Applicant:

DCC East Project LLC
3401 24th Street SW
Center, North Dakota 58530

Facility Location:

Dakota Carbon Center CO_2 Separation and Purification Plant
3401 24th Street SW
Center, North Dakota 58530
Lat/Long: 47.0648/-101.2178
NE ¼ of Section 5, T.141N, R.83W

Introduction and Background:

DCC East Project LLC (DCC) submitted a permit to construct application to the North Dakota Department of Environmental Quality – Division of Air Quality (Department) on June 2, 2023. The air dispersion modeling analysis for the project was revised and submitted to the Department on August 25, 2023. The application was for the construction of the Dakota Carbon Center Carbon Dioxide (CO_2) Separation and Purification Plant (Project). The Project will be located adjacent to the existing Milton R. Young (MRY) Station and is designed to capture, purify, and sequester up to 13,000 tons per day (~4.75 million tons per year) of CO_2 from MRY Station's coal-fired boilers (MRY Unit 1 and MRY Unit 2).

DCC's Project will be considered a separate stationary source from the MRY Station for the purposes of the applicable air pollution control rules (40 CFR Part 63 and 40 CFR Part 70). Part 63 requires two criteria to be met for two (or more) sources to be considered a single major source, the sources must be "located within a contiguous area and under common control". Part 70 contains the same first two criteria and adds a third criteria, that sources must belong to the same major industrial grouping. DCC will be responsible for operational control of the Project, including control over air emitting activities that affect permit compliance (i.e., not under common control), and the owner of MRY Station will not hold a majority ownership in DCC. DCC's Project has standard industrial classification (SIC) code 2813 compared to MRY Station SIC code of 4911 (i.e., do not belong to the same industrial grouping). DCC will be adjacent to MRY Station, so the facilities will be located within a continuous area. Of the Part 63 and Part 70 criteria the Project only meets one of the necessary criteria; therefore, the Project is considered a separate source.

Note: MRY Station operates under Title V Permit to Operate (PTO) T5-F76009 (AOP-28368 v5.0) which expires on May 12, 2025. T5-F76009 contains all the equipment onsite at MRY Station and has incorporated all previously issued air pollution control construction permits. T5-F76009 monitoring requirements and conditions will be updated upon issuance of this permit to ensure MRY Station will be able to continually demonstrate compliance with the limits in T5-F76009 at existing MRY Station emission points (EPs) and proposed EP D01.

Table 1 lists all the emissions units associated with the Project and Table 2 contains a list of all insignificant storage tanks.

Table 1 – Project Emission Units and Emission Points

Emission Unit Description	**Emission Unit (EU)**	**Emission Point (EP)**	**Air Pollution Control Equipment**
Carbon dioxide (CO_2) absorber column	D01	D01	N/A [A]
Cooling tower	D02	D02	Drift eliminators
Emergency diesel fire pump engine rated at 460 brake horsepower	D03	D03	None
Haul roads [B]	D04	D04	None
Storage tanks [B]	D05	D05	None
Fugitive components	FUG	FUG	None

[A] Process design and controls (i.e., construction material selection and intermediate cooling). No add-on controls.

[B] Insignificant unit

Table 2 – Project Insignificant Units (Storage Tanks)

Emission Unit Description	**Emission Unit (EU)**
Diesel fire pump storage tank	D05A
Solvent tank	D05B
Solvent sump tank	D05C
Reclaimed waste tank	D05D
Wash water tank	D05E
Dilute wash water tank	D05F
Fresh solvent tank	D05G
Triethylene glycol tank	D05H

Facility Wide Emissions Profile
Potential to Emit (PTE) from Standalone Project

Table 3 - PTE (tons per year) [A]

Emission Unit Description	Emission Unit (EU)	Emission Point (EP)	CO	NO_X	SO_2	VOCs	PM	PM_{10}	$PM_{2.5}$	Total HAPs	Acetaldehyde (Largest HAP)
CO_2 absorber	D01	D01	--	--	--	35.2	--	--	--	35.2	32.9
Cooling tower	D02	D02	--	--	--	--	22.2	4.0	0.0	--	--
Fire water pump engine	D03	D03	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Haul roads	D04	D04	--	--	--	--	0.2	0.0	0.0	--	--
Storage tanks	D05	D05	--	--	--	0.3	--	--	--	0.0	--
Fugitive components	FUG	FUG	--	--	--	4.3	--	--	--	--	--
		Total:	**0.1**	**0.2**	**0.0**	**39.9**	**22.4**	**4.1**	**0.0**	**35.2**	**32.9**

[A] Abbreviations:
PM: total filterable and condensable particulate matter
$PM_{2.5}$: filterable and condensable particulate matter with an aerodynamic diameter less than or equal to 2.5 microns (≤2.5 μm)
PM_{10}: filterable and condensable particulate matter with an aerodynamic diameter less than or equal to 10 microns (≤10 μm) including $PM_{2.5}$
SO_2: sulfur dioxide
NO_X: oxides of nitrogen
CO: carbon monoxide
VOCs: volatile organic compounds
HAPs: hazardous air pollutants as defined in Section 112(b) of the Clean Air Act

Rules Analysis
Potentially Applicable Rules and Expected Compliance Status

A. NDAC 33.1-15-01 - General Provisions:

Multiple topics are included in the General Provisions chapter, these include: entry onto premises - authority, variances, circumvention, severability, land use plans and zoning regulations (only to provide air quality information), measurement of air contaminants, shutdown and malfunction of an installation - requirements for notification, time schedule for compliance, prohibition of air pollution, confidentiality of records, enforcement, and compliance certifications.

Applicability and Expected Compliance

Based on the review of the information provided, the Project will comply with all applicable sections of this rule.

B. NDAC 33.1-15-02 - Ambient Air Quality Standards:

The facility must comply with the North Dakota and Federal Ambient Air Quality Standards (AAQS). In addition to these standards, compliance with the "Criteria Pollutant Modeling Requirements for a Permit to Construct" guidelines[1] and the "Policy for the Control of Hazardous Air Pollutant Emissions in North Dakota (Air Toxics Policy)"[2] is required.

Applicability and Expected Compliance

The Project does not trigger the prevention of significant deterioration (PSD) program emissions thresholds which require modeling nor do the Project emissions meet thresholds required for non-PSD required modeling under the "Criteria Pollutant Modeling Requirements for a Permit to Construct". Notwithstanding that the emissions thresholds are below North Dakota's modeling guidelines, modeling for this project was required and is appropriate and necessary since the current emissions from MRY Station will be diverted and emitted through a stack with significantly different stack characteristics. Therefore, preconstruction modeling for the Project was required to demonstrate the Project will not significantly impact the existing airshed and will not cause an AAQS violation.

The results of the preconstruction modeling demonstrate the altered dispersion characteristics associated with the Project are not expected to cause or contribute to an exceedance of the AAQS. The preconstruction permit modeling was also used to demonstrate compliance with the Department's Air Toxics Policy. Modeling demonstrated that the Project is expected to comply with both the AAQS and the Department's Air Toxic Policy. Details regarding the preconstruction permit modeling analysis and results are

[1] See October 6, 2014, Criteria Pollutant Modeling Requirements for a Permit to Construct. Available at: https://www.deq.nd.gov/publications/AQ/policy/Modeling/Criteria_Modeling_Memo.pdf
[2] See August 25, 2010, Policy for the Control of Hazardous Air Pollutant (HAP) Emissions in North Dakota. Available at: https://www.deq.nd.gov/publications/AQ/policy/Modeling/Air_Toxics_Policy.pdf

discussed in the Air Quality Impacts Analysis (AQIA) associated with this permitting action. See "ACP-18194 v1.0_AQIA" for details.

C. NDAC 33.1-15-03 - Restriction of Emission of Visible Air Contaminants:

This chapter requires all non-flare sources from new facilities to comply with an opacity limit of 20% except for one six-minute period per hour when 40% opacity is permissible. This chapter also requires facility flares to comply with an opacity limit of 20% except for one six-minute period per hour when 60% opacity is permissible. Lastly, this chapter restricts opacity of fugitive emissions transported off property to 40% except for one six-minute period per hour when 60% opacity is permissible. This chapter also contains exceptions under certain circumstances and provides the method of measurement to determine compliance with the referenced limits.

Applicability and Expected Compliance

Based on the emissions units associated with the Project, the Department expects the Project will comply with the non-flare source and fugitive emissions opacity requirements.

The CO_2 absorber column (EU D01), the cooling tower (EU D02) and the emergency diesel fire pump engine (EU D03) are subject to the non-flare source 20% opacity limit and are expected to comply. EU D01 is not expected to have any significant opacity associated with routine operations. Opacity from EU D01 would indicate an issue with the Project operations that would require investigation and resolution. EU D02 is designed with drift elimination technology. Any opacity will be associated with routine operations and expected to be well below 20%. EU D03 is also not expected to have any significant opacity associated with its emergency operations. EU D03 is also subject to NDAC 33.1-15-08 and NDAC 33.1-15-12 (Subpart IIII).

The haul roads (EU D04) are subject to the fugitive emissions transported offsite limit of 40%. The Project will maintain EU D04 using reasonable practices to comply with this limit.

D. NDAC 33.1-15-04 - Open Burning:

No person may dispose of refuse and other combustible material by open burning, or cause, allow, or permit open burning of refuse and other combustible material, except as provided for in Section 33.1-15-04-02 or 33.1-15-10-02, and no person may conduct, cause, or permit the conduct of a salvage operation by open burning.

Applicability and Expected Compliance

The Project is subject to this chapter and will comply with all open burning regulations.

E. NDAC 33.1-15-05 - Emissions of Particulates Matter Restricted:

This chapter establishes particulate matter emission limits for industrial process equipment and fuel burning equipment used for indirect heating.

Applicability and Expected Compliance

The Project will not emit any particulate matter which results from industrial process equipment, nor will the facility operate any fuel burning equipment used for indirect heating.

F. NDAC 33.1-15-06 - Emissions of Sulfur Compounds Restricted:

This chapter applies to any installation in which fuel is burned and the SO_2 emissions are substantially due to the sulfur content of the fuel; and in which the fuel is burned primarily to produce heat. This chapter is not applicable to installations which are subject to an SO_2 emission limit under Chapter 33.1-15-12, Standards for Performance for New Stationary Sources, or installations which burn pipeline quality natural gas.

Applicability and Expected Compliance

The Project will not emit any SO_2 which results from industrial process equipment, nor will the Project operate any fuel burning equipment used for indirect heating. The emergency fire water pump (ED D03) will comply with this chapter by burning ultra-low sulfur diesel.

G. NDAC 33.1-15-07 - Control of Organic Compounds Emissions:

This chapter establishes requirements for organic compound facilities and the disposal of organic compounds.

Applicability and Expected Compliance

The Project is not considered an organic compound facility, but the Project will emit organic compounds via the CO_2 absorber column (EU D01) exhaust. The organic compounds concentration in this stream is expected to be less than 1 part per million by volume dry (ppmvd) and D01 contains process controls (e.g., material selection and intermediate cooling) which limit the generation of organic compounds in the CO_2 absorber column. These controls are considered maximum achievable control technology (MACT). Therefore, the Project is expected to comply with the requirements of this chapter.

The Department encourages DCC to conduct periodic leak detection monitoring on the process equipment to minimize losses of valuable materials.

H. NDAC 33.1-15-08 - Control of Air Pollution from Vehicles and Other Internal Combustion Engines:

This chapter restricts the operation of internal combustion engines which emit from any source unreasonable and excessive smoke, obnoxious or noxious gas, fumes or vapor. This chapter also prohibits the removal or disabling of motor vehicle pollution control devices.

Applicability and Expected Compliance

The emergency diesel fire pump (EU D03) is also subject to opacity requirements under NDAC 33.1-15-03-02 and subject to the requirements of NSPS Subpart IIII. As a result of expected compliance with these provisions, the engine is not expected to emit any unreasonable and excessive smoke, obnoxious or noxious gases, fumes, or vapor. Any vehicles used onsite are also expected to comply with this chapter's provisions.

I. NDAC 33.1-15-09 - [repealed]

J. NDAC 33.1-15-10 - Control of Pesticides:

This chapter provides restrictions on pesticide use and restrictions on the disposal of surplus pesticides and empty pesticide containers.

Applicability and Expected Compliance

The Project is subject to this chapter and is expected to comply with all applicable requirements should pesticides be used.

K. NDAC 33.1-15-11 - Prevention of Air Pollution Emergency Episodes:

When an air pollution emergency episode is declared by the Department, the Project shall comply with the requirements in Chapter 33.1-15-11 of the North Dakota Air Pollution Control (NDAPC) rules.

L. NDAC 33.1-15-12 - Standards of Performance for New Stationary Sources [40 Code of Federal Regulations Part 60 (40 CFR Part 60)]:

This chapter adopts most of the Standards of Performance for New Stationary Sources (NSPS) under 40 CFR Part 60. The Project is subject to the following subparts under 40 CFR Part 60 which have been adopted by North Dakota:

Subpart A – General Provisions

Subpart A contains general requirements for plan reviews, notification, recordkeeping, performance tests, reporting, monitoring and general control device requirements.

Applicability and Expected Compliance

The Project will comply with the general provisions of Subpart A through submission of timely notifications, performance testing, reporting, and following the general control device and work practice requirements under Subpart A. In addition, any changes to the Project after it is built will be evaluated with respect to this subpart as well as others.

Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Subpart IIII establishes emissions standards (NO_X, CO, PM, and Non-methane hydrocarbons) and compliance schedules for all new, modified and reconstructed stationary compressions ignition (CI) internal combustion engines (ICE). CI ICE are categorized in this subpart by usage, size and age.

Applicability and Expected Compliance

The Project emergency fire water pump (EU D03) is rated at 460 brake horsepower and is subject to the requirements of Subpart IIII. Subpart IIII requires EU D03 to be certified to the standards listed in Table 4 to Subpart IIII[3]. Based on the information provided in the permit application, EU D03 will comply with the applicable requirements of this subpart.

M. NDAC 33.1-15-13-Emission Standards for Hazardous Air Pollutants [40 Code of Federal Regulations Part 61 (40 CFR Part 61)]

This chapter adopts most the National Emission Standards for Hazardous Air Pollutants (NESHAP) under 40 CFR Part 61.

Applicability and Expected Compliance

The Project does not appear to have any applicable requirements under this chapter.

N. NDAC 33.1-15-14-Designated Air Contaminant Sources, Permit to Construct, Minor Source Permit to Operate, Title V Permit to Operate

This chapter requires the facility to obtain a Permit to Construct and a Permit to Operate.

Applicability and Expected Compliance

DCC has submitted an application for a permit to construct for the Project and has met all requirements necessary to obtain a permit to construct. The Project will be considered a minor PSD source, a major source of HAPs, and a future major stationary source under 40 CFR Part 70 (Title V).

The permit must undergo public comment per NDAC 33.1-15-14-06.5.a.

Once the Project completes construction and meets the permit to construct requirements, a facility inspection will be performed by the Department. After Project start-up, DCC will be required to submit a timely Title V permit to operate application.

[3] See https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-60/subpart-IIII#Table-4-to-Subpart-IIII-of-Part-60 for Table 4 of NSPS Subpart IIII.

O. NDAC 33.1-15-15-Prevention of Significant Deterioration of Air Quality [40 CFR 52.21]

This chapter adopts the federal provisions of the prevention of significant deterioration of air quality (PSD) program. A facility is subject to PSD review if it is classified as a "major stationary source" under Chapter 33.1-15-15.

Applicability and Expected Compliance

The Project does not meet the definition of a "major stationary source" under 40 CFR 52.21(b)(1)(i)(a) since the regulated NSR pollutant[4] emissions do not meet the applicable requirements. The PTE for this facility, as shown in Table 3, is below the 100 tpy threshold and therefore not subject to PSD review.

P. NDAC 33.1-15-16 - Restriction of Odorous Air Contaminants

This chapter restricts the discharge of objectionable odorous air contaminants which measures seven odor concentration units or greater outside the property boundary.

Applicability and Expected Compliance

Based on Department expectations considering the source units, the Project should not emit any objectionable odorous air contaminants. Therefore, the Project is expected to comply with this chapter.

Q. NDAC 33.1-15-17 - Restriction of Fugitive Emissions

This Chapter restricts fugitive emissions from particulate matter or other visible air contaminates and gaseous emissions that would violate Chapter 2 (ambient air quality standards), Chapter 15 (PSD), Chapter 16 (odor), or Chapter 19 (visibility).

Applicability and Expected Compliance

DCC will be required to take reasonable precautions to prevent fugitive emissions in violation of the above referenced NDAC chapters.

R. NDAC 33.1-15-18 - Stack Heights

This chapter restricts the use of stack heights above good engineering practices (GEP). This chapter also restricts the use of dispersion techniques to affect the concentration of a pollutant in the ambient air.

Applicability and Expected Compliance

The main proposed stack (EU D01) for the Project does not exceed GEP and will not use dispersion techniques to affect the pollutant concentration in the ambient air.

[4] See 40 CFR 52.21(b)(50). Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-52/subpart-A/section-52.21#p-52.21(b)(50)

The required stack heights at the facility are listed in the following table:

Emission Unit	Emission Point (EP)	Stack Height (Feet)
D01	D01	335

S. NDAC 33.1-15-19 - Visibility Protection

This chapter applies to new major stationary sources as defined in Section 33.1-15-15-01.

Applicability and Expected Compliance

The Project is not an existing major stationary source and cannot experience a major modification. The Project is also not a new major stationary source; therefore, this Project is not subject to the requirements of this chapter. Given the minor source levels of the visibility impairing air pollutants, such as $PM_{2.5}$, it is expected that the Project will not adversely contribute to visibility impairment within the three units of the Theodore Roosevelt National Park (nearest federal Class I areas) or at the Lostwood National Wildlife Refuge.

T. NDAC 33.1-15-20 - Control of Emissions from Oil and Gas Well Production Facilities

The Project is not an oil or gas well facility and is therefore not subject to the requirements of this chapter.

U. NDAC 33.1-15-21 - Acid Rain Program

This chapter adopts the acid rain provisions of the Clean Air Act specified under 40 CFR Parts 72-78. The Project is not subject to the acid rain provision as it is not an electric utility.

V. NDAC 33.1-15-22 - Emissions Standards for Hazardous Air Pollutants for Source Categories [40 Code of Federal Regulations Part 60 (40 CFR Part 63)]

This chapter adopts the 40 CFR Part 63 regulations which regulates hazardous air pollutants (HAPs) from regulated source categories. Typically, these standards apply to major sources of air pollution that are a regulated source category. In addition to the major source requirements, some of the regulations have "area source" standards (for non-major sources). Some of the area source standards have not been adopted by the Department and compliance will be determined by the United States Environmental Protection Agency (USEPA) (i.e. 40 CFR 63, Subpart ZZZZ area source provisions have not been adopted by the Department).

Applicability and Expected Compliance

The Project's potential HAP emissions are greater than 10 tons/year of any single HAP and are greater than 25 tons/year of any combination of HAPs, so the Project is expected to be a major source of HAPs. As shown in the Table 3, total potential HAPs from the Project

are approximately 35.2 tons/year. The greatest single potential HAP is acetaldehyde at approximately 32.9 tons/year.

DCC shall perform HAP emissions testing upon Project start-up to confirm the representations made in the permit application as outlined in Condition II.F of ACP-18194 v1.0.

Subpart A – General Provisions

Subpart A contains general requirements for prohibited activities and circumvention, preconstruction review and notification, standards and maintenance requirements, performance tests, monitoring, recordkeeping, reporting, and control device work practice requirements.

Applicability and Expected Compliance

The Project will comply with the general provisions of Subpart A through submission of timely notifications, performance testing, monitoring, recordkeeping, reporting, and following the control device work practice requirements under Subpart A.

Subpart B – Requirements for Control Technology Determinations for Major Sources in Accordance With Clean Air Act Sections, Sections 112(g) and 112(j)

Under the Clean Air Act Amendments of 1990, EPA is required to regulate large or "major" industrial facilities that emit one or more of the listed HAPs. Air toxics are those pollutants that are known or suspected of causing cancer or other serious health effects, such as developmental effects or birth defects. On July 16, 1992, EPA published a list of industrial source categories that emit one or more of these hazardous air pollutants. EPA is required to develop standards for listed industrial categories of "major" sources (those that have the potential to emit 10 tons/year or more of a listed pollutant or 25 tons/year or more of a combination of pollutants) that will require the application of stringent controls, known as maximum achievable control technology (MACT).

The section 112(g) provision is designed to ensure that emissions of toxic air pollutants do not increase if a facility is constructed or reconstructed before EPA issues a MACT or air toxics regulation for that particular category of sources or facilities.

In effect, the 112(g) provision is a transitional measure to ensure that facilities adequately protect the public from toxic air pollutants until EPA issues a MACT standard that applies to the facility in question.

Newly constructed facilities or reconstructed units or sources at existing facilities would be subject to 112(g) requirements if they have the potential to emit hazardous air pollutants (air toxics) in "major" amounts (10 tons or more of an individual pollutant or 25 tons or more of a combination of pollutants).

Sources or facilities subject to 112(g) would be subject to stringent air pollution control requirements, referred to as "new source MACT." Under the Clean Air Act, new source

MACT control is required to be no less stringent than the best controlled similar source or facility.

EPA anticipates that the new source MACT requirements will be equally or more stringent than the requirements in the air toxics or MACT standard that EPA will later issue for the industrial source category in question. However, should the new source MACT requirements prove to be less stringent than the air toxics regulation that EPA later issues, the source or facility would be provided additional time to comply with the air toxics or MACT standard.[5]

Applicability and Expected Compliance

The Project's potential HAP emissions are greater than 10 tons/year of any single HAP and are greater than 25 tons/year of any combination of HAPs. EPA has not established MACT standards for the Project's source category; therefore, a new source MACT determination was made for the Project.

DCC's permit to construct application included a detailed analysis of potentially available controls to reduce VOC/HAP emissions from the CO_2 absorber (EU D01).[6] The Department supports the analysis and agrees with the conclusions reached in the selection of MACT for the CO_2 absorber. The Department has determined MACT for the Project's CO_2 absorber to be process controls integrated into the design of the system, which consists of CO_2 absorber material selection and intermediate cooling. Material selection to limit iron scavenging and intermediate cooling to prevent excess heat are expected to reduce the amount of amine degradation in the CO_2 absorber column, thereby lessening the amount of VOC/HAP formation. It is estimated that these changes will result in approximately 40% less VOC/HAP emissions when compared to pre-design integrated process control levels based on vendor calculations. The selection of MACT for the Project is also consistent with the control approach implemented at the Petra Nova carbon capture facility in Texas.

The permit application projects that acetaldehyde emissions account for approximately 93% of the expected combined (or total) HAPs and that acetaldehyde will be emitted from the CO_2 absorber at a rate of 7.5 pounds per hour (lb/hr). Formaldehyde is the projected next largest HAP and is expected to account for approximately 5% for the total HAPs. DCC will be required to perform performance testing for acetaldehyde and formaldehyde upon start-up of the Project to confirm the HAP representations made in the permit application. Initial performance testing is also anticipated to confirm that the emissions do not pose an adverse risk to human health and the environment.

EPA Guidance provides that MACT control technology may be based on the specific design and process controls. The MACT controls are not dependent on a percent control or allowable ratio of acetaldehyde/HAP formation per unit of CO_2 capture (i.e., pounds of acetaldehyde/HAP per amount of CO_2 recovered) but are based on the design and process controls used to limit the formation of HAPs during operation. Future compliance

[5] See: https://www3.epa.gov/airtoxics/112g/112gpg.html

[6] DCC East Project LLC, Dakota Carbon Center CO_2 Separation and Purification Plan Permit to Construct Application. Appendix C. June 2, 2023.

assurance with the MACT determination will be based on initial performance testing, documentation of compliance with the absorber material selection, and continuous monitoring of operation of the intermediate cooling system to ensure that the represented level of HAP control is being achieved.

Should initial acetaldehyde and formaldehyde emission testing indicate results vary significantly from what was provided in the permit application, additional review/analysis may be required by the Department.

Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Subpart ZZZZ establishes national emission limitations and operating limitations on HAPs emitted from RICE located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations.

Applicability and Expected Compliance

The Project has one engine (EU D03) subject to the requirements under this subpart. The requirements of Subpart ZZZZ for the engine are met by complying with the requirements of NDAC 33.1-15-12 [40 CFR 60], Subpart IIII.

W. NDAC 33.1-15-23 - Fees

This chapter requires a filing fee of $325 for permit to construct applications, plus any additional fees based on actual processing costs. The additional fees based on processing costs will be assessed upon issuance of the draft permit to construct.

The applicant has paid the $325 filing fee and may be required to pay the additional fees associated with the permit processing.

X. NDAC 33.1-15-24 - Standards for Lead-Based Paint Activities

The Project will not perform any lead-based painting and is therefore not subject to this chapter.

Y. NDAC 33.1-15-25 - Regional Haze Requirements

This chapter is specific to existing stationary sources or groups of sources which have the potential to "contribute to visibility impairment" as defined in Section 33.1-15-25-01.2. Existing stationary sources or groups of sources determined to contribute to visibility impairment may be required to implement emissions reduction measures to help the Department make reasonable progress toward North Dakota's reasonable progress goals established in accordance with 40 CFR 51.308.

Applicability and Expected Compliance

The Project is a new source and based on low PTE of visibility impairing pollutants is not expected to contribute to visibility impairment. Therefore, the facility is not subject to the requirements of this chapter.

Summary:

A complete review of the proposed project indicates that the Project is expected to comply with the applicable federal and state air pollution rules and regulations. The Department will make a final recommendation on the issuance of a Permit to Construct for the Project following completion of a 30-day public comment period. The public comment period will begin on September 21, 2023, and end on October 21, 2023.

The Department will hold a public meeting followed by a public hearing in Center, North Dakota on October 19, 2023, for interested parties. Upon completion of the public comment period, the Department will address all comments applicable to the state and federal air quality rules and regulations and make a final determination regarding the issuance of a Permit to Construct for the Project.

Update post comment period:
A public comment period was held regarding the above draft Air Pollution Control Permit to Construct from September 21, 2023, through October 21, 2023. Comments were received from three parties which consisted of two individual commentors and Region 8 of the Environmental Protection Agency. This information is included in Appendix A – Public Record, attached to this permit document. The Department has provided written response to each applicable comment, also included in Appendix A.

The Department made logical-outgrowth changes from the draft Permit to Construct and Air Quality Effects Analysis that do not depart from the terms or substance of the proposed action.

Therefore, based on the comments received and Department responses, the Department recommends issuance of a final Permit to Construct for DCC Project East LLC to construct and initially operate the Dakota Carbon Center Carbon Dioxide Separation and Purification Plant.

Date of Draft Analysis: September 18, 2023
Date of Final Analysis: December 29, 2023

Analysis By:

David Stroh
Manager, Permit Program
Division of Air Quality

DES:

Appendix A – Public Record

A.1 – Public Hearing Notice

NORTH Dakota | Environmental Quality
Be Legendary.™

September 18, 2023

Mr. Gerad Paul
Secretary
DCC East Project LLC
5301 32nd Ave. S.
Grand Forks, ND 58201

Re: Air Pollution Control
Draft Permit to Construct No. ACP-18194 v1.0

Dear Mr. Paul:

Pursuant to the Air Pollution Control Rules of the State of North Dakota, the Department of Environmental Quality (Department) has reviewed the permit application dated June 2, 2023, and the revised modeling dated August 25, 2023, to obtain a Permit to Construct for initial construction and operation of the Dakota Carbon Center CO_2 Separation and Purification Plant to be located in Oliver County, North Dakota.

Before making final determination on the draft Permit to Construct, the Department must solicit public comment by means of the enclosed public notice. As indicated in the notice, the public comment period will begin on September 21, 2023, and end on October 21, 2023. The Department's analysis and a draft copy of the Permit to Construct may be found at https://deq.nd.gov/AQ/PublicCom.aspx. The documents will be posted on or before September 21, 2023.

All comments received will be considered in the final determination concerning issuance of the permit. You will be notified in writing of our final determination.

If you have any questions, please contact me at (701)328-5229 or destroh@nd.gov.

Sincerely,

David Stroh
Environmental Engineer
Division of Air Quality

DS:lc
Enc:
xc: Adam Eisele, EPA Region 8 (email - eisele.adam@epa.gov)
Julia Witteman, EPA Region 8 (email - witteman.julia@epa.gov)
Shannon Mikula, Minnkota Power Cooperative (email - smikula@minnkota.com)

NOTICE OF MACT APPROVAL AND INTENT TO ISSUE AN AIR POLLUTION CONTROL PERMIT TO CONSTRUCT

Take notice that the North Dakota Department of Environmental Quality (NDDEQ) proposes to issue an Air Pollution Control Permit to Construct to DCC East Project LLC in accordance with the North Dakota Air Pollution Control Rules. The proposed air pollution control permit is for initial construction and operation of the Dakota Carbon Center CO_2 Separation and Purification Plant to be located in Oliver County, North Dakota. Preliminary evaluations made by NDDEQ staff indicate that the proposed project will comply with all applicable Air Pollution Control Rules and is protective of human health and the environment.

The project required NDDEQ to perform a case-by-case maximum achievable control technology (MACT) determination. NDDEQ is providing an opportunity for public comment on the MACT determination consistent with 40 CFR 63.43(h). Details regarding the MACT determination can be found in the NDDEQ's Air Quality Effects Analysis.

An air dispersion modeling analysis was conducted to determine the cumulative impact from the project, existing Milton R. Young Station sources, other significant nearby sources within 50 kilometers, and background. Modeled impacts were below ambient air quality standards for each pollutant, as follows: 42% for the NO_2 1-hour standard, 6% for the NO_2 annual standard, 25% for the PM_{10} 24-hour standard, 55% for the $PM_{2.5}$ 24-hour standard, 46% for the $PM_{2.5}$ annual standard, 31% for the SO_2 1-hour standard, 5% for the SO_2 3-hour standard, 7% for the SO_2 24-hour standard, 6% for the SO_2 annual standard, 3% for the CO 1-hour standard, and 12% for the CO 8-hour standard. More detail regarding the projected modeled impacts can be found in the NDDEQ's Air Quality Impacts Analysis.

A 30-day public comment period for the proposed permit to construct and MACT determination will begin September 21, 2023, and end on October 21, 2023. Direct comments in writing, including Re: Public Comment Permit Number ACP-18194 v1.0, to AirQuality@nd.gov or the NDDEQ, Division of Air Quality, 4201 Normandy Street, 2nd Floor, Bismarck, ND 58503-1324. Emailed comments must be sent to the email address above to be considered. Comments must be received by 11:59 p.m. central time on the last day of the public comment period to be considered in the final permit determination.

In accordance with NDAC 33.1-15-14-02, a public information meeting and public hearing regarding issuance of the Air Pollution Control Permit to Construct will be held October 19, 2023, beginning at 5:30 p.m. CDT at the Betty Hagel Memorial Civic Center, 312 Lincoln Ave, Center, ND 58530.

The application, NDDEQ's Air Quality Effects Analysis, NDDEQ's Air Quality Impacts Analysis, and NDDEQ's proposed air pollution control permit are available for review at NDDEQ's office and on-line at http://deq.nd.gov/AQ/PublicCom.aspx. A copy of these documents may be obtained by writing to the Division of Air Quality or contacting David Stroh at (701)328-5229 or by email at destroh@nd.gov.

The NDDEQ will consider every request for reasonable accommodation to provide an accessible meeting facility or other accommodation for people with disabilities, language interpretation for people with limited English proficiency (LEP), and translations of written material necessary to access programs and information. Language assistance services are available free of charge to you. To request accommodations or language assistance, contact the NDDEQ Non-discrimination/EJ Coordinator at 701-328-5150 or deqEJ@nd.gov. TTY users may use Relay North Dakota at 711 or 1-800-366-6888.

Dated this 18th day of September 2023

James L. Semerad
Director
Division of Air Quality

A.2 – Invoice of Publication

North Dakota Newspaper Association

1435 Interstate Loop
Bismarck, North Dakota 58503
Phone: 1-701-223-6397 Fax: 1-701-223-8185

INVOICE

October 16, 2023

Order: **23094ND0** Invoice# **13696**

Attn: **David Stroh** **ND Department of Environmental Quality** **4201 Normandy Street** **Bismarck, North Dakota 58503-1324**	Advertiser: **Division of Air Quality** Brand: Campaign Client Order Number: Amount Due: **$87.74**
Voice: Fax: Email: DEQ-Invoice@nd.gov	

Please detach and return this portion with your payment

Division of Air Quality Invoice# 13696 P.O.#: Client Order Number:

Run Date	*Ad Size*	*Rate Type*	*Rate*	*Color Rate*	*Total*	*Discount*	*(%)*	*Amount after Discount*	*Page*
Center Republican (Hazen, North Dakota)									
09/21/2023	107.00	Notice A Line	$0.82		$87.74	$0.00	(0.00%)	$87.74	
Caption: Notice of Mact Approval and Intent to issue an air pollution									
Subtotal:	**107.00**		**$0.82**	**$0.00**	**$87.74**	**$0.00**		**$87.74**	

Gross Advertising	$87.74	Total Misc	$0.00	Amount Paid	$0.00
Agency Discount	$0.00	Tax	$0.00	Adjustments	$0.00
Other Discount	$0.00	Total Billed	$87.74	Payment Date	
Service Charge	$0.00	Unbilled	$0.00	Balance Due	$87.74

If you'd like to pay your invoice online, go to www.ndna.com/billpay. We accept Visa/Mastercard. A 3% fee will automatically be added to your total. We also accept checks and ACH, with no additional fee added. Contact accounting@ndna.com for ACH information. Thank you!

A.3 – Registration List of Attendees

Public Hearing Sign-in Sheet | DCC East Project LLC ACP-18194 v1.0 | October 19, 2023

Name (please print)	Address	Representing	Check Here to Testify
Shannon Mikula	29 Conklin Ave Grand Forks ND	DCC East Project LLC	
Andy Freidt	1307 Eagles View Place Bismarck ND	Minnkota Power	
Ben Fladhammer	3795 Haleigh Dr. Grand Forks, ND	Minnkota Power	
Chris Benner	2200 3rd Ave NE Beulah	Minnkota/IBEW 1593	✓
David Greeson	600 Country Club, Richmond, TX	Minnkota	
John Manney	PO Box 355 Center ND 58530	Center/Oliver County	
TROY KARLBERG	411 SHADY LANE, BISMARCK, ND 58501	MINNKOTA POWER	
Mike Hager	105 Dakota Ridge Underwood	BNI Coal	
Jaden Schmidt	2207 36th Ave SW Center	Oliver County	
Brita Endrud	1126 157th Ave NE	Minnkota Power	
[illegible]	3704 Bay [illegible]	[illegible]	
Casey Ackerman	856 San Angelo Dr Bis	Minnkota Power	

Public Hearing Sign-in Sheet

DCC East Project LLC
ACP-18194 v1.0

October 19, 2023

Name (please print)	Address	Representing	Check Here to Testify
Darla Potter	4201 Normandy St Bismarck ND	NDDEQ	
Stacey Dahl	6020 E Prairiewood Dr, Grand Forks, ND	Minnkota Power	
Andrew Sorbo	418 Cole Creek Way NE, Thompson ND	Minnkota Power	
Scott Hoffman	2767 SPRINGFIELD ST BISMARCK ND	Minnkota Power	
Jim Semerad	4201 Normandy St. Bismarck	NDDEQ	
Kayla Schultz	1680 45th Ave SW Center	Minnkota Power	
Doug Schultz	7618 Courtland Pl Bismarck ND	BNI Coal	
Tucker Olson	2638 10th Ave SE Mandan	BNI Coal	
Casey Christmann	5219 Cornice Drive Bismarck ND	BNI Coal	
Craig Bleth	5300 CORNICE DR BMK ND	Minnkota	
Cheryl Froelich	3918 Lakewood Dr SE Mandan, ND	BNI Coal	

Public Hearing Sign-in Sheet | DCC East Project LLC ACP-18194 v1.0 | October 19, 2023

Name (please print)	Address	Representing	Check Here to Testify
David Stroh	4201 Normandy St. Bismarck, ND 58503	NDDEQ	
Rana Cardwell	↓	NDDEQ	
Sankalp Kumar	11	11	
Rhannon Thorton	11	NDDEQ	
Jon MADISON	5407 Country Creek Dr. Bis ND 58503	Minnkota Power	
John ElHallal	4007 Oakwood Rock, Katy, TX	TC ENERGY	
Sally Johnson	Minot, ND - Washburn ND	Senator John Hoeven	
Tony Aman	Washburn ND	Minnkota Power	
Tim Hagerott	901 Longhorn drive, Bismarck, ND 58503	Minkota Power	
Adam Undem	P.O. Box 272 Center ND 58530	BNI / IBEW	
Chris Simon	1935 46th Ave SW Hannover	BNI - self	
Darrell Berger	1962 Hwy 48 Center	Co Commissioner	
Cheryl Hanggi	PO Box 2836, Center	~~BNI~~ BNI - IBEW	
~~Russ Keller~~		MINNKOTA	
Joe Boeder	P.O. Box 507 Hazen, ND	IBEW Local 1593	✓
Kevin Thomas	2628 Springfield St Bis	Myself	
Lukas Massetti	4503 Columbus Ct Mandan	BNI	
Doug Bergan	MPC Janitor	Just me	
Kade Kolberg	23159 Hwy 25 Center	BNI	
JASON NELSON	705 14TH ST SE MANDAN	MPC	
Wyatt Echroth	2490 High country Dr N	MPC	

A.4 – Hearing Transcript

DCC Hearing Testimony from 10/19/2023.

Jim Semerad: Good evening, everybody. My name is Jim Semerad. I'm the Director of Air Quality Division for the North Dakota Department of Environmental Quality, and I'll be acting today as the hearing officer for this public hearing. I will now open the public hearing portion of today's meeting at the Memorial Civic Center in Center, North Dakota. Let the record show that the time is approximately 6:16 p.m. on October 19th, 2023. This is the time and place that was scheduled for the public hearing for the DCC East Project, LLC Draft Air Pollution Control Permit to Construct pursuant to North Dakota Century Code Title 23.1 and North Dakota Administrative Code, Chapter 33.1-15-14. Anyone wishing to present verbal testimony on the draft permit to construct will be allowed to speak. Anyone presenting testimony is asked to state their name, their address, and the organization they represent, if any. Also, anyone presenting testimony is required to sign the registration sheet for the record. And I have those up front now. They're not no longer up. The purpose of the hearing is to receive input, such as additional data or viewpoints from interested parties, especially for those who have not or will not have the opportunity to submit written testimony. Both written and oral testimony will be considered equally. It will not be necessary to repeat testimony or comments that have been or will be submitted in writing, or that have been previously submitted during the hearing. I would like to emphasize that this hearing is not a question-and-answer session, and the department will not be responding to comments made during the hearing. However, if there's clarification needed on a proposed permit, we will be listening to your testimony and we'll be happy to provide clarification after the public testimony portion of the hearing has concluded. Also, please remember that the proposed permit only relates to health environmental impacts associated with issuing the permit to construct under the North Dakota Century Code, Title 23.1 and North Dakota Administrative Code chapter 33.1-15-14, relating to air quality controls and emissions. It does not relate to social and economic impacts or compatible land use. Therefore, we ask you to limit your comments to those concerns relating to the proposed air Permit to ensure that all interested parties have the opportunity to provide a comment for the record. Given that there's only two people that have signed up for comments, we likely won't have to impose a five-minute limit on comments that you may have, but we'll track that as time goes on. Otherwise, we'll ask that you limit your comments to five minutes to allow for everybody to give their testimony. Again, my name is Jim Semerad. If the time remains at the end, commenters who request more time may be allowed additional time to provide comments. It is important to note that the comment period remains open through October 21st, 2023, and written comments to be considered as part of the record may be submitted until then. Additional information relating to the proposed DCC East project can be found at the North Dakota Department of Environmental Quality web page at DEQ.nd.gov.

With that, when your name is called, we ask that you please come forward and speak into the microphone to ensure that your comments are recorded for the hearing record. First one is Chris Renner. Chris.

Chris Renner: My name is Chris Renner. Do I have to? My address here. My address is 2200 3rd Avenue Northeast. Beulah, North Dakota. I work for Minnkota Power Cooperative as an electrical instrumentation and controls technician. I am also a unit president of the IBEW 1593 here at Beulah. I personally support Project Tundra, and this is why. We are living in a world in

which we are trying to reduce CO2 emissions. This is the right thing to do, but we have to do it safely and intelligently. We have to be realistic. Milton R Young station is a coal powered thermal energy power plant. This nation's thermal energy sources such as natural gas, nuclear and of course coal, are what we call baseload energy and dispatchable energy sources. They can be turned on or off at will, within reason, and run at 100% output all day, every day. In other words, these thermal energy sources, such as Milton R Young Station are safe, predictable, and reliable. We cannot replace a megawatt of coal energy with a megawatt of intermittent wind energy and expect to keep the lights and heaters on during the cold winter months here in North Dakota and Minnesota. As I write this, I see on the Midcontinent Independent System Operator the Miso grid, that wind is at 2494MW. Last summer I saw the grid at 655MW. Today, as I review this, I see that the wind energy is at 16,679MW. While wind and solar both provide energy on occasion, it provides a roller coaster like swing and actual output due to a reliance on nature itself. Right now, it is a beautiful fall day, and there are only 68,975MW on the Miso grid as a whole. What happens in December and January when we run into a situation where there is no wind, there is over 100,000MW of load and we have eliminated too many baseload coal plants. When the next polar vortex hits, the wind towers will shut themselves down, produce nothing, and use power off the grid to run their onboard electric heaters. However, at this point in time, we still have just enough baseload coal to power the grid through these extreme weather conditions. Probably. This nation's electric utilities have been heavily regulated since at least 1968 by organizations such as the North American Energy Reliability Corporation (NERC) and the Federal Energy Regulatory Commission (FERC). These two organizations work together to provide standards to ensure just and reasonable rates, respond to emergencies or threats to the grid, and to ensure a safe and reliable electric grid. This is particularly important up here in the northern states during the winter months. As we shudder, more and more thermal energy sources such as coal, the production of electricity becomes much less stable. Due to the loss of dispatchable energy, we lose reliability. The price of energy fluctuates like a roller coaster, and we run into the threat of blackouts and brownouts in a region. To me, as far as reliability goes, this transition from thermal energy sources to renewables is going in the opposite direction of the reliable grid that NERC and FERC envision. There is nothing just in transitioning from reliable energy to potential blackouts and brownouts. It seems like we are going in a dangerous direction. I have seen several electric utilities promised to shutter their coal plants down for good, in favor of replacing them with solar. I have seen other utilities promise to shut down their coal in favor of wind energy. We need dispatchable energy, and we cannot afford to lose more than we have already lost. We can turn our thermal energy sources on at will, and we can control the output in a coal fired plant with a nameplate rating of, say, 700MW. We can expect 700MW out of that plant between 92 and 95% of the year, all day, every day. With wind and solar, we are stuck with what nature tells us we get. A 700-megawatt wind or solar plant may, on rare occasions, put out 700MW, but how often can one rely on that? Like I said earlier, the entire Miso grid may provide 655MW, or it may be 17,000MW. That is a very substantial swing. We need reliability on the grid and Milton R Young station, provides that.

It seems that as these utilities shutter their thermal plants and replace them with green energy, they are expecting or hoping to buy energy from their neighboring utilities when they run into shortfalls of energy of their own. The problem lies in the fact that their neighbors are also planning on shuttering their coal in favor of wind and solar. The question is, who is going to be responsible for the blackouts and brownouts in the ice-cold Midwest when we run out of wind

and solar? Are the utilities themselves going to be held accountable? Are the politicians that help force their hand into closing their thermal energy sources going to be held accountable? Are the banks that refuse to give loans to coal companies going to be held accountable? You know, you may hear arguments that battery banks are the future, but why would we want to spend the money, time, and resources on batteries at this point when we do not produce enough green energy to provide the grid, let alone power the grid and charge a giant battery bank? What we need is reliability in energy production. The coal industry is required by regulation to maintain a stockpile of at least two weeks of fuel stockpiled in the event of a disruption in fuel supply. I don't know how many battery banks or the size of these battery banks we would need to power the grid for two weeks during the winter, when the daily grid demand is over 100,000MW.

Another argument you may hear in opposition to Project Tundra is that coal is expensive. In a way it is, I suppose, but there are many factors that make it so. One of the major contributing factors in the price of coal is the fact that coal is forced to reduce load or shut down completely when the wind is blowing, or the sun is shining. This causes a loss of income in the coal sector. Imagine if Napa Auto Parts were banned from selling their goods unless Rock auto could not keep up with demand. Napa would have no choice but raise their prices or just go under. I have seen some people call Project Tundra a waste of money. How can anyone truly consider investing in clean, reliable energy a waste of money? Again, reliability is key. Doing nothing to preserve our baseload and dispatchable power sources means a future of blackouts and brownouts due to intermittent energy sources. Doing nothing is a danger to everyone that relies on the grid. Sometimes innovation and reliability are expensive, but necessary. In fact, the EPA administrator, Michael Regan himself sees huge potential for carbon capture here in North Dakota. Minnkota also spends countless dollars and hours working to meet and exceed all governmental safety, reliability, and environmental regulations. I have heard people call the coal industry names such as Dirty coal, Obsolete Coal, Killer coal, and I have heard the same people call the industry as a whole, greedy coal. You know, I don't know if we can classify modern cooperatives like Minnkota greedy when we spend so much time and revenue working to eliminate our emissions and safeguard our environment. On a separate note, I have seen state governments promise to abolish the sales of gas cars in favor of electric cars. As a nation, we are looking at adding countless megawatts of load to our already strained grid. We need to keep our powerful and reliable sources of baseload and ready to dispatchable thermal utilities such as Milton R Young station operating if we want to keep the furnaces running when it is 20 below outside. From the day I first started work at Minnkota, Minnkota has already worked hard and spared no expense to meet and exceed all rules of law, as well as all safety and environmental regulations. There is no doubt in my mind that Minnkota will work very hard to meet and exceed all safety regulations and standards to make tundra a safe, successful, and innovative project. So, with Project Tundra, we will be eliminating many tons of CO2 from entering the atmosphere while providing the safe, stable and reliable grid that the member owners and users and our many regulatory agencies demand. Tundra is a great solution for a climate issue. It is my hope that Minnkota may one day become not only a producer of reliable energy that it already is, but also a producer of energy with zero carbon emissions or perhaps a negative carbon producer, meaning we eliminate more carbon from the atmosphere than we actually create.

Thank you.

Jim Semerad: Thank you, Chris. Next is Joe.

Joe Roeder: Hi, my name is Joe Roeder. I'm a representative of the International Brotherhood of Electrical Workers Local Union 1593. We represent over a thousand members in the western part of the state here in this community. The industries we represent are mostly coal based, but we also have gas, Dakota Gas. We also have a wind farm by Max North Dakota and a nursing home in Beulah. Uh, we represent the workers at Milton R Young station in the adjacent coal mine of BNI Coal. We're here today to pledge our support for this project. We believe that Minnkota has done their due diligence, and we believe this project is a safe and efficient project that can be developed. And we would urge you to pass this air permit in their favor. We believe it'll bring a lot of economic benefit to this community and to all the workers that are represented here. That's all I have to say. Thank you.

Jim Semerad: That's all I see that signed up to testify. Is there anybody else who would like to testify?

Last call on testifying. Okay. Again, we want to say thank you all for coming. All information gathered at this hearing will be provided to the Department of Environmental Quality, which is the decision-making body. The record will be held open for written comments through October 21st, 2023. And at this time, I close the hearing on the Department of Environmental Quality's Draft Air Pollution Control Permit to Construct for the DCC East project. The hearing is closed at 6:33 p.m. Thank you all.

A.5 – Comments Received During the Public Comment Period

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
Denver, CO 80202-1129
Phone 800-227-8917
www.epa.gov/region8

Ref: 8ARD-PM

David Stroh
North Dakota Department of Environmental Quality, Division of Air Quality
4201 Normandy Street, 2nd Fl
Bismark, ND 58503-1324

Re: EPA Comments to Dakota Carbon Center East Project LLC, Permit to Construct

Dear David Stroh:

This letter is in response to the North Dakota Department of Environmental Quality's (NDDEQ) public notice of the draft permit to construct for the Dakota Carbon Center East Project LLC (DCC). The NDDEQ's public comment period for this permit ends October 21st, 2023.

After reviewing the draft permit to construct, EPA submits the following comments. As explained in more detail below, these technical comments are related to source aggregation, incorporation by reference, monitoring, recordkeeping, reporting requirements, modeling found in the permit and corresponding air quality effects analysis, and Clean Air Act (CAA) Section 112(g).

Comments Related to Aggregation

The DCC Air Quality Effects Analysis (AQEA) discusses the potential of aggregating the DCC facility with the existing Milton R. Young (MRY) Station coal-fired power plant. DCC is located next to the existing MRY facility. DCC will capture, purify, and sequester up to 13,000 tons per day of CO_2 from MRY's boilers (MRY Unit 1, MRY Unit 2). The AQEA states:

> *DCC's Project will be considered a separate stationary source from the MRY Station for the purposes of the applicable air pollution control rules (40 CFR Part 63 and 40 CFR Part 70). Part 63 requires two criteria to be met for two (or more) sources to be considered a single major source, the sources must be "located within a contiguous area and under common control". Part 70 contains the same first two criteria and adds a third criteria, that sources must belong to the same major industrial grouping. DCC will be responsible for operational control of the Project, including control over air emitting activities that affect permit compliance (i.e., not under common control), and the owner of MRY Station will not hold a majority ownership in DCC. DCC's Project has standard industrial classification (SIC) code 2813 compared to MRY Station SIC code of 4911 (i.e., do not belong to the same industrial grouping). DCC will be adjacent to MRY Station, so the facilities will be located within a continuous area. Of the Part 63 and Part*

> *70 criteria the Project only meets one of the necessary criteria; therefore, the Project is considered a separate source.*
>
> AQEA at page 1

Region 8 has reviewed the NDDEQ's discussion of the DCC project source determination and has concerns about the record of support for the decision that the DCC project and MRY facility should be considered separate facilities. The NDDEQ's analysis is correct in that both 40 CFR part 70 and 40 CFR part 63 have separate definitions of what constitutes a major source for each regulation and that if the case-specific facts support that only one of the necessary criteria in either definition is met then the two sources in question should be considered separate stationary sources for the purposes of those regulations. However, as laid out in the following discussions, the EPA recommends enhancement of the permit record to support the NDDEQ's conclusions.

The draft permit action available for EPA review and for public comment is a permit to construct. Therefore, the EPA believes the NDDEQ should first determine whether these two entities should be considered part of the same "stationary source" under the New Source Review (NSR) preconstruction permit programs under title I of the CAA. This determination will dictate whether or not the project requires a permit to construct a minor or major new source or a minor or major "modification" to an existing source. That exercise will inform whether the facilities are considered part of the same "major source" under title V and part 63 of the CAA and any required application of those programs.

Under the federal rules governing both the NSR and title V permitting programs, entities may be considered part of the same "stationary source" or "major source" if they (1) belong to the same industrial grouping: (2) are located on one or more contiguous or adjacent properties: and (3) are under the control of the same person (or persons under common control).

The NDDEQ's AQEA indicates that the DCC and MRY facilities are located on contiguous and adjacent properties. On the question of common control, NDDEQ has described DCC and MRY as having separate controlling entities. EPA has long determined that establishing the relationship for common control is done on a case-by-case basis. The 2018 Meadowbrook source determination[1] states:

> *For the reasons discussed further in the Attachment, the agency believes clarity and consistency can be restored to source determinations if the assessment of "control" for title V and NSR permitting purposes focuses on the power or authority of one entity to dictate decisions of the other that could affect the applicability of, or compliance with, relevant air pollution regulatory requirements.*
>
> Meadowbrook at page 2.

A review of available information on the internet indicates that MRY is directly owned by Minnkota Power Cooperative.[2] Further, the same Minnkota Power Cooperative website contains links to "Project Tundra".[3] Project Tundra would "retrofit the Milton R. Young Station with CO_2 capture technology" and "Final air permits are being pursued and are anticipated in 2023".

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[1] https://www.epa.gov/sites/default/files/2018-05/documents/meadowbrook_2018.pdf, accessed October 16, 2023
[2] https://www.minnkota.com/minnkota-website/our-power/coal, accessed October 16, 2023.
[3] https://www.projecttundrand.com/about, accessed October 16, 2023.

Further, the June 2, 2023 permit application refers to the proposed project as Project Tundra. This information may suggest the that the Minnkota Power Cooperative has control over both the MRY and DCC projects. The EPA recommends that the NDDEQ enhance the permit record with additional information supporting the conclusion that a common control relationship does not exist between the DCC and MRY facilities.

The third source determination criteria is whether both facilities belong within the same industrial grouping, commonly indicated by Standard Industrial Classification (SIC) code. The NDDEQ states that DCC has the SIC code of 2813 and MRY has the SIC code of 4911. The preamble to the 1980 PSD rule discussed the EPA's view on how to evaluate what SIC code applies to facilities that support the operation of a primary facility. The preamble[4] to the rule, discusses that "each source is to be classified according to its primary activity, which is determined by its principal product or group of products produced or distributed, or services rendered. Thus, one source classification encompasses both primary and support facilities, even when the latter includes units with a different two-digit SIC code. Support facilities are typically those which convey, store, or otherwise assist in the production of the principal product."

The AQEA states:

> *The Project will be located adjacent to the existing Milton R. Young (MRY) Station and is designed to capture, purify, and sequester up to 13,000 tons per day (~4.75 million tons per year) of CO_2 from MRY Station's coal-fired boilers (MRY Unit 1 and MRY Unit 2).*

The EPA recommends that the NDDEQ include additional information in the permit record to support the conclusion that a support facility relationship does not exist between the DCC project and MRY. Recommended details to consider or clarify in supplementing the permit record on the appropriate industrial classification for DCC includes the role of DCC and its principal product produced or distributed (if any), or services rendered, and the source of power to operate DCC.

If upon additional review, the NDDEQ determines that that the MRY and DCC facilities should be aggregated as one source under the CAA Title I permitting programs, (and by extension 40 CFR Part 63 and 40 CFR Part 70) then the EPA recommends the NDDEQ modify the permit and supporting documentation according to the North Dakota State Implementation Plan.

Comments Related to Incorporation by Reference

Incorporation by reference into permits is an allowable way for permitting authorities to cite requirements applicable to permitted sources. One of the earliest documents recognizing the utility of this process was the March 5, 1996, *White Paper Number 2 for Improved Implementation of The Part 70 Operating Permits Program* (*White Paper 2*).[5] This document states:

> *Citations, cross references, and incorporations by reference must be detailed enough that the manner in which any referenced material applies to a facility is clear and is not*

[4] 45 FR at 52694

[5] https://www.epa.gov/sites/default/files/2015-08/documents/wtppr-2.pdf, accessed October 16, 2023, accessed October 16, 2023.

> *reasonably subject to misinterpretation. Where only a portion of the referenced document applies, applications and permits must specify the relevant section of the document. Any information cited, cross referenced, or incorporated by reference must be accompanied by a description or identification of the current activities, requirements, or equipment for which the information is referenced.*

White Paper 2 at 37. Further, the EPA stated:

> *Incorporation by reference in permits may be appropriate and useful under several circumstances. Appropriate use of incorporation by reference in permits includes referencing of test method procedures, inspection and maintenance plans, and calculation methods for determining compliance. One of the key objectives Congress hoped to achieve in creating title V, however, was the issuance of comprehensive permits that clarify how sources must comply with applicable requirements. Permitting authorities should therefore balance the streamlining benefits achieved through use of incorporation by reference with the need to issue comprehensive, unambiguous permits useful to all affected parties, including those engaged in field inspections.*

White Paper 2 at 38.

The EPA has also addressed the subject of incorporation by reference more recently in Administrative Orders for title V operating permit Petitions to Object. The March 18, 2022, Exxon Baytown Order[6] and the March 10, 2020 Waha Gas Plant Order[7] both address the issue and cite to *White Paper 2* as the basis for establishing the appropriate methodologies in the correct us of incorporation by reference.

In the DCC permit to construct there are instances were only a portion of the referenced applicable requirement applies and the permit does not specify that portion. Condition II.C.1 of the draft permit incorporates by reference 40 CFR Part 60 Subpart IIII. While Condition II.C.1 does not state which emission unit at the proposed facility is subject to the cited Subpart, the table above Condition II.C.1 does indicate the that the emergency diesel fire pump engine is subject to the Subpart. However, neither Condition II.C.1 nor the table provide enough information for the reader to determine which emission limit and associated monitoring, recordkeeping and reporting applies to the emission unit. The level of incorporation by reference used in the draft permit is insufficient for the applicant and public to determine what standard applies to the unit and how the source is to achieve compliance with that standard.

In addition, Condition II.D.1 incorporates by reference 40 CFR Part 63 Subpart ZZZZ. Unlike the previous Condition, this Condition does not have any associated Table stating which unit the standard applies to, nor does the Condition itself state which emission unit is subject to the standard. It is up to the reader of the permit to assume it is the emergency diesel fire pump engine, and similar to Condition II.C.1, there is no information available in the permit to determine which of the Subpart ZZZZ standards, monitoring, recordkeeping or reporting apply.

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[6] https://www.epa.gov/system/files/documents/2022-02/etc-waha-order_1-28-22.pdf, accessed October 16, 2023.
[7] https://www.epa.gov/system/files/documents/2022-02/etc-waha-order_1-28-22.pdf, accessed October 16, 2023.

This level of incorporation by reference is similarly insufficient for the applicant and public to determine which standard applies and what are the associated compliance requirements.

EPA recommends that the NDDEQ revises the draft permit to construct to include which portions of the associated regulations apply to each permit condition and to clearly state the standard or associated limit and compliance requirements. The references should be unambiguous and useful to all affected parties.

Comments Related to the Ambient Air Boundary used in Modeling

Appendix 2 of the AQEA document supplied in the record discusses the air dispersion modeling done to demonstrate compliance with the North Dakota Ambient Air Quality Standards. As a part of this document, the applicant included site layout maps and maps expressing a visual representation of the established air dispersion modeling receptor grid.

These maps contain the ambient air boundary for the MRY facility. The EPA defines ambient air within 40 CFR 50.1(e) as "that portion of the atmosphere, external to buildings, to which the general public has access". The EPA has long followed a policy that allows for the exclusion of certain areas, outside of a building, from ambient air. As described in a 1980 letter from then-Administrator Douglas Costle to Senator Jennings Randolf, this "exemption from ambient air is available only for the atmosphere over land owned or controlled by the source and to which the public is precluded". The December 2019 *Revised Policies on Exclusions from "Ambient Air"*[8] continues to support that concept of exclusions from ambient air and establishes what requirements are needed to demonstrate that the public is precluded.

Figure A-1 in Appendix 2 of the AQIA establishes what appears to be an ambient air boundary for the facility that is used to delineate where the air dispersion modeling receptor grid is located. This receptor grid is shown in Figure A-4 and excludes the area inside the defined ambient air boundary.

However, in the permit's June 2, 2023 application, in Figure 2-1, the larger ambient air boundary contains a smaller defined area labeled as the DCC Separation and Purification Plant and locates the MRY facility's Unit 1 and Unit 2 in relationship to the DCC facility. The larger ambient air boundary area used in the air dispersion modeling process to establish the modeling receptor grid appears to be the MRY ambient air boundary and the DCC ambient air boundary, according to Figure 2-1 appears to be a smaller area located within the MRY boundary. As it contains MRY Unit 1 and Unit 2, this would appear to be the MRY ambient air boundary.

The EPA provided guidance for the treatment of ambient air in a June 22, 2007 memorandum to the Regional Air Division Directors.[9] With respect to a particular source, EPA's practice has been to exempt an area from ambient air when the source (1) owns or controls the land or

[8] https://www.epa.gov/sites/default/files/2019-12/documents/revised_policy_on_exclusions_from_ambient_air.pdf, accessed October 16, 2023.

[9] *Interpretation of "Ambient Air" In Situations Involving Leased Land Under the Regulations for Prevention of Significant Deterioration (PSD)*, June 22, 2007, available at https://www.epa.gov/sites/default/files/2015-07/documents/leaseair.pdf, accessed October 16, 2023.

property; and (2) precludes public access to the land or property using a fence or other effective barrier. As discussed above within the aggregation section, the permit states that DCC and MRY are separate facilities and are not under common control. However, for the purposes of modeling, areas are exempted because they are owned or controlled by the same party. Both scenarios are unlikely to be both simultaneously true. The EPA also discussed situations where a lessor/lessee situation exists and one facility is nested within the ambient air boundary established by the other in the June 22, 2007 guidance. This discussion may be useful in determining the extent and location of ambient air for the DCC project.

EPA recommends that the NDDEQ review the cited documents and confirm that the ambient air boundary and associated receptor grid used in the air dispersion modeling for the DCC project is accurate based on definitions of ambient air and the boundary that DCC establishes. If that boundary is different than the one used to define the model's receptor grid, the EPA recommends that the NDDEQ or the applicant rerun the model to determine no NAAQS concerns exist.

Comments Related to CAA Section 112(g)

The EPA has concerns with the CAA section 112(g) case-by-case maximum achievable control technology (MACT) analysis for hazardous air pollutants (HAPs) in the permit application, particularly regarding the use of acetaldehyde as a surrogate pollutant for all organic HAPs. The DCC permit also has emissions testing for acetaldehyde only, and asserts it is a suitable surrogate for all HAPs. In a MACT analysis, a surrogate is allowed when the control of the surrogate indicates a similar or identical control of the other pollutants. In this case, acetaldehyde and amines (including nitrosamines) exhibit different behaviors under different control scenarios. The effectiveness of controls for amine HAPs should therefore be evaluated separately from the effectiveness of controls for aldehyde HAPs (acetaldehyde and formaldehyde). The EPA recommends that the NDDEQ address this deficiency in the MACT analysis.

Conclusion

We are committed to working with the NDDEQ to ensure that the final Permit to Construct is consistent with all applicable EPA-approved North Dakota state implementation plan requirements.

If you have questions or wish to discuss this further, please contact me, or your staff can contact Donald Law at (303) 312-7015 or law.donald@epa.gov.

Sincerely,

Recoverable Signature

X Adrienne Sandoval

Signed by: Environmental Protection Agency

Adrienne Sandoval
Director
Air and Radiation Division

A.5.i – DCC East Project LLC Response to Comments

DCC EAST PROJECT LLC

5301 32nd Ave. South
Grand Forks, ND 58201
Phone 701.795.4000

November 16, 2023

Jim Semerad, Director, Division of Air Quality
David Stroh, Environmental Engineer
North Dakota Department of Environmental Quality
4201 Normandy Street, 2nd Floor
Bismarck, ND 58503-1324

Re: Application of DCC East Project LLC for Permit to Construct No. ACP-18194 for Dakota Carbon Center CO_2 Separation and Purification Plant

Dear Mr. Semerad and Mr. Stroh:

Please accept this letter as a further supplement to the record for the application of DCC East Project LLC (DCC East) for Permit to Construct No. ACP-18194 for the Dakota Carbon Center CO_2 Separation and Purification Plant (the DCC Facility) in Oliver County, North Dakota. This letter responds to the comments received from EPA Region 8 on the Draft Permit to Construct. DCC East does not intend to waive confidentiality privilege for the underlying agreements discussed in this response letter that contain trade secret-business proprietary information under NDCC 44-04-18.4(1) and confidential business information under 40 CFR Part 2. DCC East offers the following discussion of agreements to further supplement the record subject to confidentiality treatment of the agreements.

Comments related to Aggregation

DCC East Response: In its comments, EPA Region 8 recommended that NDDEQ include additional information in the permit record to support the separate source determination that NDDEQ made for the DCC Facility under the New Source Review (NSR) preconstruction permitting program. As correctly noted by EPA Region 8, NDDEQ found the existing Milton R. Young (MRY) Station and the proposed DCC Facility to be separate sources based on its determinations that (1) the two facilities are not under the control of the same person (or persons under common control) and (2) the two facilities do not belong to the same industrial grouping (and one entity is not support facility for the other). NDDEQ summarized its review of the application in the Air Quality Effects Analysis (AQEA) stating that:

> *DCC will be responsible for operational control of the Project, including control over air emitting activities that affect permit compliance (i.e., not under common control), and the owner of MRY Station will not hold a majority ownership in DCC.*

DCC's Project has standard industrial classification (SIC) code 2813 compared to MRY Station SIC code of 4911 (i.e., do not belong to the same industrial grouping).

Based on these findings, NDDEQ concluded that two of the three criteria that are necessary to find that the two facilities are located at the same stationary source are absent and therefore aggregation would not be appropriate. DCC East supports NDDEQ's conclusion and provides the following additional responsive information to support the permit record.

Common Control. The MRY Station and the proposed DCC Facility are not under the control of the same person or persons under common control. In its April 30, 2018 *Meadowbrook* determination, EPA established that the focus of the common control analysis is on whether one entity has power or authority to dictate decisions over any aspect of another entity's operations that could affect the applicability of, or compliance with, permitting requirements.[1] Neither owner of the electric generating units at the MRY Station will have such power or authority over the proposed DCC Facility.

First, the MRY Station and the proposed DCC Facility are not owned by the same person. The MRY Station consists of a two-unit electric generation plant, Unit 1 owned by Minnkota Power Cooperative, Inc. (Minnkota), and Unit 2, owned by Square Butte Cooperative (Square Butte). Minnkota operates both units at the MRY Station. In contrast, the proposed DCC Facility will be owned and operated by a separate legal entity named DCC East.

Second, the MRY Station and proposed DCC Facility are not owned by persons under common control. If one person owns a majority interest in two facilities, or the persons owning the two facilities, then it may be possible for a reviewing agency to presume that the two facilities or persons are under common control.[2] But that is not the case here. Neither Minnkota nor Square Butte will own a majority interest in the DCC Facility or DCC East. Instead, a majority interest in both the DCC Facility and DCC East will be owned by an unrelated third party or third parties, including TC Energy Carbon Capture LLC, which is a subsidiary of TC Energy Corporation.

The DCC Facility is being developed pursuant to the terms of commercial agreements, including a Joint Development Agreement (JDA), dated June 23, 2023, between Minnkota and TC

[1] EPA Letter: William L. Wehrum, Assistant Administrator, Office of Air and Radiation, U.S. Environmental Protection Agency, to the Honorable Patrick McDonnell, Secretary, Pennsylvania Department of Environmental Protection (April 30, 2018) (hereinafter "*Meadowbrook* Letter").

[2] EPA Region 8 has found that two wholly or majority-owned subsidiaries are "persons under common control" and thus meet that criterion for source determinations. EPA stated that it expects that common ownership inherently involves the parent company's ability to dictate, at a certain level, a substantial portion of the activities of its subsidiaries in a manner that could impact compliance with, or the applicability of, air permitting requirements. Thus, based on the principles outlined in the Meadowbrook and Ameresco letters, common ownership is a sufficient basis for determining that multiple entities are "persons under common control…given that common ownership inherently involves a significant amount of control, the EPA thinks it would be reasonable for permitting authorities to rely on the existence of common ownership when determining entities are "persons under common control" rather than undertaking a more detailed analysis." EPA Region 8, *Single Source Determination for Jaques Compressor Station,* (2019).

Energy Carbon Capture LLC (TC Energy CC).[3] These agreements provide for TC Energy CC's majority ownership share of the DCC Facility through its equity interest in DCC East. Accordingly, the owner of one unit at the MRY Station, Minnkota, will at most own a minority interest in the proposed DCC Facility and DCC East. Given this project development structure, the two facilities are not owned by persons under common control.

EPA Region 8 included in its comment letter references to "Project Tundra" on Minnkota's website to suggest that Minnkota has control over both the MRY Station and the DCC Facility. Information contained on the website does not alter the structure reflected in the recently executed commercial agreements. Rather, the Project Tundra website reflects Minnkota's historical role as a project sponsor to lead the development and advancement of CCS technology in the electric generation industry. Minnkota has been promoting Project Tundra since 2015, first acting as host site for carbon capture research and geologic sequestration characterization efforts under many federal and state funded research programs. However, a CO_2 gas separation plant of the economic and financing scale and requirements such as this cannot be constructed and operated primarily by Minnkota. Minnkota has been transparent throughout Project Tundra's development by clearly communicating to its members, the community, and stakeholders that Minnkota cannot and will not be a majority owner of the proposed DCC Facility. Through project financing, equity, and debt investment, Minnkota will own no more than a minority interest, as is confirmed by the June 28, 2023 press release on that website, announcing the foregoing commercial agreements with TC Energy, among others, to move "Project Tundra into its final stage of project development."

Finally, neither Minnkota nor Square Butte will have the power or authority to dictate decisions over any aspect of the DCC Facility's operations that could affect the applicability of, or compliance with, permitting requirements.[4] The DCC Facility will be operated and managed by DCC East, as confirmed by the commercial agreements between Minnkota and TC Energy CC, including the JDA and a separate Flue Gas Supply Agreement (FGSA), dated June 23, 2023.[5] These agreements also confirm that DCC East holds all environmental responsibility and liabilities, including the obligation to obtain permits and authorizations under and comply with all environmental requirements for the emissions generated by proposed DCC Facility. Contractual provisions such as these further highlight the absence of any common power or authority over the facilities relevant to the common control test articulated by EPA in the *Meadowbrook* letter.

Same Industrial Grouping. EPA Region 8 recommended providing additional details for the permit record regarding the role of DCC East and its principal product produced or distributed (if any) or services rendered, and the source of power to operate the DCC Facility. NDDEQ's

[3] DCC East identifies and provides information from confidential commercial agreements for the limited purposes of supporting the permit record. DCC East does not intend to waive any claim to confidentiality for the referenced agreements that contain trade secret-business proprietary information under NDCC 44-04-18.4(1) and confidential business information under 40 CFR Part 2.

[4] *Meadowbrook* Letter.

[5] DCC East identifies and provides information from confidential commercial agreements for the limited purposes of supporting the permit record. DCC East does not intend to waive any claim to confidentiality for the referenced agreements that contain trade secret-business proprietary information under NDCC 44-04-18.4(1) and confidential business information under 40 CFR Part 2.

permit record correctly documents the industrial grouping for MRY as 4911 (Electric Services) and for the proposed DCC Facility as 2813 (Industrial Gases). The operations of the MRY Station and the DCC Facility are classified under different two-digit SIC codes, and therefore this source determination criterion is also not met. As noted in EPA Region 8 comments, EPA has stated in guidance that one source classification may encompass both primary and support facilities, even when the latter includes units with a different two-digit SIC code: "[s]upport facilities" that "convey, store, or otherwise assist in the production of the principal product or group of products produced or distributed, or services rendered" should be considered under one source classification.[6]

In this case, no such support facility relationship exists because the facilities produce different principal products. Minnkota exists for the sole purpose of meeting the electricity needs of rural member cooperatives in eastern North Dakota and northwestern Minnesota. The MRY Station is part of Minnkota's portfolio of generation assets that have and will continue to be used to provide electricity in Minnkota's service area. The operation of the MRY Station will not be dependent on or supported by the construction and operation of the DCC Facility. The primary product of the MRY Station is electricity, and MRY will continue to provide this electrical product irrespective of the DCC Facility.

In contrast, the principal product of the DCC Facility is a concentrated CO_2 gas stream.. The concentrated CO_2 gas will be sequestered to generate tax credits for the benefit of the owners of DCC East. The DCC Facility will manufacture the CO_2 product from flue gas that is fully authorized to be emitted to the atmosphere from the MRY Station. The proposed DCC Facility will be powered by electricity from Minnkota via an arms-length contractual arrangement.

The relationship of the MRY Station and the DCC Facility is similar to the relationship of Red Cedar Gathering Company's Arkansas Loop and Simpson Treating Plant and a proposed carbon capture facility evaluated by EPA Region 8 in its August 24, 2023 determination. EPA Region 8 concluded there that "the facts do not establish a support relationship of the proposed new CO_2 Plant to the Arkansas Loop and Simpson Treating Plants." In *Red Cedar*, EPA Region 8 noted that the permit for the treating plants did not prohibit venting of waste CO_2 gas, stating "[i]n that sense, while an environmental benefit, in taking the waste CO_2 gas from the treating plants to make a secondary product, the CO_2 Plant would not convey, store, or otherwise assist in the production of the principal product for the treating plants." Here, the MRY Station air permit does not prohibit venting of the MRY Station flue gas, and in taking the CO_2 from MRY Station to make a product, DCC would not be conveying, storing, or assisting in the production of the "principal product" for MRY Station. EPA Region 8 also emphasized the established nature of Red Cedar, highlighting that if the carbon capture facility is not built, Red Cedar would continue operating as it has for years. EPA Region 8 stated that "[e]xisting EPA policy…does not reasonably support consideration of an existing source long established with a primary activity that supplies a waste gas from that activity to be considered a support facility of a proposed new source." Likewise,

[6] Requirements for Preparation, Adoption, and Submittal of Implementation Plans; Approval and Promulgation of Implementation Plans, 45 Fed. Reg. 52,676, 52,695 (August 7, 1980).

MRY Station went into service decades ago, and MRY Station will continue to operate, even if the DCC Facility is not built. No support facility relationship exists between MRY Station and the DCC Facility based on these facts and Region 8 precedent.

Facility Emissions. EPA Region 8 also stated in its comments with respect to aggregation that "[t]his determination will dictate whether or not the project requires a permit to construct a minor or major new source or a minor or major 'modification' to an existing source." That consequence is not accurate in this case. Even if the DCC Facility had been improperly evaluated under NSR permitting program as a modification to the MRY Station, only a minor modification permit would have been required. The DCC Facility potential to emit for each regulated NSR pollutant does not equal or exceed the significant amount for that pollutant under the modification thresholds found at 40 CFR § 52.21(b)(23).

Conclusion. NDDEQ properly determined the MRY Station and the proposed DCC Facility to be separate sources for NSR permitting purposes based on the information in the record.

Comment: Ambient air boundary

DCC Response: In its comments, EPA Region 8 recommended that NDDEQ review the cited documents and confirm that the ambient air boundary and associated receptor grid used in the air dispersion modeling for the DCC Facility for accuracy. If that boundary is different than the one used to define the model's receptor grid, then EPA recommended that the NDDEQ or the applicant rerun the model to confirm that no NAAQS concerns exist.

The permit record confirms that the use of the property boundary of the MRY Station as the ambient air boundary is appropriate. EPA defines "ambient air" as "that portion of the atmosphere, external to buildings, to which the general public has access."[7] Applying this definition, EPA has stated "that portion of the atmosphere over land owned or controlled by the stationary source may be excluded where the source employs measures, which may include physical barriers, that are effective in precluding access to the land by the general public."[8]

Minnkota maintains a fenced physical barrier preventing unauthorized entry of the public into the MRY Station. DCC East used the fenced MRY Station property boundary in its modeling demonstrations. The fenced barrier will remain after the start-up of the DCC Facility. The proposed operation plan for the DCC Facility consists of use of the existing MRY Station security gate for designated access across Minnkota property to the DCC Facility secured site. The DCC Facility will be located on leased property, adjacent to the MRY Station, and will be considered "nested" within the footprint of Minnkota's access restrictions. The MRY Station is a critical infrastructure site and requires strict adherence to security protocols to mitigate access risk. As

[7] 40 CFR 50.1(c).
[8] EPA Memorandum: Andrew R. Wheeler, U.S. Environmental Protection Agency, to Regional Administrators, regarding Revised Policy on Exclusion from "Ambient Air" (December 2, 2019).

such, authorized employees and contractors of the DCC Facility will be required to comply with security and access requirements of the MRY Station and invitee practices and policies.

Given the physical barrier and access control of Minnkota for the MRY Station, there is no access of the general public. Moreover, even the parcel leased to DCC East is not ambient air to Minnkota as lessor for the evaluation of MRY Station emissions. EPA has acknowledged that ambient air over land that a lessor owns and leases to a lessee is not ambient air to the lessor:

> *When two (or more) companies operate separate sources on property owned by one company and leased in part to the other, and the lessor retains control over public access to the entire property and actually maintains a physical barrier around it to preclude public access – the air over the entire property (including the leased portion) is not ambient air to the lessor.*[9]

For this reason, the DCC East leased parcel is not ambient air for any evaluation of the emissions from the MRY Station. This is true both for the direct emissions from MRY Station and the indirect, pass-through flue gas that will exit the new absorber stack following processing in the proposed DCC Facility. The FGSA confirms that title to the flue gas from the MRY Station will remain in the name of the MRY owners when the flue gas is emitted from the absorber stack.[10] Consequently, the modeling of the impacts of the pass-through emissions from the Station may use the MRY Station boundary as the ambient air boundary for NAAQS modeling. While the DCC Facility will also emit pollutants that are not considered pass-through emissions, the modeled impacts of those pollutants are not expected to be materially affected by a change in the ambient air boundary, given that they represent such a small percentage of emission rates modeled.

Comment: Case-by-Case MACT

DCC Response: EPA Region 8 noted that a surrogate is allowed when the control of the surrogate indicates a similar or identical control of the other pollutants. In this case, EPA Region 8 commented that acetaldehyde and amines may exhibit different behaviors under different control scenarios, and that the effectiveness of controls for amine hazardous air pollutants (HAPs) should therefore be evaluated separately from the effectiveness of controls for aldehyde HAPs.

As described in section 7.1 of the Case-by-Case MACT Analysis, aldehydes, including acetaldehyde and formaldehyde, are expected to make up a large majority of the HAP emissions from the carbon absorber column, accounting for more than 98 percent of all HAP emissions (MACT Analysis, Table 2-1). The remaining HAP constituents, accounting for approximately 2

[9] EPA Memorandum: Stephen D. Page, Director, Office of Air Planning & Standards, U.S. Environmental Protection Agency, to Regional Air Division Directors (June 22, 2007).

[10] DCC East identifies and provides information from confidential commercial agreements for the limited purposes of supporting the permit record. DCC East does not intend to waive any claim to confidentiality for the referenced agreements that contain trade secret-business proprietary information under NDCC 44-04-18.4(1) and confidential business information under 40 CFR Part 2.

percent of total HAP emissions, are generally classified as amines. An amine is a derivative of ammonia in which one, two, or all three hydrogen atoms are replaced by hydrocarbon groups.

Control systems and technologies available to reduce HAP emissions from the carbon absorber column were evaluated in the MACT Analysis for their ability to reduce HAP formation in the absorption process and to control HAP emissions at the CO_2 absorber column exhaust stacks. Potentially available controls included:

- Process and Design Modifications
  - Absorber Intermediate Cooling
  - Materials of Construction
- Post-Absorber Column Controls
  - Thermal and Catalytic Oxidation
  - Water Wash
    - Acid Wash

Each control option was evaluated for technical feasibility, effectiveness, and applicability to the carbon absorber column. The MACT Analysis included an assessment of the formation mechanisms for both amine and aldehyde HAPs, as well as the technical feasibility and effectiveness of post-absorber controls with respect to both amine and aldehyde HAP emissions. The MACT Analysis concluded that process design upgrades, including absorber column intermediate cooling systems, upgraded materials of construction, and pre-absorber column pollution control systems, would reduce the formation of both amine and aldehyde HAPs.

Process Controls and Design Upgrades. As described in Section 7.2.1 of the MACT Analysis, the solvent used for CO_2 capture is separated from the CO_2-rich solvent in the stripper column and recycled for reuse in the capture process. Emissions from the absorber column generally consist of liquid entrainment (*i.e.,* solvent carryover), aerosol/mist emissions, and gas-phase or vapor solvent degradation byproducts. The amine solvent used to absorb CO_2 from the flue gas is susceptible to degradation due to heat (thermal degradation) and the presence of oxygen (oxidative degradation). Thermal and oxidative degradation of the solvent can lead to the formation of both amine and aldehyde HAPs; thus, process controls or design modifications that reduce degradation will reduce the formation of both amine and aldehyde HAPs.

Oxidative degradation of the solvent occurs due to the presence of oxygen and metal ions, primarily iron in the flue gas. The highest oxygen concentration will occur in the absorber column which is the most likely place for oxidative degradation of the amine. Degradation products include fragments of the amine, such as ammonia and the formation of byproducts such as acetaldehyde, formaldehyde, and ammonia.[11] Oxidative degradation mainly depends on the metal ion

[11] Shao, Renjie and Strangeland, Aage; Amines Used in CO2 Capture – Health and Environmental Impacts, The Bellona Foundation, September 2009, available at: https://network.bellona.org/content/uploads/sites/3/fil_Bellona_report_September_2009_-_Amines_used_in_CO2_capture.pdf, accessed November 1, 2023.

concentration and oxygen concentration in the absorber column. Metal ions, especially iron (Fe), is an important catalyst in oxidation of amines. Metal ions will generate oxide radical which will increase the oxidation rate of amines. Reducing metal ion concentrations in the absorber column will limit the oxidative degeneration and the formation of both amine and aldehyde HAPs.

Thermal degradation may occur in the absorber column and stripper column and is generally dependent upon process operating temperatures. High temperatures will break the chemical bonds of amines and increase the reaction rate of amines reacting with CO_2 to form the thermal degradation byproducts, which will also cause loss of amines in the system. Studies indicate that thermal degradation primarily takes place during the solvent regeneration process in the stripper column, at elevated temperatures and in the presence of CO_2;[12] however, thermal degradation may occur in the absorber column at elevated temperatures. Products of the thermal degradation process are often more volatile than amine solvent and are likely to evaporate in the absorber, resulting in increased emissions.[13] Designing the absorber column with intermediate cooling systems to reduce temperatures within the column will reduce thermal oxidation and the formation of both amine and aldehyde HAPs.

As described in Section 7.2.1 of the MACT Analysis, process controls and design changes incorporated into the design of the DCC Facility, including absorber column intermediate cooling and upgraded materials of construction to eliminate introducing Fe into the absorber, are expected to reduce solvent degradation and the formation of both amine and aldehyde HAPs. Based on information provided by the carbon capture system vendor, design changes implemented to reduce both thermal and oxidative degradation of the solvent will reduce HAP formation by approximately 40% percent from pre-design change levels.

Post-Absorber Column Controls. Post-absorber column control systems were evaluated for the control of both amine and aldehyde HAPs (MACT Analysis, Sections 7.2.3 and 7.2.4). Based on an assessment of technical feasibility and applicability to the absorber column exhaust, it was determined that water wash and acid wash were the only technically feasible post-absorber column control systems. As EPA Region 8 noted, the amine- and aldehyde-based HAP emissions will react differently in the post-absorber column control systems. However, the water wash and acid wash systems are generally designed to address amine carryover from the absorber column and reduce aerosol amine and amine droplets that can result in VOC emissions. The systems also play an important role in curtailing amine losses and maintaining the water balance of the solvent in the absorber column.

Although aldehydes are water soluble, they do not dissociate in water and may not be effectively controlled using a water wash system. In addition, aldehydes are weak acids as the hydrogen atom in the carbonyl group of an aldehyde molecule provide H^+ ions; thus, the acid wash system is not expected to provide effective aldehyde-based HAP emission control. No emissions

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[12] Buvik, V, Hoisaeter, K, Vevelstad, S., Knuutila, H., A Review of Degradation and Emissions in Post-Combustion CO_2 Capture Pilot Plants, International Journal of Greenhouse Gas Control, February 18, 2021, pg. 2.
[13] *Id.*

data were identified from the carbon capture system vendor or technical literature demonstrating effective aldehyde control using either water wash or acid wash systems. Therefore, no aldehyde-based HAP control was assumed with these systems. These systems are instead designed for reduction of amines.

Projected HAP Emissions and Exhaust Gas Concentration. Based on vendor emission estimates, HAP emissions from the CO_2 absorber column are summarized in the following table. HAP emissions were provided by the carbon capture system vendor, taking into account reduced HAP formation with the intermediate cooling and upgraded materials of construction. Emission estimates assumed no additional control in the water/acid wash systems, other than reducing amine solvent carryover and reducing VOC emissions.

Projected Project-Related §112 Potential-to-Emit HAP Emissions

Hazardous Air Pollutant	**Projected Emission Rate[14]* (lb/hr)**	**Concentration ppbvd @ 15% O_2**
Clean Air Act §112 Listed HAPs		
Acetaldehyde	7.5	464
Formaldehyde	0.4	36
Acetamide	0.12	5.5
Ethylenimine	0.0041	0.3
N-nitrosodiethylamine	0.005	0.1
Nitrosodimethylamine	0.010	0.4
N'-Nitrosomorpholine	0.004	0.09
Total § 112 Listed HAPs	8.04	NA

The feasibility of testing for amine-based HAPs must also be considered. Given the low concentration of amine-based HAPs in the exhaust gas, stack testing would not be feasible. EPA Test Method 320 (Vapor Phase Organic and Inorganic Emissions by Extractive FTIR) would be used to measure both aldehyde and amine-based organic HAP emissions. Test Method 320 specifies a number of analytical uncertainty parameters that the analyst must calculate to characterize the FTIR system performance; however, it does not provide analytical detection limits for all organic compounds. Based on published information it appears that the test method by itself may achieve a minimum detection limit of approximately 100 ppb, and an optimal minimum detection limit as low as 10 ppb for formaldehyde in a natural gas fired turbine field test using optimized hardware and software.[15] No specific information was identified regarding method

[14] Projected lb/hr emission rates are estimated for each HAP based on emissions data and modeling conducted by the control system vendor, and represent worst-case conditions for each individual constituent, which could not occur simultaneously for all constituents.

[15] See, Montrose Environmental, Enhanced Measurements of Low-Concentration Emissions from Combustion Units, available at: https://montrose-env.com/wp-content/uploads/2017/09/CIBO-Low-Level-Emissions-Technologies-Updated.pdf, accessed November 2, 2023; Clean Air, An Alternative Option in EtO Testing, June 18, 2020, available at: https://www.cleanair.com/alternative-option-in-eto-testing/, accessed November 1, 2023.

detection limits for amine-based organic constituents using Test Method 320; however, it appears likely based on optimal minimum detection limit reported for formaldehyde emissions, that the amine concentrations in the exhaust gas (all less than 0.5 ppb) will be well below the minimum detection limit.

Conclusion. Aldehyde HAPs are expected to account for more than 98 percent of all HAP emissions from the absorber column, with acetaldehyde being the individual HAP emitted at the highest rate. Acetaldehyde is proposed as a surrogate for all HAP emissions because (1) acetaldehyde accounts for approximately 93 percent of all HAP emissions; and (2) the design and process changes proposed to reduce thermal and oxidative degradation of the amine solvent will reduce the formation of both amine and aldehyde HAPs.

Sincerely,

DCC East Project LLC

Robert N. McLennan
President and CEO

A.5.ii – DCC East Project LLC Supplemental Response to Comments

DCC EAST PROJECT LLC

5301 32nd Ave. South
Grand Forks, ND 58201
Phone 701.795.4000

December 26, 2023

Jim Semerad, Director, Division of Air Quality
David Stroh, Environmental Engineer
North Dakota Department of Environmental Quality
4201 Normandy Street, 2nd Floor
Bismarck, ND 58503-1324

Re: Supplemental Response for Application of DCC East Project LLC for Permit to Construct No. ACP-18194 for Dakota Carbon Center CO_2 Separation and Purification Plant

Dear Mr. Semerad and Mr. Stroh:

Please accept this letter as a further supplement to the record for the application of DCC East Project LLC (DCC East) for Permit to Construct No. ACP-18194 for the Dakota Carbon Center CO_2 Separation and Purification Plant (the DCC Facility) in Oliver County, North Dakota. This letter offers additional information concerning NDDEQ's determination in the draft Air Permit to Construct that acetaldehyde would be tested as a surrogate for validation of the Section 112 HAPs emissions.

DCC East provides the enclosed report authored by third-party consultant TRC entitled, "Evaluation of the Feasibility of EPA Method 320 to Measure Air Emissions from a Carbon Dioxide Removal System," dated December 15, 2023 (the TRC Report). The TRC Report provides expert analysis of Method 320 as applied to the emissions estimates represented in the application. Consistent with our discussion in our Response Comment dated November 16, 2023, aldehyde HAPs are expected to account for more than 98 percent of all HAP emissions from the absorber column, with acetaldehyde being the individual HAP emitted at the highest rate. The TRC Report further supports acetaldehyde as a surrogate for all HAP emissions because it is the only CAA Section 112 HAP emitted in a greater than 1.0 part per million quantity that is measurable by EPA Method 320. The Report provides discussion of the remaining estimated HAPs, identifying whether they are not detectable (1) due to the lack the availability of a reference standard in the spectral library for the HAPor (2) due to a concentration value below the FTIR spectrometer lowest detection limits, thereby resulting in no quantity value being detected.

DCC East continues to support the use of acetaldehyde as a surrogate for validation of the Section 112 HAPs emissions. While DCC East does not believe that additional verification testing is necessary for the Permit to Construct, formaldehyde could be tested using Method 320. It is the second highest estimated Section 112 HAP emissions value, albeit infinitesimal at 0.4 lb/hr.

Formaldehyde, at its estimated emissions value, is projected to be unmeasurable. For this reason, adding formaldehyde would be a conservative measure to validate emissions estimates.

Thank you for your consideration of this additional information in the permit record.

Sincerely,

DCC East Project LLC

Robert N. McLennan
President and CEO

FINAL REPORT
Evaluation of the Feasibility of EPA Method 320 to Measure Air Emissions from a Carbon Dioxide Removal System

Performed For
DCC East Project LLC

Draft Report No.
TRC Environmental Corporation Report 581624

Report Submittal Date
12/15/23

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Introduction

The Project Sponsors of DCC East Project LLC are developing Project Tundra, the goal of which is to produce CO_2 from the flue gas emissions from the Milton R. Young Station in Center, North Dakota and inject the captured gases into permeable bedrock thousands of feet below the facility("Project"). A key component of the Project is the Carbon Capture system. CO_2 produced by the capture system is injected into bedrock as described above, and the remaining gases from the flue gas emissions and the capture facility absorber are exhausted to the atmosphere. The North Dakota Department of Environmental Quality (DEQ) has proposed measurement of the CO_2 production facility emissions at the outlet of the absorber using EPA Method 320 (extractive Fourier Transform Infrared (FTIR) spectroscopy).

The Project Sponsors retained Thomas A. Dunder, Ph.D. from TRC to evaluate the feasibility of measuring these emissions with FTIR technology. Dr. Dunder has over 30 years of experience conducting air emissions measurements by FTIR and has detailed knowledge of the technology and its capabilities.

This report summarizes data provided by the CO_2 capture technology vendor (expected emissions, effluent conditions) ("Vendor") and details the conversion from lb/hr emission rates quoted by the vendor to parts per million concentrations necessary to determine the applicability of FTIR measurements in terms of detection limits.

Results Summary

The table below summarizes the results of the calculations. Detailed explanations and sample calculations of the data conversions and interpretation and provided in the succeeding sections.

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Compound	Emission Rate	Reference Spectrum	MW	SCFM	DSCFM	ppmvd	Measureable
HAPS	lb/hr	Available?	g/mol	Standard ft^3/min	Dry Standard ft^3/min	parts per million, dry basis	By M320
Acetaldehyde	**7.5**	**Y**	**44.053**	**1266249.6**	**1178878.4**	**0.93**	**Y**
Formaldehyde	**0.4**	**Y**	**30.026**	**1266249.6**	**1178878.4**	**0.073**	**N**
Acetamide	0.12	N	59.07	1266249.6	1178878.4	0.011	N
Ethyleneimine	0.0041	N	43	1266249.6	1178878.4	0.00052	N
N-nitrosodiethylamine	**0.0**	**Y**	**102.14**	**1266249.6**	**1178878.4**	**0.00027**	**N**
Nitrosodimethylamine	**0.0**	**Y**	**74.082**	**1266249.6**	**1178878.4**	**0.00074**	**N**
N'-Nitrosomorpholine	**0.0**	**Y**	**116.12**	**1266249.6**	**1178878.4**	**0.00019**	**N**
Other HAPS							
Ammonia	**2.9**	**Y**	**17.031**	**1266249.6**	**1178878.4**	**0.93**	**Y**
Diethylamine	**2.0**	**Y**	**73.14**	**1266249.6**	**1178878.4**	**0.15**	**N**
Ethanolamine	**1.1**	**Y**	**61.08**	**1266249.6**	**1178878.4**	**0.098**	**N**
Ethylamine	**0.8**	**Y**	**45.08**	**1266249.6**	**1178878.4**	**0.093**	**N**
Ethylenediamine	0.25	N	60.1	1266249.6	1178878.4	0.023	N
Formamide	1.2	N	45.04	1266249.6	1178878.4	0.15	N
Methylamine	**0.5**	**Y**	**31.1**	**1266249.6**	**1178878.4**	**0.088**	**N**
Morpholine	0.25	N	87.1	1266249.6	1178878.4	0.016	N

The Vendor provided the first 2 columns of data (compounds and lb/hr estimated emissions) as well as gaseous effluent conditions (temperature, pressure, flow, moisture). For a compound to be measured by Method 320, a set of quantitative reference spectra must be available to identify and determine concentrations. TRC uses the MKS 2030 FTIR instrument that has a spectral library provided with the instrument. TRC determined if each compound was present in the library. The table lines in **BLUE** show compounds for which reference standards are available. Therefore Method 320 can only be used to measure this subset of compounds.

The Vendor provided flow rate in ACFM (actual cubic feet per minute) and this must be converted to DSCFM (dry standard cubic feet per minute) to obtain concentrations in ppmvd (parts per million by volume, dry basis). The FTIR detection limits for different compounds varies depending on the compound (how efficiently it absorbs infrared light) and the presence of interferents whose spectral absorbance overlaps the compound. For a modern FTIR spectrometer equipped with a high sensitivity detector and long pathlength gas cell such as the MKS 2030 instrument, the lowest detection limits are generally in the 0.5-1 ppm range. Reviewing the calculated ppmvd concentrations in the table, some concentrations are in the ppt (parts per trillion) range, and many are in the ppb (parts per billion range). These ppb and ppt concentrations cannot be detected by the MKS FTIR.

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Only 2 compounds from the Vendor estimates, acetaldehyde and ammonia, would be above detection limits based on these calculations. TRC has measured these compounds in many emissions tests and can confirm that they are readily detectable at these concentrations.

Detailed Calculations

The Vendor provided the data in the two tables below.

Compounds and Estimated Emissions

Compound	Emission Rate
HAPS	lb/hr
Acetaldehyde	7.5
Formaldehyde	0.4
Acetamide	0.12
Ethyleneimine	0.0041
N-nitrosodiethylamine	0.005
Nitrosodimethylamine	0.01
N'-Nitrosomorpholine	0.0041
Other HAPS	
Ammonia	2.9
Diethylamine	2
Ethanolamine	1.1
Ethylamine	0.77
Ethylenediamine	0.25
Formamide	1.2
Methylamine	0.5
Morpholine	0.25

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Process Data

Process Data	
Flow	1342800 ACFM
T	99.9 ^{o}F
% H_2O	6.9
% O_2	7.7
P (static)	29.92 " Hg

The flow in ACFM must be first converted to SCFM (actual basis to standard basis) using the following equation:

$$Qscfm = \frac{Qacfm \times (459.67\ ^{o}R\ + 68\ ^{o}F) \times P_o}{(459.67\ ^{o}R + T_o) \times P_s}$$

Where:
Qscfm = gas flow rate at standard temperature and pressure
Qacfm = gas flow rate at actual temperature and pressure (1342800 ft^3/min)
P_o = pressure at actual conditions (inches Hg) (29.92 “Hg)
T_o = temperature at actual conditions (^{o}F) (99.9 ^{o}F)
P_s = pressure at standard conditions (29.92 “Hg)
^{o}R = temperature on Rankine scale

The SCFM flow is converted to dry basis DSCFM using the equation below:

$$Qdscfm = Qscfm \times (1 - \%\ Moisture)$$

Where:
Qscfm = gas flow rate at standard temperature and pressure (Calculated above)
Qdscfm = gas flow rate at standard temperature and pressure, dry basis
% Moisture = Moisture at actual conditions (6.9%)

The final calculation step is to convert the lb/hr emissions to parts per million, dry basis using the data in the summary table presented on page 2. The equation is shown below:

$$Emission\ Rate\ \left(\frac{lb}{hr}\right) = Concentration(ppmvd) \times Molecular\ Weight\left(\frac{g}{mole}\right) \times Flow\ Rate\ (dscfm) \times 60\ min/hr \times \frac{1}{3.853x10^{8}}$$

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Respectfully submitted,

TRC Environmental Corporation

Thomas Dunder, Ph.D.
Technical Director

TRC Execut

A.6 – Department Response to Public Comments

Response to Comments Received
by
The North Dakota Department of Environmental Quality
on
Draft Air Pollution Permit to Construct No. ACP-18197 v1.0
DCC East Project LLC - Dakota Carbon Center CO2 Separation and Purification Plant
Oliver County, North Dakota

December 2023

A public comment period was held regarding the above draft Air Pollution Control Permit to Construct (PTC) from September 21, 2023, through October 21, 2023. The comments received by the North Dakota Department of Environmental Quality (NDDEQ) and the response to each comment by NDDEQ is shown below.

Comments were received from three parties which consisted of two individual commentors and Region 8 of the Environmental Protection Agency (EPA R8). The two individual comments provided verbal testimony during the public hearing held on October 19, 2023, in Center, North Dakota. EPA Region 8 submitted written comments to NDDEQ staff on October 20, 2023.

Note on EPA Comment Submittal:
NDDEQ acknowledges EPA's comments on the draft PTC and will introduce them into the record despite EPA R8 not following NDDEQ's stated requirements. When commenting on future actions proposed by the NDDEQ, please read the notice of intent (NOI) and follow the instructions provided within, see Appendix A.1.

As stated in the NOI *"Direct comments in writing, including* ***Re: Public Comment Permit Number ACP-18194 v1.0****, to* ***AirQuality@nd.gov*** *or the NDDEQ, Division of Air Quality, 4201 Normandy Street, 2nd Floor, Bismarck, ND 58503-1324.* ***Emailed comments must be sent to the email address above to be considered****." (****emphasis added****).*

NDDEQ makes this clear statement in the NOI to help mitigate the potential for staff to miss comments received in their personal email inbox which are required to be introduced into the record. Further, emailing comments directly to staff is unreliable since staff turnover can happen rapidly.

Verbal Comment No. 1:

Both individual commentors who provided verbal testimony on October 19, 2023, expressed strong support for the Project. The commentors indicated how important the Project was for the area, for North Dakota, and for decarbonization goals. The complete transcript of the hearing can be found in Appendix A.4.

Response to Verbal Comment No. 1:

Thank you for the comments and overall support for the proposed Project. NDDEQ generally agrees with the statements raised. The concerns expressed are outside the scope of the PTC, however, these concerns are important items for North Dakota.

Written Comment No. 1:

EPA R8 comments on the potential for source aggregation between DCC East Project LLC's proposed Dakota Carbon Center CO_2 Separation and Purification Plant (DCC) and Minnkota's Milton R, Young Station (MRY). EPA recommended NDDEQ enhance the permit record to support NDDEQ's source aggregation conclusion and better outline the relationship between the entities.

Embedded within this comment is a notion that if DCC and MRY are determined to be part of the same "stationary source", it will dictate whether the project requires a Permit to Construct a minor or major new source or a minor or major "modification" to an existing source.

Response to Written Comment No. 1:

NDDEQ agrees with EPA R8 that the permit record regarding the relationship and source aggregation conclusion could be enhanced. To address this comment, DCC has better documented the nature of the relationship between DCC and MRY. This information is provided in Appendix A.5.i, pages 1-5.

NDDEQ affirms that DCC's supplemental information adequately explains the nature of the relationship between DCC and MRY and supports the determination that the sources should not be aggregated. As a result of introducing this information into the permit record, no changes to the Permit to Construct are necessary.

Regarding the embedded comment that, if DCC and MRY are considered the same "stationary source" then a minor or major "modification" to an existing source should be evaluated, NDDEQ notes that the potential to emit for DCC is below the significant emissions increase[1,2] thresholds for regulated NSR pollutants[3] that triggers the major modification[4] for existing major stationary sources. In other words, regardless of source aggregation (one source or two), DCC would be considered a "PSD minor source" – as currently proposed, or DCC would be a minor "modification" to an existing major source – if aggregated with MRY. No further modification to the Permit to Construct or Air Quality Effects Analysis is warranted.

Written Comment No. 2:

[1] See: https://www.ecfr.gov/current/title-40/part-52/section-52.21#p-52.21(b)(40)
[2] See: https://www.ecfr.gov/current/title-40/part-52/section-52.21#p-52.21(b)(23)(i)
[3] See: https://www.ecfr.gov/current/title-40/part-52/section-52.21#p-52.21(b)(50)
[4] See: https://www.ecfr.gov/current/title-40/part-52/section-52.21#p-52.21(b)(2)(i)

EPA R8 comments on the level of incorporation by reference in the proposed Permit to Construct. EPA recommended NDDEQ revise the permit to include more detailed incorporation by reference.

Response to Written Comment 2:
NDDEQ agrees that the permit record could be enhanced and will add the rated horsepower for the emergency diesel fire pump engine (EU D03) to the emission unit description in the final Permit to Construct (see table under Condition I.B.4 of ACP-18194 v1.0) and final Air Quality Effects Analysis (see page 8 of ACP-18194 v1.0 AQEA).

As proposed, Condition II.C.1 and Condition II.D.1 of ACP-18194 v1.0 both state the emission unit, emergency diesel fire pump engine EU D03, at the proposed facility specifically subject to 40 CFR 60, Subpart IIII and 40 CFR 63, Subpart ZZZZ, respectively.

Condition II.C.1 "*40 CFR 60, **Subpart IIII** – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines **(EU D03)**."* (**emphasis added**).

Condition II.D.1 "*40 CFR 63, **Subpart ZZZZ** – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines **(EU D03)**."* (**emphasis added**).

NDDEQ's experience as the Clean Air Act implementation and enforcement authority has shown that the level of incorporation by reference as written in the Permit to Construct requirements for 40 CFR Part 60, Subpart IIII and 40 CFR Part 63, Subpart ZZZZ including emission unit identification has been sufficient and useful to the applicant and public to determine what standard applies to the emission unit and how the source is to achieve compliance with each standard. NDDEQ will consider specifying which portions of the above-mentioned regulations apply in the future Title V permit to operate.

Written Comment No. 3:
EPA R8 comments on the ambient air boundary used for the air dispersion modeling for the proposed DCC project with relation to MRY. EPA recommended NDDEQ confirm the accuracy of the ambient air boundary and associated receptor grid used for the air dispersion modeling.

Response to Written Comment 3:
NDDEQ has confirmed the accuracy of the ambient air boundary and associated receptor grid used for the air dispersion modeling. To address this comment, DCC has better outlined the site access and security requirements, the lessor/lessee relationship, and reference to contractual agreements which transfers the "pass through[5]" flue gas back to MRY. This information is provided in detail in Appendix A.5.i, pages 5 and 6.

[5] DCC's objective is to remove the carbon dioxide from the MRY flue gas stream. The remaining species (e.g., nitrogen oxides, sulfur oxides, particulate matter, uncaptured carbon dioxide) are transferred back to MRY at the absorber stack discharge.

NDDEQ concurs with the information provided by DCC. Therefore, the ambient air boundary and associated receptor grid are accurate and no further air dispersion modeling is warranted.

Written Comment No. 4:
EPA R8 comments on the Clean Air Act 112(g) case-by-case maximum achievable control technology (MACT) analysis for hazardous air pollutants (HAPs), particularly regarding the use of acetaldehyde as a surrogate pollutant for all organic HAPs. EPA recommended NDDEQ separately evaluate the effectiveness of controls for amine HAPs from aldehyde HAPs.

Response to Written Comment 4:
DCC's Permit to Construct application included a detailed analysis of potentially available controls to reduce VOC and organic HAP emissions from the CO_2 absorber.[6] The analysis was inclusive of organic HAP emissions and noted that aldehydes make up the majority of the HAP emissions and the remaining HAP constituents are generally classified as amines. Of note, the total of all the expected Clean Air Act Section 112 amine HAPs is approximately 0.10 tons per year (tpy), or significantly below HAP major source thresholds for any individual HAP.[7] As explained in the case-by-case MACT, amine HAPs are reduced using water wash and acid wash to limit the amine solvent loss. Aldehyde HAPs are not expected to be affected by the water and acid wash. The analysis also recognized that aldehydes and amines are generally classified as VOCs and the available controls were evaluated for effectiveness included technologies in industry to reduce VOC emissions.[8] The NDDEQ found no deficiency in the case-by-case MACT analysis.

DCC has also provided a more succinct response, largely based on information already in the record[9], to help EPA R8 understand the aldehyde/amine relationship as it relates to DCC. This can be found in Appendix A.5.i, pages 6-10.

As part DCC's response to EPA R8's comment, DCC discussed the lack of feasibility for testing[10] amine-based HAPs due to the projected low concentrations of these species and limited published information on detection limits for amine-based organic compounds. DCC provided additional technical information on the feasibility of HAP testing using Method 320 in a supplemental response to comment, included in Appendix A.5.ii. DCC indicated that any amine-based organic HAPs would be well below the minimum detection limit of Method 320 or do not have reference spectra. NDDEQ does not possess any technical information to dispute this claim and will not require DCC to test for amine-based organic HAPs.

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[6] DCC East Project LLC, Dakota Carbon Center CO2 Separation and Purification Plan Permit to Construct Application. Appendix C. June 2, 2023
[7] DCC East Project LLC, Dakota Carbon Center CO2 Separation and Purification Plan Permit to Construct Application. Appendix B, page 2. June 2, 2023
[8] DCC East Project LLC, Dakota Carbon Center CO2 Separation and Purification Plan Permit to Construct Application. Appendix C, page 9. June 2, 2023
[9] DCC East Project LLC, Dakota Carbon Center CO2 Separation and Purification Plan Permit to Construct Application. Appendix C.
[10] Using EPA Test Method 320 – Vapor Phase Organic and Inorganic Emissions by Extractive FTIR

Since DCC project is the first of its kind and size in the world[11], NDDEQ's position is that initial testing of the second largest projected Section 112 HAP species (formaldehyde) is reasonable and will be required. NDDEQ does not dispute the projected project related HAP emission determined from emissions testing and modeling conducted by the carbon capture system vendor but is of the opinion that evaluation of formaldehyde in addition to acetaldehyde is warranted for the initial testing required after DCC project start-up.

NDDEQ's conclusion as it relates to HAP testing is that initial testing will be required to confirm the HAP representations made in the permit application for acetaldehyde as a suitable surrogate and has added emissions testing in the final Permit to Construct (See Condition II.F of ACP-18194 v1.0) and final Air Quality Effects Analysis (see page 12 and 13 in ACP-18194 v1.0 AQEA). NDDEQ is requiring EPA Method 320 – Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy as the means to confirm the representations made in the Permit to Construct application. Undetectable organic compounds (i.e., below detection limit) will be considered insignificant.

[11] Given that this is the first of its kind in scale carbon capture project on lignite coal-fired electrical generating utilities and has yet to be constructed, carbon capture and sequestration/storage (CCS) has not yet been "adequately demonstrated" in practice to be identified as a "best system of emissions reduction".

AIR QUALITY IMPACT ANALYSIS

DCC East Project LLC
CO_2 Separation and Purification Plant

Prepared By:

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September 15, 2023

Project 232401.0032

Approved By:

North Dakota Department of Environmental Quality
Division of Air Quality
Air Pollution Control Program

David Stroh, Environmental Engineer

Rhannon Thorton, Environmental Scientist

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1. EXECUTIVE SUMMARY

DCC East Project LLC (DCC) completed air dispersion modeling to demonstrate compliance with the North Dakota Ambient Air Quality Standards (ND AAQS) for a proposed project to construct a carbon dioxide (CO_2) separation and purification plant (Project) to generate commodity CO_2 from the flue gas produced by the Milton R. Young (MRY) Station's coal-fired boilers (MRY Unit 1 and MRY Unit 2). The modeling was completed using potential emissions from the project under two operating scenarios. Based on the data provided in the Permit to Construct (PTC) application and Trinity Consultants' (Trinity's) independent review and modeling analysis, it is expected that the proposed project will comply with applicable ND AAQS. Results for the modeled ND AAQS analysis are shown in Table 1-1.

Table 1-1. ND AAQS Analysis Results Summary

Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	ND AAQS ($\mu g/m^3$)
NO_2	1-hr[1]	44.20	35.0	79.20	188
	Annual[2]	1.33	5.0	6.33	100
PM_{10}	24-hr[3]	7.97	30.0	37.97	150
$PM_{2.5}$	24-hr[4]	5.56	13.7	19.26	35
	Annual[5]	0.71	4.8	5.46	12
SO_2	1-hr[6]	48.33	13.0	61.33	196
	3-hr[7]	60.70	11.0	71.70	1,309
	24-hr[7]	16.16	9.0	25.16	365
	Annual[2]	1.54	3.0	4.54	80
CO	1-hr[7]	32.24	1,149.0	1,181.24	40,000
	8-hr[7]	10.98	1,149.0	1,159.98	10,000

1 Eighth-highest maximum daily 1-hour concentration (98th percentile) averaged over the 5 years.
2 Maximum annual concentration over the 5 years.
3 Sixth-highest maximum 24-hour concentration averaged over the 5 years.
4 Eighth-highest maximum 24-hour concentration averaged over the 5 years.
5 Maximum annual concentration averaged over the 5 years.
6 Fourth-highest maximum daily 1-hour concentration (99th percentile) averaged over the 5 years.
7 Second-highest maximum concentration over the 5 years.

2. INTRODUCTION AND BACKGROUND

In June 2023, DCC submitted a revised PTC application to the North Dakota Department of Environmental Quality, Division of Air Quality (Department) to construct the Project. A revised air dispersion modeling protocol and modeling report that reflects the information in this PTC application was submitted by DCC in August 2023. The revised modeling report summarizes the ND AAQS modeling analysis that was completed, using AERMOD v22112 for the Project. The analysis demonstrates compliance with the ND AAQS. Trinity was contracted to assist the Department with a third-party review of the modeling analysis and preparation of an Air Quality Impact Analysis (AQIA) report. This AQIA summarizes Trinity's findings based on a thorough review and independent modeling of the Project.

DCC is proposing to construct a CO_2 separation and purification plant to generate commodity CO_2 from the flue gas produced by the MRY Station's coal-fired boilers (MRY Unit 1 and MRY Unit 2). The carbon capture system includes a new CO_2 absorber stack where processed flue gas from MRY Units 1 and 2 will be emitted. The Project will receive commingled flue gases from MRY Units 1 and 2, which will be processed to remove CO_2, and the uncaptured emissions (e.g., nitrogen oxides) will be emitted through the Project's CO_2 absorber stack (emission unit and emission point D01 in ACP-18194 v1.0). Capability to exhaust all or a portion of the exhaust from MRY Units 1 and 2 through the existing stacks for MRY Units 1 and 2 will be retained. The Project will consist of installation of the following emission sources:

- One (1) carbon capture system,
- One (1) cooling tower,
- One (1) emergency diesel-fired fire water pump engine,
- Amine solvent storage tanks and handling system, and
- Haul roads.

3. MODEL REQUIREMENTS

The Project's potential to emit (PTE) for the regulated New Source Review (NSR) pollutants are below major source thresholds. Therefore, the project will not trigger Prevention of Significant Deterioration (PSD) permitting and does not explicitly require modeling per the Department's non-PSD project modeling policy.[1] However, because the carbon capture stack will have considerably different stack characteristics (e.g., shorter stack) than the existing MRY Unit 1 and MRY Unit 2 stacks; the Department required that DCC complete a modeling assessment for this project to demonstrate compliance with the ND AAQS for operating scenarios when emissions are exhausted through the new carbon capture system stack.

Per Department guidance, modeling for PTC applications not subject to PSD are only required to address compliance with the ND AAQS. Therefore, the DCC modeling analysis did not include a modeling assessment against the PSD increment standards. Additionally, the MRY facility is not located within 50 km of any Class I area; therefore, in accordance with Department guidance a Class I increment assessment is not required for the Project.

Emissions from the carbon capture system stack and the cooling towers were included in the ND AAQS modeling analysis. The diesel fire water pump engine was not included in accordance with the Department's policy.[2] The haul roads associated with the project were not included in modeling because they are paved and Department convention is to exclude paved haul roads from ND AAQS modeling. Finally, the amine solvent storage tanks and handling system has only insignificant emissions of VOCs that need not be included in the ND AAQS modeling analysis.

[1] https://deq.nd.gov/publications/aq/Policy/modeling/Criteria_Modeling_Memo.pdf

[2] https://deq.nd.gov/publications/AQ/policy/Modeling/Emergency_Unit_Modeling.pdf

4. MODELING METHODOLOGY

4.1 Model Version

The current U.S. EPA regulatory model, AERMOD (version 22112) was used in this analysis to calculate ground-level concentrations with the regulatory default parameters. Appropriate averaging periods, based on federal and state ambient air quality standards, and model options were considered in the analysis, in conjunction with the U.S. EPA's *Guideline on Air Quality Models* 40 CFR 51, Appendix W (Revised, January 17, 2017).

4.2 Meteorological Data

Surface and upper-air data are pre-processed by AERMET to generate the boundary layer parameters required by AERMOD to calculate plume dispersion. AERMET processes hourly meteorological data to determine plume transport and dispersion downwind of a source. Per Appendix W Section 8.4.2.e, a *minimum* of either one year of site-specific data (i.e., an onsite monitor) or five years of representative National Weather Service (NWS) data or at least 3 years of prognostic meteorological data should be used to ensure a sufficiently conservative result which addresses hourly and seasonal variation in meteorological conditions over a year which affect plume movement due to atmospheric conditions.

Hourly meteorological data for the 5-year period of 2017 to 2021 were used from a state-operated meteorological observation station in Beulah, ND. Data from this site were supplemented with concurrent cloud cover and upper air observations from the Bismarck Airport in Bismarck, ND. Missing upper air data from Bismarck were substituted with data from Glasgow, MT and Aberdeen, SD.[3]

See Table 4-1 for MET stations used. AERMET uses hourly surface observations of wind speed and direction, ambient temperature, sky cover (opacity), and (optionally) local air pressure. AERMET then includes the pre-processed AERSURFACE output values (see Table 4-2) to compile the appropriate surface meteorological inputs for AERMOD. AERMET version 22112 was used to process meteorological data for this analysis.

Surface roughness length, albedo, and Bowen ratio are required values used by AERMET to preprocess meteorological data for AERMOD. AERSURFACE allows users to develop these values using inputs based on set seasonal variability in the vegetative landscape (e.g. landcover). The Department has compiled a set of recommended inputs to be used for the AERSURFACE pre-processor for various regions of the state as listed in the *Recommended AERSURFACE Inputs (North Dakota)* guidance as shown in Table 4-2.[4] Seasonal category assignments for each month were based on recommendations for the southwest geographic area. Four sectors were used in the analysis to define surface roughness length, as shown in Figure 4-1. AERSURFACE version 20060 was used for this analysis with land cover, impervious surface, and tree canopy data from the USGS National Land Cover Data (NLCD) archives for 2016.

[3] A total of 22 days over the 5 years to be modeled were substituted.

[4] https://deq.nd.gov/publications/AQ/policy/Modeling/AERSURFACE_InputsND.pdf

Table 4-1. Meteorological Data Stations

Location	Latitude (deg)	Longitude (deg)	Base Elevation (m)	Distance / Direction from Source*	Data Type
Beulah, ND	47.229	-101.767	630	45 km W-NW	Surface
Bismarck Airport - Bismarck, ND	46.774	-100.748	506	48 km SE	Surface
Bismarck, ND	46.774	-100.748	503	48 km SE	Upper Air
Glasgow, MT	48.200	-106.620	693	430 km W-NW	Upper Air
Aberdeen, SD	45.455	-98.420	397	280 km SE	Upper Air

* Approximate distances using Google Earth's measuring tool.

Table 4-2. AERSURFACE Input Values

Parameter	Value Used
Radius of study area used for surface roughness.	1 km
Define the surface roughness length for multiple sectors?	Yes
Temporal resolution of surface characteristics	Monthly
Continuous snow cover for at least one month?	Yes
Reassign the months to different seasons?	Yes
Specify months for each season.	
Late autumn after frost and harvest, or winter with no snow.	Oct, Nov, Dec, Feb, Mar
Winter with continuous snow on the ground.	Jan
Transitional spring.	Apr, May
Midsummer with lush vegetation.	Jun, Jul, Aug
Autumn with unharvested cropland.	Sep
Is the site at an airport?	No
Is the site in an arid region?	No
Surface moisture condition at the site.	Average

Figure 4-1. Sectors Used for Surface Roughness Characteristics at Beulah Station

4.3 Receptor Grid

Receptors are the locations where the model calculates ground-level pollutant concentrations. The receptor grid included discrete receptors at specific intervals around the facility extending out in a square shape with the facility at the center.

- Fence line receptors along the secured MRY property boundary with spacing of 25 meters
- 50 meter spacing, extending out approximately 500 meters from the boundary
- 100 meter spacing, extending out approximately 3 kilometers from the boundary
- 250 meter spacing, extending between approximately 3 to 5 kilometers from the boundary
- 500 meter spacing, extending between approximately 5 to 10 kilometers from the boundary

Receptor points within the MRY Station boundary are not modeled as they are not considered ambient air.[5] Ambient air has been interpreted to be air located outside of a boundary (e.g., a fence) which restricts general public access to a facility or source.

4.4 Terrain Elevations

The terrain elevation for each receptor point was determined using USGS 1/3 arc-second National Elevation Dataset (NED) data. The data, obtained from the USGS, has terrain elevations at 10-meter intervals. The terrain height for each individual modeled receptor was determined by assigning the interpolated height from the digital terrain elevations surrounding each modeled receptor.

In addition, the AERMOD terrain processor, AERMAP (version 18081), was used to compute the hill height scales for each receptor. AERMAP searches all NED data points for the terrain height and location that has the greatest influence on each receptor to determine the hill height scale for that receptor. AERMOD then uses the hill height scale in order to select the correct critical dividing streamline and concentration algorithm for each receptor. The elevations of the sources and buildings involved in the modeling demonstration were set using AERMAP.

4.5 NO_2 Modeling Methodology

For nitrogen dioxide (NO_2) modeling, the USEPA approved Tier 3 Plume Volume Molar Ratio Method (PVMRM) was utilized. USEPA Appendix W and subsequent guidance recommends a three tier NO_2 modeling approach for the conversion of nitric oxide (NO) to NO_2. These tiers are regulatory options provided in AERMOD and each consider increasingly complex considerations of NO to NO_2 conversion chemistry.

- Tier 1 assumes total conversion of NO to NO_2;
- Tier 2 utilizes the revised Ambient Ratio Method 2 (ARM2) approach; and,
- Tier 3 incorporates the Ozone Limiting Method (OLM) and Plume Volume Molar Ratio Method (PVMRM) as regulatory options in AERMOD.

Numerous studies and reports that analyze use of PVMRM and OLM show that for a given NO_X emission rate and ambient ozone concentration, the NO_2/NO_X conversion ratio for PVMRM is primarily controlled by the volume of the plume, whereas the conversion ratio for OLM is primarily controlled by ground-level NO_X concentration. EPA memoranda do not indicate any preference between PVMRM and OLM. EPA guidance

[5] https://www.epa.gov/nsr/ambient-air-guidance

suggests that PVMRM is preferred for isolated, elevated point sources.[6] This modeling analysis is specifically examining impacts from three relatively isolated, elevated point sources. As such, PVMRM was selected as the Tier 3 approach to be utilized in the modeling analysis using the ozone data discussed in Section 4.5.1 and NO_2 to NO_X ratios discussed in Section 4.5.2.

4.5.1 Ozone Data

Hourly ozone data from 2017 through 2021 for the Hannover ozone monitor (AQS Site ID: 38-065-0002) was used as the primary ozone data for the Tier 3 PVMRM analysis. Missing Hannover observations were filled using a three-step process:

1) Missing observations were filled with observations from the nearby Beulah North ozone monitor (AQS Site: 38-057-0004).
2) After supplementing Hannover observations with observations from Beulah North, remaining single missing hourly observations were filled using linear interpolation.
3) Data gaps of more than one hour were filled using a table of monthly and diurnal varying maximum hourly observations developed from the combined Hannover/Beulah North dataset.

4.5.2 In-Stack and Ambient Equilibrium Ratios

PVMRM in AERMOD uses an in-stack ratio (ISR) that specifies the ratio of NO_2 /NO_X present in each stack. In lieu of using the default ISR of 0.5, an ISR of 0.1 was used for the absorber stack, MRY Unit 1, and MRY Unit 2. This ISR was justified by the applicant using NO_2 and NO_X emissions data from MRY Unit 1 and MRY Unit 2. An ISR of 0.2 was used for nearby sources based on EPA guidance that indicates this value can be used for nearby sources located greater than 1-3 km away from the source being permitted.[7]

The default ambient equilibrium ratio of 0.9 was used.[8]

4.6 Rural/Urban Option Selection in AERMOD

For any dispersion modeling exercise, the “urban” or “rural” determination of the area surrounding the subject source is important in determining the applicable atmospheric boundary layer characteristics that affect a model’s calculation of ambient concentrations. Thus, a determination was made of whether the area around the MRY Station was urban or rural.

One method discussed in Section 5.1 of the *AERMOD Implementation Guide*[9] (also referring therein to Section 7.2.3c of the Guideline on Air Quality Models, Appendix W) is called the “land use” technique because it examines the various land use within 3 km of a source and quantifies the percentage of area in various land use categories. If greater than 50% of the land use in the prescribed area is considered urban, then the urban option should be used in AERMOD.

There is much less than 50% compact residential and industrial development in the 3-km radius surrounding the MRY Station. Therefore, rural dispersion characterization was used for this modeling effort.

[6] https://www.epa.gov/sites/default/files/2015-07/documents/appwno2_2.pdf

[7] https://www.epa.gov/sites/default/files/2020-10/documents/no2_clarification_memo-20140930.pdf

[8] https://www.epa.gov/sites/default/files/2015-07/documents/appwno2_2.pdf

[9] https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_implementation_guide.pdf

4.7 Building Downwash

The purpose of a building downwash analysis is to determine if the plume discharged from a stack will become caught in the turbulent wake of a building (or other structure), resulting in downwash of the plume. The downwash of the plume can result in elevated ground-level concentrations.

The Building Profile Input Program (BPIP) with Plume Rise Model Enhancements (PRIME) (version 04274) was used to determine the building downwash characteristics for each stack in 10-degree directional intervals. The PRIME version of BPIP features enhanced plume dispersion coefficients due to turbulent wake and reduced plume rise caused by a combination of the descending streamlines in the lee of the building and the increased entrainment in the wake. For PRIME downwash analyses, the building downwash data include the following parameters for the dominant building:

- Building height,
- Building width,
- Building length,
- X-dimension building adjustment, and
- Y-dimension building adjustment.

The Good Engineering Practice (GEP) stack height determined using BPIP for the stacks for the absorber stack (ABSORB), cooling tower stacks (CT 1-18), MRY Unit 1 (Unit 1), and MRY Unit 2 (Unit 2) are shown in Table 4-3 compared with the physical stack heights. The preliminary GEP stack height value is greater than the physical stack heights for the absorber and cooling tower stacks; therefore, the full physical stack heights were modeled for these stacks. For the MRY Unit 1 and MRY Unit 2 stacks, the preliminary GEP stack height values are slightly less than the physical stack heights. In the model supporting the PTC application for the Project, the full physical stack height of MRY Unit 1 and MRY Unit 2 was used. A sensitivity analysis for stack height was completed by AECOM, who prepared the modeling, indicating that the percentages of the ND AAQS in the modeled results (rounded to the nearest whole number) are unaffected if the preliminary GEP stack height values were modeled. As shown later, the model results are well less than the ND AAQS; therefore, the conclusions of the modeling report with respect to ND AAQS compliance would be unaffected by modeling a reduced stack height compared with the physical stack height.

Table 4-3. GEP Stack Height Analysis

Stack ID	Physical Stack Height (m)	GEP Equation Height (m)	Preliminary GEP Stack Height Value (m)
ABSORB	102.44	123.60	123.60
CT1-CT4; CT10-CT14	16.76	41.90	65.00
CT5-CT9; CT15-CT18	16.76	72.20	72.20
UNIT1	171.91	170.93	170.93
UNIT2	167.64	164.45	164.45

4.8 Representation of Emission Sources

AERMOD allows for emission units to be represented as point, area, volume, or open pit sources, among other less commonly used source types. A source with a stack is most appropriately modeled as a point source. For point sources with unobstructed vertical releases, it is appropriate to use actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity) in the modeling analyses.

4.8.1 Emission Sources at MRY Station

The modeled sources at the MSY Station include point sources with upward unrestricted releases, which were modeled with the POINT source type. Allowable emission rates were used with other stack parameters for the absorber stack, MRY Unit 1, MRY Unit 2, and the cooling tower for two operating modes. In Mode 1, all of Unit 2's flue gas is treated while only 25% of Unit 1's flue gas is treated. In Mode 2, all of Unit 1's flue gas is treated while only 57% of Unit 2's flue gas is treated. For either Mode 1 or Mode 2 operations, the balance of the untreated plume is assumed to be emitted out its original stack (Mode 1 – 75% of Unit 1 is emitted out the Unit 1 stack; Mode 2 – 43% of Unit 2 is emitted out the Unit 2 stack).

Stack parameters and emission rates for the two operating mode scenarios are shown in Table 4-4.

Table 4-4. Absorber, Cooling Tower, MRY Unit 1, and MRY Unit 2 Emission Rates and Stack Parameters

Mode No.	Source	Stack ID	Unit	% Flue Gas Treated	Stack Ht. (m)	Stack Diam. (m)	Flue Gas Temp (K)	Flue Gas Velocity (m/s)	SO_2 (g/s)	NO_X (g/s)	PM_{10} (g/s)	$PM_{2.5}$ (g/s)	CO (g/s)
1	All Unit 2, Partial Unit 1	ABSORB	Unit 1	25%	102.13	5.49	310.87	26.81	82.81	314.11	56.47	56.47	26.84
			Unit 2	100%									
	Remaining Unit 1	UNIT1	Unit 1	75%	171.91	6.20	334.76	11.55	35.44	108.86	19.11	19.11	9.07
2	All Unit 2, Partial Unit 2	ABSORB	Unit 1	100%	102.13	5.49	310.87	26.81	87.72	303.51	54.04	54.04	25.67
			Unit 2	57%									
	Remaining Unit 2	UNIT2	Unit 2	43%	167.64	9.14	335.76	5.47	30.53	119.46	21.54	21.54	10.24
	Cooling Tower	CT1-CT18	CT1-CT18[1]	N/A	16.76	9.75	310.04	11.46	N/A	N/A	6.43E-03	4.88E-05	N/A

1 Parameters represent each cooling tower cell exhaust.

4.8.2 Nearby and Other Sources

As described in Section 8.3 of the *Guideline*, background concentrations consist of two categories: 1) nearby sources and 2) other sources. "Nearby sources" are those individual sources located in the vicinity of the sources that are the primary focus on the modeling analysis that are not adequately represented by ambient monitoring data. These sources should be few in number (Appendix W Section 8.3.3(b)(iii)) and are accounted for by explicitly modeling their emissions. "Other sources" are that portion of the background attributable to natural sources, other unidentified sources in the vicinity, and regional transport contributions from more distant sources. Other sources are typically accounted for through use of ambient monitoring data.

Nearby sources explicitly modeled in this analysis include stacks at all three coal-fired electric generating stations located within 50 km of the MRY Station. Point source parameters and emission rates for these sources are shown in Table 4-5.

Table 4-5. Nearby Source Emission Rates and Stack Parameters

Facility	Stack Ht. (m)	Stack Diam. (m)	Flue Gas Temp (K)	Flue Gas Velocity (m/s)	SO_2 (g/s)	NO_X (g/s)	PM_{10} (g/s)	$PM_{2.5}$ (g/s)	CO (g/s)
Coal Creek	206.41	7.86	334.26	18.59	92.56	103.72	1.25	0.14	6.79
Coal Creek	206.41	7.86	332.04	18.01	89.62	83.11	2.46	0.26	13.17
Coyote	151.79	6.40	378.15	27.86	362.90	181.93	1.13	0.09	17.90
Leland Olds	182.88	5.64	335.37	14.17	17.14	26.71	1.65	0.67	24.15
Leland Olds	182.88	8.23	335.37	9.48	33.81	107.63	1.21	0.49	24.23

Ambient air quality data are used to represent the contribution to total ambient air pollutant concentrations from natural and non-modeled anthropogenic sources. The Department modeling guidance provides fixed background concentrations for criteria pollutants that reflect default values which are representative for the entire State of North Dakota.[10] These values are provided in Table 4-6 and were used in the air quality modeling analysis.

Table 4-6. Background Concentrations (µg/m³)

Pollutant	Averaging Period				
	1-hour	3-hour	8-hour	24-hour	Annual
SO_2	13	11	---	9	3
NO_2	35	---	---	---	5
PM_{10}	---	---	---	30	15
$PM_{2.5}$	---	---	---	13.7	4.75
CO	1,149	---	1,149	---	---

[10] https://deq.nd.gov/publications/AQ/policy/Modeling/ND_Air_Dispersion_Modeling_Guide.pdf

5. NAAQS MODELING ANALYSIS

A ND AAQS analysis was conducted to determine the cumulative impact from the Project, existing MRY sources, nearby sources, and background in the vicinity of the MRY Station. The modeling results in micrograms per cubic meter (µg/m^3) are summarized in Tables 5-1 and 5-2. As shown in the tables, the modeled impacts of the proposed project were below the ND AAQS for each pollutant and averaging period for both operating modes modeled.

Table 5-1. ND AAQS Modeling Results for Mode 1

Pollutant	Averaging Period	Rank of Modeled Impacts	Mode 1 Modeled Conc. (µg/m^3)	Background Conc. (µg/m^3)	Total Conc. (µg/m^3)	ND AAQS (µg/m^3)	% of Criteria
NO_2	1-hr[1]	H8H	43.48	35.0	78.48	188	42
	Annual[2]	H1H	1.31	5.0	6.31	100	6
PM_{10}	24-hr[3]	H6H	7.81	30.0	37.81	150	25
$PM_{2.5}$	24-hr[4]	H8H	5.47	13.7	19.17	35	55
	Annual[5]	H1H	0.71	4.75	5.46	12	45
SO_2	1-hr[6]	H4H	47.25	13.0	60.25	196	31
	3-hr[7]	H2H	60.40	11.0	71.40	1,309	5
	24-hr[7]	H2H	15.20	9.0	24.20	365	7
	Annual[2]	H1H	1.48	3.0	4.48	80	6
CO	1-hr[7]	H2H	31.82	1,149.0	1,180.82	40,000	3
	8-hr[7]	H2H	10.74	1,149.0	1,159.74	10,000	12

1 Eighth-highest maximum daily 1-hour concentration (98th percentile) averaged over the 5 years.
2 Maximum annual concentration over the 5 years.
3 Sixth-highest maximum 24-hour concentration averaged over the 5 years.
4 Eighth-highest maximum 24-hour concentration averaged over the 5 years.
5 Maximum annual concentration averaged over the 5 years.
6 Fourth-highest maximum daily 1-hour concentration (99th percentile) averaged over the 5 years.
7 Second-highest maximum concentration over the 5 years.

Table 5-2. ND AAQS Modeling Results for Mode 2

Pollutant	Averaging Period	Rank of Modeled Impacts	Mode 2 Modeled Conc. (µg/m^3)	Background Conc. (µg/m^3)	Total Conc. (µg/m^3)	ND AAQS (µg/m^3)	% of Criteria
NO_2	1-hr[1]	H8H	44.20	35.0	79.20	188	42
	Annual[2]	H1H	1.33	5.0	6.33	100	6
PM_{10}	24-hr[3]	H6H	7.97	30.0	37.97	150	25
$PM_{2.5}$	24-hr[4]	H8H	5.56	13.7	19.26	35	55
	Annual[5]	H1H	0.71	4.75	5.46	12	46
SO_2	1-hr[6]	H4H	48.33	13.0	61.33	196	31
	3-hr[7]	H2H	60.70	11.0	71.70	1,309	5
	24-hr[7]	H2H	16.16	9.0	25.16	365	7
	Annual[2]	H1H	1.54	3.0	4.54	80	6
CO	1-hr[7]	H2H	32.24	1,149.0	1,181.24	40,000	3
	8-hr[7]	H2H	10.98	1,149.0	1,159.98	10,000	12

1 Eighth-highest maximum daily 1-hour concentration (98th percentile) averaged over the 5 years.
2 Maximum annual concentration over the 5 years.
3 Sixth-highest maximum 24-hour concentration averaged over the 5 years.
4 Eighth-highest maximum 24-hour concentration averaged over the 5 years.
5 Maximum annual concentration averaged over the 5 years.
6 Fourth-highest maximum daily 1-hour concentration (99th percentile) averaged over the 5 years.
7 Second-highest maximum concentration over the 5 years.

6. AIR TOXICS ANALYSIS

The Policy for the Control of Hazardous Air Pollutant Emissions in North Dakota (Air Toxics Policy)[11] outlines the methods used to evaluate new or modified emission sources which release Hazardous Air Pollutants (HAPs) into the ambient air for their potential carcinogenic and non-carcinogenic health risks. The acceptable risk is evaluated by determining the maximum individual carcinogenic risk (MICR) for all toxics with known or possible carcinogenic effects. A MICR value of 1.0 x 10-5 (i.e., 1 in 100,000 risk), and Hazard Index (HI) of 1 are the accepted thresholds, any value greater will trigger further review by the Department.

6.1 Method

The Air Toxics Policy outlines a three-tier approach for use in determining compliance. Tier 1 uses lookup tables (provided in pages 16-17 of the Air Toxics Policy), which lists normalized maximum 1-hr concentrations for various stack heights and downwind distances.

Tier 2 involves using EPA's SCREEN3 model to produce the highest predicted 1-hr concentration from a matrix of predictions for a given set of source conditions and downwind distances in all plausible meteorological conditions. The use of SCREEN3 is considered conservative, but less conservative than Tier 1.

Tier 3 involves the use of refined EPA computer models, such as AERMOD. The use of refined modeling uses actual hour-by-hour meteorological and actual site terrain data. The use of refined modeling also treats each stack or emission point independently. DCC implemented a Tier 3 analysis.

The specifics of each Tier's methods for calculating MICR and the Hazard Index can be found in the Air Toxics Policy.

6.2 Air Toxics Results

DCC performed a conservative Tier 3 approach to determine the MICR and HI which would result from the Project. This conservative approach consisted of DCC normalizing total toxic emissions from the absorber stack to 1 g/s. The unit modeled impacts were then scaled based on the emission rates of HAP emitted and divided by the pollutant specific unit risk factor to obtain calculated risk and hazard indices. These results are shown in Table 6-1. The results are well below the thresholds and indicate that the expected MICR and HI concentrations are well in compliance with the Air Toxics Policy. Refer to DCC's permit application for the detailed discussion regarding the Air Toxics analysis and results.

Table 6-1. Air Toxics MICR and Hazard Index Results

Standard	Limit	Results	Pass (Y/N)
MICR	1.0E-05	5.14E-07	Y
Hazard Index	1	0.016	Y

[11] https://deq.nd.gov/publications/AQ/policy/Modeling/Air_Toxics_Policy.pdf

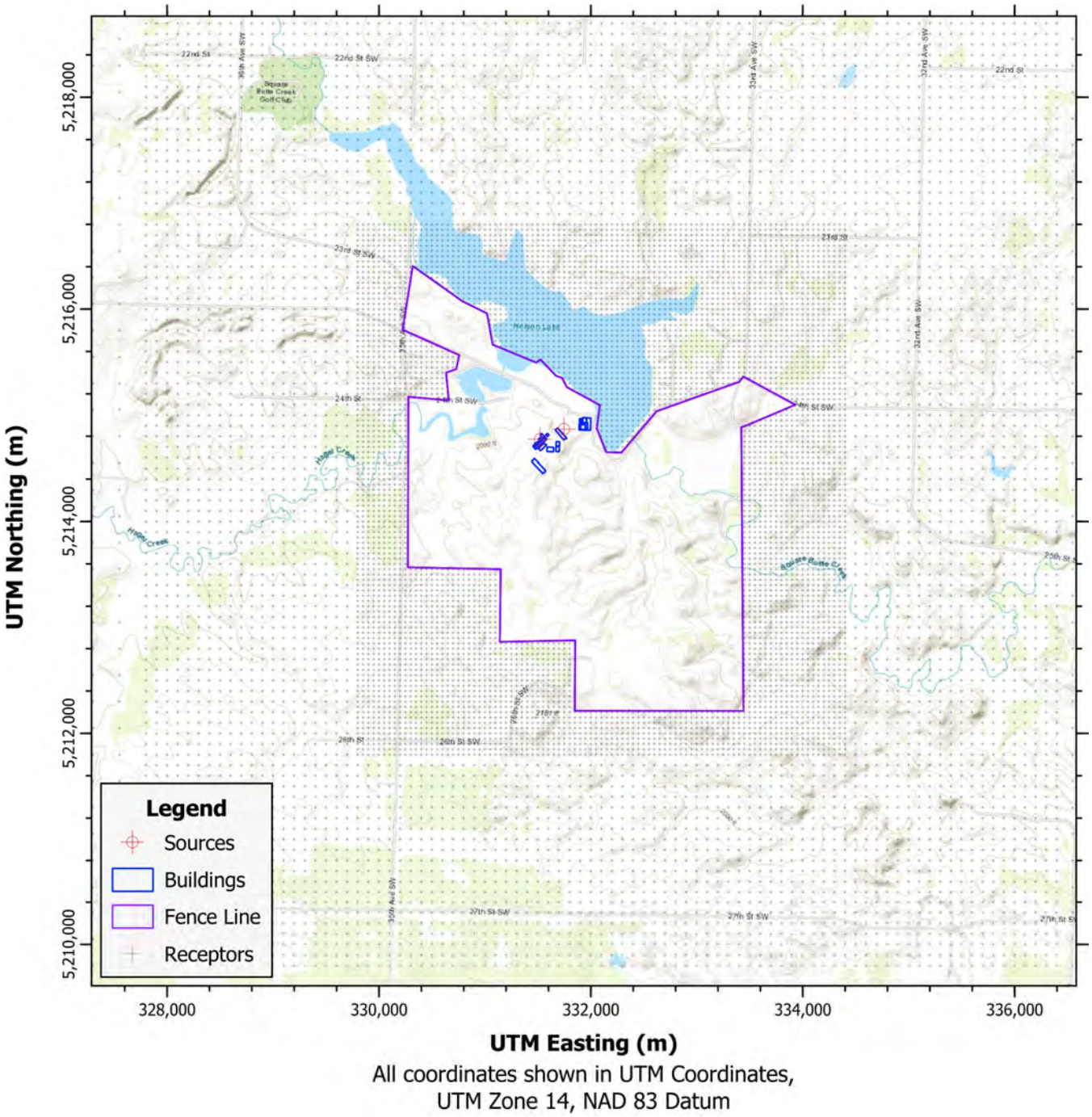
7. SUMMARY AND CONCLUSIONS

Upon Trinity's review and third-party analysis of the modeling submitted by DCC, the following is concluded:

- DCC followed applicable state and Federal guidance in their modeling protocol.
- DCC's modeling was conducted to demonstrate that emissions from the Project are expected to comply with North Dakota Ambient Air Quality Standards (ND AAQS). Emissions associated with operating the facility after the Project are not expected to cause or contribute to a violation of the ND AAQS as listed in NDAC 33.1-15-02-04. Results of the modeled impacts for the ND AAQS are displayed in Figures 1-1, 5-1, and 5-2.
- The air toxics analysis conducted by DCC follows the procedure put forth in the Department's Air Toxics Policy. The results indicate that the expected MICR and HI thresholds are in compliance with the Air Toxics Policy.

APPENDIX A. PLOTS AND FIGURES

Figure A-1. Site Layout



All coordinates shown in UTM Coordinates,
UTM Zone 14, NAD 83 Datum

Figure A-2. Terrain

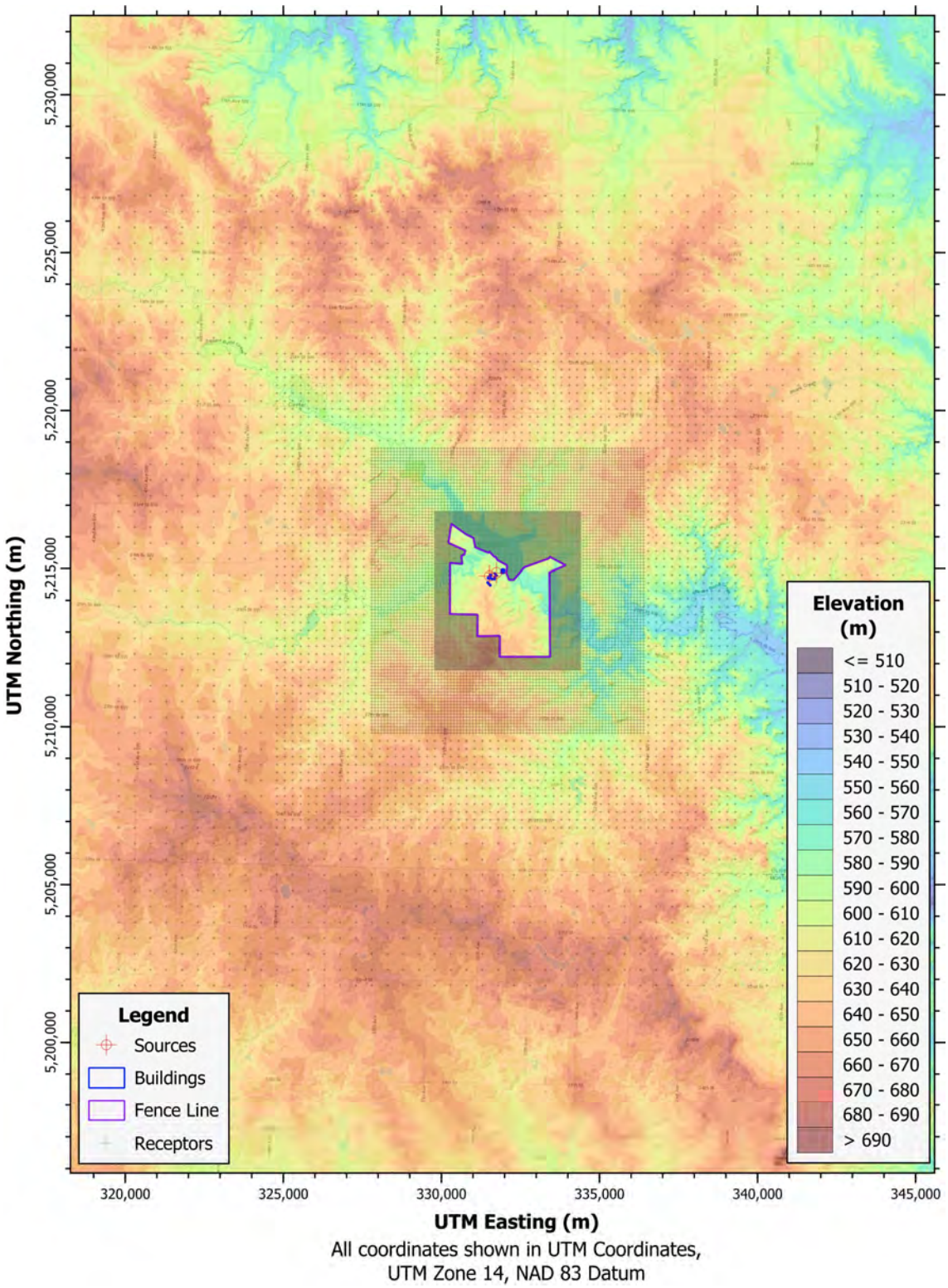


Figure A-3. Wind Rose for Beulah Station (10-meter level) for 2017-2021

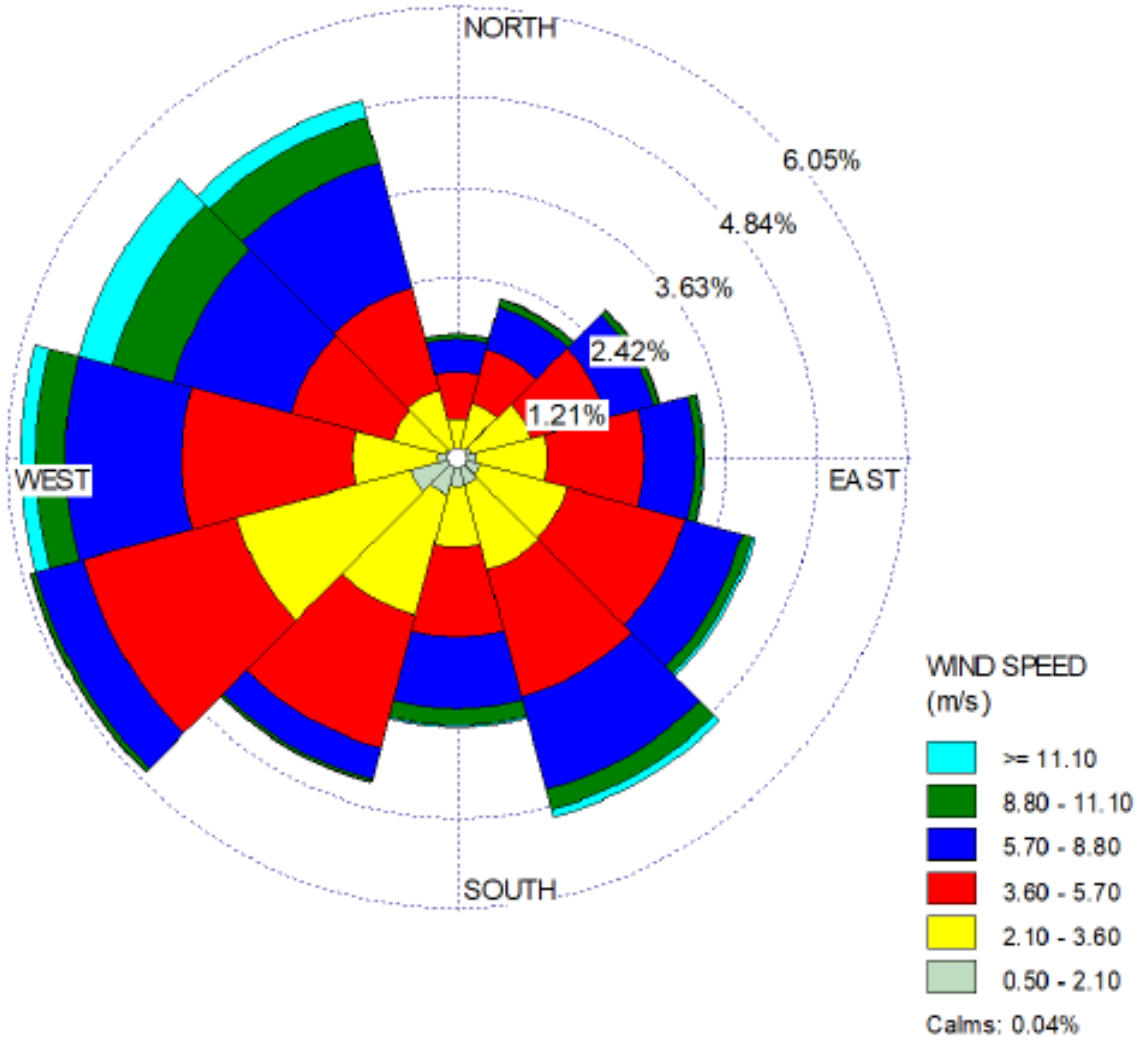


Figure A-4. Receptor Grid

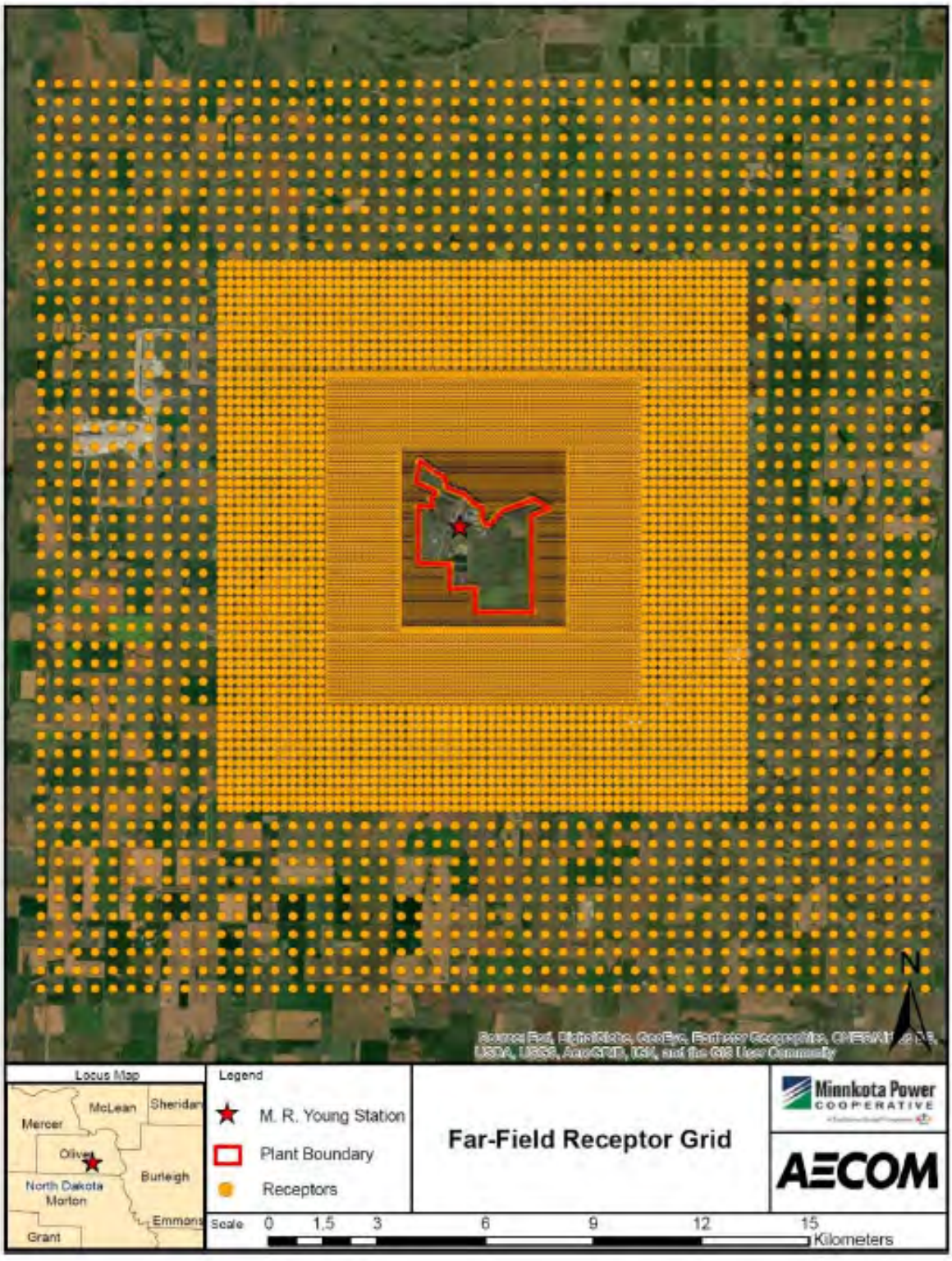


Figure A-5. 1-Hour NO_2 ND AAQS Concentrations for Mode 2

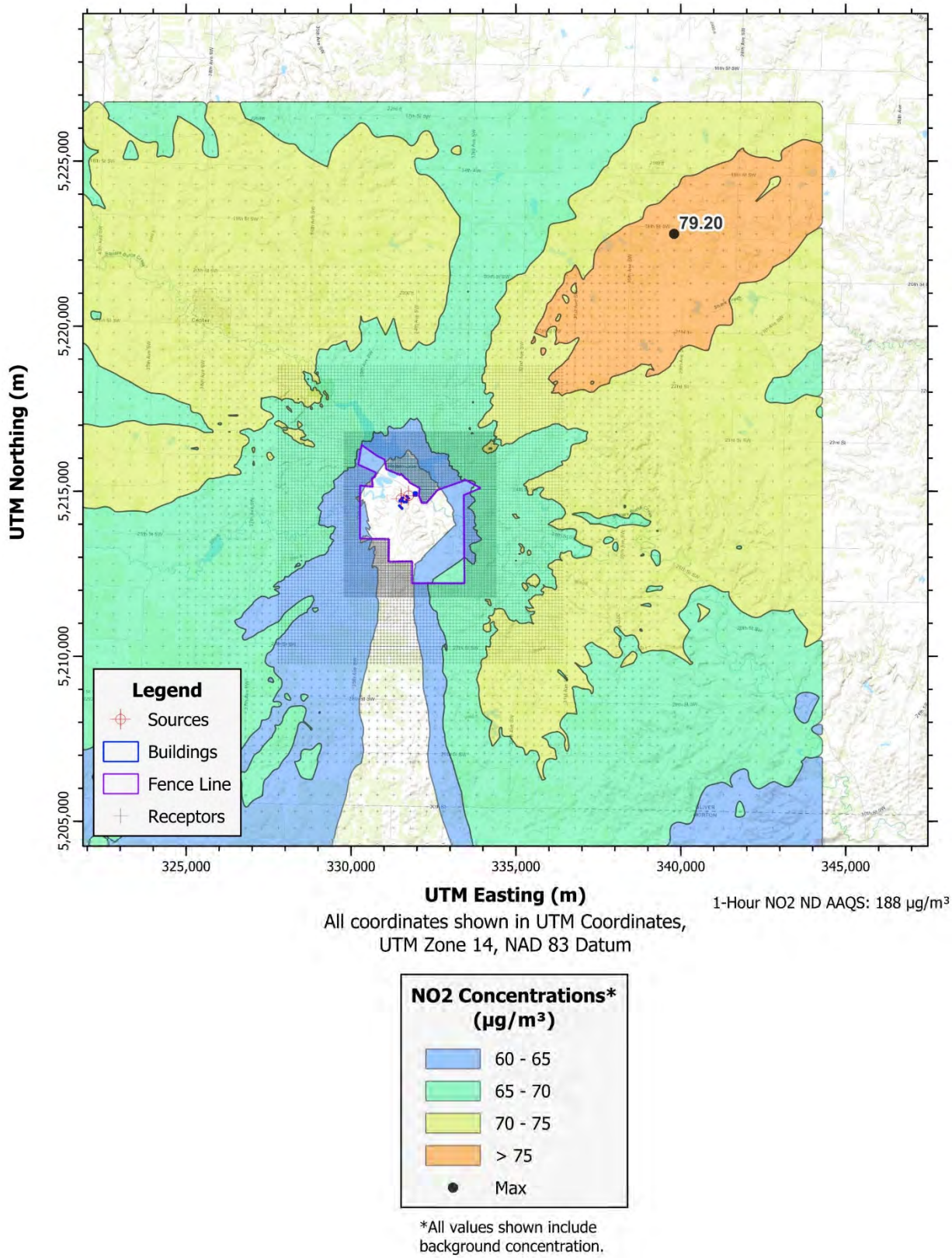


Figure A-6. Annual NO_2 ND AAQS Concentrations for Mode 2

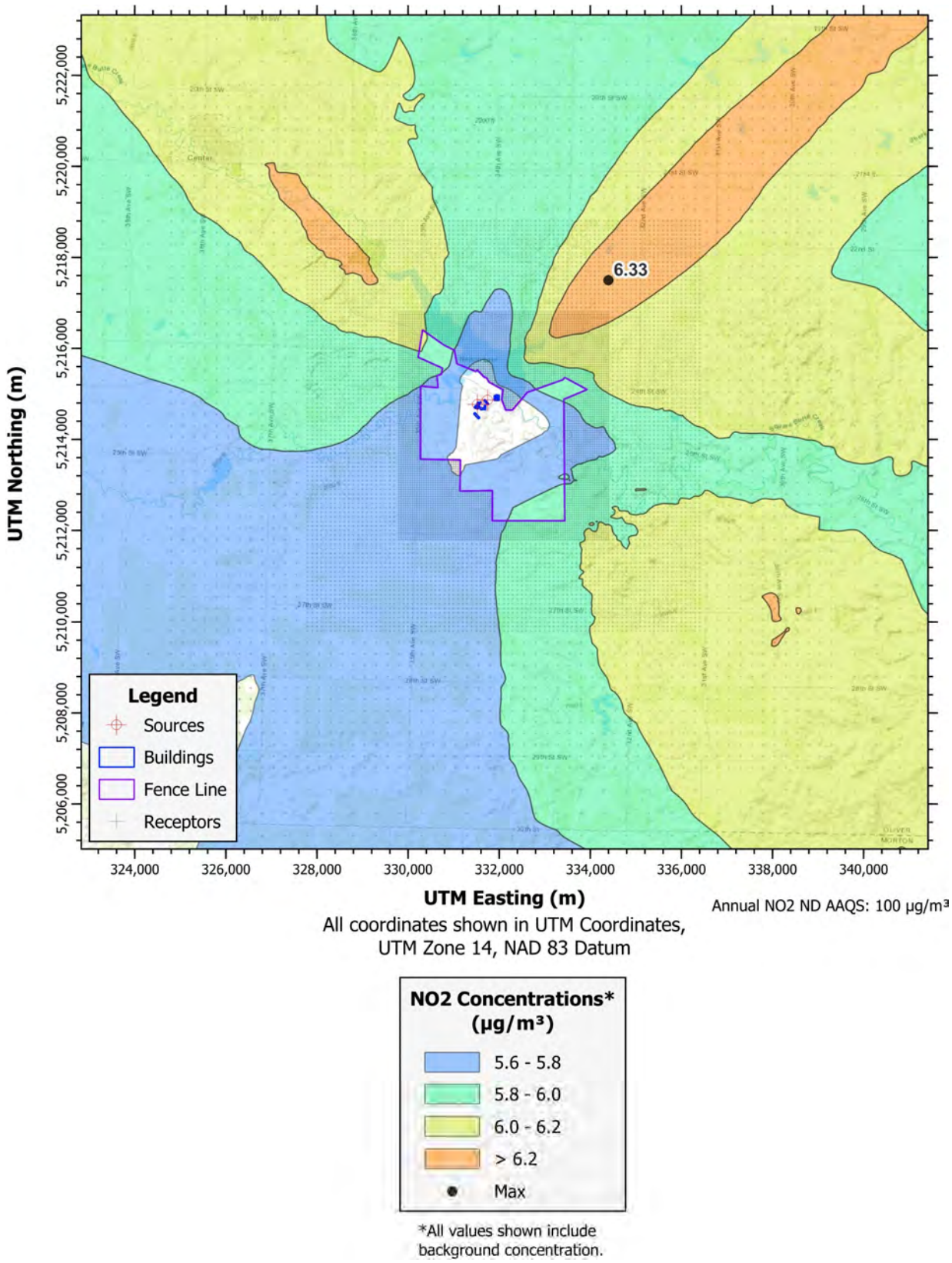


Figure A-7. 24-hour PM_{10} ND AAQS Concentrations for Mode 2

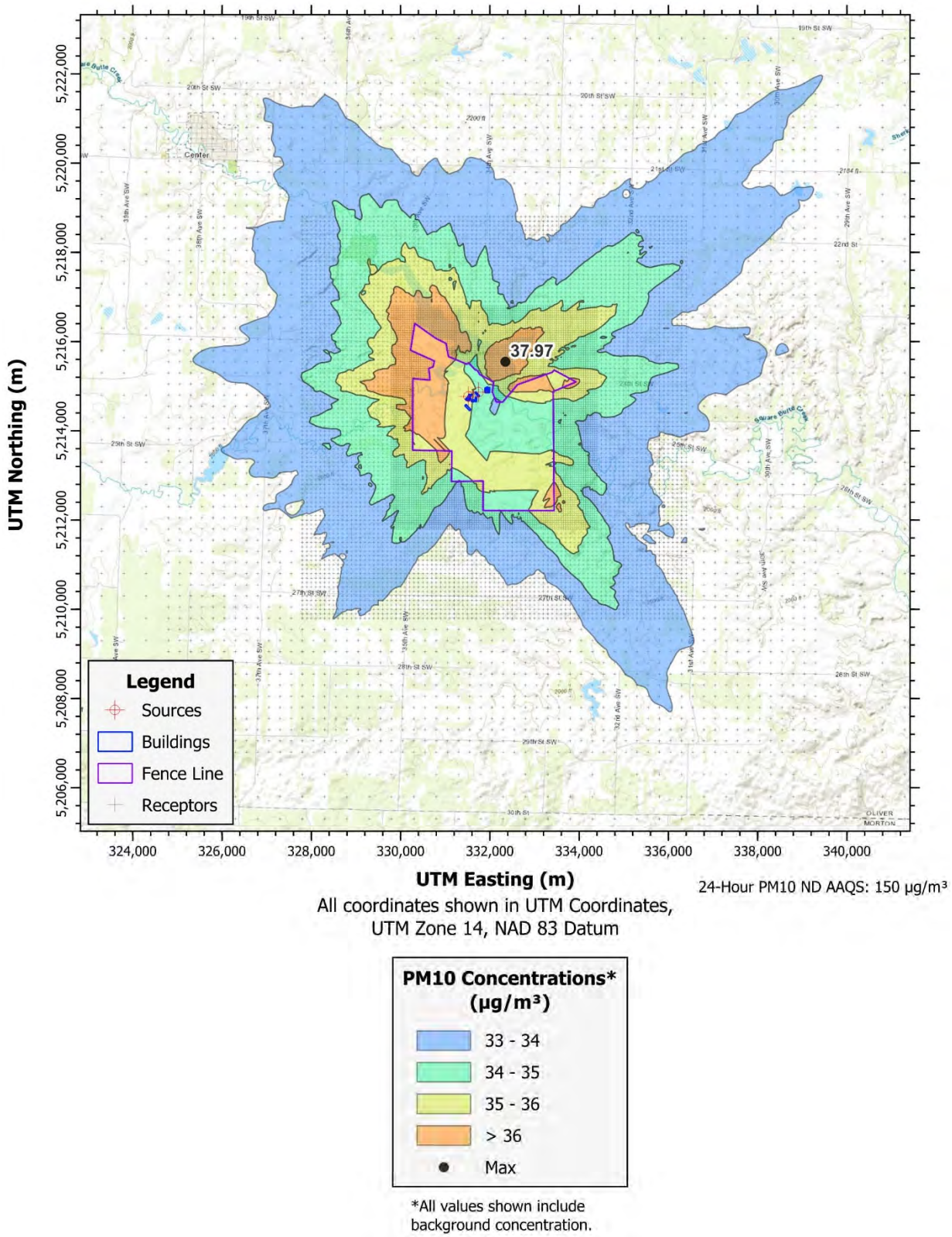


Figure A-8. 24-hour $PM_{2.5}$ ND AAQS Concentrations for Mode 2

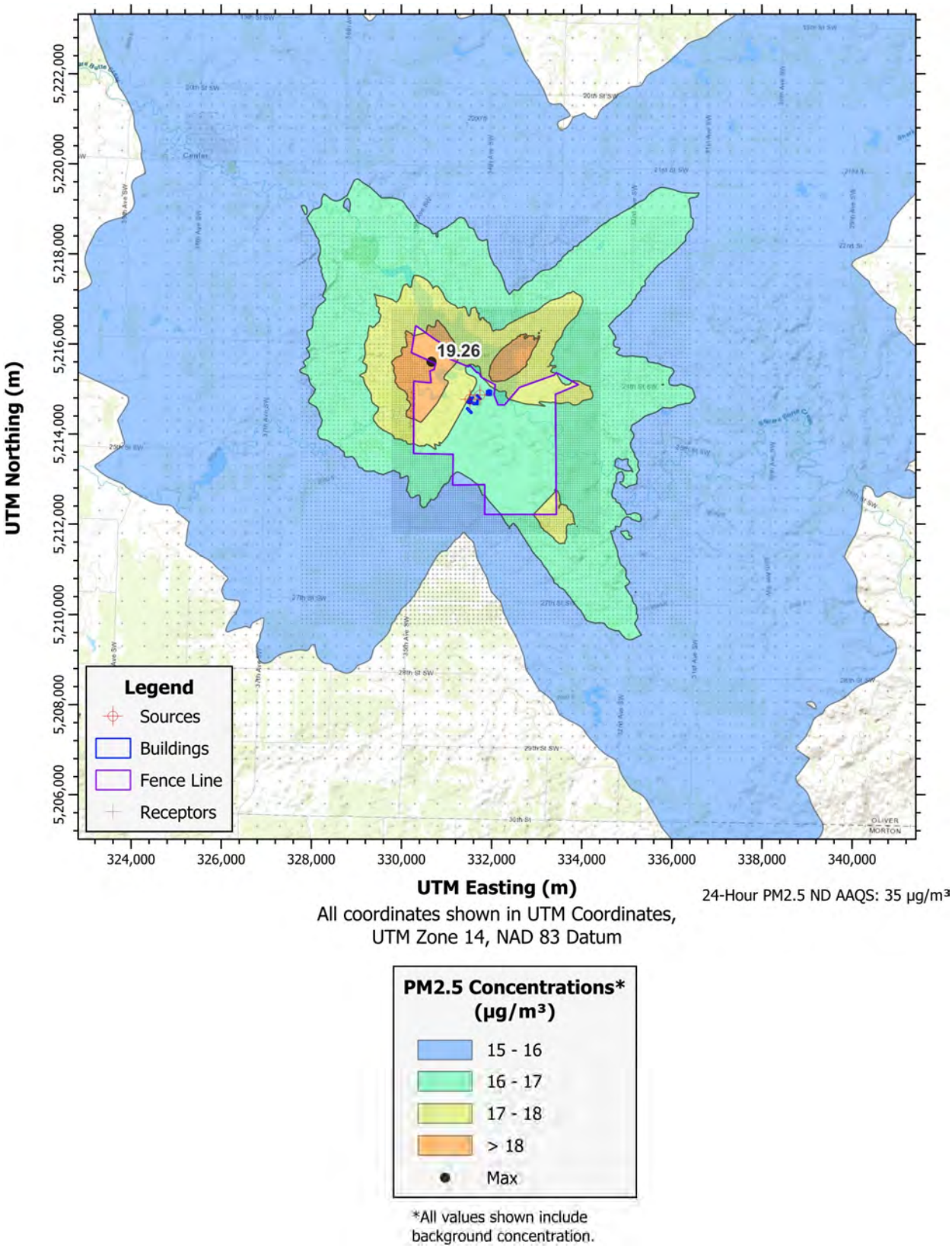


Figure A-9. Annual $PM_{2.5}$ ND AAQS Concentrations for Mode 2

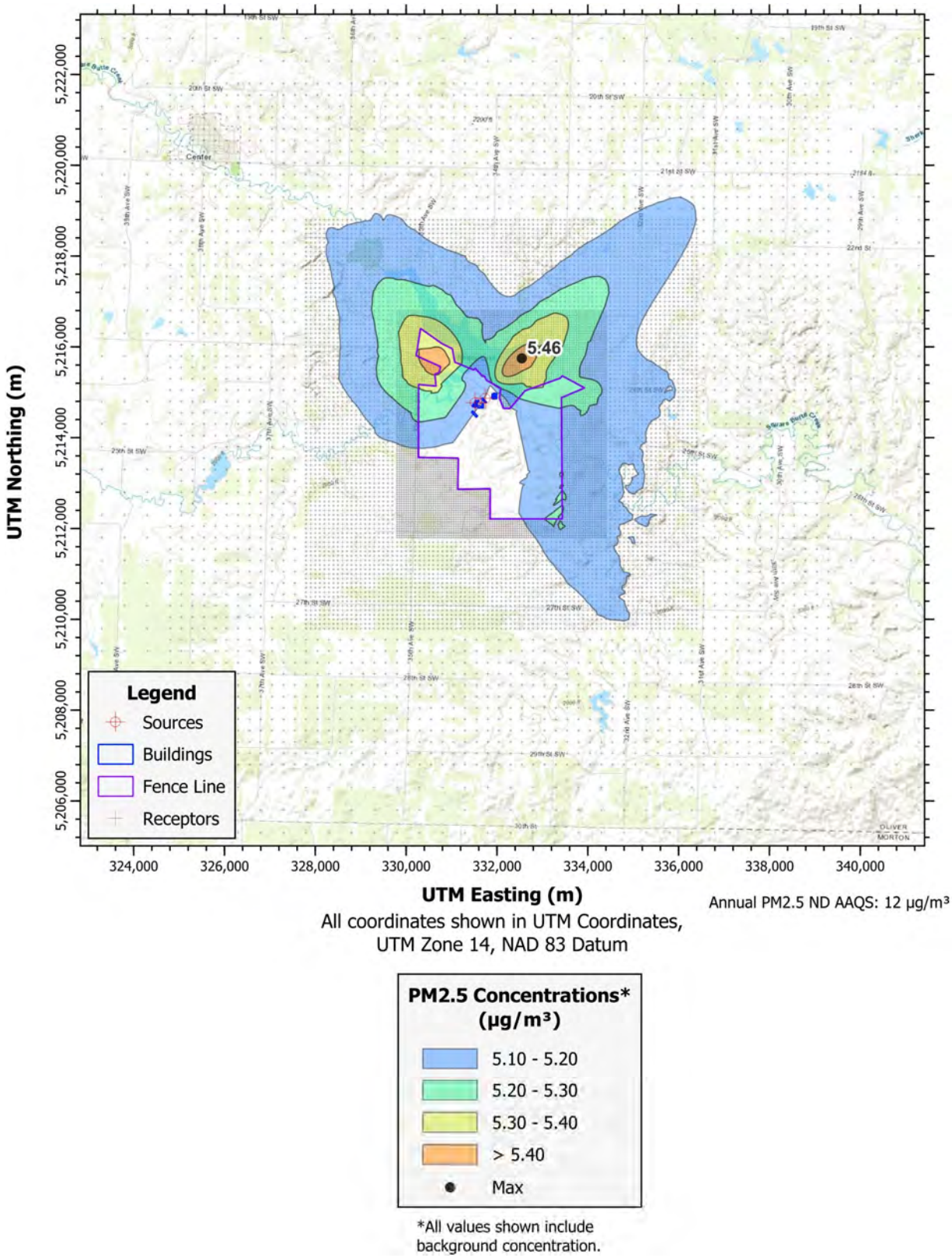


Figure A-10. 1-hour SO_2 ND AAQS Concentrations for Mode 2

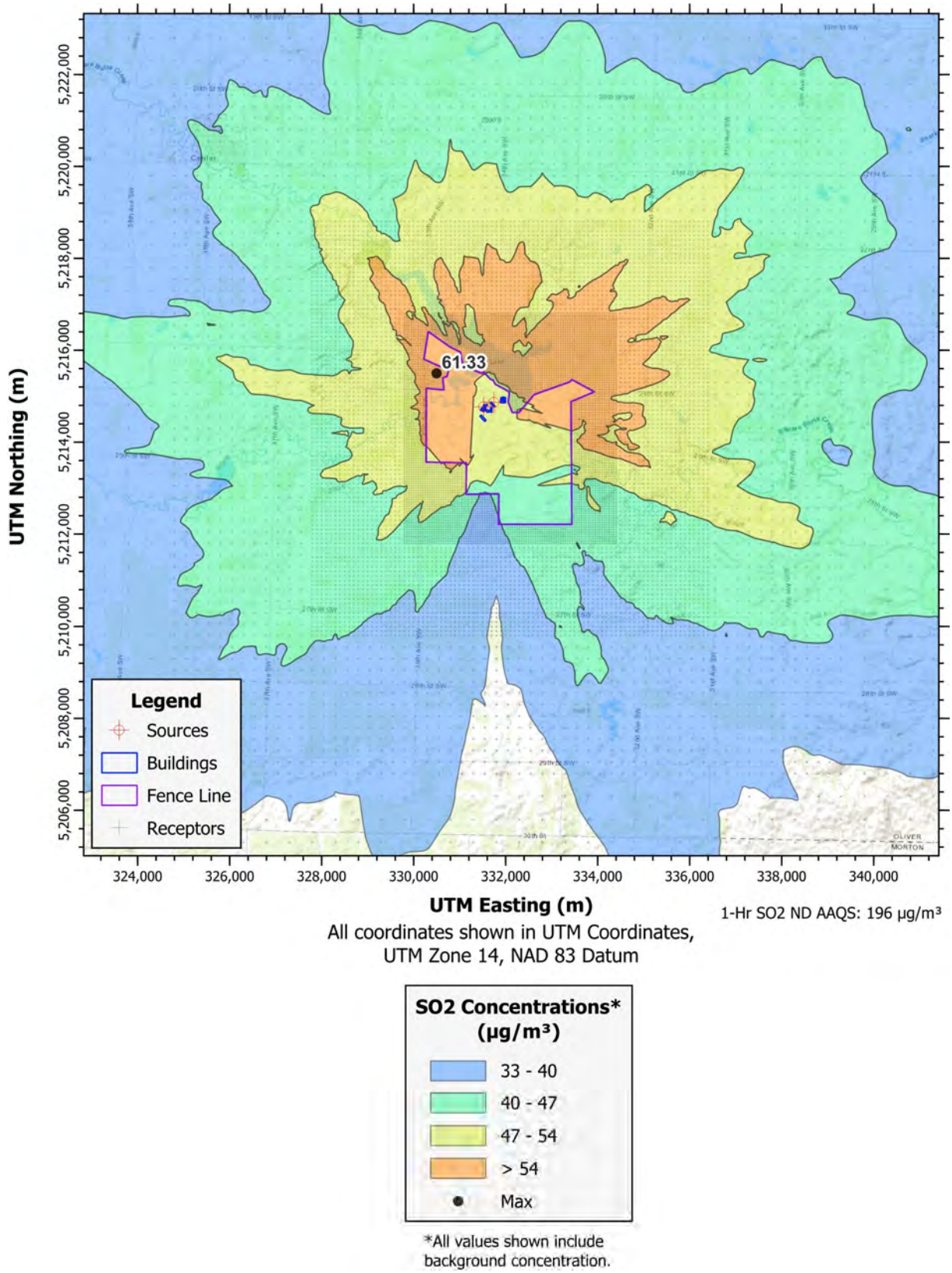


Figure A-11. 3-hour SO_2 ND AAQS Concentrations for Mode 2

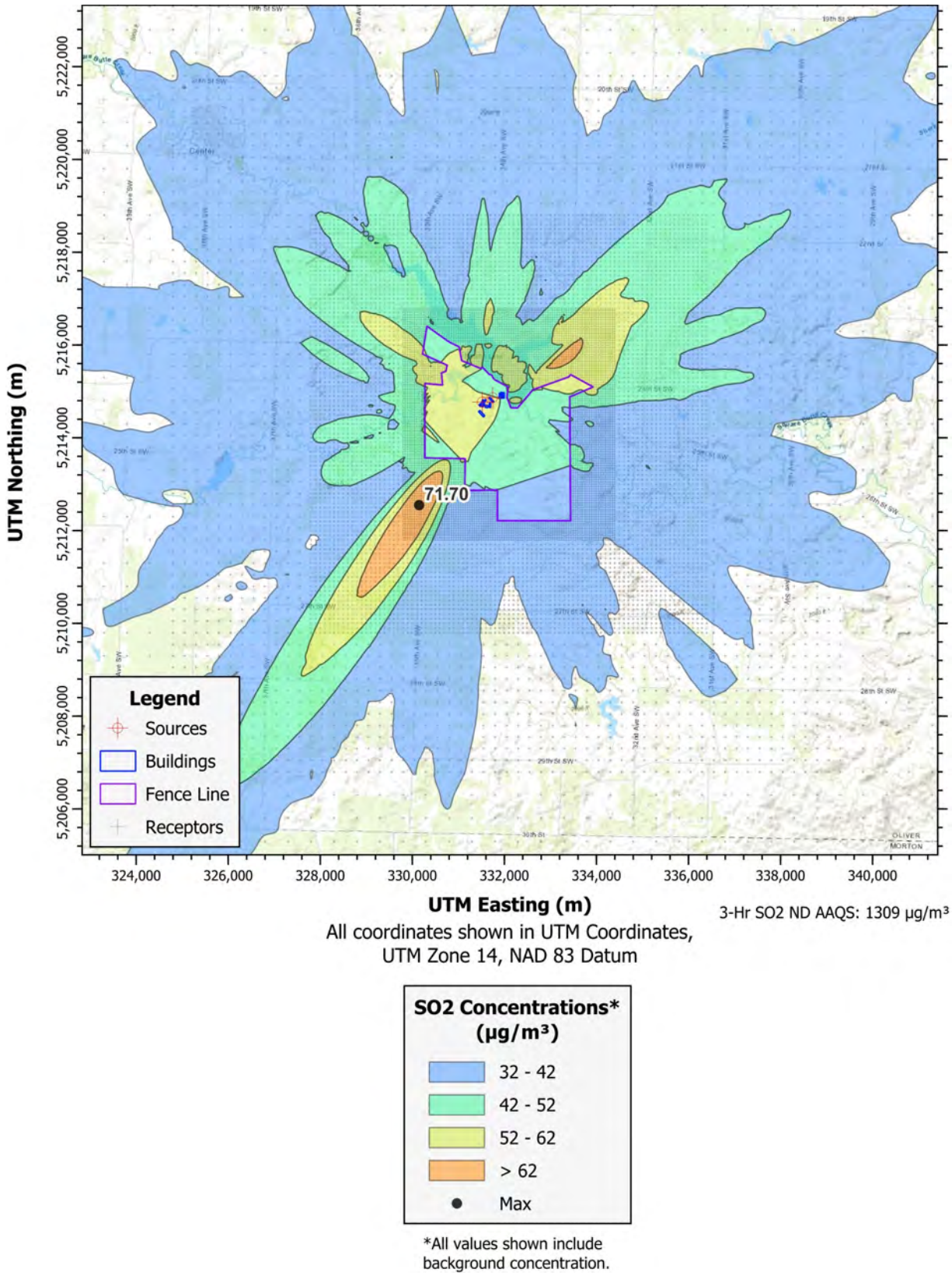


Figure A-12. 24-hour SO_2 ND AAQS Concentrations for Mode 2

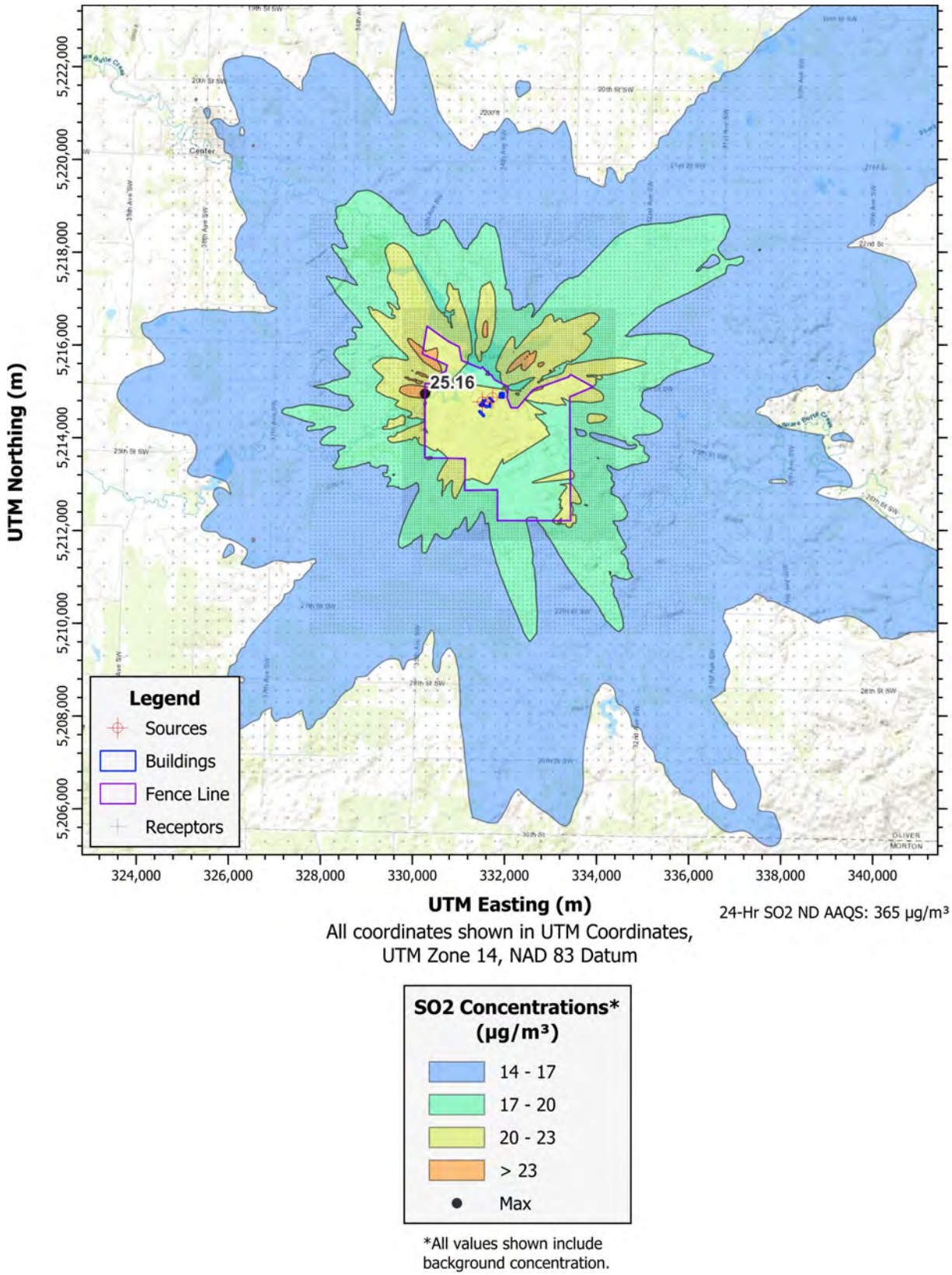


Figure A-13. Annual SO_2 ND AAQS Concentrations for Mode 2

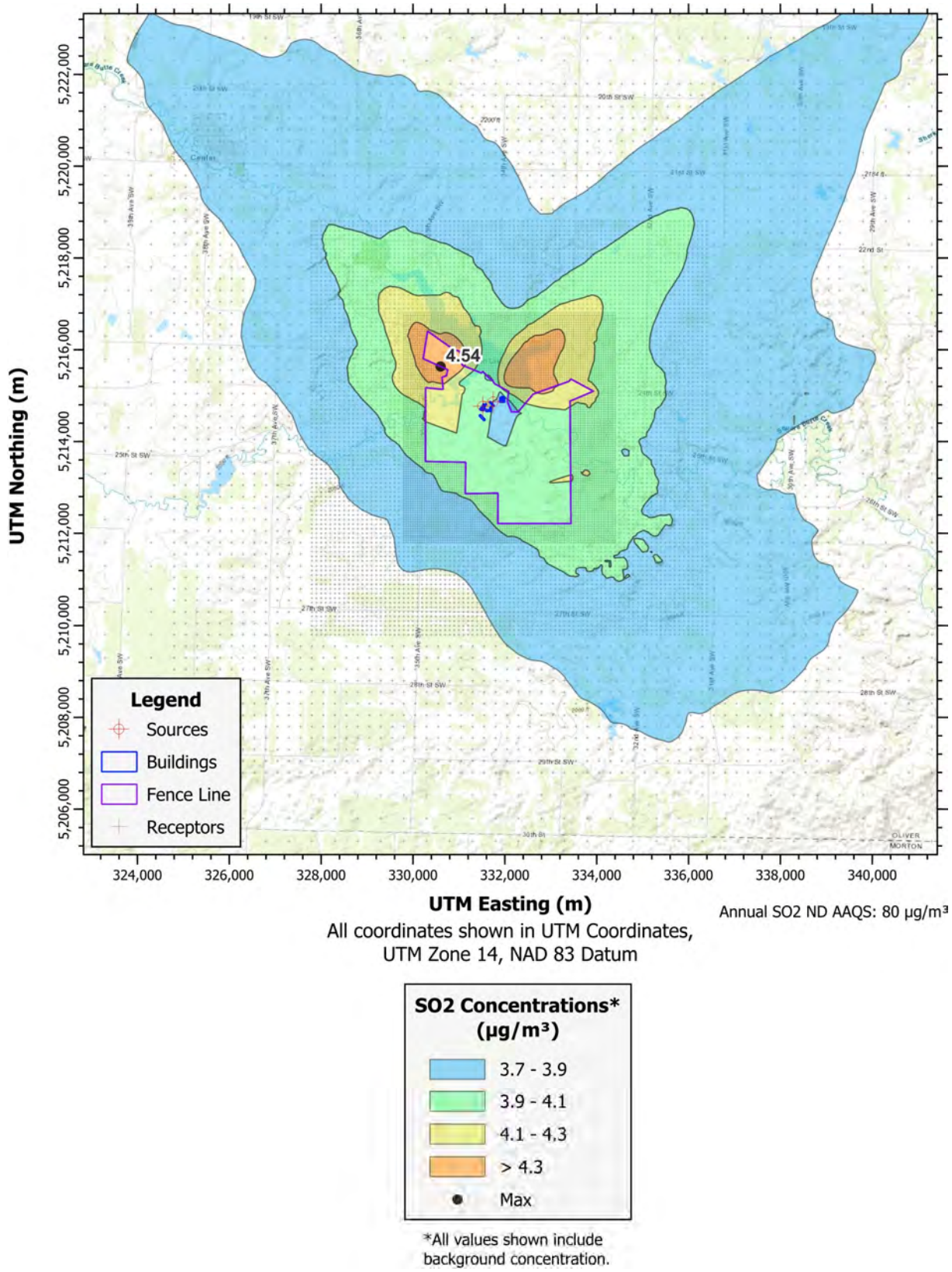


Figure A-14. 1-hour CO ND AAQS Concentrations for Mode 2

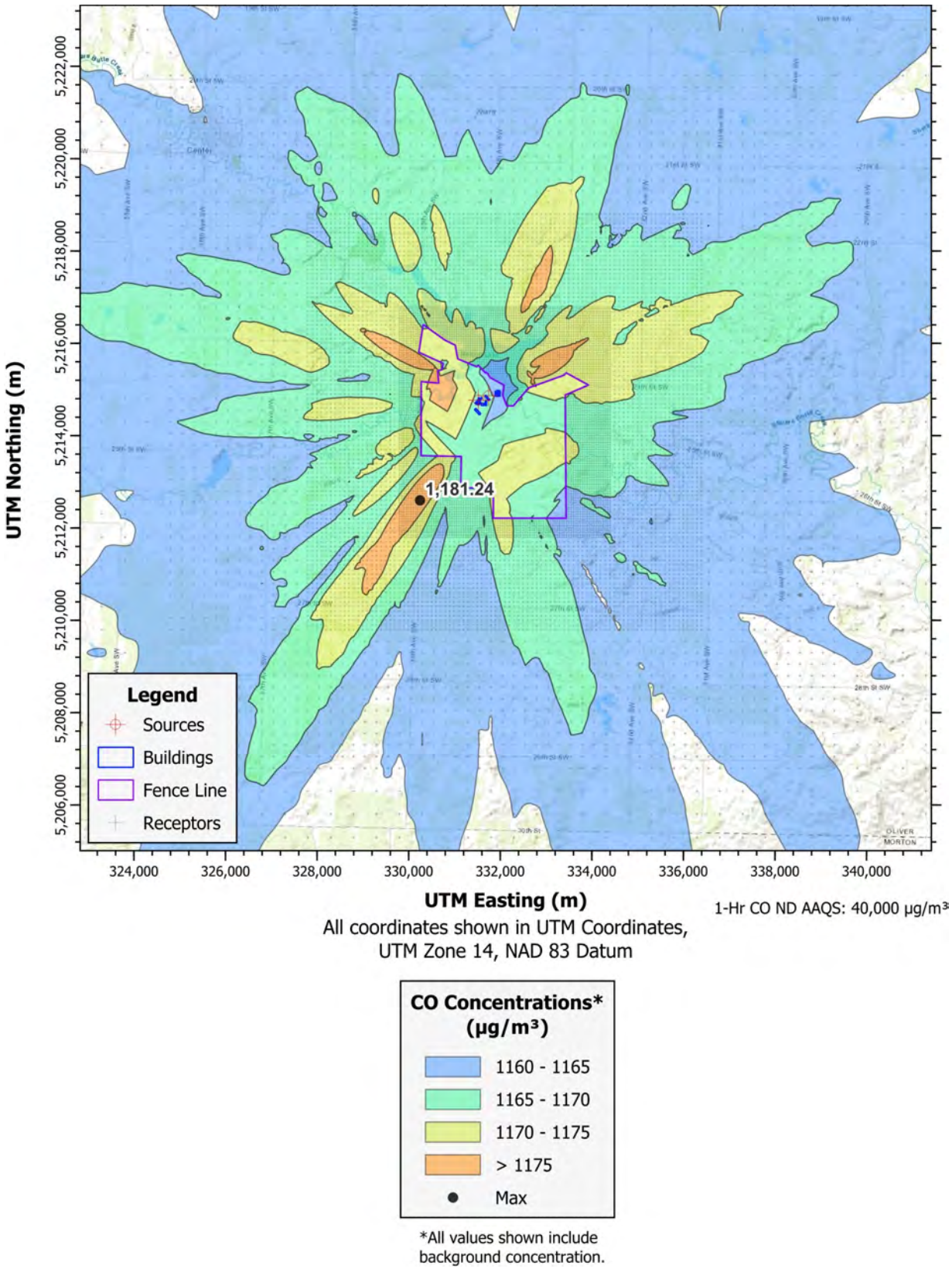


Figure A-15. 8-hour CO ND AAQS Concentrations for Mode 2