Law, Donald

From:	Law, Donald
Sent:	Monday, May 01, 2017 4:01 PM
To:	'amcurnow@nrg-llc.com'; 'amy@aspenenvironmentals.com'; 'ashley@AspenenvironmentalS.com'; 'Bill Jamieson'; 'Bobbi Tessier'; 'bret@bison-eng.com'; 'brogers@newfield.com'; 'bsohm@swca.com'; 'carla.latuda@qepres.com'; 'carolyn.hare@arcadis-us.com'; 'ceecee_candler@eogresources.com'; 'chalvorson@mhanation.com'; 'Chris J Colville'; 'Coburnbergum@gmail.com'; 'colin.harris@hro.com'; 'cory.miller@qepres.com'; 'cynthia_hanselman@eogresources.com'; Darling, Corbin; 'david_long@eogresources.com'; 'dclark@petrohunt.com'; 'debbie.stanberry@qepres.com'; 'dhanson@petrohunt.com'; 'Don Shepherd'; 'doug.lee@arrowmidstream.com'; 'Douglas Goulding'; 'Drew Hall'; 'ed.liebsch@hdrinc.com'; 'elewis@fulbright.com'; 'emmett.keegan@sageenvironmental.com'; 'envjoel@ix.netcom.com'; 'eric_dille@eogresources.com'; 'fdsearle@marathonoil.com'; 'ffox@mhanation.com'; 'Gibbons, Thomas'; 'jeepaxle@gmail.com'; 'Jeffrey Stovall'; 'jeffrey.hunt@bia.gov'; 'jherman@petrohunt.com'; 'jholtkamp@hollandhart.com'; 'jj@baumstarkbraaten.com'; 'jmalone@aquionix.com'; 'jmblanco@marathonpetroleum.com'; 'jodell.mizoue@wpxenergy.com'; 'John Barth'; 'John Jehn'; 'john_mcmichael@xtoenergy.com'; 'jon.bandzul@sageenvironmental.com'; 'jsemerad@nd.gov'; 'Kathy Smit'; 'kenhall@mhanation.com'; 'Kenny Malmquist'; 'kholthouser@slawsoncompanies.com'; 'ksuthiwan@slawsoncompanies.com'; 'Lionel Trepanier'; 'lselser@sbpipeline.com'; 'Lynn Olson'; 'marilyn.bercier@bia.gov'; 'mark.herman@bia.gov'; 'matt.mahler@qepres.com'; 'Matthew Hazleton'; 'mbdurrant@hollandhart.com'; 'mday@us-dev.com'; 'mfischel@tecinc.com'; 'mhouston@slawsoncompanies.com'; 'Michele Ebbole'; 'Mike Smith'; 'mike_oconnor@xtoenergy.com'; 'mistirude73@yahoo.com'; 'mjensen@aquionix.com'; 'mppeacock@marathonoil.com'; 'nina_hutton@xtoenergy.com'; 'pam.roth@wpxenergy.com'; 'publisher@petroleumnews.com'; 'rgorka@slawsoncompanies.com'; 'richard.k.culmer@xtoenergy.com'; 'rick.matar@wpxenergy.com'; 'rkskiba@MarathonOil.com'; 'robert.king@wpxenergy.com'; 'Scott Mason'; 'susan.newhams@bryancave.com'; 'tbb09@restel.com'; 'tbb58763@yahoo.com'; 'thompsonIII@gtlaw.com'; 'thompsonro@gtlaw.com'; 'tmerrill@aquionix.com'; 'toclair@nd.gov'; 'Todd Hartleben'; 'tysmith@lesair.com'; 'Victoria Parker-Christensen'; 'vinnie.rigatti@qepres.com'; 'Woolery, Tonya S. (MRO)'
Subject:	Notice of Issuance of Permit to Construct on the Fort Berthold Indian Reservation
Attachments:	Response to Comments TBPS SMNSR 5-1-17.pdf; Final Permit TBPS SMNSR 5-1-2017.pdf

This is to notify you that the EPA has issued a final Clean Air Act (CAA) synthetic minor permit to construct for the Thunder Butte Petroleum Services Crude Storage and Loading Facilty pursuant to the Tribal Minor New Source Review (MNSR) Permit Program at 40 CFR Part 49. The final MNSR permit and response to comments can be accessed in PDF format on our website at: http://www.epa.gov/caa-permitting/caa-permits-issued-epa-region-8.

The effective date of this permit is May 1, 2017.

Law, Donald

From: Law, Donald
Sent: Monday, May 01, 2017 3:53 PM
To: 'berniefox@mhanation.com'; 'Richard E. Mayer'; 'Felty, Roger'; Al Nygard; Cloutier, Kathryn
Cc: Fallon, Gail; North, Alexis; Smith, Claudia; Joffe, Brian
Subject: Final SMNSR Permit for Thunder Butte Petroleum Services Crude Storage and Loading Facility
Attachments: Final Permit TBPS SMNSR 5-1-2017.pdf; Response to Comments TBPS SMNSR 5-1-17.pdf

I have attached the final requested permit and the accompanying response to comments document for the Thunder Butte Petroleum Services Crude Storage and Loading Facility issued pursuant to the Tribal Minor New Source Review (MNSR) Program at 40 CFR Part 49. We will also be posting the final MNSR permit and response to comments in PDF format on our website at: http://www.epa.gov/caa-permitting/caa-permits-issued-epa-region-8.

The final permit is effective on May 1, 2017.

Law, Donald

From: Felty, Roger <Roger.Felty@arcadis.com>
Sent: Friday, April 21, 2017 3:51 PM
To: Law, Donald
Cc: Bernie Fox; Luke Spotted Bear; Pete Hale; Cloutier, Kathryn; Felty, Roger
Subject: RE: Thunder Butte draft air permit
Attachments: TBPSTerminal Proposed Permit-TSD SMNSR-000781-2016.001_3-16-17 Arcadis e....pdf

Hi DJ,

Attached are the minor edits that we have for the Thunder Butte draft permit and technical support document (TSD).

These are not formal comments, but rather informal input on one minor typo in a permit condition and a few suggested clarifications for the TSD.

Thanks for your efforts on developing this permit for the facility.

Please contact me with any questions.

Best regards, Roger

Roger Felty | Principal Environmental Specialist | Environmental Business Consulting, Air Services
roger.felty@arcadis.com
Arcadis | Arcadis U.S., Inc.
11001 W. 120th Avenue Suite 200 Broomfield CO | 80021 | USA
T. +1 720 409 0288

Connect with us! www.arcadis.com | LinkedIn | Twitter | Facebook

ARCADIS Design & Consultancy for natural and built assets

Be green, leave it on the screen.

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

Ref: 8P-AR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Richard Mayer, Chief Executive Officer
Thunder Butte Petroleum Services, Inc.
P.O. Box 1227
New Town, North Dakota 58763

Re: Thunder Butte Petroleum Services, Inc., Thunder Butte Petroleum Services Crude Storage and Loading Facility, Permit #SMNSR-TAT-000781-2016.001, Proposed Synthetic Minor New Source Review Permit

Dear Mr. Mayer:

The U.S. Environmental Protection Agency Region 8 has completed its review of Thunder Butte Petroleum Service, Inc.'s application requesting a synthetic minor permit pursuant to the Tribal Minor New Source Review (MNSR) Permit Program at 40 CFR part 49 for the Thunder Butte Petroleum Services Crude Storage and Loading Facility, located on Indian country lands within the Fort Berthold Indian Reservation in North Dakota.

Enclosed are the proposed permit and the corresponding technical support document. The regulations at 40 CFR 49.157 require that the affected community and the general public have the opportunity to submit written comments on any proposed MNSR permit. All written comments submitted within 30 calendar days after the public notice is published will be considered by the EPA in making its final permit decision. Enclosed is a copy of the public notice which will be published on the EPA's website located at: https://www.epa.gov/caa-permitting/caa-permit-public-comment-opportunities-region-8, on March 22, 2017. The public comment period will end at 5:00 p.m. on April 21, 2017.

The conditions contained in the proposed permit will become effective and enforceable by the EPA if the permit is issued final. If you are unable to accept any term or condition of the draft permit, please submit your written comments, along with the reason(s) for non-acceptance to:

Tribal NSR Permit Contact
c/o Air Program (8P-AR)
U.S. EPA, Region 8
1595 Wynkoop Street
Denver, Colorado 80202

or

R8AirPermitting@epa.gov

If you have any questions concerning the enclosed proposed permit or technical support document, please contact Donald Law of my staff at (303) 312-7015.

Sincerely,

Monica Morales
Acting Director
Air Program

Enclosures (2)

cc: Edmund Baker, Environmental Director, MHA Nation
Al Nygard, Chief Executive Officer, MHA Nation

Edmund Baker, Environmental Director
MHA Nation
404 Frontage Road
New Town, North Dakota 58763-9404

Al Nygard, Chief Executive Officer
MHA Nation
404 Frontage Road
New Town, North Dakota 58763-9404

United States Environmental Protection Agency
Region 8, Air Program
1595 Wynkoop Street
Denver, CO 80202

Air Pollution Control
Synthetic Minor Source Permit to Construct

40 CFR 49.151

#SMNSR-TAT-000781-2016.001

Synthetic Minor Permit to Construct to establish legally and practically enforceable limitations and requirements, specifically: a facility-wide volatile organic compound (VOC) emission limit and to be considered a minor source with respect to the Prevention of Significant Deterioration (PSD) Permit Program at 40 CFR part 52, and the Title V Operating Permit Program at 40 CFR part 71 (Part 71) with respect to VOC emissions.

Permittee:

Thunder Butte Petroleum Services, Inc.

Permitted Facility:

Thunder Butte Petroleum Services Crude Storage and Loading Facility on the
Fort Berthold Indian Reservation
Ward County, North Dakota

Effective:

Month, XX YYYY

Summary

On May 17, 2016, the EPA received from Thunder Butte Petroleum Services, Inc. (TBPS) an application requesting approval to construct and operate a crude oil storage and loading facility within the exterior boundaries of the Fort Berthold Indian Reservation in Ward County, North Dakota. On October 17, 2016, the EPA received supplemental information and received a complete application package on February 3, 2017.

Potential uncontrolled emissions of VOC from the facility were estimated to be 272.47 tons per year (tpy). This permit requires the installation of controls with a 98% VOC control efficiency, and a limit on the amount of crude oil that can flow through the facility in any given year to minimize VOC emissions at the facility. However, potential uncontrolled emissions of all other regulated pollutants were estimated to be at concentrations below the levels that trigger PSD permitting requirements. Therefore, only limits for VOC emissions needed to be addressed in this permit. This permit has an allowable VOC emission level of 94.95 tpy.

The uncontrolled potential emissions for all other criteria pollutants are as follows:

NO_x =	0.42 tpy (uncontrolled potential, not a limit)
SO_2 =	0.01 tpy (uncontrolled potential, not a limit)
CO =	1.28 tpy (uncontrolled potential, not a limit)
PM =	NIL tpy (uncontrolled potential, not a limit)
PM_{10} =	NIL tpy (uncontrolled potential, not a limit)
$PM_{2.5}$ =	NIL tpy (uncontrolled potential, not a limit)
CO_2e =	703.58 tpy (uncontrolled potential, not a limit)

TBPS is required to use vapor collection and enclosed combustors for control of VOC emissions displaced during loading of trucks from the crude oil storage tanks. Additionally, the storage tanks must be equipped with internal floating roofs and the truck-to-tank off-loading stations must use submerged filling to control VOC emissions. Requirements have also been included for minimizing fugitive dust from construction and operation activities.

The EPA has determined that dispersion modeling for the proposed project was not necessary because captured emissions would be controlled by at least 98%, and there are no identified air quality concerns with regard to effects of VOC emissions within the external boundaries of the Fort Berthold Indian Reservation airshed.

Table of Contents

I. Conditional Permit to Construct

A. General Information

Facility:	Thunder Butte Truck Loading Facility
Permit number:	SMNSR-TAT-000781-2016.001
SIC Code and SIC Description:	5171 – Petroleum Bulk Stations and Terminals

The equipment listed in this permit shall be operated by Thunder Butte Petroleum Services, LLC at the following location:

Site Location:	Corporate Office Location
Thunder Butte Truck Loading Facility	Thunder Butte Petroleum Services
NW ¼ Sec 19 T152N R87W	P.O. Box 1227
Fort Berthold Indian Reservation	New Town, North Dakota 58763
Ward County, ND	
Latitude / Longitude:	
47.974722N / -101.869167W	

B. Construction Proposal

This permit approves the construction and operation of a crude oil storage and loading facility. The facility will include two (2) crude oil storage tanks with 140,000-barrel capacity each, four (4) truck-to-tank off-loading stations, and three (3) tank-to-truck loading stations. The crude oil storage tanks will be equipped with internal floating roofs for control of VOC emissions from crude oil storage tanks pursuant to 40 CFR part 60, subpart Kb. The truck off-loading stations will use submerged filling arms and piping to the tanks. The tanks will act as intermediate storage between the trucks that will deliver the crude oil to the facility and the trucks that will transport the crude oil to its final destination. The Permittee will use vapor collection with a 70% capture efficiency and an enclosed combustion device with a 98% VOC control efficiency for the control of VOCs displaced during loading of crude oil into trucks.

C. Applicability

1. This Federal Permit to Construct is being issued under the authority of 40 CFR 49.151, Tribal Minor New Source Review Program (MNSR).

2. The requirements in this permit have been created, at the Permittee's request, to establish a facility-wide VOC emission limit and to maintain minor source status with respect to the PSD Permit Program and thus PSD requirements do not apply.

3. The requirements in this permit are intended to establish legally and practically enforceable restrictions on the potential-to-emit (PTE) of VOC emissions.

4. Any conditions established for this facility or any specific units at this facility pursuant to any Conditional Permit to Construct issued under the authority of 40 CFR part 52 (PSD) or 40 CFR part 49 (MNSR) shall continue to apply.

5. By issuing this permit, EPA does not assume any risk of loss which may occur as a result of the operation of the permitted facility by the Permittee, owner, and/or operator, if the conditions of this permit are not met by the Permittee, owner, and/or operator.

D. Facility-Wide Emission Requirements

1. Facility-wide Emission Limit

Facility-wide VOC emissions shall not exceed 95.0 tons during any consecutive 12 months.

2. Work Practice and Operational Requirements

(a) Total liquid flow rate of crude oil from the storage tanks to the three (3) tank-to-truck loading stations shall not exceed 1,760,000 barrels in any given consecutive 12-month period.

(b) All liquid and gas collection, storage, and handling operations, regardless of size, shall be designed, operated and maintained so as to minimize leakage of hydrocarbons to the atmosphere.

3. Monitoring Requirements – VOC Emissions Calculations **[40 CFR 49.155(a)(3)]**

(a) Total liquid flow rate of crude oil from the storage tanks to the three (3) tank-to-truck loading stations shall be measured as specified in the **Requirements for Tank-to-Truck Loading Stations, Section G** of this permit.

(b) Facility-wide actual VOC emissions shall be calculated in tons and recorded at the end of each month, beginning the first calendar month that operations commence.

(c) Prior to 12 full months of facility-wide VOC emissions calculations, the Permittee shall, at the end of each month, add the emissions for that month to the calculated emissions for all previous months since production commenced and record the total. Thereafter, the Permittee shall, at the end of each month, add the emissions for that month to the calculated emissions for the preceding 11 months and record a new 12-month total.

(d) VOC emissions from all controlled and uncontrolled emission sources at the facility shall be included in the monthly calculation, including, but not limited to: crude oil storage tanks, truck off-loading operations, truck loading operations, engines, enclosed combustion devices, and equipment leaks.

(e) VOC emissions shall be calculated as specified in this permit.

4. Testing Requirements

The Permittee shall conduct semiannual extended laboratory analysis of the crude oil received at the facility to obtain an actual Reid vapor pressure (RVP) to be used in calculating monthly VOC emissions from the truck-to tank off-loading and truck loading and vapor combustion processes.

5. Recordkeeping Requirements **[40 CFR 49.155(a)(4)(i)]**

The Permittee shall maintain the following records:

(a) The actual rolling monthly facility-wide VOC total emissions, in tpy;

(b) Daily total liquid flow rate of crude oil to the tank-to-truck loading stations;

(c) The results of each extended laboratory analysis of the crude oil received at the facility;

(d) All input parameters and methodologies and supporting documentation used to calculate the facility-wide monthly VOC emissions; and

(e) All deviations from the requirements of this permit.

E. Requirements for Minimizing Fugitive Dust

1. Work Practice and Operational Requirements

(a) The Permittee shall take all reasonable precautions to prevent fugitive dust emissions and shall construct, maintain, and operate the facility to minimize fugitive dust emissions. Reasonable precautions include, but are not limited to the following:

i. Use, where possible, water or chemicals for control of dust during construction and operations, grading of roads, or clearing of land;
ii. Application of asphalt, water, or other suitable chemicals on unpaved roads, materials stockpiles, and other surfaces that can create airborne dust;
iii. The prompt removal from paved streets of earth or other material that does or may become airborne; and
iv. Restricting vehicle speeds at the facility.

2. Monitoring Requirements **[40 CFR 49.155(a)(3)]**

(a) The Permittee shall periodically survey the facility during construction and operation to determine if there are obvious visible dust plumes. This survey must be done once per week, at a minimum, in all active areas and during daylight hours.

(b) The Permittee shall document the results of each survey, including the date and time of the survey, identification of the cause of the visible dust plumes found, any corrective action taken and the reasonable precautions taken to prevent future fugitive dust emissions.

3. Recordkeeping Requirements **[40 CFR 49.155(a)(4)]**

The permittee shall maintain records for 5 years that document the fugitive dust periodic surveys, any corrective action taken and the reasonable precautions that were taken to prevent future fugitive dust emissions.

F. Requirements for Truck-to-Tank Off-Loading Stations and Crude Oil Storage Tanks

1. Work Practice and Operational Requirements

(a) The Permittee shall install and operate a truck-to-tank off-loading out piping system designed for submerged off-loading of crude oil from trucks to the crude oil storage tanks at the facility.

(b) The Permittee shall install, operate and maintain crude oil storage tanks designed with internal floating roofs and mechanical shoe rim seal systems.

2. Monitoring and Testing Requirements **[40 CFR 49.155(a)(3)]**

(a) The Permittee shall visually inspect the internal floating roof, the seal system and any other gaskets, slotted membranes and sleeve seals prior to initial filling of each storage tank with crude oil, at least once every 12 months after initial fill, and each time the storage tank is emptied and degassed.

(b) The Permittee shall repair the items below before filling or refilling the storage tank with crude oil if one or more of the following are observed:

i. If the internal floating roof is not resting on the surface of the crude oil inside the storage tank;
ii. There is liquid accumulated on the roof;
iii. The seal is detached, or there are holes, tears, or other openings in the primary or secondary seal or seal fabric;
iv. The gaskets no longer close off the liquid surfaces from the atmosphere; or
v. The slotted membrane has more than 10% open area.

(c) VOC emissions from crude oil storage tanks at the facility due to standing, working and breathing losses for each calendar month shall be calculated using the most current version of the EPA TANKS Emission Estimation Software, Version 4.09D, and the following:

i. Total measured volume of crude oil transferred from crude oil storage tanks to trucks for the month by barrel (bbl); and

ii. Molecular weight of vapors, pounds per pound-mole (lbs/lb-mole) of **68.21 lbs/lb-mole,** as provided in the Calculated Physical Properties from the Thunder Butte Petroleum Services Bakken Crude PIONA-DHA Analysis.

[Note to Permittee: EPA TANKS can be found online at http://www.epa.gov/ttnchie1/software/tanks/index.html.]

3. Recordkeeping Requirements **[40 CFR 49.155(a)(4)(i)]**

(a) The Permittee shall document and maintain a record of each storage tank inspection and any repairs.

(b) All storage tank inspection records shall include, at a minimum, the following information:

i. The date of the inspection;
ii. All documentation and/or images produced in the inspection;
iii. The findings of the inspection;
iv. Any corrective action taken; and
v. The inspector's name and signature.

G. Requirements for Tank-to-Truck Loading Stations

1. Work Practice and Operational Requirements

(a) All VOC emissions from the tank-to-truck loading stations at the facility shall be continuously controlled using an enclosed vapor collection system that routes vapors to an enclosed combustion device designed and operated to reduce the mass content of VOC emissions vented to the device by at least 98.0 %.

(b) All piping connections, fittings, valves, or any other appurtenance employed to contain and collect vapors and transport them to the enclosed combustion device shall be designed to operate under negative pressure (suction) using a blower fan, maintained in a leak-free condition and connected and operating at all times a truck loading event is occurring.

(c) The enclosed combustion device shall be:

i. Designed to have sufficient capacity to achieve at least a 98.0 % destruction efficiency for the minimum and maximum hydrocarbon mass flow routed to the device;
ii. Equipped with an automatic ignition system or continuous burning pilot;
iii. Equipped with a thermocouple, or similar temperature sensing device, to detect the presence of a pilot flame;
iv. Equipped with a continuous recording device, such as a chart recorder or similar device, to document the presence of a flame;
v. Maintained in a leak-free condition; and
vi. Designed to minimize visible smoke emissions.

(d) The Permittee shall follow the manufacturer's written operating instructions, procedures and maintenance schedule for the enclosed combustion device and enclosed vapor collection system, to ensure good air pollution control practices for minimizing emissions.

(e) Control devices other than those listed above that are capable of achieving a control efficiency at least equivalent to that specified in this permit may be utilized upon written EPA approval.

2. Monitoring and Testing Requirements **[40 CFR 49.155(a)(3)]**

(a) The Permittee shall measure the barrels of crude oil loaded into trucks from the crude oil storage tanks using a meter.

(b) Within 180 days after initial startup, during a truck loading event, the Permittee shall conduct a VOC emissions test of the enclosed combustor to which emissions from the combined truck loading stations are routed, to demonstrate 98% destruction efficiency. Emissions testing shall be conducted in accordance with EPA Reference Method 25A, listed in 40 CFR part 60, appendix A. The Permittee may submit a written request to the EPA for an alternate testing method, but shall only use that test method upon receipt of written approval by the EPA.

(c) Within 180 days after initial start-up and every 5 years thereafter, the Permittee shall verify the destruction efficiency of the VOC control equipment using EPA Reference Method 25A, listed in 40 CFR part 60, appendix A. The Permittee may submit a written request to the EPA for an alternate testing method, but shall only use that test method upon receipt of written approval by the EPA.

(d) Within 180 days after initial start-up, and every 5 years thereafter, during a truck loading event, the Permittee shall conduct a test of the closed-vent system to demonstrate that it is operating under negative pressure. Testing shall be conducted in accordance with EPA Reference Method 21, listed in 40 CFR part 60, appendix A. The Permittee may submit a written request to the EPA for an alternative testing method, but shall only use that test method upon receipt of written approval by the EPA.

(e) The Permittee shall monitor the enclosed vapor collection system during all truck loading events, to confirm proper operation as follows:

i. Continuously ensure that the blower fan is operating at all times a truck loading event is occurring using vacuum pressure measurement upstream of the blower fan; and
ii. In the event that the blower fan is not operational, immediately shut down all loading operations and repair the blower fan. Loading operations shall not resume until the blower fan is repaired and operational.

(f) The Permittee shall monitor the control device to confirm proper operation as follows:

i. Continuously monitor the pilot flame using a thermocouple and recording device that indicates the continuous ignition of the pilot flame at all times the enclosed combustion device is operating;
ii. Check the recording device to insure proper operation once per day;
iii. Check the pilot flame to insure proper operation once per day; and
iv. Correct a pilot flame failure when notified by the malfunction alarm, as soon as possible, but no longer than 5 days from the day of the notification.

(g) VOC emissions from truck loading for each calendar month shall be calculated using the methodology described in the most current version of EPA AP-42 – Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Section 5.2 Transportation and Marketing of Petroleum Liquids (for loading losses), and using the following:

i. Total measured volume of crude oil produced for the month (bbl);
ii. Molecular weight of vapors, pounds per pound-mole (lbs/lb-mole) of **68.21 lbs/lb-mole** as provided in the Calculated Physical Properties from the Thunder Butte Petroleum Services Bakken Crude PIONA-DHA Analysis;
iii. The hours that losses from tank-to-truck loading were routed to the enclosed combustion device; and
iii. The destruction efficiency of the enclosed combustion device as required by this permit.

3. Recordkeeping Requirements **[40 CFR 49.155(a)(4)(i)]**

(a) Records shall be kept daily of the total barrels of crude oil transferred to trucks.

(b) Records shall be kept of the site specific design input parameters provided by an independent engineering analysis, or the manufacturer or vendor, and used to properly size the enclosed combustor to assure the 98.0 % VOC reduction requirement in this permit. The permittee has selected maximum total liquid flow rate to the trucks as the design input parameter.

(c) Records shall be kept of all exceedances of the maximum total liquid flow rate limit of crude oil to the trucks as specified in this permit. The records shall include the enclosed combustor's total operating time during the calendar month in which the exceedance occurred, the date, time and length of time that the parameters were exceeded, and the corrective actions taken or the preventative measures adopted to operate the facility within that operating parameter.

(d) Records shall be kept of any instances in which the blower fan on the vapor collection system malfunctions while a truck loading event is occurring, the date of the malfunction, and the amount of time that the truck loading event continued before being shut down for blower fan repairs.

(e) Records shall be kept of any instances in which the enclosed combustion device was bypassed or down in each calendar month while crude oil was being loaded onto trucks, the reason for each incident, its duration, and the corrective actions taken or the preventative measures adopted to avoid such bypasses or downtimes.

(f) Records shall be kept of any instances in which the pilot flame is not present in the enclosed combustor while it is operating, the date and times that the pilot was not present and the corrective actions taken or the preventative measures adopted to increase the operating time of the pilot flame.

(g) Records shall be kept of any instances in which the thermocouple installed to detect the presence of a flame in the enclosed combustor is not operational while the enclosed combustor is operating, the time period during which it was not operational and the corrective measures taken.

(h) Records shall be kept of all required testing and monitoring in accordance with 40 CFR 49.155(a)(4). The records shall include the following:

i. The date, place, and time of observations, sampling or measurements;
ii. The date(s) analyses were performed;
iii. The companies or entities that performed observations and the analyses;
iv. The analytical techniques or methods used;
v. The results of such analyses or measurements; and
vi. The operating conditions as existing at the time of sampling or measurement.

H. Records Retention [40 CFR 49.155(a)(4)(ii)]

1. The Permittee must retain all records required by this permit for a period of at least 5 years from the date the record was created.

2. Records must be kept at the facility or the location that has day-to-day operational control over the facility.

I. Reporting [40 CFR 49.155(a)(5)]

1. Annual Emission Reports

(a) The Permittee shall submit a written annual report of the actual annual emissions from all emission units at the facility covered under this permit each year no later than April 1st. The annual report shall cover the period for the previous calendar year. All reports shall be certified to truth and accuracy by the responsible official for Clean Air Act compliance for the Permittee.

(b) The report shall be submitted to:

U.S. Environmental Protection Agency, Region 8
Office of Partnerships and Regulatory Assistance
Tribal Air Permitting Program, 8P-AR
1595 Wynkoop Street
Denver, Colorado 80202

The report may be submitted via electronic mail to R8AirPermitting@epa.gov.

2. All other documents required to be submitted under this permit, with the exception of the Annual Emission Reports, shall be submitted to:

U.S. Environmental Protection Agency, Region 8
Office of Enforcement, Compliance & Environmental Justice
Air Toxics and Technical Enforcement Program, 8ENF-AT
1595 Wynkoop Street
Denver, Colorado 80202

Documents may be submitted via electronic mail to R8AirReportEnforcement@epa.gov.

3. The Permittee shall promptly submit to the EPA a written report of any deviations of emission or operational limits specified in this permit and a description of any corrective actions or preventative measures taken. A "prompt" deviation report is one that is post marked or submitted via electronic mail to R8AirReportEnforcement@epa.gov as follows:

(a) Within 30 days from the discovery of a deviation that would cause the Permittee to exceed the emission limits or operational limits in this permit if left un-corrected for more than 5 days after discovering the deviation; and

(b) By April 1st for the discovery of a deviation of recordkeeping or other permit conditions during the preceding calendar year that do not affect the Permittee's ability to meet the emission limits.

4. The Permittee shall submit a written report for any required performance tests to the EPA Regional Office within 60 days after completing the tests.

5. The Permittee shall submit any record or report required by this permit upon EPA request.

II. General Provisions

A. Conditional Approval

Pursuant to the authority of 40 CFR 49.151, the EPA hereby conditionally grants this permit to construct. This authorization is expressly conditioned as follows:

1. *Document Retention and Availability:* This permit and any required attachments shall be retained and made available for inspection upon request at the location set forth herein.

2. *Permit Application:* The Permittee shall abide by all representations, statements of intent and agreements contained in the application submitted by the Permittee. The EPA shall be notified 10 days in advance of any significant deviation from this permit application as well as any plans, specifications or supporting data furnished.

3. *Permit Deviations:* The issuance of this permit may be suspended or revoked if the EPA determines that a significant deviation from the permit application, specifications, and supporting data furnished has been or is to be made. If the proposed source is constructed, operated, or modified not in accordance with the terms of this permit, the Permittee will be subject to appropriate enforcement action.

4. *Compliance with Permit:* The Permittee shall comply with all conditions of this permit, including emission limitations that apply to the affected emissions units at the permitted facility/source. Noncompliance with any permit term or condition is a violation of this permit and may constitute a violation of the CAA and is grounds for enforcement action and for a permit termination or revocation.

5. *Fugitive Emissions:* The Permittee shall take all reasonable precautions to prevent and/or minimize fugitive emissions during the construction period.

6. *NAAQS and PSD Increments:* The permitted source shall not cause or contribute to a NAAQS violation or a PSD increment violation.

7. *Compliance with Federal and Tribal Rules, Regulations, and Orders:* Issuance of this permit does not relieve the Permittee of the responsibility to comply fully with all other applicable federal and tribal rules, regulations, and orders now or hereafter in effect.

8. *Enforcement:* It is not a defense, for the Permittee, in an enforcement action, to claim that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

9. *Modifications of Existing Emissions Units/Limits:* For proposed modifications, as defined at 40 CFR 49.152(d), that would increase an emissions unit allowable emissions of pollutants above its existing permitted annual allowable emissions limit, the Permittee shall first obtain a permit modification pursuant to the MNSR regulations approving the increase. For a proposed modification that is not otherwise subject to review under the PSD or MNSR regulations, such proposed increase in the annual allowable emissions limit shall be approved through an administrative permit revision as provided at 40 CFR 49.159(f).

10. *Relaxation of Legally and Practically Enforceable Limits:* At such time that a new or modified source within this permitted facility/source or modification of this permitted facility/source becomes a major stationary source or major modification solely by virtue of a relaxation in any legally and practically enforceable limitation which was established after August 7, 1980, on the capacity of the permitted facility/source to otherwise emit a pollutant, such as a restriction on hours of operation, then the requirements of the PSD regulations shall apply to the source or modification as though construction had not yet commenced on the source or modification.

11. *Revise, Reopen, Revoke and Reissue, or Terminate for Cause:* This permit may be revised, reopened, revoked and reissued, or terminated for cause. The filing of a request by the Permittee, for a permit revision, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition. The EPA may reopen this permit for a cause on its own initiative, e.g., if this permit contains a material mistake or the Permittee fails to assure compliance with the applicable requirements.

12. *Severability Clause:* The provisions of this permit are severable, and in the event of any challenge to any portion of this permit, or if any portion is held invalid, the remaining permit conditions shall remain valid and in force.

13. *Property Rights:* This permit does not convey any property rights of any sort or any exclusive privilege.

14. *Information Requests:* The Permittee shall furnish to the EPA, within a reasonable time, any information that the EPA may request in writing to determine whether cause exists for revising, revoking and reissuing, or terminating this permit or to determine compliance with this permit. For any such information claimed to be confidential, the Permittee shall also submit a claim of confidentiality in accordance with 40 CFR part 2, subpart B.

15. *Inspection and Entry:* The EPA or its authorized representatives may inspect this permitted facility/source during normal business hours for the purpose of ascertaining compliance with all conditions of this permit. Upon presentation of proper credentials, the Permittee shall allow the EPA or its authorized representative to:

    (a) Enter upon the premises where this permitted facility/source is located or emissions-related activity is conducted, or where records are required to be kept under the conditions of this permit;

    (b) Have access to and copy, at reasonable times, any records that are required to be kept under the conditions of this permit;

    (c) Inspect, during normal business hours or while this permitted facility/source is in operation, any facilities, equipment (including monitoring and air pollution control equipment), practices or operations regulated or required under this permit;

    (d) Sample or monitor, at reasonable times, substances or parameters for the purpose of assuring compliance with this permit or other applicable requirements; and

    (e) Record any inspection by use of written, electronic, magnetic and photographic media.

16. *Permit Effective Date:* This permit is effective immediately upon issuance unless comments resulted in a change in the proposed permit, in which case the permit is effective 30 days after issuance. The Permittee may notify the EPA, in writing, that this permit or a term or condition of it is rejected. Such notice should be made within 30 days of receipt of this permit and should include the reason or reasons for rejection.

17. *Permit Transfers:* Permit transfers shall be made in accordance with 40 CFR 49.159(f). The Air Program Director shall be notified in writing at the address shown below if the company is sold or changes its name.

U.S. Environmental Protection Agency, Region 8
Office of Partnerships and Regulatory Assistance
Tribal Air Permitting Program, 8P-AR
1595 Wynkoop Street
Denver, Colorado 80202

18. *Invalidation of Permit:* Unless this permitted source of emissions is an existing source, this permit becomes invalid if construction is not commenced within 18 months after the effective date of this permit, construction is discontinued for 18 months or more, or construction is not completed within a reasonable time. The EPA may extend the 18-month period upon a satisfactory showing that an extension is justified. This provision does not apply to the time period between the construction of the approved phases of a phased construction project. The Permittee shall commence construction of each such phase within 18 months of the projected and approved commencement date.

19. *Notification of Start-Up:* The Permittee shall submit a notification of the anticipated date of initial startup of this permitted source to the EPA within 60 days of such date, unless this permitted source of emissions is an existing source.

B. **Authorization**

Authorized by the United States Environmental Protection Agency, Region 8

_____ _____

Monica Morales
Acting Director
Air Program

Date

Air Pollution Control
40 CFR 49.151 Tribal Minor New Source Review
Synthetic Minor Permit to Construct
Technical Support Document
Proposed Permit No. SMNSR-TAT-000781-2016.001

Thunder Butte Petroleum Services, Inc.
Thunder Butte Petroleum Services Crude Storage and Loading Facility
Fort Berthold Indian Reservation
Ward County, North Dakota

In accordance with the requirements of the Tribal Minor New Source Review (MNSR) Permit Program at 40 CFR part 49, this Federal permit to construct is being issued under authority of the Clean Air Act (CAA). The Region 8 office of the U.S. Environmental Protection Agency (EPA) has prepared this technical support document (TSD) describing the conditions of this MNSR permit for a proposed crude storage and loading facility and presents information that is germane to this permit action.

Table of Contents

I. Project Description

On May 17, 2016, the EPA received from Thunder Butte Petroleum Services, Inc. (TBPS) an application requesting approval to construct and operate a crude oil storage and loading facility within the exterior boundaries of the Fort Berthold Indian Reservation in Ward County, North Dakota. On October 17, 2016, the EPA received supplemental information, and received a complete application package on February 3, 2017.

TBPS plans to construct and operate the following equipment:

2 - crude oil storage tanks with 140,000-barrel capacity each
4 – truck-to-tank loading stations
3 – tank-to-truck loading stations
1 – John Zink Vapor Combustion system designed for a minimum of 350 gallons per minute loading and a maximum of 1,050 gallons per minute loading designed to operate at 98% control efficiency.

The storage tanks will act as intermediate storage between the trucks that will deliver the crude oil to the site and the trucks that will transport the crude oil to its final destination.

TBPS has proposed pumping oil into storage tanks via submerged fill piping during truck load out operations and using internal floating roofs on the crude oil storage tanks for control of volatile organic compound (VOC) emissions pursuant to 40 CFR part 60, subpart Kb. TBPS has also proposed using an enclosed vapor collection system and enclosed combustion device with a 98% VOC control efficiency for the control of VOCs displaced during the loading of crude oil into trucks.

The potential VOC emissions from the proposed facility's operations are greater than 250 tons per year (tpy). Therefore, a Prevention of Significant Deterioration (PSD) pre-construction permit would be required before construction begins. However, TBPS has requested enforceable VOC emission limits to create a synthetic minor source to avoid PSD and title V permitting requirements.

The EPA's proposed permit includes a facility-wide rolling 12-month total VOC emission limit of 95.0 tpy, installation and operation of emission control equipment and monitoring, record keeping, and reporting requirements to provide legal and practical enforceability of the VOC emissions limits.

Other NSR regulated pollutants such as CO, NO_x, SO_2, CO_2^e, and PM will be emitted in much smaller amounts, and are below MNSR permit thresholds, and therefore, not subject to MNSR requirements.

The uncontrolled potential emissions for all pollutants are as follows:

VOC =	272.47 tpy (uncontrolled potential, not a limit)
NO_x =	0.42 tpy (uncontrolled potential, not a limit)
SO_2 =	0.01 tpy (uncontrolled potential, not a limit)
CO =	1.28 tpy (uncontrolled potential, not a limit)
PM =	NIL tpy (uncontrolled potential, not a limit)
PM_{10} =	NIL tpy (uncontrolled potential, not a limit)
$PM_{2.5}$ =	NIL tpy (uncontrolled potential, not a limit)
CO_2e =	703.58 tpy (uncontrolled potential, not a limit)

II. Potential Uncontrolled and Proposed Allowable VOC Emissions

Pursuant to 40 CFR 52.21, "potential to emit" is defined as the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed, shall be treated as part of its design if the limitation, or the effect it would have on emissions, is federally enforceable.

Therefore, to calculate potential uncontrolled emissions in this proposal, the worst possible case for emissions should be considered since there are currently no existing legally and practically enforceable restrictions on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed.

This is generally calculated by assuming that the facility will be producing at its maximum capacity upon start-up and that all the production equipment are functioning at their maximum operating rates at 8,760 hours in a year.

TBPS has calculated potential emissions assuming a maximum facility throughput of 1.76 million barrels (bbls) of crude oil per year and proposed a 70% capture efficiency and a 98% control efficiency of the VOC collection and control system for vapors emitted from tank to truck loading.

A. Crude Oil Storage Tanks and Loading/Unloading

The majority of VOC emissions from the storage tanks occur during the load out (withdrawal) process. Since TBPS is planning to capture and combust the flashed gases from tank to truck loading, the total tank emissions needed to be broken down into flashing gases (to be captured in a closed-vent system and combusted in an enclosed combustor) and standing, working and breathing losses (from interim storage of the crude oil in the tanks).

1. Standing, Working and Breathing Losses

TBPS used the EPA's TANKS Emission Estimation Software, version 4.09d program to calculate VOC emissions from standing, working and breathing losses from the tanks. Inputs to the program included a Reid Vapor Pressure (RVP) of 11.8, typical for crude oil, and assumed an internal floating roof with a mechanical shoe rim-seal system and welded deck. The program calculated emissions results in tons per year (tpy) based the throughput limitations:

VOC (tpy) Tank TK-2101 (140,000 bbl design size) = **4.44 tpy**
VOC (tpy) Tank TK-2102 (140,000 bbl design size) = **4.44 tpy**

This results in total potential VOC emissions from standing, working and breathing losses of **8.88 tpy**.

2. Flashing Emissions

TBPS estimated the potential flashed gas VOC emissions from truck loading using the methodologies described in AP-42 Fifth Edition – Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Section 5.2 Transportation and Marketing of Petroleum Liquids (for loading losses) as follows:

L_L = 12.46 SPM/T = **7.03 lb/10^3 gal**

Where:

L_L = loading loss, pounds per 1,000 gallons of liquid loaded (lb/10^3 gal)
S = saturation factor for submerged loading, dedicated normal service – **0.60** (Table 5.2-1)
P = True vapor pressure of liquid loaded, pounds per square inch absolute (psia) – **6.91 psia**, calculated from the most conservative RVP of **11.8 psia**.
M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) – **68.20 lb/lb-mole** from speciated emissions profile.
T = temperature of bulk liquid loaded, °R (°F +460) – **501.12 °R**

The total VOC emissions were calculated as follows:

VOC (tpy) = L_L x C x (1 gal/0.024 bbl) x (1 ton/2,000 lb) = **259.68 tpy**

Where:

L_L = loading loss, lb/10^3 gal of liquid loaded, as calculated above – **7.03 lb/10^3 gal.**
C = the maximum total volume of crude oil estimated to be loaded per year – **1.76 million bbls/year**

This results in potential uncontrolled VOC emissions from load out of crude oil from tanker trucks to the storage tanks and off-loading of the crude oil storage tanks into trucks of **259.68 tpy**.

The total proposed allowable VOC emissions were calculated as follows:

VOC (tpy) = uncVOC x {(1-(cap/100)) + [(1-(cap/100)) x (1-(eff/100))]}

uncVOC = uncontrolled VOC emissions as calculated above – **259.68 tpy**
eff = overall VOC control efficiency of the enclosed combustor – **98 %**
cap = assumed overall VOC capture efficiency of loading losses – **70%**

This results in allowable VOC emissions from controlled off-loading of the crude oil storage tanks into trucks of **77.90 tpy**.

TBPS is estimating 96 hours per year of potential tank degassing for maintenance activities. The VOC emissions from this activity are calculated to be 0.44 tpy.

In addition, TBPS is estimating two roof landings at the facility per year. The total emissions from these maintenance activities are calculated to be 3.47 tpy of VOC. They are calculated American Petroleum Institute's Manual of Petroleum Measurement Standards Chapter 19.1.

B. Total Facility-Wide VOC Emissions

Table 1 summarizes the total facility-wide potential VOC Emissions in comparison to the proposed controlled, or allowable VOC Emissions. The facility-wide PTE of other regulated pollutants, for which TBPS is not requesting emission limitations, are estimated at: 0.42 tpy NO_X; 0.01 tpy SO_2; 1.28 tpy CO; 703.58 tpy CO_2e; and 5.78 tpy total HAP.

Table 1 – Summary of Potential and Proposed Allowable VOC Emissions

Emission Unit Description	**Potential Emissions (tpy)**	**Proposed Allowable Emissions (tpy)**
Crude Oil Storage Tank TK-2101 (140,000 bbl).	4.44	4.44
Crude Oil Storage Tank TK-2102 (140,000 bbl).	4.44	4.44
4 Truck to tank loading stations.	259.68	Negligible Fugitive Emissions - Submerged Fill Piping
3 tank to truck loading stations.		70% Routed to 98% Control Efficiency Enclosed Combustion Device 77.90
Enclosed Combustion Device.	-	4.26
Tank Degassing.	0.44	0.44
Landing Losses.	3.47	3.47
Total	**272.47**	**95.0**

III. Particulate Emissions from Construction Activities

In past permitting actions, EPA has received public comments concerning road dust associated with oil and gas production on the Fort Berthold Indian Reservation. In light of these past comments, this permit contains requirements for minimizing fugitive dust through work practices and operational requirements. The permit requires that TBPS take all reasonable precautions to prevent fugitive dust emissions at the facility and construct, maintain, and operate the facility in a manner to minimize fugitive dust emissions. Reasonable precautions include, but are not limited to the following:

1. Use, where possible, of water or chemicals for control of dust during construction and operations, grading of roads, or clearing of land;

2. Application of asphalt, oil (but not used oil), water, or other suitable chemicals on unpaved roads, materials stockpiles, and other surfaces, located at the facility, that can create airborne dust;

3. The prompt removal from paved streets, located at the facility, of earth or other material that does or may become airborne; or

4. Restricting vehicle speeds at the facility.

IV. Applicability – Federal Minor New Source Review in Indian Country

Potential air emissions indicate that the proposed facility would exceed the PSD thresholds for VOCs, thus, PSD permitting would be required. However, the regulations at 40 CFR 49.151-Tribal Minor New Source Review provide the EPA with the authority to establish enforceable emission and operational limits in MNSR permits to create a synthetic minor source.

V. Synthetic Minor Permitting

Under 40 CFR 49.152, PTE is defined as the maximum capacity of a source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is enforceable as a practical matter. Secondary emissions, as defined at §52.21(b)(18), do not count in determining the PTE of a source.

Under 40 CFR 49.152, "Enforceable as a practical matter" means that an emission limitation or other standard is both legally and practically enforceable as follows:

(1) An emission limitation or other standard is legally enforceable if the reviewing authority has the right to enforce it.

(2) Practical enforceability for an emission limitation or for other standards (design standards, equipment standards, work practices, operational standards, and pollution prevention techniques) in a permit for a source is achieved if the permit's provisions specify:

  (i) A limitation or standard and the emissions units or activities at the source subject to the limitation or standard;
  (ii) The time period for the limitation or standard (e.g., hourly, daily, monthly, and/or annual limits such as rolling annual limits); and
  (iii) The method to determine compliance, including appropriate monitoring, recordkeeping, reporting, and testing.

A. National EPA Guidance on PTE

National EPA guidance on PTE states that air pollution control equipment can be credited as restricting PTE only if federally enforceable requirements are in place requiring the use of such air pollution control equipment. The primary applicable guidance for establishing PTE limits is a memo titled, "Guidance on Limiting Potential to Emit in New Source Permitting," (NSR) dated June 13, 1989, to the EPA Regional Offices, from Terrell F. Hunt, Associate Enforcement Counsel, Air Enforcement Division, Office of Enforcement and Compliance Monitoring (OECA), and from John Seitz, Director, Stationary Source Compliance Division,

Office of Air Quality Planning & Standards (OAQPS) (available online at: https://www3.epa.gov/ttn/atw/pte/june13_89.pdf. The 1989 guidance identifies the following as essential components of a restriction on PTE:

1. An emission limitation, in terms of mass of emissions allowed per unit of time; and

2. A production or operational limitation (which can include requirements for the use of in-place air pollution control equipment).

The 1989 guidance explains that restrictions on PTE must be enforceable as a practical matter. This means there must also be adequate monitoring, reporting and recordkeeping requirements. The 1989 memo also explains that an emission limitation alone, expressed as a long-term rolling average (e.g., a rolling 12-month total) should not be relied upon as the basis for a PTE limit, with the exception of sources that are VOC surface coating operations, and where no add-on emission control equipment is employed at those sources, and where operating and production parameters are not readily limited due to the wide variety of coatings and products and due to the unpredictable nature of the operation.

A subsequent memo to the EPA Regional Offices, dated January 25, 1995, from Kathie Stein, Director, Air Enforcement Division, OECA, titled "Guidance on Enforceability Requirements for Limiting Potential to Emit through SIP and Section 112 Rules and General Permits," (available online at: http://www.epa.gov/region07/air/title5/t5memos/potoem) explains that the averaging time for the emission limitation must readily allow for determination of compliance: "EPA policy expresses a preference toward short term limits, generally daily but not to exceed one month."

Independently enforceable applicable requirements, such as New Source Performance Standards (NSPS) and National Emissions Standards for Hazardous Air Pollutants (NESHAP) are considered enforceable to the extent that the source is in compliance with the standard. In addition, reductions in non-targeted pollutants resulting from compliance with an independently enforceable applicable requirement may be counted as restrictions on PTE, provided the emission reduction of the non-targeted pollutant is enforceable as a practical matter.

B. Components of PTE Restrictions

The 1989 guidance identifies six (6) components of PTE restrictions:

1. Emission Limit Requirements: Can be a pollutant specific facility-wide emission limit of a unit specific emission limit;

2. Work Practice and Operational Requirements, such as:

   a. A requirement to equip specific emission unit controls, and specifying the emission reduction efficiency;
   b. A fuel restriction requirement; or
   c. Operating parameter restriction to ensure proper control equipment operations (temperature, pressure, flow rates, etc.);

3. Stack Testing Requirements (reference method);

4. Monitoring Requirements;

5. Record Keeping Requirements; and

6. Reporting Requirements.

The restrictions in the proposed permit ensure that the facility will meet the relevant regulations and guidance.

Specifically, in response to TBPS's request, the EPA proposes practically and legally enforceable conditions for the TBPS Crude Storage and Loading Facility for the following emission sources at the facility:

- Crude Oil Storage Tanks;
- Tank-to-Truck Loading Stations;
- Truck-to-Tank Loading Stations; and
- Enclosed Combustion Device.

C. Emission and Operational Limits

The facility-wide annual VOC emission cap must be sufficiently low to ensure that the net emission increase of the new facility is below the PSD major source threshold(s), and to account for margin of error in emission estimations. Region 8 has typically set this margin at 5 to 8 % below the applicability threshold. For this project, Region 8 proposes facility-wide annual emission limits of 5% below the major source thresholds for Title V and HAP pollutants. For this project, the Region proposes a facility-wide annual emission cap of **95.0 tpy VOC**. This emission cap is 5% below the Title V major source threshold and, therefore, is consistent with the margin set by the Region in the past where applicants seek to maintain minor source status with respect to the PSD and Title V permit programs.

TBPS requested that the enforceable VOC emission limit account for the actual emission reductions that would occur from using an enclosed combustion device at the rail loading stations, internal floating roofs on the crude oil storage tanks, and submerged fill piping and arms at the tank-to-truck loading stations.

The proposed permit specifies the additional requirements necessary to establish enforceability of the requested VOC emission limits.

D. Work Practice and Operational Requirements *(Specific Control Device Requirements)*

The EPA determined that operational and work practice requirements are necessary for the practical enforceability of the facility-wide VOC emission limit. The EPA proposes work practice and operational requirements that include, but are not limited to:

1. The use of an enclosed vapor recovery system and enclosed combustor with VOC emission control efficiency at least as high as 98%;

2. The use of a truck load out piping system designed for submerged off-loading of crude oil from trucks to the storage tanks at the facility; and

3. The use of crude oil storage tanks with internal floating roofs and mechanical shoe rim seal systems.

E. Monitoring Requirements **[40 CFR 49.155(a)(3)]**

The EPA proposes to require that the applicant directly measure, or calculate using approved models, various parameters (i.e., product throughput, enclosed combustor flame presence/ temperature, etc.) related to the proper operation of emissions units and required control devices to assure compliance with the proposed emissions and work practice and operational limitations.

The applicant shall calculate monthly and rolling 12-month facility-wide actual emissions of VOC. The calculations shall include emissions from all controlled and uncontrolled emitting units at the facility and shall be made using various required assumptions or emission factors, or results of required measurements or testing.

F. Recordkeeping and Reporting Requirements **[40 CFR 49.155(a)(4)(i) and (a)(5)]**

The EPA proposes that the applicant keep extensive records to be made available upon EPA request, in lieu of voluminous reporting requirements. The records to be kept include, but are not limited to, all required measurements, testing, monitoring and calculations, as well as any manufacturer specifications and guarantees, deviations from permit conditions and corrective actions taken and any determinations that vapor recovery is not feasible.

The EPA proposes that the applicant submit a report of rolling 12-month VOC emissions each year covering the period for the previous calendar year. The applicant shall also promptly report any deviations or exceedances of emission or operational limits and a description of any corrective actions or preventative measures taken. Additionally, a report shall be submitted for any required performance test.

G. Records Retention **[40 CFR 49.155(a)(4)(ii)]**

All required records shall be retained for at least 5 years from the date the record was created.

VI. Air Quality Review

A. Regulatory Requirements

The MNSR Regulations at 40 CFR 49.159(d) require that an Air Quality Impact Assessment (AQIA) modeling analysis be performed if there is reason to be concerned that new construction would cause or contribute to a National Ambient Air Quality Standard (NAAQS) or PSD increment violation. If the AQIA reveals that the proposed construction could cause or contribute to a NAAQS or PSD increment violation, such impacts must be addressed before a pre-construction permit can be issued.

Based on the available data, discussed below, there do not appear to be any significant air quality concerns within the exterior boundaries of the Fort Berthold Indian Reservation. Additionally, operating emissions from the proposed facility will be well controlled at all times. Therefore, the EPA has determined that an AQIA modeling analysis is not required for the proposed permit.

The following air quality review of the proposed project is in accordance with the instruction in the EPA's Form NEW which can be found at: https://www.epa.gov/caa-permitting/tribal-nsr-permits-region-8#Applications.

B. Review of Proposed Project

1. Existing Air Quality and Monitoring Stations

There are no designated NAAQS non-attainment areas in the regional vicinity of the proposed project.

The state of North Dakota operates seven (7) ambient monitoring stations, including three (3) stations in western North Dakota near Dunn, Theodore Roosevelt National Park (TRNP), and Lostwood National Wildlife Refuge (LNWR) that are designed to characterize regional background pollutant levels.[1]

2. Topography

According to information provided in the synthetic MNSR application for the proposed facility, the proposed project area is in relatively flat to gently rolling open terrain. There is little industrial development within a few miles of the site, with the exception of an occasional oil well production facility.

3. Pollutants of Concern

a. Ozone:

The NAAQS for ozone is 70 parts per billion (ppb), and compliance with the NAAQS is determined by comparison to a "design value" that is calculated as the three-year average of the fourth highest daily eight-hour ozone concentration at each site. Based on the most recent monitoring data, the 2016 ozone design values at the Williston, Dunn, TRNP and LNWR sites are 56, 58, 57 and 59 ppb, respectively.[2] Thus, current air quality for western North Dakota is substantially lower than the ozone NAAQS.

The primary air pollutant that would be emitted from the proposed facility is VOC which can contribute to ozone formation. Generally, a photochemical

[1] Annual Report, North Dakota Ambient Air Quality Monitoring Program Network Plan with Data Summary, 2016, available online at: http://www.ndhealth.gov/AQ/ambient/Annual%20Reports/ARNP_15-16.pdf

[2] The Air Quality System (AQS) – the EPA's Repository of Air Quality Data, available online at: http://www.epa.gov/ttn/airs/airsaqs/.

modeling analysis is needed to determine if VOC contributes to ozone formation. However, in rural areas ozone is typically insensitive to changes in VOC emissions. Additionally, because ozone is generally a regional air pollutant, smaller projects such as the proposed project subject to this permit are not expected to significantly affect NAAQS attainment for ozone. Therefore, VOC emissions are not expected to cause or contribute to exceedances of the ozone NAAQS as a result of the proposed project.

While NO_X emissions can also contribute to ozone formation, emissions of less than a few hundred tons per year typically do not have a detectable impact on ambient ozone levels. For example, a photochemical modeling study of a source in Colorado with 400 tpy NO_X and 200 tpy VOC emissions showed increases in ozone of less than 1 ppb on most days.[3] Because ambient monitoring data show that ozone levels in North Dakota are substantially below the ozone NAAQS, and because NO_X emissions from the project are less than 40 tpy, photochemical model simulations would not be expected to indicate exceedances of the ozone NAAQS.

b. NO_X:

NO_X would be emitted in small amounts due to combustion units at the proposed facility. For NO_2, the proposed project would include two (2) emission sources, an emergency generator engine meeting EPA "Tier 2" NSPS for NO_X and other criteria pollutants, and the enclosed combustion device for the rail loading stations. The increase in allowable (controlled) NO_X emissions from the proposed project is estimated at 0.42 tpy.

The greatest potential air quality concern for projects involving combustion of petroleum-related gases is with respect to the EPA's 1-hour NAAQS for NO_2 promulgated in June 2010. Compliance with the NAAQS for this pollutant is determined by calculating a "design value" which is a statistical average of data collected at the monitor over a three year period.

Data reported to AQS for the period of 2014 through 2016 show a pattern of generally low concentrations. The design value for the 1-hour NO_2 NAAQS is defined as the eighth highest value in each year, averaged over a three-year period. 1-hour NO_2 design values for the Dunn, TRNP and LNWR sites are 12, 11 and 12 ppb, respectively, compared to the standard of 100 ppb.

Given the above discussion of existing monitored concentrations in the general project area, which demonstrates that there is large margin of compliance with the 1-hour NO_2 NAAQS, and the proposed allowable NO_2 emissions of less than 40 tpy, it is expected that combustion sources at the proposed project site are unlikely to cause or contribute to non-attainment of the 1-hour NO_2 NAAQS.

[3] Morris, R.E, Sakulyanontvittaya, T., McNally, D., and Loomis, C., Final Report: EFFECT OF THE HIGH PLAINS ENERGY STATION ON THE FINAL 2010 OZONE ATTAINMENT DEMONSTRATION MODELING FOR THE DENVER 8-HOUR OZONE SIP, March 9, 2009, submitted to High Plains Energy Associates, LLC 400 Chesterfield Center, Suite 110, St. Louis, Missouri 63017

VII. Tribal Consultations and Communications

EPA Region 8 offers the Tribal government leaders an opportunity to consult on each proposed MNSR permit action. EPA Region 8 projected that consultation on this project, if requested, could take approximately 30 days total. The EPA sent a letter offering the opportunity to consult on this permit action on February 3, 2017, to the Chairman of the Mandan, Hidatsa, and Arikara Nation (MHA Nation) that asked for a response within 10 days of receipt of the offer letter. On February 24, 2017, the EPA received a letter from Chairman Mark Fox to Assistant Regional Administrator Martin Hestmark that stated MHA Nation did not believe it was necessary to consult on the proposed TBPS facility.

All minor source applications (synthetic minor, modification to an existing facility, new true minor or general permit) are submitted to both EPA Region 8 and the Tribal Environmental Director per the application instructions (see https://www.epa.gov/caa-permitting/tribal-nsr-permits-region-8). The Tribal Environmental Office has 10 business days to respond to the EPA with questions and comments on the application. In the event an Air Quality Impact Assessment (AQIA) is triggered, a copy of that document is emailed to the tribe within 5 business days of receipt by Region 8.

Additionally, the Tribe's Environmental Director is notified of the public comment period for the draft permit and provided copies of the notice of public comment opportunity to post in various locations on the Reservation that they deem fit. The Tribe is also notified of the issuance of the final permit.

Tribal Environmental Contact:

Edmund Baker, Environmental Director
MHA Nation
404 Frontage Road
New Town, North Dakota 58763-9404

VIII. Environmental Justice

On February 11, 1994, the President issued Executive Order 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The Executive Order calls on each federal agency to make environmental justice a part of its mission by "identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations."

The EPA defines "Environmental Justice" as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and polices. The EPA's goal with respect to Environmental Justice in permitting is to enable overburdened communities to have full and meaningful access to the permitting process and to develop permits that address environmental justice issues to the greatest extent practicable under existing environmental laws. *Overburdened* is used to describe the minority, low-income, tribal and indigenous populations or communities in the United States that potentially experience disproportionate environmental harms and risks as a result of greater vulnerability to environmental hazards.

This discussion describes our efforts to identify environmental justice communities and assess potential effects in connection with issuing this permit in Ward County, North Dakota, on Indian country lands within the Fort Berthold Indian Reservation.

A. Region 8 Air Program Determination

We conclude that issuance of the aforementioned permit is not expected to have disproportionately high or adverse human health effects on overburdened communities in the vicinity of the facility.

B. Environmental Impacts to Potentially Overburdened Communities

The permit contains a provision stating, "*The permitted source shall not cause or contribute to a National Ambient Air Quality Standard violation or a PSD increment violation.*" Noncompliance with this permit provision is a violation of the permit and is grounds for enforcement action and for permit termination or revocation. As a result, we conclude that issuance of the aforementioned permit will not have disproportionately high or adverse human health effects on communities in the vicinity of the Fort Berthold Indian Reservation.

C. Tribal Consultation and Enhanced Public Participation

Given the presence of potentially overburdened communities in the vicinity of the facility, we are providing an enhanced public participation process for this permit.

1. Interested parties can subscribe to an EPA email list that notifies them of public comment opportunities on the Fort Berthold Indian Reservation for proposed air pollution control permits via email at https://www.epa.gov/caa-permitting/caa-permit-public-comment-opportunities-region-8.

2. All minor source applications (synthetic minor, modification to an existing facility, new true minor or general permit) are submitted to both the Tribe and us per the application instructions (see https://www.epa.gov/caa-permitting/tribal-nsr-permits-region-8).

3. The Tribe has 10 business days to respond to us with questions and comments on the application.

4. In the event an AQIA is triggered, we email a copy of that document to the Tribe within 5 business days from the date we receive it.

5. We notify the Tribe of the public comment period for the proposed permit and provide copies of the notice of public comment opportunity to post in various locations of their choosing on the Reservation. We also notify the Tribe of the issuance of the final permit.

6. We offer the tribal government leaders an opportunity to consult on each proposed permit action. We ask the tribal government leaders to respond to us within 10 days. We offered an opportunity to consult on this permit action to the Chairman of the MHA Nation via letter dated February 3, 2017.

IX. Public Notice & Comment, Hearing and Appeals

A. Public Notice

In accordance with §49.157, the EPA Region 8 Air Program (Air Program) must provide public notice and a 30 day public comment period to ensure that the affected community and the general public have reasonable access to the application and draft permit information. The application, the draft permit, this technical support document, and all supporting materials for the draft permit are available at:

MHA Nation
Environmental Division Office
404 Frontage Road
New Town, North Dakota 58763-9404

and

US EPA Region 8
Air Program Office
1595 Wynkoop Street (8P-AR)
Denver, Colorado 80202-1129

All documents are available for review at the U.S. EPA Region 8 office Monday through Friday from 8:00 a.m. to 4:00 p.m. (excluding Federal holidays). Additionally, the draft permit and technical support document can be reviewed on the Air Program's website at https://www.epa.gov/caa-permitting/caa-permit-public-comment-opportunities-region-8.

Any person may submit written comments on the draft permit and may request a public hearing during the public comment period. These comments must raise any reasonably ascertainable issue with supporting arguments by the close of the public comment period (including any public hearing).

B. Public Hearing

A request for a public hearing must be in writing and must state the nature of the issues proposed to be raised at the hearing. The Air Program will hold a hearing whenever there is, on the basis of requests, a significant degree of public interest in a draft permit. The Air Program may also hold a public hearing at its discretion, whenever, for instance, such a hearing might clarify one or more issues involved in the permit decision.

C. Final Permit Action

In accordance with §49.159, a final permit becomes effective 30 days after permit issuance, unless: (1) a later effective date is specified in the permit; or (2) appeal of the final permit is made as detailed in the next section; or (3) the Air Program may make the permit effective immediately upon issuance if no comments resulted in a change in the draft permit or a denial of the permit. The Air Program will send notice of the final permit action to any individual who commented on the draft permit during the public comment period, as well as to any persons

subscribed to the Air Program's public email list for the Fort Berthold Indian Reservation. In addition, the source will be added to a list of final minor NSR permit actions which is posted on the Air Program's website at https://www.epa.gov/caa-permitting/caa-permits-issued-epa-region-8. Anyone may request a copy of the final minor NSR permit at any time by contacting the Region 8 Tribal Air Permit Program at (800) 227-8917 or sending an email to r8airpermitting@epa.gov.

D. Appeals to the Environmental Appeals Board (EAB)

In accordance with §49.159, within 30 days after a final permit decision has been issued, any person who filed comments on the draft permit or participated in the public hearing may petition the Board to review any condition of the permit decision. The 30-day period within which a person may request review under this section begins when the Region has fulfilled the notice requirements for the final permit decision. Motions to reconsider a final order by the EAB must be filed within 10 days after service of the final order. A petition to the EAB is, under section 307(b) of the Act, a prerequisite to seeking judicial review of the final agency action. For purposes of judicial review, final agency action occurs when a final permit is issued or denied by the Air Program and agency review procedures are exhausted.

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

Ref: 8P-AR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Edmund Baker, Environmental Director
MHA Nation
404 Frontage Road
New Town, North Dakota 58763-9404

Re: Thunder Butte Petroleum Services, Inc., Thunder Butte Petroleum Services Crude Storage and Loading Facility, Permit #SMNSR-TAT-000781-2016.001, Proposed Synthetic Minor New Source Review Permit

Dear Mr. Baker:

The U.S. Environmental Protection Agency Region 8 has completed its review of Thunder Butte Petroleum Service, Inc.'s application requesting a synthetic minor permit pursuant to the Tribal Minor New Source Review (MNSR) Permit Program at 40 CFR part 49 for the Thunder Butte Petroleum Services Crude Storage and Loading Facility, located on Indian country lands within the Fort Berthold Indian Reservation in North Dakota.

Enclosed are the proposed permit and the corresponding technical support document. The regulations at 40 CFR 49.157 require that the affected community and the general public have the opportunity to submit written comments on any proposed MNSR permit. All written comments submitted within 30 calendar days after the public notice is published will be considered by the EPA in making its final permit decision. Enclosed is a copy of the public notice which will be published on the EPA's website located at: https://www.epa.gov/caa-permitting/caa-permit-public-comment-opportunities-region-8, on March 22, 2017. The public comment period will end at 5:00 p.m. on April 21, 2017. We request that you make these documents available to the public at the MHA Nation Tribal Mandan, Hidatsa and Arikara Nation Environmental Programs Office, 404 Frontage Road, New Town, North Dakota until the end of the public comment period.

The conditions contained in the proposed permit will become effective and enforceable by the EPA if the permit is issued final. If you are unable to accept any term or condition of the draft permit, please submit your written comments, along with the reason(s) for non-acceptance to:

Tribal NSR Permit Contact
c/o Air Program (8P-AR)
U.S. EPA, Region 8
1595 Wynkoop Street
Denver, Colorado 80202

or

R8AirPermitting@epa.gov

If you have any questions concerning the enclosed proposed permit or technical support document, please contact Donald Law of my staff at (303) 312-7015.

Sincerely,

Monica Morales
Acting Director
Air Program

Enclosures

Public Notice: Request For Comments

Proposed Air Quality Permit to Construct
Thunder Butte Petroleum Services
Crude Storage and Loading Facility

Notice issued: March 22, 2017

Written comments due:
5 p.m., April 21, 2017

Permit Writer: Donald Law

Who is the applicant?
Thunder Butte Petroleum Services
Crude Storage and Loading Facility

Where will the facility be located?
Fort Berthold Indian Reservation
Ward County, North Dakota
Latitude 47.974722 N
Longitude -101.869167W

What is being proposed?
The EPA proposes to approve a new crude oil storage and loading facility on the Fort Berthold Indian Reservation. The operation will consist of crude oil storage tanks, truck-to-tank loading equipment, and tank-to-truck loading equipment.

Permit number:
SMNSR-TAT-000781-2016.001

What is being proposed?
The applicant has requested emission limitations that will limit the facility-wide emissions of volatile organic compounds (VOCs).

Potential uncontrolled emissions from the proposed construction are estimated to be as follows: NO_X: 0.42 tons per year (tpy); CO: 1.28 tpy; VOCs: 272.47 tpy; and SO_2: 0.01 tpy.

Considering the requirements proposed in the permit, potential controlled emissions will be as follows: NO_X: 0.42 tons per year (tpy); CO: 1.28 tpy; VOCs: 95.0 tpy; and SO_2: 0.01 tpy.

The Permittee is required to limit the VOC emissions from the tank-to-truck loading equipment. VOC emissions from this equipment must be captured and reduced using a device with a control efficiency of 98%. To minimize VOC, the Permittee is also required to use submerged loading of the tanks from trucks.

What are the effects on air quality?
Based on the available data, discussed in the application, there do not appear to be any significant air quality concerns within the exterior boundaries of the Fort Berthold Indian Reservation. Additionally, emissions from the proposed operation will be controlled at all times. These controlled emissions do not appear to have a significant impact to the air quality of the surrounding area.

Where can I send comments?
EPA accepts comments by mail, fax and e-mail.

US EPA
Region 8 Air Program, 8P-AR
1595 Wynkoop Street
Denver, CO 80202
R8AirPermitting@epa.gov
Fax: 303-312-6064, Attn: Donald Law

How can I review documents?
You can review the proposed permit and administrative record at the:

- Mandan, Hidatsa and Arikara Nation
  Environmental Programs Office
  404 Frontage Road, New Town, ND
  Attn: Edmund Baker

- US EPA Region 8 Office
  Air Program Office
  1595 Wynkoop Street
  Denver, CO
  Attn: Donald Law, 303-312-7015

Electronic copies of the proposed permit and administrative record may also be viewed at: https://www.epa.gov/caa-permitting/caa-permitting-epas-mountains-and-plains-region

What happens next?
EPA will review and consider all comments received during the comment period. Following this review, the EPA may issue the permit as proposed or modified, or deny the permit.

What are the EPA's responsibilities?
The EPA Region 8 Air Program is the regulatory agency that helps protect and preserve the Mandan, Hidatsa, and Arikara Nation's air quality. One way EPA does this is by requiring permits for certain activities. The purpose of this notice is to invite you to submit written comments on this proposed permit.

Federal Minor New Source Review in Indian Country

United States Environmental Protection Agency

Region 8
Air Program
1595 Wynkoop Street
Denver, CO 80202
Phone 800-227-8917

https://www.epa.gov/caa-permitting/tribal-nsr-permits-region-8

United States Environmental Protection Agency
Region 8, Air Program
1595 Wynkoop Street
Denver, CO 80202

Air Pollution Control
Synthetic Minor Source Permit to Construct

40 CFR 49.151

#SMNSR-TAT-000781-2016.001

Synthetic Minor Permit to Construct to establish legally and practically enforceable limitations and requirements, specifically: a facility-wide volatile organic compound (VOC) emission limit and to be considered a minor source with respect to the Prevention of Significant Deterioration (PSD) Permit Program at 40 CFR part 52, and the Title V Operating Permit Program at 40 CFR part 71 (Part 71) with respect to VOC emissions.

Permittee:

Thunder Butte Petroleum Services, Inc.

Permitted Facility:

Thunder Butte Petroleum Services Crude Storage and Loading Facility on the
Fort Berthold Indian Reservation
Ward County, North Dakota

Effective:

Month, XX YYYY

Summary

On May 17, 2016, the EPA received from Thunder Butte Petroleum Services, Inc. (TBPS) an application requesting approval to construct and operate a crude oil storage and loading facility within the exterior boundaries of the Fort Berthold Indian Reservation in Ward County, North Dakota. On October 17, 2016, the EPA received supplemental information and received a complete application package on February 3, 2017.

Potential uncontrolled emissions of VOC from the facility were estimated to be 272.47 tons per year (tpy). This permit requires the installation of controls with a 98% VOC control efficiency, and a limit on the amount of crude oil that can flow through the facility in any given year to minimize VOC emissions at the facility. However, potential uncontrolled emissions of all other regulated pollutants were estimated to be at concentrations below the levels that trigger PSD permitting requirements. Therefore, only limits for VOC emissions needed to be addressed in this permit. This permit has an allowable VOC emission level of 94.95 tpy.

The uncontrolled potential emissions for all other criteria pollutants are as follows:

NO_x =	0.42 tpy (uncontrolled potential, not a limit)
SO_2 =	0.01 tpy (uncontrolled potential, not a limit)
CO =	1.28 tpy (uncontrolled potential, not a limit)
PM =	NIL tpy (uncontrolled potential, not a limit)
PM_{10} =	NIL tpy (uncontrolled potential, not a limit)
$PM_{2.5}$ =	NIL tpy (uncontrolled potential, not a limit)
CO_2e =	703.58 tpy (uncontrolled potential, not a limit)

TBPS is required to use vapor collection and enclosed combustors for control of VOC emissions displaced during loading of trucks from the crude oil storage tanks. Additionally, the storage tanks must be equipped with internal floating roofs and the truck-to-tank off-loading stations must use submerged filling to control VOC emissions. Requirements have also been included for minimizing fugitive dust from construction and operation activities.

The EPA has determined that dispersion modeling for the proposed project was not necessary because captured emissions would be controlled by at least 98%, and there are no identified air quality concerns with regard to effects of VOC emissions within the external boundaries of the Fort Berthold Indian Reservation airshed.

Table of Contents

I. Conditional Permit to Construct

A. General Information

Facility:	Thunder Butte Truck Loading Facility
Permit number:	SMNSR-TAT-000781-2016.001
SIC Code and SIC Description:	5171 – Petroleum Bulk Stations and Terminals

The equipment listed in this permit shall be operated by Thunder Butte Petroleum Services, LLC at the following location:

Site Location:	Corporate Office Location
Thunder Butte Truck Loading Facility	Thunder Butte Petroleum Services
NW ¼ Sec 19 T152N R87W	P.O. Box 1227
Fort Berthold Indian Reservation	New Town, North Dakota 58763
Ward County, ND	
Latitude / Longitude:	
47.974722N / -101.869167W	

B. Construction Proposal

This permit approves the construction and operation of a crude oil storage and loading facility. The facility will include two (2) crude oil storage tanks with 140,000-barrel capacity each, four (4) truck-to-tank off-loading stations, and three (3) tank-to-truck loading stations. The crude oil storage tanks will be equipped with internal floating roofs for control of VOC emissions from crude oil storage tanks pursuant to 40 CFR part 60, subpart Kb. The truck off-loading stations will use submerged filling arms and piping to the tanks. The tanks will act as intermediate storage between the trucks that will deliver the crude oil to the facility and the trucks that will transport the crude oil to its final destination. The Permittee will use vapor collection with a 70% capture efficiency and an enclosed combustion device with a 98% VOC control efficiency for the control of VOCs displaced during loading of crude oil into trucks.

C. Applicability

1. This Federal Permit to Construct is being issued under the authority of 40 CFR 49.151, Tribal Minor New Source Review Program (MNSR).

2. The requirements in this permit have been created, at the Permittee's request, to establish a facility-wide VOC emission limit and to maintain minor source status with respect to the PSD Permit Program and thus PSD requirements do not apply.

3. The requirements in this permit are intended to establish legally and practically enforceable restrictions on the potential-to-emit (PTE) of VOC emissions.

4. Any conditions established for this facility or any specific units at this facility pursuant to any Conditional Permit to Construct issued under the authority of 40 CFR part 52 (PSD) or 40 CFR part 49 (MNSR) shall continue to apply.

5. By issuing this permit, EPA does not assume any risk of loss which may occur as a result of the operation of the permitted facility by the Permittee, owner, and/or operator, if the conditions of this permit are not met by the Permittee, owner, and/or operator.

D. Facility-Wide Emission Requirements

1. Facility-wide Emission Limit

Facility-wide VOC emissions shall not exceed 95.0 tons during any consecutive 12 months.

2. Work Practice and Operational Requirements

(a) Total liquid flow rate of crude oil from the storage tanks to the three (3) tank-to-truck loading stations shall not exceed 1,760,000 barrels in any given consecutive 12-month period.

(b) All liquid and gas collection, storage, and handling operations, regardless of size, shall be designed, operated and maintained so as to minimize leakage of hydrocarbons to the atmosphere.

3. Monitoring Requirements – VOC Emissions Calculations **[40 CFR 49.155(a)(3)]**

(a) Total liquid flow rate of crude oil from the storage tanks to the three (3) tank-to-truck loading stations shall be measured as specified in the **Requirements for Tank-to-Truck Loading Stations, Section G** of this permit.

(b) Facility-wide actual VOC emissions shall be calculated in tons and recorded at the end of each month, beginning the first calendar month that operations commence.

(c) Prior to 12 full months of facility-wide VOC emissions calculations, the Permittee shall, at the end of each month, add the emissions for that month to the calculated emissions for all previous months since production commenced and record the total. Thereafter, the Permittee shall, at the end of each month, add the emissions for that month to the calculated emissions for the preceding 11 months and record a new 12-month total.

(d) VOC emissions from all controlled and uncontrolled emission sources at the facility shall be included in the monthly calculation, including, but not limited to: crude oil storage tanks, truck off-loading operations, truck loading operations, engines, enclosed combustion devices, and equipment leaks.

(e) VOC emissions shall be calculated as specified in this permit.

4. Testing Requirements

The Permittee shall conduct semiannual extended laboratory analysis of the crude oil received at the facility to obtain an actual Reid vapor pressure (RVP) to be used in calculating monthly VOC emissions from the truck-to tank off-loading and truck loading and vapor combustion processes.

5. Recordkeeping Requirements **[40 CFR 49.155(a)(4)(i)]**

The Permittee shall maintain the following records:

(a) The actual rolling monthly facility-wide VOC total emissions, in tpy;

(b) Daily total liquid flow rate of crude oil to the tank-to-truck loading stations;

(c) The results of each extended laboratory analysis of the crude oil received at the facility;

(d) All input parameters and methodologies and supporting documentation used to calculate the facility-wide monthly VOC emissions; and

(e) All deviations from the requirements of this permit.

E. Requirements for Minimizing Fugitive Dust

1. Work Practice and Operational Requirements

(a) The Permittee shall take all reasonable precautions to prevent fugitive dust emissions and shall construct, maintain, and operate the facility to minimize fugitive dust emissions. Reasonable precautions include, but are not limited to the following:

i. Use, where possible, water or chemicals for control of dust during construction and operations, grading of roads, or clearing of land;
ii. Application of asphalt, water, or other suitable chemicals on unpaved roads, materials stockpiles, and other surfaces that can create airborne dust;
iii. The prompt removal from paved streets of earth or other material that does or may become airborne; and
iv. Restricting vehicle speeds at the facility.

2. Monitoring Requirements **[40 CFR 49.155(a)(3)]**

(a) The Permittee shall periodically survey the facility during construction and operation to determine if there are obvious visible dust plumes. This survey must be done once per week, at a minimum, in all active areas and during daylight hours.

(b) The Permittee shall document the results of each survey, including the date and time of the survey, identification of the cause of the visible dust plumes found, any corrective action taken and the reasonable precautions taken to prevent future fugitive dust emissions.

3. Recordkeeping Requirements **[40 CFR 49.155(a)(4)]**

The permittee shall maintain records for 5 years that document the fugitive dust periodic surveys, any corrective action taken and the reasonable precautions that were taken to prevent future fugitive dust emissions.

F. Requirements for Truck-to-Tank Off-Loading Stations and Crude Oil Storage Tanks

1. Work Practice and Operational Requirements

(a) The Permittee shall install and operate a truck-to-tank off-loading out piping system designed for submerged off-loading of crude oil from trucks to the crude oil storage tanks at the facility.

(b) The Permittee shall install, operate and maintain crude oil storage tanks designed with internal floating roofs and mechanical shoe rim seal systems.

2. Monitoring and Testing Requirements **[40 CFR 49.155(a)(3)]**

(a) The Permittee shall visually inspect the internal floating roof, the seal system and any other gaskets, slotted membranes and sleeve seals prior to initial filling of each storage tank with crude oil, at least once every 12 months after initial fill, and each time the storage tank is emptied and degassed.

(b) The Permittee shall repair the items below before filling or refilling the storage tank with crude oil if one or more of the following are observed:

i. If the internal floating roof is not resting on the surface of the crude oil inside the storage tank;
ii. There is liquid accumulated on the roof;
iii. The seal is detached, or there are holes, tears, or other openings in the primary or secondary seal or seal fabric;
iv. The gaskets no longer close off the liquid surfaces from the atmosphere; or
v. The slotted membrane has more than 10% open area.

(c) VOC emissions from crude oil storage tanks at the facility due to standing, working and breathing losses for each calendar month shall be calculated using the most current version of the EPA TANKS Emission Estimation Software, Version 4.09D, and the following:

i. Total measured volume of crude oil transferred from crude oil storage tanks to trucks for the month by barrel (bbl); and

ii. Molecular weight of vapors, pounds per pound-mole (lbs/lb-mole) of **68.21 lbs/lb-mole,** as provided in the Calculated Physical Properties from the Thunder Butte Petroleum Services Bakken Crude PIONA-DHA Analysis.

[Note to Permittee: EPA TANKS can be found online at http://www.epa.gov/ttnchie1/software/tanks/index.html.]

3. Recordkeeping Requirements **[40 CFR 49.155(a)(4)(i)]**

(a) The Permittee shall document and maintain a record of each storage tank inspection and any repairs.

(b) All storage tank inspection records shall include, at a minimum, the following information:

i. The date of the inspection;
ii. All documentation and/or images produced in the inspection;
iii. The findings of the inspection;
iv. Any corrective action taken; and
v. The inspector's name and signature.

G. Requirements for Tank-to-Truck Loading Stations

1. Work Practice and Operational Requirements

(a) All VOC emissions from the tank-to-truck loading stations at the facility shall be continuously controlled using an enclosed vapor collection system that routes vapors to an enclosed combustion device designed and operated to reduce the mass content of VOC emissions vented to the device by at least 98.0 %.

(b) All piping connections, fittings, valves, or any other appurtenance employed to contain and collect vapors and transport them to the enclosed combustion device shall be designed to operate under negative pressure (suction) using a blower fan, maintained in a leak-free condition and connected and operating at all times a truck loading event is occurring.

(c) The enclosed combustion device shall be:

i. Designed to have sufficient capacity to achieve at least a 98.0 % destruction efficiency for the minimum and maximum hydrocarbon mass flow routed to the device;
ii. Equipped with an automatic ignition system or continuous burning pilot;
iii. Equipped with a thermocouple, or similar temperature sensing device, to detect the presence of a pilot flame;
iv. Equipped with a continuous recording device, such as a chart recorder or similar device, to document the presence of a flame;
v. Maintained in a leak-free condition; and
vi. Designed to minimize visible smoke emissions.

(d) The Permittee shall follow the manufacturer's written operating instructions, procedures and maintenance schedule for the enclosed combustion device and enclosed vapor collection system, to ensure good air pollution control practices for minimizing emissions.

(e) Control devices other than those listed above that are capable of achieving a control efficiency at least equivalent to that specified in this permit may be utilized upon written EPA approval.

2. Monitoring and Testing Requirements **[40 CFR 49.155(a)(3)]**

(a) The Permittee shall measure the barrels of crude oil loaded into trucks from the crude oil storage tanks using a meter.

(b) Within 180 days after initial startup, during a truck loading event, the Permittee shall conduct a VOC emissions test of the enclosed combustor to which emissions from the combined truck loading stations are routed, to demonstrate 98% destruction efficiency. Emissions testing shall be conducted in accordance with EPA Reference Method 25A, listed in 40 CFR part 60, appendix A. The Permittee may submit a written request to the EPA for an alternate testing method, but shall only use that test method upon receipt of written approval by the EPA.

(c) Within 180 days after initial start-up and every 5 years thereafter, the Permittee shall verify the destruction efficiency of the VOC control equipment using EPA Reference Method 25A, listed in 40 CFR part 60, appendix A. The Permittee may submit a written request to the EPA for an alternate testing method, but shall only use that test method upon receipt of written approval by the EPA.

(d) Within 180 days after initial start-up, and every 5 years thereafter, during a truck loading event, the Permittee shall conduct a test of the closed-vent system to demonstrate that it is operating under negative pressure. Testing shall be conducted in accordance with EPA Reference Method 21, listed in 40 CFR part 60, appendix A. The Permittee may submit a written request to the EPA for an alternative testing method, but shall only use that test method upon receipt of written approval by the EPA.

(e) The Permittee shall monitor the enclosed vapor collection system during all truck loading events, to confirm proper operation as follows:

i. Continuously ensure that the blower fan is operating at all times a truck loading event is occurring using vacuum pressure measurement upstream of the blower fan; and
ii. In the event that the blower fan is not operational, immediately shut down all loading operations and repair the blower fan. Loading operations shall not resume until the blower fan is repaired and operational.

(f) The Permittee shall monitor the control device to confirm proper operation as follows:

i. Continuously monitor the pilot flame using a thermocouple and recording device that indicates the continuous ignition of the pilot flame at all times the enclosed combustion device is operating;
ii. Check the recording device to insure proper operation once per day;
iii. Check the pilot flame to insure proper operation once per day; and
iv. Correct a pilot flame failure when notified by the malfunction alarm, as soon as possible, but no longer than 5 days from the day of the notification.

(g) VOC emissions from truck loading for each calendar month shall be calculated using the methodology described in the most current version of EPA AP-42 – Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Section 5.2 Transportation and Marketing of Petroleum Liquids (for loading losses), and using the following:

i. Total measured volume of crude oil produced for the month (bbl);
ii. Molecular weight of vapors, pounds per pound-mole (lbs/lb-mole) of **68.21 lbs/lb-mole** as provided in the Calculated Physical Properties from the Thunder Butte Petroleum Services Bakken Crude PIONA-DHA Analysis;
iii. The hours that losses from tank-to-truck loading were routed to the enclosed combustion device; and
iii. The destruction efficiency of the enclosed combustion device as required by this permit.

3. Recordkeeping Requirements **[40 CFR 49.155(a)(4)(i)]**

(a) Records shall be kept daily of the total barrels of crude oil transferred to trucks.

(b) Records shall be kept of the site specific design input parameters provided by an independent engineering analysis, or the manufacturer or vendor, and used to properly size the enclosed combustor to assure the 98.0 % VOC reduction requirement in this permit. The permittee has selected maximum total liquid flow rate to the trucks as the design input parameter.

(c) Records shall be kept of all exceedances of the maximum total liquid flow rate limit of crude oil to the trucks as specified in this permit. The records shall include the enclosed combustor's total operating time during the calendar month in which the exceedance occurred, the date, time and length of time that the parameters were exceeded, and the corrective actions taken or the preventative measures adopted to operate the facility within that operating parameter.

(d) Records shall be kept of any instances in which the blower fan on the vapor collection system malfunctions while a truck loading event is occurring, the date of the malfunction, and the amount of time that the truck loading event continued before being shut down for blower fan repairs.

(e) Records shall be kept of any instances in which the enclosed combustion device was bypassed or down in each calendar month while crude oil was being loaded onto trucks, the reason for each incident, its duration, and the corrective actions taken or the preventative measures adopted to avoid such bypasses or downtimes.

(f) Records shall be kept of any instances in which the pilot flame is not present in the enclosed combustor while it is operating, the date and times that the pilot was not present and the corrective actions taken or the preventative measures adopted to increase the operating time of the pilot flame.

(g) Records shall be kept of any instances in which the thermocouple installed to detect the presence of a flame in the enclosed combustor is not operational while the enclosed combustor is operating, the time period during which it was not operational and the corrective measures taken.

(h) Records shall be kept of all required testing and monitoring in accordance with 40 CFR 49.155(a)(4). The records shall include the following:

i. The date, place, and time of observations, sampling or measurements;
ii. The date(s) analyses were performed;
iii. The companies or entities that performed observations and the analyses;
iv. The analytical techniques or methods used;
v. The results of such analyses or measurements; and
vi. The operating conditions as existing at the time of sampling or measurement.

H. Records Retention [40 CFR 49.155(a)(4)(ii)]

1. The Permittee must retain all records required by this permit for a period of at least 5 years from the date the record was created.

2. Records must be kept at the facility or the location that has day-to-day operational control over the facility.

I. Reporting [40 CFR 49.155(a)(5)]

1. Annual Emission Reports

(a) The Permittee shall submit a written annual report of the actual annual emissions from all emission units at the facility covered under this permit each year no later than April 1st. The annual report shall cover the period for the previous calendar year. All reports shall be certified to truth and accuracy by the responsible official for Clean Air Act compliance for the Permittee.

(b) The report shall be submitted to:

U.S. Environmental Protection Agency, Region 8
Office of Partnerships and Regulatory Assistance
Tribal Air Permitting Program, 8P-AR
1595 Wynkoop Street
Denver, Colorado 80202

The report may be submitted via electronic mail to R8AirPermitting@epa.gov.

2. All other documents required to be submitted under this permit, with the exception of the Annual Emission Reports, shall be submitted to:

U.S. Environmental Protection Agency, Region 8
Office of Enforcement, Compliance & Environmental Justice
Air Toxics and Technical Enforcement Program, 8ENF-AT
1595 Wynkoop Street
Denver, Colorado 80202

Documents may be submitted via electronic mail to R8AirReportEnforcement@epa.gov.

3. The Permittee shall promptly submit to the EPA a written report of any deviations of emission or operational limits specified in this permit and a description of any corrective actions or preventative measures taken. A "prompt" deviation report is one that is post marked or submitted via electronic mail to R8AirReportEnforcement@epa.gov as follows:

(a) Within 30 days from the discovery of a deviation that would cause the Permittee to exceed the emission limits or operational limits in this permit if left un-corrected for more than 5 days after discovering the deviation; and

(b) By April 1st for the discovery of a deviation of recordkeeping or other permit conditions during the preceding calendar year that do not affect the Permittee's ability to meet the emission limits.

4. The Permittee shall submit a written report for any required performance tests to the EPA Regional Office within 60 days after completing the tests.

5. The Permittee shall submit any record or report required by this permit upon EPA request.

II. General Provisions

A. Conditional Approval

Pursuant to the authority of 40 CFR 49.151, the EPA hereby conditionally grants this permit to construct. This authorization is expressly conditioned as follows:

1. *Document Retention and Availability:* This permit and any required attachments shall be retained and made available for inspection upon request at the location set forth herein.

2. *Permit Application:* The Permittee shall abide by all representations, statements of intent and agreements contained in the application submitted by the Permittee. The EPA shall be notified 10 days in advance of any significant deviation from this permit application as well as any plans, specifications or supporting data furnished.

3. *Permit Deviations:* The issuance of this permit may be suspended or revoked if the EPA determines that a significant deviation from the permit application, specifications, and supporting data furnished has been or is to be made. If the proposed source is constructed, operated, or modified not in accordance with the terms of this permit, the Permittee will be subject to appropriate enforcement action.

4. *Compliance with Permit:* The Permittee shall comply with all conditions of this permit, including emission limitations that apply to the affected emissions units at the permitted facility/source. Noncompliance with any permit term or condition is a violation of this permit and may constitute a violation of the CAA and is grounds for enforcement action and for a permit termination or revocation.

5. *Fugitive Emissions:* The Permittee shall take all reasonable precautions to prevent and/or minimize fugitive emissions during the construction period.

6. *NAAQS and PSD Increments:* The permitted source shall not cause or contribute to a NAAQS violation or a PSD increment violation.

7. *Compliance with Federal and Tribal Rules, Regulations, and Orders:* Issuance of this permit does not relieve the Permittee of the responsibility to comply fully with all other applicable federal and tribal rules, regulations, and orders now or hereafter in effect.

8. *Enforcement:* It is not a defense, for the Permittee, in an enforcement action, to claim that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

9. *Modifications of Existing Emissions Units/Limits:* For proposed modifications, as defined at 40 CFR 49.152(d), that would increase an emissions unit allowable emissions of pollutants above its existing permitted annual allowable emissions limit, the Permittee shall first obtain a permit modification pursuant to the MNSR regulations approving the increase. For a proposed modification that is not otherwise subject to review under the PSD or MNSR regulations, such proposed increase in the annual allowable emissions limit shall be approved through an administrative permit revision as provided at 40 CFR 49.159(f).

10. *Relaxation of Legally and Practically Enforceable Limits:* At such time that a new or modified source within this permitted facility/source or modification of this permitted facility/source becomes a major stationary source or major modification solely by virtue of a relaxation in any legally and practically enforceable limitation which was established after August 7, 1980, on the capacity of the permitted facility/source to otherwise emit a pollutant, such as a restriction on hours of operation, then the requirements of the PSD regulations shall apply to the source or modification as though construction had not yet commenced on the source or modification.

11. *Revise, Reopen, Revoke and Reissue, or Terminate for Cause:* This permit may be revised, reopened, revoked and reissued, or terminated for cause. The filing of a request by the Permittee, for a permit revision, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition. The EPA may reopen this permit for a cause on its own initiative, e.g., if this permit contains a material mistake or the Permittee fails to assure compliance with the applicable requirements.

12. *Severability Clause:* The provisions of this permit are severable, and in the event of any challenge to any portion of this permit, or if any portion is held invalid, the remaining permit conditions shall remain valid and in force.

13. *Property Rights:* This permit does not convey any property rights of any sort or any exclusive privilege.

14. *Information Requests:* The Permittee shall furnish to the EPA, within a reasonable time, any information that the EPA may request in writing to determine whether cause exists for revising, revoking and reissuing, or terminating this permit or to determine compliance with this permit. For any such information claimed to be confidential, the Permittee shall also submit a claim of confidentiality in accordance with 40 CFR part 2, subpart B.

15. *Inspection and Entry:* The EPA or its authorized representatives may inspect this permitted facility/source during normal business hours for the purpose of ascertaining compliance with all conditions of this permit. Upon presentation of proper credentials, the Permittee shall allow the EPA or its authorized representative to:

    (a) Enter upon the premises where this permitted facility/source is located or emissions-related activity is conducted, or where records are required to be kept under the conditions of this permit;

    (b) Have access to and copy, at reasonable times, any records that are required to be kept under the conditions of this permit;

    (c) Inspect, during normal business hours or while this permitted facility/source is in operation, any facilities, equipment (including monitoring and air pollution control equipment), practices or operations regulated or required under this permit;

    (d) Sample or monitor, at reasonable times, substances or parameters for the purpose of assuring compliance with this permit or other applicable requirements; and

    (e) Record any inspection by use of written, electronic, magnetic and photographic media.

16. *Permit Effective Date:* This permit is effective immediately upon issuance unless comments resulted in a change in the proposed permit, in which case the permit is effective 30 days after issuance. The Permittee may notify the EPA, in writing, that this permit or a term or condition of it is rejected. Such notice should be made within 30 days of receipt of this permit and should include the reason or reasons for rejection.

17. *Permit Transfers:* Permit transfers shall be made in accordance with 40 CFR 49.159(f). The Air Program Director shall be notified in writing at the address shown below if the company is sold or changes its name.

U.S. Environmental Protection Agency, Region 8
Office of Partnerships and Regulatory Assistance
Tribal Air Permitting Program, 8P-AR
1595 Wynkoop Street
Denver, Colorado 80202

18. *Invalidation of Permit:* Unless this permitted source of emissions is an existing source, this permit becomes invalid if construction is not commenced within 18 months after the effective date of this permit, construction is discontinued for 18 months or more, or construction is not completed within a reasonable time. The EPA may extend the 18-month period upon a satisfactory showing that an extension is justified. This provision does not apply to the time period between the construction of the approved phases of a phased construction project. The Permittee shall commence construction of each such phase within 18 months of the projected and approved commencement date.

19. *Notification of Start-Up:* The Permittee shall submit a notification of the anticipated date of initial startup of this permitted source to the EPA within 60 days of such date, unless this permitted source of emissions is an existing source.

B. **Authorization**

Authorized by the United States Environmental Protection Agency, Region 8

_____ _____

Monica Morales Date
Acting Director
Air Program

Air Pollution Control
40 CFR 49.151 Tribal Minor New Source Review
Synthetic Minor Permit to Construct
Technical Support Document
Proposed Permit No. SMNSR-TAT-000781-2016.001

Thunder Butte Petroleum Services, Inc.
Thunder Butte Petroleum Services Crude Storage and Loading Facility
Fort Berthold Indian Reservation
Ward County, North Dakota

In accordance with the requirements of the Tribal Minor New Source Review (MNSR) Permit Program at 40 CFR part 49, this Federal permit to construct is being issued under authority of the Clean Air Act (CAA). The Region 8 office of the U.S. Environmental Protection Agency (EPA) has prepared this technical support document (TSD) describing the conditions of this MNSR permit for a proposed crude storage and loading facility and presents information that is germane to this permit action.

Table of Contents

I. Project Description

On May 17, 2016, the EPA received from Thunder Butte Petroleum Services, Inc. (TBPS) an application requesting approval to construct and operate a crude oil storage and loading facility within the exterior boundaries of the Fort Berthold Indian Reservation in Ward County, North Dakota. On October 17, 2016, the EPA received supplemental information, and received a complete application package on February 3, 2017.

TBPS plans to construct and operate the following equipment:

2 - crude oil storage tanks with 140,000-barrel capacity each
4 – truck-to-tank loading stations
3 – tank-to-truck loading stations
1 – John Zink Vapor Combustion system designed for a minimum of 350 gallons per minute loading and a maximum of 1,050 gallons per minute loading designed to operate at 98% control efficiency.

The storage tanks will act as intermediate storage between the trucks that will deliver the crude oil to the site and the trucks that will transport the crude oil to its final destination.

TBPS has proposed pumping oil into storage tanks via submerged fill piping during truck load out operations and using internal floating roofs on the crude oil storage tanks for control of volatile organic compound (VOC) emissions pursuant to 40 CFR part 60, subpart Kb. TBPS has also proposed using an enclosed vapor collection system and enclosed combustion device with a 98% VOC control efficiency for the control of VOCs displaced during the loading of crude oil into trucks.

The potential VOC emissions from the proposed facility's operations are greater than 250 tons per year (tpy). Therefore, a Prevention of Significant Deterioration (PSD) pre-construction permit would be required before construction begins. However, TBPS has requested enforceable VOC emission limits to create a synthetic minor source to avoid PSD and title V permitting requirements.

The EPA's proposed permit includes a facility-wide rolling 12-month total VOC emission limit of 95.0 tpy, installation and operation of emission control equipment and monitoring, record keeping, and reporting requirements to provide legal and practical enforceability of the VOC emissions limits.

Other NSR regulated pollutants such as CO, NO_x, SO_2, CO_2^e, and PM will be emitted in much smaller amounts, and are below MNSR permit thresholds, and therefore, not subject to MNSR requirements.

The uncontrolled potential emissions for all pollutants are as follows:

VOC = 272.47 tpy (uncontrolled potential, not a limit)
NO_x = 0.42 tpy (uncontrolled potential, not a limit)
SO_2 = 0.01 tpy (uncontrolled potential, not a limit)
CO = 1.28 tpy (uncontrolled potential, not a limit)
PM = NIL tpy (uncontrolled potential, not a limit)
PM_{10} = NIL tpy (uncontrolled potential, not a limit)
$PM_{2.5}$ = NIL tpy (uncontrolled potential, not a limit)
CO_2e = 703.58 tpy (uncontrolled potential, not a limit)

II. Potential Uncontrolled and Proposed Allowable VOC Emissions

Pursuant to 40 CFR 52.21, "potential to emit" is defined as the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed, shall be treated as part of its design if the limitation, or the effect it would have on emissions, is federally enforceable.

Therefore, to calculate potential uncontrolled emissions in this proposal, the worst possible case for emissions should be considered since there are currently no existing legally and practically enforceable restrictions on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed.

This is generally calculated by assuming that the facility will be producing at its maximum capacity upon start-up and that all the production equipment are functioning at their maximum operating rates at 8,760 hours in a year.

TBPS has calculated potential emissions assuming a maximum facility throughput of 1.76 million barrels (bbls) of crude oil per year and proposed a 70% capture efficiency and a 98% control efficiency of the VOC collection and control system for vapors emitted from tank to truck loading.

A. Crude Oil Storage Tanks and Loading/Unloading

The majority of VOC emissions from the storage tanks occur during the load out (withdrawal) process. Since TBPS is planning to capture and combust the flashed gases from tank to truck loading, the total tank emissions needed to be broken down into flashing gases (to be captured in a closed-vent system and combusted in an enclosed combustor) and standing, working and breathing losses (from interim storage of the crude oil in the tanks).

1. Standing, Working and Breathing Losses

TBPS used the EPA's TANKS Emission Estimation Software, version 4.09d program to calculate VOC emissions from standing, working and breathing losses from the tanks. Inputs to the program included a Reid Vapor Pressure (RVP) of 11.8, typical for crude oil, and assumed an internal floating roof with a mechanical shoe rim-seal system and welded deck. The program calculated emissions results in tons per year (tpy) based the throughput limitations:

VOC (tpy) Tank TK-2101 (140,000 bbl design size) = **4.44 tpy**
VOC (tpy) Tank TK-2102 (140,000 bbl design size) = **4.44 tpy**

This results in total potential VOC emissions from standing, working and breathing losses of **8.88 tpy**.

2. Flashing Emissions

TBPS estimated the potential flashed gas VOC emissions from truck loading using the methodologies described in AP-42 Fifth Edition – Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Section 5.2 Transportation and Marketing of Petroleum Liquids (for loading losses) as follows:

L_L = 12.46 SPM/T = **7.03 lb/10^3 gal**

Where:

L_L = loading loss, pounds per 1,000 gallons of liquid loaded (lb/10^3 gal)
S = saturation factor for submerged loading, dedicated normal service – **0.60** (Table 5.2-1)
P = True vapor pressure of liquid loaded, pounds per square inch absolute (psia) – **6.91 psia**, calculated from the most conservative RVP of **11.8 psia**.
M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) – **68.20 lb/lb-mole** from speciated emissions profile.
T = temperature of bulk liquid loaded, °R (°F +460) – **501.12 °R**

The total VOC emissions were calculated as follows:

VOC (tpy) = L_L x C x (1 gal/0.024 bbl) x (1 ton/2,000 lb) = **259.68 tpy**

Where:

L_L = loading loss, lb/10^3 gal of liquid loaded, as calculated above – **7.03 lb/10^3 gal**.
C = the maximum total volume of crude oil estimated to be loaded per year – **1.76 million bbls/year**

This results in potential uncontrolled VOC emissions from load out of crude oil from tanker trucks to the storage tanks and off-loading of the crude oil storage tanks into trucks of **259.68 tpy**.

The total proposed allowable VOC emissions were calculated as follows:

VOC (tpy) = uncVOC x {(1-(cap/100)) + [(1-(cap/100)) x (1-(eff/100))]}

uncVOC = uncontrolled VOC emissions as calculated above – **259.68 tpy**
eff = overall VOC control efficiency of the enclosed combustor – **98 %**
cap = assumed overall VOC capture efficiency of loading losses **– 70%**

This results in allowable VOC emissions from controlled off-loading of the crude oil storage tanks into trucks of **77.90 tpy**.

TBPS is estimating 96 hours per year of potential tank degassing for maintenance activities. The VOC emissions from this activity are calculated to be 0.44 tpy.

In addition, TBPS is estimating two roof landings at the facility per year. The total emissions from these maintenance activities are calculated to be 3.47 tpy of VOC. They are calculated American Petroleum Institute's Manual of Petroleum Measurement Standards Chapter 19.1.

B. Total Facility-Wide VOC Emissions

Table 1 summarizes the total facility-wide potential VOC Emissions in comparison to the proposed controlled, or allowable VOC Emissions. The facility-wide PTE of other regulated pollutants, for which TBPS is not requesting emission limitations, are estimated at: 0.42 tpy NO_X; 0.01 tpy SO_2; 1.28 tpy CO; 703.58 tpy CO_2e; and 5.78 tpy total HAP.

Table 1 – Summary of Potential and Proposed Allowable VOC Emissions

Emission Unit Description	**Potential Emissions (tpy)**	**Proposed Allowable Emissions (tpy)**
Crude Oil Storage Tank TK-2101 (140,000 bbl).	4.44	4.44
Crude Oil Storage Tank TK-2102 (140,000 bbl).	4.44	4.44
4 Truck to tank loading stations.	259.68	Negligible Fugitive Emissions - Submerged Fill Piping
3 tank to truck loading stations.		70% Routed to 98% Control Efficiency Enclosed Combustion Device 77.90
Enclosed Combustion Device.	-	4.26
Tank Degassing.	0.44	0.44
Landing Losses.	3.47	3.47
Total	**272.47**	**95.0**

III. Particulate Emissions from Construction Activities

In past permitting actions, EPA has received public comments concerning road dust associated with oil and gas production on the Fort Berthold Indian Reservation. In light of these past comments, this permit contains requirements for minimizing fugitive dust through work practices and operational requirements. The permit requires that TBPS take all reasonable precautions to prevent fugitive dust emissions at the facility and construct, maintain, and operate the facility in a manner to minimize fugitive dust emissions. Reasonable precautions include, but are not limited to the following:

1. Use, where possible, of water or chemicals for control of dust during construction and operations, grading of roads, or clearing of land;

2. Application of asphalt, oil (but not used oil), water, or other suitable chemicals on unpaved roads, materials stockpiles, and other surfaces, located at the facility, that can create airborne dust;

3. The prompt removal from paved streets, located at the facility, of earth or other material that does or may become airborne; or

4. Restricting vehicle speeds at the facility.

IV. Applicability – Federal Minor New Source Review in Indian Country

Potential air emissions indicate that the proposed facility would exceed the PSD thresholds for VOCs, thus, PSD permitting would be required. However, the regulations at 40 CFR 49.151-Tribal Minor New Source Review provide the EPA with the authority to establish enforceable emission and operational limits in MNSR permits to create a synthetic minor source.

V. Synthetic Minor Permitting

Under 40 CFR 49.152, PTE is defined as the maximum capacity of a source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is enforceable as a practical matter. Secondary emissions, as defined at §52.21(b)(18), do not count in determining the PTE of a source.

Under 40 CFR 49.152, "Enforceable as a practical matter" means that an emission limitation or other standard is both legally and practically enforceable as follows:

(1) An emission limitation or other standard is legally enforceable if the reviewing authority has the right to enforce it.

(2) Practical enforceability for an emission limitation or for other standards (design standards, equipment standards, work practices, operational standards, and pollution prevention techniques) in a permit for a source is achieved if the permit's provisions specify:

- (i) A limitation or standard and the emissions units or activities at the source subject to the limitation or standard;
- (ii) The time period for the limitation or standard (e.g., hourly, daily, monthly, and/or annual limits such as rolling annual limits); and
- (iii) The method to determine compliance, including appropriate monitoring, recordkeeping, reporting, and testing.

A. National EPA Guidance on PTE

National EPA guidance on PTE states that air pollution control equipment can be credited as restricting PTE only if federally enforceable requirements are in place requiring the use of such air pollution control equipment. The primary applicable guidance for establishing PTE limits is a memo titled, "Guidance on Limiting Potential to Emit in New Source Permitting," (NSR) dated June 13, 1989, to the EPA Regional Offices, from Terrell F. Hunt, Associate Enforcement Counsel, Air Enforcement Division, Office of Enforcement and Compliance Monitoring (OECA), and from John Seitz, Director, Stationary Source Compliance Division,

Office of Air Quality Planning & Standards (OAQPS) (available online at: https://www3.epa.gov/ttn/atw/pte/june13_89.pdf. The 1989 guidance identifies the following as essential components of a restriction on PTE:

1. An emission limitation, in terms of mass of emissions allowed per unit of time; and

2. A production or operational limitation (which can include requirements for the use of in-place air pollution control equipment).

The 1989 guidance explains that restrictions on PTE must be enforceable as a practical matter. This means there must also be adequate monitoring, reporting and recordkeeping requirements. The 1989 memo also explains that an emission limitation alone, expressed as a long-term rolling average (e.g., a rolling 12-month total) should not be relied upon as the basis for a PTE limit, with the exception of sources that are VOC surface coating operations, and where no add-on emission control equipment is employed at those sources, and where operating and production parameters are not readily limited due to the wide variety of coatings and products and due to the unpredictable nature of the operation.

A subsequent memo to the EPA Regional Offices, dated January 25, 1995, from Kathie Stein, Director, Air Enforcement Division, OECA, titled "Guidance on Enforceability Requirements for Limiting Potential to Emit through SIP and Section 112 Rules and General Permits," (available online at: http://www.epa.gov/region07/air/title5/t5memos/potoem) explains that the averaging time for the emission limitation must readily allow for determination of compliance: "EPA policy expresses a preference toward short term limits, generally daily but not to exceed one month."

Independently enforceable applicable requirements, such as New Source Performance Standards (NSPS) and National Emissions Standards for Hazardous Air Pollutants (NESHAP) are considered enforceable to the extent that the source is in compliance with the standard. In addition, reductions in non-targeted pollutants resulting from compliance with an independently enforceable applicable requirement may be counted as restrictions on PTE, provided the emission reduction of the non-targeted pollutant is enforceable as a practical matter.

B. Components of PTE Restrictions

The 1989 guidance identifies six (6) components of PTE restrictions:

1. Emission Limit Requirements: Can be a pollutant specific facility-wide emission limit of a unit specific emission limit;

2. Work Practice and Operational Requirements, such as:

   a. A requirement to equip specific emission unit controls, and specifying the emission reduction efficiency;
   b. A fuel restriction requirement; or
   c. Operating parameter restriction to ensure proper control equipment operations (temperature, pressure, flow rates, etc.);

3. Stack Testing Requirements (reference method);

4. Monitoring Requirements;

5. Record Keeping Requirements; and

6. Reporting Requirements.

The restrictions in the proposed permit ensure that the facility will meet the relevant regulations and guidance.

Specifically, in response to TBPS's request, the EPA proposes practically and legally enforceable conditions for the TBPS Crude Storage and Loading Facility for the following emission sources at the facility:

- Crude Oil Storage Tanks;
- Tank-to-Truck Loading Stations;
- Truck-to-Tank Loading Stations; and
- Enclosed Combustion Device.

C. Emission and Operational Limits

The facility-wide annual VOC emission cap must be sufficiently low to ensure that the net emission increase of the new facility is below the PSD major source threshold(s), and to account for margin of error in emission estimations. Region 8 has typically set this margin at 5 to 8 % below the applicability threshold. For this project, Region 8 proposes facility-wide annual emission limits of 5% below the major source thresholds for Title V and HAP pollutants. For this project, the Region proposes a facility-wide annual emission cap of **95.0 tpy VOC**. This emission cap is 5% below the Title V major source threshold and, therefore, is consistent with the margin set by the Region in the past where applicants seek to maintain minor source status with respect to the PSD and Title V permit programs.

TBPS requested that the enforceable VOC emission limit account for the actual emission reductions that would occur from using an enclosed combustion device at the rail loading stations, internal floating roofs on the crude oil storage tanks, and submerged fill piping and arms at the tank-to-truck loading stations.

The proposed permit specifies the additional requirements necessary to establish enforceability of the requested VOC emission limits.

D. Work Practice and Operational Requirements *(Specific Control Device Requirements)*

The EPA determined that operational and work practice requirements are necessary for the practical enforceability of the facility-wide VOC emission limit. The EPA proposes work practice and operational requirements that include, but are not limited to:

1. The use of an enclosed vapor recovery system and enclosed combustor with VOC emission control efficiency at least as high as 98%;

2. The use of a truck load out piping system designed for submerged off-loading of crude oil from trucks to the storage tanks at the facility; and

3. The use of crude oil storage tanks with internal floating roofs and mechanical shoe rim seal systems.

E. Monitoring Requirements **[40 CFR 49.155(a)(3)]**

The EPA proposes to require that the applicant directly measure, or calculate using approved models, various parameters (i.e., product throughput, enclosed combustor flame presence/ temperature, etc.) related to the proper operation of emissions units and required control devices to assure compliance with the proposed emissions and work practice and operational limitations.

The applicant shall calculate monthly and rolling 12-month facility-wide actual emissions of VOC. The calculations shall include emissions from all controlled and uncontrolled emitting units at the facility and shall be made using various required assumptions or emission factors, or results of required measurements or testing.

F. Recordkeeping and Reporting Requirements **[40 CFR 49.155(a)(4)(i) and (a)(5)]**

The EPA proposes that the applicant keep extensive records to be made available upon EPA request, in lieu of voluminous reporting requirements. The records to be kept include, but are not limited to, all required measurements, testing, monitoring and calculations, as well as any manufacturer specifications and guarantees, deviations from permit conditions and corrective actions taken and any determinations that vapor recovery is not feasible.

The EPA proposes that the applicant submit a report of rolling 12-month VOC emissions each year covering the period for the previous calendar year. The applicant shall also promptly report any deviations or exceedances of emission or operational limits and a description of any corrective actions or preventative measures taken. Additionally, a report shall be submitted for any required performance test.

G. Records Retention **[40 CFR 49.155(a)(4)(ii)]**

All required records shall be retained for at least 5 years from the date the record was created.

VI. Air Quality Review

A. Regulatory Requirements

The MNSR Regulations at 40 CFR 49.159(d) require that an Air Quality Impact Assessment (AQIA) modeling analysis be performed if there is reason to be concerned that new construction would cause or contribute to a National Ambient Air Quality Standard (NAAQS) or PSD increment violation. If the AQIA reveals that the proposed construction could cause or contribute to a NAAQS or PSD increment violation, such impacts must be addressed before a pre-construction permit can be issued.

Based on the available data, discussed below, there do not appear to be any significant air quality concerns within the exterior boundaries of the Fort Berthold Indian Reservation. Additionally, operating emissions from the proposed facility will be well controlled at all times. Therefore, the EPA has determined that an AQIA modeling analysis is not required for the proposed permit.

The following air quality review of the proposed project is in accordance with the instruction in the EPA's Form NEW which can be found at: https://www.epa.gov/caa-permitting/tribal-nsr-permits-region-8#Applications.

B. Review of Proposed Project

1. Existing Air Quality and Monitoring Stations

There are no designated NAAQS non-attainment areas in the regional vicinity of the proposed project.

The state of North Dakota operates seven (7) ambient monitoring stations, including three (3) stations in western North Dakota near Dunn, Theodore Roosevelt National Park (TRNP), and Lostwood National Wildlife Refuge (LNWR) that are designed to characterize regional background pollutant levels.[1]

2. Topography

According to information provided in the synthetic MNSR application for the proposed facility, the proposed project area is in relatively flat to gently rolling open terrain. There is little industrial development within a few miles of the site, with the exception of an occasional oil well production facility.

3. Pollutants of Concern

a. Ozone:

The NAAQS for ozone is 70 parts per billion (ppb), and compliance with the NAAQS is determined by comparison to a "design value" that is calculated as the three-year average of the fourth highest daily eight-hour ozone concentration at each site. Based on the most recent monitoring data, the 2016 ozone design values at the Williston, Dunn, TRNP and LNWR sites are 56, 58, 57 and 59 ppb, respectively. [2] Thus, current air quality for western North Dakota is substantially lower than the ozone NAAQS.

The primary air pollutant that would be emitted from the proposed facility is VOC which can contribute to ozone formation. Generally, a photochemical

[1]Annual Report, North Dakota Ambient Air Quality Monitoring Program Network Plan with Data Summary, 2016, available online at: http://www.ndhealth.gov/AQ/ambient/Annual%20Reports/ARNP_15-16.pdf
[2] The Air Quality System (AQS) – the EPA's Repository of Air Quality Data, available online at: http://www.epa.gov/ttn/airs/airsaqs/.

modeling analysis is needed to determine if VOC contributes to ozone formation. However, in rural areas ozone is typically insensitive to changes in VOC emissions. Additionally, because ozone is generally a regional air pollutant, smaller projects such as the proposed project subject to this permit are not expected to significantly affect NAAQS attainment for ozone. Therefore, VOC emissions are not expected to cause or contribute to exceedances of the ozone NAAQS as a result of the proposed project.

While NO_X emissions can also contribute to ozone formation, emissions of less than a few hundred tons per year typically do not have a detectable impact on ambient ozone levels. For example, a photochemical modeling study of a source in Colorado with 400 tpy NO_X and 200 tpy VOC emissions showed increases in ozone of less than 1 ppb on most days.[3] Because ambient monitoring data show that ozone levels in North Dakota are substantially below the ozone NAAQS, and because NO_X emissions from the project are less than 40 tpy, photochemical model simulations would not be expected to indicate exceedances of the ozone NAAQS.

b. NO_X:

NO_X would be emitted in small amounts due to combustion units at the proposed facility. For NO_2, the proposed project would include two (2) emission sources, an emergency generator engine meeting EPA "Tier 2" NSPS for NO_X and other criteria pollutants, and the enclosed combustion device for the rail loading stations. The increase in allowable (controlled) NO_X emissions from the proposed project is estimated at 0.42 tpy.

The greatest potential air quality concern for projects involving combustion of petroleum-related gases is with respect to the EPA's 1-hour NAAQS for NO_2 promulgated in June 2010. Compliance with the NAAQS for this pollutant is determined by calculating a "design value" which is a statistical average of data collected at the monitor over a three year period.

Data reported to AQS for the period of 2014 through 2016 show a pattern of generally low concentrations. The design value for the 1-hour NO_2 NAAQS is defined as the eighth highest value in each year, averaged over a three-year period. 1-hour NO_2 design values for the Dunn, TRNP and LNWR sites are 12, 11 and 12 ppb, respectively, compared to the standard of 100 ppb.

Given the above discussion of existing monitored concentrations in the general project area, which demonstrates that there is large margin of compliance with the 1-hour NO_2 NAAQS, and the proposed allowable NO_2 emissions of less than 40 tpy, it is expected that combustion sources at the proposed project site are unlikely to cause or contribute to non-attainment of the 1-hour NO_2 NAAQS.

[3] Morris, R.E, Sakulyanontvittaya, T., McNally, D., and Loomis, C., Final Report: EFFECT OF THE HIGH PLAINS ENERGY STATION ON THE FINAL 2010 OZONE ATTAINMENT DEMONSTRATION MODELING FOR THE DENVER 8-HOUR OZONE SIP, March 9, 2009, submitted to High Plains Energy Associates, LLC 400 Chesterfield Center, Suite 110, St. Louis, Missouri 63017

VII. Tribal Consultations and Communications

EPA Region 8 offers the Tribal government leaders an opportunity to consult on each proposed MNSR permit action. EPA Region 8 projected that consultation on this project, if requested, could take approximately 30 days total. The EPA sent a letter offering the opportunity to consult on this permit action on February 3, 2017, to the Chairman of the Mandan, Hidatsa, and Arikara Nation (MHA Nation) that asked for a response within 10 days of receipt of the offer letter. On February 24, 2017, the EPA received a letter from Chairman Mark Fox to Assistant Regional Administrator Martin Hestmark that stated MHA Nation did not believe it was necessary to consult on the proposed TBPS facility.

All minor source applications (synthetic minor, modification to an existing facility, new true minor or general permit) are submitted to both EPA Region 8 and the Tribal Environmental Director per the application instructions (see https://www.epa.gov/caa-permitting/tribal-nsr-permits-region-8). The Tribal Environmental Office has 10 business days to respond to the EPA with questions and comments on the application. In the event an Air Quality Impact Assessment (AQIA) is triggered, a copy of that document is emailed to the tribe within 5 business days of receipt by Region 8.

Additionally, the Tribe's Environmental Director is notified of the public comment period for the draft permit and provided copies of the notice of public comment opportunity to post in various locations on the Reservation that they deem fit. The Tribe is also notified of the issuance of the final permit.

Tribal Environmental Contact:

Edmund Baker, Environmental Director
MHA Nation
404 Frontage Road
New Town, North Dakota 58763-9404

VIII. Environmental Justice

On February 11, 1994, the President issued Executive Order 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The Executive Order calls on each federal agency to make environmental justice a part of its mission by "identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations."

The EPA defines "Environmental Justice" as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and polices. The EPA's goal with respect to Environmental Justice in permitting is to enable overburdened communities to have full and meaningful access to the permitting process and to develop permits that address environmental justice issues to the greatest extent practicable under existing environmental laws. *Overburdened* is used to describe the minority, low-income, tribal and indigenous populations or communities in the United States that potentially experience disproportionate environmental harms and risks as a result of greater vulnerability to environmental hazards.

This discussion describes our efforts to identify environmental justice communities and assess potential effects in connection with issuing this permit in Ward County, North Dakota, on Indian country lands within the Fort Berthold Indian Reservation.

A. Region 8 Air Program Determination

We conclude that issuance of the aforementioned permit is not expected to have disproportionately high or adverse human health effects on overburdened communities in the vicinity of the facility.

B. Environmental Impacts to Potentially Overburdened Communities

The permit contains a provision stating, "*The permitted source shall not cause or contribute to a National Ambient Air Quality Standard violation or a PSD increment violation.*" Noncompliance with this permit provision is a violation of the permit and is grounds for enforcement action and for permit termination or revocation. As a result, we conclude that issuance of the aforementioned permit will not have disproportionately high or adverse human health effects on communities in the vicinity of the Fort Berthold Indian Reservation.

C. Tribal Consultation and Enhanced Public Participation

Given the presence of potentially overburdened communities in the vicinity of the facility, we are providing an enhanced public participation process for this permit.

1. Interested parties can subscribe to an EPA email list that notifies them of public comment opportunities on the Fort Berthold Indian Reservation for proposed air pollution control permits via email at https://www.epa.gov/caa-permitting/caa-permit-public-comment-opportunities-region-8.

2. All minor source applications (synthetic minor, modification to an existing facility, new true minor or general permit) are submitted to both the Tribe and us per the application instructions (see https://www.epa.gov/caa-permitting/tribal-nsr-permits-region-8).

3. The Tribe has 10 business days to respond to us with questions and comments on the application.

4. In the event an AQIA is triggered, we email a copy of that document to the Tribe within 5 business days from the date we receive it.

5. We notify the Tribe of the public comment period for the proposed permit and provide copies of the notice of public comment opportunity to post in various locations of their choosing on the Reservation. We also notify the Tribe of the issuance of the final permit.

6. We offer the tribal government leaders an opportunity to consult on each proposed permit action. We ask the tribal government leaders to respond to us within 10 days. We offered an opportunity to consult on this permit action to the Chairman of the MHA Nation via letter dated February 3, 2017.

IX. Public Notice & Comment, Hearing and Appeals

A. Public Notice

In accordance with §49.157, the EPA Region 8 Air Program (Air Program) must provide public notice and a 30 day public comment period to ensure that the affected community and the general public have reasonable access to the application and draft permit information. The application, the draft permit, this technical support document, and all supporting materials for the draft permit are available at:

MHA Nation
Environmental Division Office
404 Frontage Road
New Town, North Dakota 58763-9404

and

US EPA Region 8
Air Program Office
1595 Wynkoop Street (8P-AR)
Denver, Colorado 80202-1129

All documents are available for review at the U.S. EPA Region 8 office Monday through Friday from 8:00 a.m. to 4:00 p.m. (excluding Federal holidays). Additionally, the draft permit and technical support document can be reviewed on the Air Program's website at https://www.epa.gov/caa-permitting/caa-permit-public-comment-opportunities-region-8.

Any person may submit written comments on the draft permit and may request a public hearing during the public comment period. These comments must raise any reasonably ascertainable issue with supporting arguments by the close of the public comment period (including any public hearing).

B. Public Hearing

A request for a public hearing must be in writing and must state the nature of the issues proposed to be raised at the hearing. The Air Program will hold a hearing whenever there is, on the basis of requests, a significant degree of public interest in a draft permit. The Air Program may also hold a public hearing at its discretion, whenever, for instance, such a hearing might clarify one or more issues involved in the permit decision.

C. Final Permit Action

In accordance with §49.159, a final permit becomes effective 30 days after permit issuance, unless: (1) a later effective date is specified in the permit; or (2) appeal of the final permit is made as detailed in the next section; or (3) the Air Program may make the permit effective immediately upon issuance if no comments resulted in a change in the draft permit or a denial of the permit. The Air Program will send notice of the final permit action to any individual who commented on the draft permit during the public comment period, as well as to any persons

subscribed to the Air Program's public email list for the Fort Berthold Indian Reservation. In addition, the source will be added to a list of final minor NSR permit actions which is posted on the Air Program's website at https://www.epa.gov/caa-permitting/caa-permits-issued-epa-region-8. Anyone may request a copy of the final minor NSR permit at any time by contacting the Region 8 Tribal Air Permit Program at (800) 227-8917 or sending an email to r8airpermitting@epa.gov.

D. Appeals to the Environmental Appeals Board (EAB)

In accordance with §49.159, within 30 days after a final permit decision has been issued, any person who filed comments on the draft permit or participated in the public hearing may petition the Board to review any condition of the permit decision. The 30-day period within which a person may request review under this section begins when the Region has fulfilled the notice requirements for the final permit decision. Motions to reconsider a final order by the EAB must be filed within 10 days after service of the final order. A petition to the EAB is, under section 307(b) of the Act, a prerequisite to seeking judicial review of the final agency action. For purposes of judicial review, final agency action occurs when a final permit is issued or denied by the Air Program and agency review procedures are exhausted.

Notice of Intent to Issue Clean Air Act
Minor New Source Review Permit
United States Environmental Protection Agency
Region 8, Air and Radiation Program

Take notice that the United States Environmental Protection Agency (U.S. EPA) has received an application for a minor new source review (MNSR) permit that regulates air pollution emissions from the following source located within the Fort Berthold Indian Reservation, Ward County, North Dakota:

Thunder Butte Petroleum Services, LLC
Crude Storage and Loading Facility
Ward County, ND
Latitude / Longitude:
47.974722N / -101.869167W

The U.S. EPA issues Clean Air Act (CAA) minor new source review permits in Indian country under Part 49 of Title 40 of the Code of Federal Regulations (40 CFR Part 49), where EPA has not approved a tribe to implement a new source review program.

This permit approves the construction and operation of a crude oil storage and loading facility. The facility will include two (2) crude oil storage tanks with 140,000-barrel capacity each, four (4) truck-to-tank off-loading stations, and three (3) tank-to-truck loading stations. The crude oil storage tanks will be equipped with internal floating roofs for control of VOC emissions to comply with 40 CFR part 60, subpart Kb. The truck off-loading stations will use submerged filling arms and piping to the tanks. The tanks will act as intermediate storage between the trucks that will deliver the crude oil to the facility and the trucks that will transport the crude oil to its final destination. The Permittee will use vapor collection and combustion with 70% control efficiency for VOCs displaced during loading of crude oil into trucks.

Members of the public may review a copy of the proposed permit prepared by the EPA, the technical support document for the proposed permit, the application, and all supporting materials, at the U.S. EPA Region 8 Technical Library, at 1595 Wynkoop Street, 2nd floor, Denver, Colorado 80202-1129. All documents will be available for review Monday through Thursday from 8:00 am to 4:00 p.m. (excluding federal holidays). To obtain information, please contact Donald Law at 303-312-7015. Please be aware that government identification with a picture, such as a driver's license, is required to enter the EPA building.

The proposed permit, technical support document, and supporting materials are also available for review at the following locations: Mandan, Hidatsa and Arikara Nation Environmental Programs Office, 404 Frontage Road, New Town, North Dakota.

Electronic copies of the proposed permit, technical support document, and all supporting materials are also available for review on the EPA Region 8 website at: https://www.epa.gov/caa-permitting/caa-permit-public-comment-opportunities-region-8.

The public comment period on this proposed permit action will begin on March 22, 2017 and will end on April 21, 2017. All comments should be addressed to Donald Law, Air Program (8P-AR), U.S. EPA, Region 8, 1595 Wynkoop Street, Denver, CO 80202-1129, or submitted electronically following the instructions provided at: https://www.epa.gov/caa-permitting/caa-permit-public-comment-opportunities-region-8.

All comments received on or before the end of the public comment period will be considered in arriving at a final decision on the permit. The final permit is a public record that can be obtained upon request. A statement of reasons for changes made to the proposed permit and responses to all significant comments received will be sent to all persons who submitted comments and contact information on the proposed permit, or who requested notice of the final permit decision.

If you believe any conditions in the proposed permit are inappropriate, or that our initial decision to prepare a permit is inappropriate, you must raise all reasonably ascertainable issues and submit all reasonably ascertainable arguments supporting your position by the end of the public comment period. Any supporting materials that you submit must be included in full and may not be incorporated by reference, unless they are already part of the administrative docket for this permit proceeding or consist of State, Tribal, or Federal statutes and regulations, EPA documents of general availability, or other generally available referenced materials.

All comments received will be included in the public docket without change and will be available to the public, including any personal information provided, unless the comment includes Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Information that is considered to be CBI or otherwise protected should be clearly identified as such and should not be submitted through e-mail. If a commenter sends e-mail directly to the EPA, the e-mail address will be automatically captured and included as part of the public comment. Please note that an e-mail or postal address must be provided with comments if the commenter wishes to receive direct notification of EPA's final decision regarding the proposed permit.

Any interested person may request a public hearing on the proposed permit. The request must be submitted in writing and must state the nature of the issues proposed to be raised at the hearing. The request should be addressed to Donald Law, Air Program (8P-AR), U.S. EPA, Region 8, 1595 Wynkoop Street, Denver, CO 80202-1129. Public hearing requests must be received by the EPA on or before the end of the public comment period. The EPA will hold a hearing whenever there is, on the basis of requests, a significant degree of public interest in a proposed MNSR permit. The EPA may also hold a public hearing at its discretion, whenever, for instance, such a hearing might clarify one or more issues involved in the MNSR permit decision.

The EPA will proceed with final permit issuance after considering all comments received during the public comment period. In accordance with 40 CFR §49.159, the final permit becomes effective 30 days after permit issuance, unless: (1) a later effective date is specified in the permit; or (2) the permit decision is appealed to EPA's Environmental Appeals Board pursuant to 40 CFR §124.19; or (3) no comments resulted in a change to the proposed permit or a denial of the permit, in which case the EPA may make the final permit effective immediately upon issuance.

The EPA will add the final MNSR permit to a list of final MNSR permit actions which is posted on the EPA Region 8 website at http://www.epa.gov/caa-permitting/caa-permits-issued-epa-region-8. Anyone may request a copy of the final MNSR permit at any time by contacting the Region 8 Tribal Air Permit Program at (800) 227-8917 or sending an email to R8AirPermitting@epa.gov

If you would like to be added to our mailing list to be informed of future actions on this or other CAA permits issued in Indian country, please send your name and address to Tribal Air Permitting Contact, Air Program (8P-AR), U.S. EPA Region 8, 1595 Wynkoop Street, Denver, CO 80202-1129, or by e-mail to R8AirPermitting@epa.gov.

MANDAN, HIDATSA & ARIKARA NATION

Three Affiliated Tribes * Fort Berthold Indian Reservation
404 Frontage Road New Town, ND 58763
Tribal Business Council

Office of the Chairman
Mark N. Fox

February 9, 2017

Assistant Regional Administrator Martin Hestmark
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

RE: Consultation and Coordination on Synthetic Minor New Source Review (NSR) for the Thunder Butte Petroleum Services Crude Storage and Loading Facility on the Fort Berthold Indian Reservation

Dear Mr. Hestmark:

The Mandan, Hidatsa and Arikara Nation (MHA Nation) is in receipt of your offer for an opportunity to consult with the U.S. Environmental Protection Agency Region 8 (EPA) on the issuance of a Synthetic Minor NSR Air Pollution Control Permit for the Thunder Butte Petroleum Services Crude Storage and Loading Facility on the Fort Berthold Indian Reservation. Representatives of the MHA Nation have met with the EPA on several occasions to discuss the Thunder Butte Facility. The MHA Nation does not believe that it is necessary to engage in further government-to-government consultation at this time. The MHA Nation would like you to proceed with your review of the permit and regularly coordinate and communicate with the MHA Nation's Environmental Director, Edmund Baker.

Should you have questions or need other information, please do not hesitate to contact me. Thank you.

Sincerely,

Mark N Fox

Mark Fox, Chairman

Cc Richard Mayer, TBPS CEO
Tom Fredericks, FP&M LLP
Jerry Koblitz, ARCADIS US, Inc.

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

FEB 0 2 2017

Ref: 8P-AR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Mark Fox, Chairman
Mandan, Hidatsa and Arikara (MHA) Nation
404 Frontage Road
New Town, North Dakota 58763-9404

Re: Notification of Consultation and Coordination on Issuance of a Synthetic Minor New Source Review (NSR) Air Pollution Control Permit to Thunder Butte Petroleum Services for the Thunder Butte Petroleum Services Crude Storage and Loading Facility on the Fort Berthold Indian Reservation

Dear Chairman Fox:

The U.S. Environmental Protection Agency Region 8 (EPA) is offering an opportunity to consult to the MHA Nation on issuance of a Synthetic Minor NSR Air Pollution Control Permit for the Thunder Butte Petroleum Services Crude Storage and Loading Facility on the Fort Berthold Indian Reservation. The company, in accordance with the Federal Tribal New Source Review Clean Air Act air pollution control permitting program found at 40 CFR part 49, is requesting legally and practically enforceable restrictions on volatile organic compounds in order to become a minor source with respect to the Prevention of Significant Deterioration Permit Program at 40 CFR part 52 and the Title V Operating Permit Program at 40 CFR part 71.

This consultation and coordination process will be conducted in accordance with the *EPA Policy on Consultation and Coordination with Indian Tribes* (www.epa.gov/tribal/consultation/consult-policy.htm). We invite you and your designated consultation representative(s) to participate in this process.

Whether or not you decide to accept this offer for government-to-government consultation, we plan to regularly coordinate and communicate with the MHA Nation's Environmental Director, Edmund Baker, for facilities located within the exterior boundaries of the Fort Berthold Indian Reservation. If you would prefer to designate an alternative representative for communication on permitting matters, please notify us of that person's name and contact information. We will keep the tribal government informed and will seek your input on these permits.

The EPA welcomes the opportunity to consult and coordinate with the MHA Nation. If you choose to consult about this permitting action, we will work with your tribal government to develop a consultation plan including a description of the process we would follow, opportunity for your input, and timeline for

the Region to provide feedback and to complete the consultation. We will send a draft consultation plan for your review as soon as practicable if we receive your request to consult in response to this letter. The agency's goal will be to ensure that you have an opportunity to provide tribal input into this permit action either through the formal consultation process or through communication from your staff related to the proposed permit.

We would like to complete the consultation and coordination period within 30 days after you receive this letter. Please reply in writing to this letter as soon as possible but preferably within 10 days of receipt if the MHA Nation desires to consult on this permit action. The official EPA contact person for this consultation and coordination process is Donald Law, a permit engineer on my staff.

Thank you very much for your attention to this matter. Please contact me at (303) 312-6776, or your staff can contact Donald Law at (303) 312-7015 or law.donald@epa.gov, if you have any questions on this action. We look forward to hearing from you on this important matter.

Sincerely,

Martin Hestmark
Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

cc: Edmund Baker, Environmental Director, MHA Nation
Al Nygard, Chief Executive Officer, MHA Nation

Edmund Baker, Environmental Director
MHA Nation
404 Frontage Road
New Town, North Dakota 58763-9404

Al Nygard, Chief Executive Officer
MHA Nation
404 Frontage Road
New Town, North Dakota 58763-9404

Ms. Monica S. Morales
Acting Director, Air Program (8P-AR)
U.S. EPA, Region 8
1595 Wynkoop Street, 8P-AR
Denver, CO 80202-1129

February 3, 2017

Subject:
Federal New Source Review Program Synthetic Minor Application in Indian Country Mandan, Hidatsa, and Arikara Nation dba Thunder Butte Petroleum Services, Inc. Truck Loading and Storage Facility, Ward County, North Dakota

Dear Ms. Morales:

The Mandan, Hidatsa, and Arikara (MHA) Nation doing business as (dba) Thunder Butte Petroleum Services, Inc. (TBPS) is submitting this new Federal New Source Review Program application for a synthetic minor source permit to emit regulated air pollutants at the MHA Nation/TBPS Truck Loading and Storage Facility (the facility) pursuant to the requirements of 40 CFR §49.153(a)(3). The facility is located in Ward County, North Dakota on the Fort Berthold Indian Reservation. The facility proposed to load and store Bakken crude oil and is not an oil and natural gas production facility subject to the Federal Implementation Plan (FIP) for the Fort Berthold Reservation under 40 CFR §49, Subpart K [See 40 CFR §49.4161].

TBPS appreciates EPA's efforts to expedite the permit process to authorize the facility with a federally enforceable limit on the potential to emit (PTE) of criteria air pollutants under a synthetic minor source permit pursuant to 40 CFR §49.153(a)(3). Based on EPA direction provided during the January 18, 2017 meeting with Mr. Donald J. Law of EPA Region 8 and Mr. Roger Felty and Kathryn Cloutier of Arcadis, TBPS submits a new application materials as enclosures with this letter, including forms: NEW and SYNMIN, along with all applicable components needed for the application as required under 40 CFR §49.158.

If you have any questions regarding this submittal, please feel free to contact Richard Mayer at rmayer@mhanation.com or at (701) 862-2560.

Sincerely,

Richard Mayer
TBPS Chief Executive Officer

Cc:
Mark Fox, Chairman of the MHA Nation

ARCADIS Design & Consultancy for natural and built assets

Mandan, Hidatsa, and Arikara (MHA) Nation dba
Thunder Butte Petroleum Services, Inc. (TBPS)

FEDERAL NEW SOURCE REVIEW APPLICATION FOR SYNTHETIC MINOR SOURCE PERMIT

Thunder Butte Petroleum Services/MHA Nation
Truck Loading and Storage Facility

February 2017

FEDERAL NEW SOURCE REVIEW APPLICATION FOR SYNTHETIC MINOR SOURCE PERMIT

Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility

Justin Uhall
Air Specialist

Roger Felty
Principal Environmental Specialist

Kathryn Cloutier
Technical Project Manager

Prepared for:

Mandan, Hidatsa, and Arikara (MHA) Nation
dba Thunder Butte Petroleum Services, Inc. (TBPS)
P.O. Box 1227
New Town
North Dakota 58763
Tel 701 862 2640
Fax 701 862 3072

Prepared by:

Arcadis U.S., Inc.
630 Plaza Drive
Suite 100
Highlands Ranch
Colorado 80129
Tel 720 344 3500
Fax 720 344 3535

Our Ref.:
CO001577.0001

Date:
February 2017

CONTENTS

TABLES

FIGURE

APPENDICES

ACRONYMS AND ABBREVIATIONS

40 CFR	Title 40 of the United States Code of Federal Regulations
AP-42	EPA's AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition
bbl	Barrel
BOPY	Barrels of Oil per Year
BRE	Bryan Research & Engineering
BWPD	Barrels of Water per Day
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
GPM	Gallons per Minute
H_2S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
lb	Pound
lb-mol	Pound-Mole
MACT	Maximum Achievable Control Technology
Mgal	1,000 gallons
MHA	Mandan, Hidatsa, Arikara
MSS	Maintenance, Startup, and Shutdown
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NO_x	Oxides of Nitrogen
NSPS	New Source Performance Standards
NSR	New Source Review
ppmv	Parts per Million by Volume
PSD	Federal Clean Air Act, Part C
psia	Pounds per Square Inch (absolute)
psig	Pounds per Square Inch (gauge)
RVP	Reid Vapor Pressure
Scfm	standard cubic feet per minute
SO_2	Sulfur Dioxide
TPBS	Thunder Butte Petroleum Services, Inc.
tpy	Tons per Year
VOC	Volatile Organic Compound

1. INTRODUCTION

The Mandan, Hidatsa, and Arikara (MHA) Nation doing business as (dba) Thunder Butte Petroleum Services, Inc. (TBPS) proposes to construct and operate the Thunder Butte Petroleum Services / MHA Nation Truck Loading and Storage Facility (the facility) to receive, store and ship crude oil by truck. The proposed facility will be located in Ward County, North Dakota on the Fort Berthold Indian Reservation (FBIR). The facility is not an oil and gas production facility subject to the Federal Implementation Plan (FIP) for the Fort Berthold Indian Reservation under 40 CFR §49, Subpart K [See 40 CFR §49.4161]. Further, Ward County is designated as attainment/unclassifiable for all criteria pollutants. As such, the facility is required to comply with the Clean Air Act (CAA) under the permitting authority of the Environmental Protection Agency (EPA) Region 8 Federal Minor New Source Review Program in Indian Country under 40 CFR §49, Subpart C.

TBPS respectfully submits this application for a synthetic minor source permit in accordance with 40 CFR §49.158 to emit regulated air pollutants and establish federally enforceable limits at the facility pursuant to 40 CFR §49.153(a)(3). With the issuance of the requested permit, the facility will have a potential to emit (PTE) criteria air pollutants below the major source thresholds as defined in 40 CFR §52.21(b)(1). The facility is a petroleum storage and transfer unit; however, the total storage capacity does not exceed 300,000 barrels. Therefore, it is not a listed source category under 40 CFR §52.21(b)(1) and would be considered a major source if the PTE of any criteria pollutant is greater than or equal to 250 tons per year (tpy). As summarized in Table 3-1, the PTE, calculated as defined in 40 CFR §49.152 and 40 CFR §52.21(b)(1) for non-named sources, for each criteria pollutant is less than 250 tpy. Federal major new source review and prevention of significant deterioration (PSD) review are not triggered for the facility.

Additionally, Title V permitting requirements will not be triggered since the Title V major source thresholds, as defined in 40 CFR §71.2, are not exceeded (100 tpy for each criteria pollutant, 25 tpy for total hazardous air pollutants (HAPs), or 10 tpy for any single HAP). Note that fugitive emissions are not required to be included in evaluating the major source threshold because the facility is not a listed source category.

This report includes all required elements for an application for a synthetic minor source permit defined in 40 CFR §49.158(a)(1).

Detailed emission calculations for the proposed equipment and operations are presented in Appendix A. As applicable, this information is provided on the required Tribal NSR Synthetic Minor application materials including the FORM SYNMIN and FORM NEW provided in Appendix B.

2. PROCESS DESCRIPTION AND PROCESS FLOW DIAGRAM

The facility will include two (2) 140,000-barrel (bbl) nominal capacity internal floating roof (IFR) crude oil storage tanks (IDs TK-2101 & TK-2102), three (3) loadout racks, four (4) unloading racks, and one (1) process flare (FL-1). Incoming crude oil will be unloaded at the four unloading racks and outgoing crude oil will be removed from the three loadout racks by truck loading operations (LOAD). Vapors released during all loading operations will be routed to the flare/combustor (FL-1) for control. Associated piping components will generate fugitive emissions (FUG). Additional emission sources at the facility include Maintenance, Startup, and Shutdown (MSS) operations, which are included in this application, and are discussed in Section 3.2.

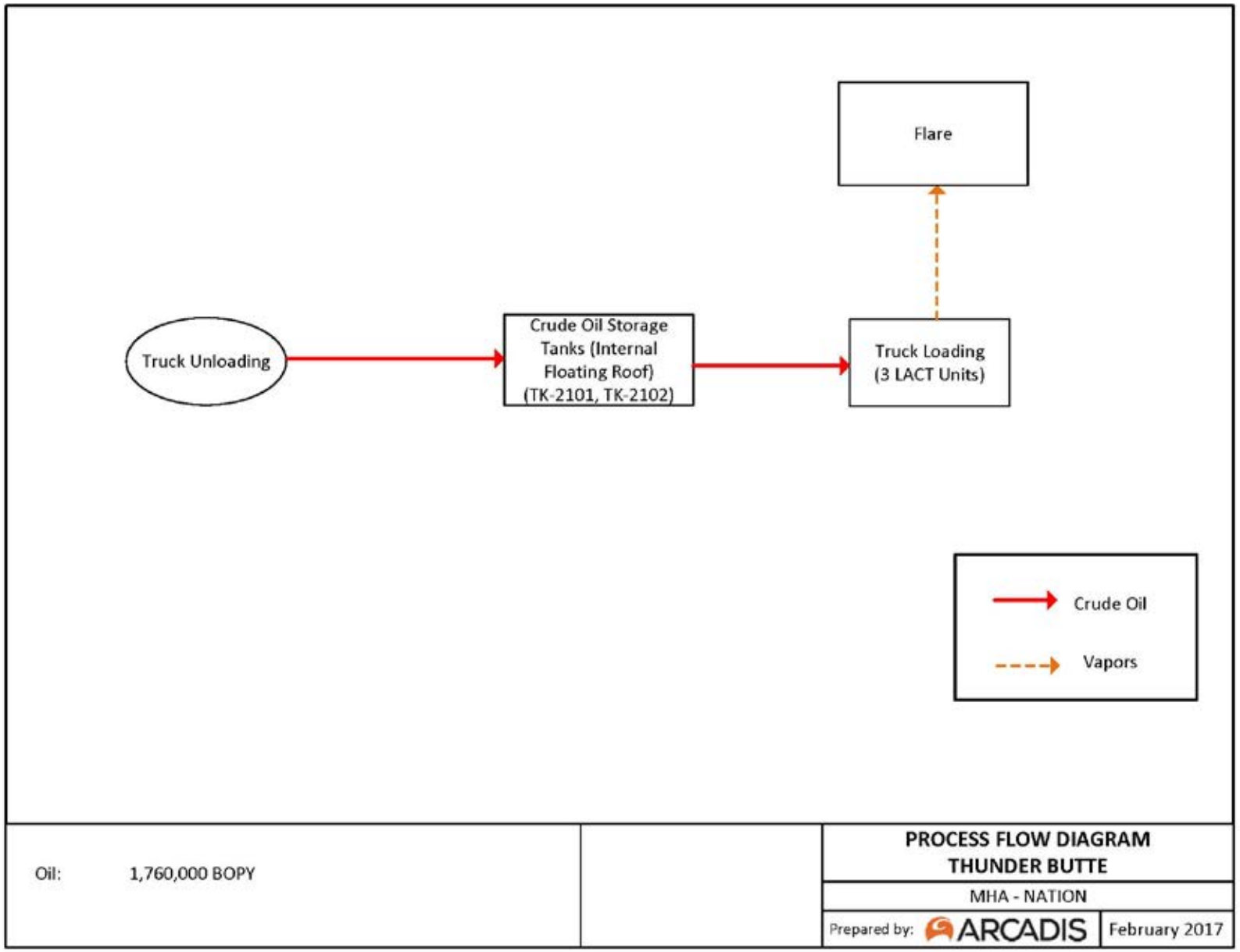
TBPS proposes to handle up to 1,760,000 barrels of oil per year (BOPY) of Bakken light sweet crude oil and operate the facility for storage and transport of crude oil for 8,760 hours per year. Based on the Texas Commission on Environmental Quality (TCEQ) definition of a sour gas, TBPS assumes a hydrogen sulfide (H2S) concentration of 24 ppmv for each of the vapor streams.

Per 40 CFR Part 60, Subpart Kb, storage vessels containing volatile organic liquids (VOL) with a true vapor pressure (TVP) of less than 11.1 pounds per square inch, absolute (psia) and greater than 0.75 psia being stored in a vessel greater than 40,000 gallons shall be equipped with an internal floating roof, and external floating roof, or a closed vent system with a control device. TBPS operates two (2) internal floating roof tanks with capacities greater than 40,000 gallons and conservatively assumes a true vapor pressure of the stored material of 11.1 psia for the purposes of this application. Using Figure 7.1-13a from AP-42, Fifth Edition, Volume 1, Chapter 7.1: Organic Liquid Storage Tanks, the TVP was converted to a Reid Vapor Pressure (RVP) of 11.8 psi. A stock liquid temperature of 70.1 degrees Fahrenheit was used in the RVP conversion and represents the maximum monthly average from the TANKS 4.0 meteorological date for Williston, ND. Therefore, crude oil handled by the facility is conservatively expected to have a RVP of 11.8 (psi).

A summary of the proposed emission sources at the facility is presented in Table 2-1.

Table 2-1 Summary of Emission Sources

Equipment ID	Equipment Description	Capacity/Design Rate	Controls
FUG	Fugitives	N/A	None
FL-1	Process Flare/Combustor	140 scfm	None
TK-2101	Crude Oil IFR Storage Tank Fugitives	140,000 bbl	IFR
TK-2102	Crude Oil IFR Storage Tank Fugitives	140,000 bbl	IFR
LOAD	Crude Oil Export Truck Loading	350 GPM	FL-1
--	Truck Unloading	350 GPM	Non-Emitting
MSS-LL	Tank Landing Losses	N/A	None
MSS-DEGAS	Tank Vent Degassing	N/A	None


Flare
Truck Unloading
Crude Oil Storage Tanks (Internal Floating Roof) (TK-2101, TK-2102)
Truck Loading (3 LACT Units)
Crude Oil
Vapors
Oil: 1,760,000 BOPY
PROCESS FLOW DIAGRAM
THUNDER BUTTE
MHA - NATION
Prepared by: ARCADIS
February 2017

3. EMISSIONS SUMMARY

The maximum allowable air pollutant emission rates proposed for each emission source at the facility are presented in Table 3-1, and the maximum uncontrolled PTE air pollutant emission rates are presented in Table 3-2. Detailed emission calculations for the proposed equipment and operations are presented in Appendix A.

3.1 Emissions Calculations

Emissions of Volatile Organic Compounds (VOCs) from material phase change such as loading and tank losses were calculated using AP-42 calculation methodologies. Emission calculation tables are provided in Appendix A.

3.1.1 Liquid Analysis

The composition of the inlet crude oil (Bakken Crude) were taken from a site-specific initial cut (IBP to 160F) of an ASTM Method D-2892 (distillation of Bakken Crude) analysis, and is provided in Appendix C.

3.1.2 Internal Floating Roof (IFR) Storage Tank Emissions

Emissions of VOCs and hazardous air pollutants (HAPs) from the IFR crude oil storage tanks (IDsTK-2101 & TK-2102) were estimated using calculation methodology provided by AP-42, Fifth Edition, Volume 1, Chapter 7.1: Organic Liquid Storage Tanks. The calculation methodology determines the total emission losses from each IFR tank, by summing the emissions from the rim seal losses, withdrawal losses, deck fitting losses, and deck seam losses.

The working and standing tank gas speciation was determined using the crude oil sample referenced in Section 3.1.1 and modeled with ProMax Process Simulator published by Bryan Research and Engineering (BRE) according to methods published in AP-42 Chapter 7.1. This working and standing speciation was also used to estimate HAP emissions associated with crude loading and gas-phase fugitive emissions. The process simulator process stream tables are provided in Appendix A.

Detailed emission calculations for each IFR storage tank (TK-2101 & TK-2102) are provided in Appendix A.

3.1.3 Liquid Loading Emissions

Emissions from truck loading (ID: LOAD) of the crude oil were estimated using the loading loss emission factor and maximum design loading rates. The loading losses emission factor is based on Equation 1 from USEPA AP-42, Chapter 5.2 Transportation and Marketing of Petroleum Liquids, dated June 2008:

$$L_L = \frac{12.46 * SPM}{T}$$

Where:

L_L = loading losses (lb/Mgal);

S = saturation factor (dimensionless);

P = true vapor pressure of the liquid loaded (psia);

M = vapor molecular weight (lb/lb-mol); and

T = temperature of the liquid loaded (R).

The saturation factor for the submerged loading of a dedicated normal service truck was used per USEPA AP-42 Table 5.2-1. True vapor pressure, P, was determined using Antoine Coefficients, an anticipated Crude RVP of 11.8 (AP-42, Chapter 7 methodology), and the temperature of liquid loaded. T was determined from EPA tanks 4.09d for Williston, ND. The emissions were conservatively assumed to be 100% VOC. The Vapor Molecular Weight (M), and HAP speciation are based on the simulated tank working and breathing stream from the ProMax simulation as described in Section 3.1.2.

Hourly emissions were calculated assuming that the three truck loading racks can operate simultaneously, though annual crude loading is limited to 1,760,000 bbl/year.

Loading emissions associated with crude oil loading (LOAD) are controlled by the flare (FL-1), assuming a capture efficiency of 70% and a destruction efficiency of 98%.

3.1.4 Flare/Vapor Combustor Emissions

TBPS proposes to install a John Zink® Open Flame Vapor Combustor to control vapor emissions from crude loading. The vapor combustor will be designed to meet the requirements of 40 CFR §60.18 with a minimum net heating value of 300 British thermal units per standard cubic foot (Btu/scf) of vapor, and a tip velocity not to exceed 54 feet per second (fps). The design basis specification is provided in Appendix D. Emissions from the flare/combustor (FL-1) were estimated based on the maximum expected flow rate and heating value of the loading emissions stream routed to the control device. The maximum flow rate was estimated using AP-42, Chapter 5 calculation methodology for loading, and is shown in Appendix A. The heating value of the gas stream was estimated from the crude representative working and standing analysis, as determined in ProMax process simulation. Emission factors for the flare/combustor were taken from AP-42 Section 13.5 for Industrial Flares. Calculations for the flare/combustor assume it operates with a minimum capture efficiency of 70% (AP-42, Chapter 5.2) and a destruction efficiency of 98% for VOCs. The control device will be smokeless and unassisted, and will operate with an automatic ignition system to ensure the flare is constantly available; however, emissions conservatively assume a constantly lit propane pilot.

3.1.5 Fugitive Emissions

Fugitive emissions from equipment leaks were calculated using calculation methodology and emission factors from the EPA Protocol for Equipment Leak Emissions Estimates (document EPA-453/R-95-0174), Table 2-4. No reduction from Leak Detection and Repair (LDAR) monitoring is claimed. The expected component counts for the facility were estimated from facility design information. Fugitive emissions conservatively assume that the streams are 100% VOC. The weight percent of HAPs in gas/vapor service were based on the ProMax simulation for tank working and breathing streams as detailed in Section 3.1.2. The HAPs in liquid service were based on the liquid analysis provided in Appendix C.

3.1.6 Greenhouse Gas Emissions

No Greenhouse Gases (GHGs) are present in the inlet crude oil; therefore, no GHG emissions are represented from fugitives, crude oil truck loading, storage tanks, or MSS activities. GHG emissions from the flare pilot were calculated based on the pilot heat input rates and the carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) emission factors for fuel gas provided in 40 CFR Part 98 - Mandatory Greenhouse Gas Reporting, Subpart C, Tables C-1 and C-2. GHG emissions from the combustion of loading vapors at the flare were estimated based on the carbon content of the loading vapors and assuming 100% conversion to CO_2. No CH_4 or N_2O emissions are represented from combustion of loading vapor because the loading vapor stream contains no CH_4 or nitrogen. Equivalent carbon dioxide emissions (CO2e) were estimated based on individual GHG emissions and the Global Warming Potentials (GWP) provided in 40 CFR Part 98, Subpart A, Table A-1.

3.2 Maintenance, Startup and Shutdown (MSS)

In addition to the normal operation emission sources, TBPS is requesting to include the following planned MSS operations into the total annual emissions for the facility:

- Tank Landing Losses (MSS-LL);
- Tank Vent Degassing (MSS-DEGAS);

Tank Landing Losses were determined using AP-42, Fifth Edition Chapter 7 calculation methodology (equations 2-10, 2-16, and 2-26). Tank Vent Degassing Losses were estimated based on the vapor space under the landed roof, the forced ventilation blower rate, and the ideal gas law, assuming a full liquid heel. True vapor pressure, P, was determined using Antoine Coefficients, the anticipated Crude RVP of 11.8 (AP-42, Chapter 7 methodology), and the temperature from EPA TANKS 4.09d for Williston, ND. The Vapor Molecular Weight was estimated by ProMax as described in Section 3.1.2.

Table 3-1 Proposed Allowable Maximum Air Pollutant Emission Rates

Emissions Summary

Company Name: Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.

Site Location: Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility

ID	Description	PM		PM_{10}		$PM_{2.5}$		SO_2		NO_X		VOC		CO		n-Hexane		HAPs		H2S	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG	Fugitives	--	--	--	--	--	--	--	--	--	--	2.92	12.80	--	--	0.44	1.92	0.47	2.05	3.51E-05	1.54E-04
LOAD	Crude Oil Export (Truck)	--	--	--	--	--	--	--	--	--	--	44.26	77.90	--	--	2.28	4.01	2.37	4.17	5.31E-04	9.34E-04
TK-2101	Tank TK-2101 Transload Fill	--	--	--	--	--	--	--	--	--	--	2.35	4.44	--	--	0.12	0.23	0.13	0.24	2.82E-05	5.32E-05
TK-2102	Tank TK-2102 Transload Fill	--	--	--	--	--	--	--	--	--	--	2.35	4.44	--	--	0.12	0.23	0.13	0.24	2.82E-05	5.32E-05
FL-1	Transloading Flare	--	--	--	--	--	--	4.57E-03	0.01	0.18	0.42	2.21	4.26	0.70	1.28	0.11	0.19	0.11	0.19	2.48E-05	4.36E-05
Maintenance Startup and Shutdown																					
MSS-LL	Landing Losses TK-2101 - TK 2102	--	--	--	--	--	--	--	--	--	--	226.56	3.47	--	--	--	--	12.14	0.19	2.85E-03	4.37E-05
MSS-DEGAS	Tank Vent Degassing	--	--	--	--	--	--	--	--	--	--	13.99	0.44	--	--	--	--	0.75	0.75	1.76E-04	5.52E-06
TOTAL		**--**	**--**	**--**	**--**	**--**	**--**	**4.57E-03**	**0.01**	**0.18**	**0.42**	**294.65**	**107.75**	**0.70**	**1.28**	**3.07**	**6.57**	**16.09**	**7.83**	**3.68E-03**	**1.29E-03**
Total Applicable to Major Source Threshold (40 CFR §52.21(b)(1))		**--**	**--**	**--**	**--**	**--**	**--**	**4.57E-03**	**0.01**	**0.18**	**0.42**	**291.73**	**94.95**	**0.70**	**1.28**	**2.63**	**4.65**	**15.63**	**5.78**	**3.64E-03**	**1.13E-03**

Table 3-2 Uncontrolled PTE Maximum Air Pollutant Emission Rates

Emissions Summary

Company Name: Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.

Site Location: Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility

ID	Description	PM		PM_{10}		$PM_{2.5}$		SO_2		NO_X		VOC		CO		n-Hexane		HAPs		H2S	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG	Fugitives	--	--	--	--	--	--	--	--	--	--	2.92	12.80	--	--	0.44	1.92	0.47	2.05	3.51E-05	1.54E-04
LOAD	Crude Oil Export (Truck)	--	--	--	--	--	--	--	--	--	--	147.54	259.68	--	--	7.59	13.37	7.91	13.92	1.77E-03	3.11E-03
TK-2101	Tank TK-2101 Transload Fill	--	--	--	--	--	--	--	--	--	--	2.35	4.44	--	--	0.12	0.23	0.13	0.24	2.82E-05	5.32E-05
TK-2102	Tank TK-2102 Transload Fill	--	--	--	--	--	--	--	--	--	--	2.35	4.44	--	--	0.12	0.23	0.13	0.24	2.82E-05	5.32E-05
FL-1	Transloading Flare	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maintenance Startup and Shutdown																					
MSS-LL	Tank Landing Losses	--	--	--	--	--	--	--	--	--	--	226.56	3.47	--	--	--	--	12.14	0.19	2.85E-03	4.37E-05
MSS-DEGAS	Tank Vent Degassing	--	--	--	--	--	--	--	--	--	--	13.99	0.44	--	--	--	--	0.75	0.75	1.76E-04	5.52E-06
	TOTAL	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**395.72**	**285.26**	**--**	**--**	**8.28**	**15.74**	**21.52**	**17.38**	**4.89E-03**	**3.42E-03**

4. COMPLIANCE WITH FEDERAL AND TRIBAL NSR SYNTHETIC MINOR PERMITTING REQUIREMENTS

A summary of compliance with applicable federal requirements, including applicable NSPS and MACT regulations is provided in Table 4-2. Information required in Section B of the Tribal NSR Synthetic Minor application form (SYNMIN) is provided below.

4.1 Tribal NSR Application Form Information

4.1.1 Item 1

TBPS is proposing to limit the PTE of the facility loading emissions by limiting annual crude oil throughput to 1,760,000 BOPY and routing the vapors to a smokeless flare. As summarized in Table 3-2, the uncontrolled PTE rates for VOCs are greater than 250 tpy with the throughput limitation. As such, TBPS is also requesting to authorize the flare as a control device limitation. The flare will operate with a 70% capture efficiency and a 98% destruction efficiency for VOC emissions, as described in Section 3.1.3. The flare will limit the facility-wide PTE for VOC emissions from 285.26 tpy to 107.75 tpy, as shown in Table 3-1 and Table 3-2. These will serve as practically enforceable limits (as defined in 40 CFR §49.152) in order to establish PTE less than the major source threshold of 250 tpy for criteria pollutants, as defined in 40 CFR §52.21.

Additionally, TBPS is requesting these limits and requirements in order to avoid the major source threshold of 100 tpy for criteria pollutants, and 10 tpy for any single HAP, as defined in 40 CFR §71.2. With the proposed federally enforceable limits on PTE, Title V permitting requirements will not be triggered since the Title V major source thresholds are not exceeded (100 tpy for each criteria pollutant, 25 tpy for total hazardous air pollutants (HAPs), and 10 tpy for any single HAP). The facility is not a named source; therefore, fugitive emissions are not required to be included in the assessment of Title V applicability. With the requested enforceable limits, maximum VOC emissions for Title V purposes will be 94.95 tpy. In addition, the facility will be an area source of HAP and not subject to the provisions of 40 CFR Part 63, Subpart EEEE, National Emissions Standards for Hazardous Air Pollutants, Organic Liquids Distribution (Non-gasoline).

4.1.2 Item 2

TBPS will demonstrate compliance with throughput limitations by recording the monthly unloading and loading rates of crude oil. Compliance will be demonstrated by the 12-month rolling sum of the total loading and unloading rates.

TBPS proposes to install a John Zink® Open Flame Vapor Combustor to control vapor emissions from crude loading. The vapor combustor will be designed to meet the requirements of 40 CFR §60.18.

TBPS will conduct the following monitoring procedures on the control device to confirm proper operation:

- Continuous monitoring of the pilot flame using a temperature sensing device, and recording device that will indicate the continuous ignition of the pilot flame at all time when the device is operating;
- Check the recording device is in proper operation once per day;
- Check the auto-ignition system, where applicable, to ensure proper operation once per day;
- Check the pilot flame to ensure proper operation once per day;
- Correct any pilot flame and auto-ignition system failure, when notified by the malfunction alarm as soon as possible, but no longer than five (5) days from the day of the malfunction.

4.1.3 Item 3

TBPS proposes to install a vapor combustor with a capture efficiency of 70% (AP-42, Chapter 5.2), and a destruction efficiency of 98% for VOC emissions. The control device will be manufactured with a manufacturer's guarantee for the 98% destruction efficiency. Technical specifications of the device are provided in Appendix D. TBPS is not proposing to modify the control device in order to meet the requested limit.

4.1.4 Item 4

Emission estimates and calculation methodologies are discussed in Section 3 of this application, and detailed emission calculations are provided in Appendix A.

4.1.5 Item 5

Emissions of Greenhouse Gases (GHG) are presented in Table 4-1 below, and detailed calculations are provided in Appendix A.

Table 4-1 Greenhouse Gas Emission Rates

Emissions Summary

Company Name: Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.

Site Location: Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility

ID	Description	CO2		CH_4		N_2O		HFC		PFC		SF_6		CO_2e	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG	Fugitives	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LOAD	Crude Oil Export (Truck)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TK-2101	TK-2101 Transload Fill	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TK-2102	TK-2102 Transload Fill	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FL-1	Transloading Flare	348.66	702.97	1.66E-03	0.01	3.33E-04	1.46E-03	--	--	--	--	--	--	348.80	703.58
Maintenance Startup and Shutdown															
MSS-LL	Tank Landing Losses	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MSS-DEGAS	Tank Vent Degassing	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	**348.66**	**702.97**	**1.66E-03**	**7.29E-03**	**3.33E-04**	**1.46E-03**	**--**	**--**	**--**	**--**	**--**	**--**	**348.80**	**703.58**

Notes:

1 Represents both controlled and uncontrolled GHG.

Table 4-2 Federal Standard Applicability

Federal Standard	Name	Applicability
NSPS		
NSPS OOOO	Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution	This subpart applies to each storage vessel affected facility, which is a single storage vessel located in the oil and natural gas production segment, natural gas processing segment or natural gas transmission and storage segment. *The storage vessels at the facility are in the oil production segment after the point of custody transfer, and therefore do not meet the applicability provisions of 40 CFR §60.5365. NSPS OOOO is not applicable.*
NSPS Kb	Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984	This subpart applies to storage vessels containing volatile organic liquids with either a capacity greater than 75 m^3 (470 bbl) with a maximum true vapor greater than 76.6 kPa (11.1 psi) or greater than 151 m^3 (950 bbl) with a maximum true vapor pressure greater than 3.5 kPa (0.5 psi). *The facility will operate two 140,000 bbl nominal capacity internal floating roof tanks to store crude oil feed stocks with a vapor pressure that exceeds 0.5 psi. These tanks will exceed the applicability thresholds, and are therefore, subject to the control requirements of this subpart as specified in 40 CFR §60.112b. The facility will comply with NSPS Kb by installing internal floating roofs with mechanical shoe seals; gasketed rim vents and fitting seals.*
MACT		
Subpart EEEE	National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)	This subpart establishes national emission limitations, operating limits, and work practice standards for organic hazardous air pollutants (HAP) emitted from organic liquids distribution (OLD) (non-gasoline) operations at major sources of HAP emissions. *The facility does not exceed major source thresholds of 10 tpy of a single HAP or 25 tpy of aggregate HAP, therefore Subpart EEEE is not applicable.*

4.2 Air Quality Review

The facility will be constructed in Ward county which is attainment/unclassifiable for all criteria air pollutants. Further, TBPS is requesting a synthetic minor source permit to limit the PTE of regulated pollutants below major source threshold levels as specified in 40 CFR §52.21(b)(1). Therefore, major new source is not triggered and the requirements of 40 CFR §49.158 do not specify the need for air quality review. Therefore, preconstruction monitoring or analysis of impacts to NAAQS, PSD increments, or air quality related values (AQRVs) under 40 CFR §52.21(m) is not required or provided in this application.

4.3 NHPA – National Historic Preservation Act

A records search was completed for the project area of the proposed truck loading and storage and facility through the North Dakota State Historical Society. There were no records of previous cultural investigations or previously documented prehistoric or historical cultural resources within the project area or within one mile of the project area. Two undocumented cultural resources are adjacent to the proposed facility: the location of a previous farm complex and a segment of the historical Soo Line Railway (now operated as a branch of the Canadian Pacific Railway). These resources are not eligible for the National Register of Historic Places and will not be affected by the proposed undertaking. Within one mile of the proposed facility there are an additional five farm complexes shown on topographic maps that have not been recorded as cultural resources. The proposed facility is located within an area of glacial till plain dotted by pothole lakes. This setting has a low potential for containing undocumented prehistoric cultural resources. In addition to records at the State Historical Society, the National Register Database for Ward and Mountrail Counties (NPS 2017a, 2017b) was reviewed for any sites listed on the National Register of Historic Places that might be affected by the undertaking. The National Register Database listed 18 National Register properties for these two counties. The majority (16) of these National Register properties are buildings or historic districts within or near the cities of Minot and Stanley. All the National Register sites are more than 30 miles from the project site. The project will have no direct or indirect effect on any of these properties. A determination of No Historic Properties Affected was recommended.

The North Dakota State Historic Preservation Office (SHPO 2005) and the Three Affiliated Tribes, Cultural Preservation Office (TAT 2005) have reviewed the available information for the project area of proposed facility. The SHPO and the TAT concurred that there are no known historic properties within the project area and that there is a low potential for undocumented historic properties. The SHPO and the TAT concurred on a determination of No Historic Properties Affected.

On February 3, 2017, TBPS sent a letter to Mr. Elgin Crow Breast requesting a determination of effect to historic and cultural resources for the proposed facility. Upon receipt of a response letter, TBPS will provide a copy of the TAT determination to the EPA.

References

National Park Service. 2017a. NP Gallery Search, Ward County North Dakota. [Web Page] located at https://npgallery.nps.gov/nrhp/search results. Last accessed January 23, 2017.

National Park Service. 2017b. NP Gallery Search, Mountrail County North Dakota. [Web Page] located at https://npgallery.nps.gov/nrhp/search results. Last accessed January 23, 2017.

North Dakota State Historic Preservation Office (SHPO). 2005. SHPO #98-0343: MHA Nation's Clean Fuel Refinery Project. Letter from Fern Swenson, Deputy State Historic Preservation Officer to Elgin Crow Breast, Cultural Preservation Office, Three Affiliated Tribes, 24 March 2005.

Three Affiliated Tribes, Cultural Preservation Office (TAT). 2005. Letter from Elgin Crows Breast (no subject line), Three Affiliated Tribes, Cultural Preservation Office to Horace Pipe, Project Engineer, Oil & Gas Refinery, Dated April 4, 2005.

U.S. Bureau of Indian Affairs and U.S. Environmental Protection Agency. 2009. Final Environmental Impact Statement for the Mandan, Hidatsa, and Arikara Nation's Proposed Clean Fuels Refinery Project. Prepared by the U.S. Department of the Interior Bureau of Indian Affairs Great Plains Regional Office, Aberdeen, South Dakota, and the U.S Environmental Protection Agency Region 8, Denver Colorado. 402 pages and appendices.

4.4 ESA – Endangered Species Act

Table 4-3 below lists the potentially affected threatened and endangered species within the project area of the proposed facility. As result of historic disturbance, the project area for the proposed facility has little or no suitable habitat for these protected species.

The U.S. Fish and Wildlife Service (USFWS) developed the avoidance and minimization measures as described in the Programmatic Biological Assessment and Biological Evaluation (BABE) for Fort Berthold Indian Reservation Oil and Gas Development (Cardno 2014) and subsequent Revised Addendum to Programmatic Biological Assessment and Biological Evaluation (BABE Addendum) for Fort Berthold Indian Reservation Oil and Gas Development (Trihydro Corporation 2015). The avoidance and minimization measures identified by the USFWS for the potentially affected threatened and endangered species within the project area are listed in Table 4-3.

TBPS is committed to the integration of and adherence to the conservation measures, avoidance and minimization measures to ensure the activities associated with oil and gas development comply with the Endangered Species Act (ESA). TBPS will implement all relevant conservation measures applicable to each potentially affected species within the project area as summarized in Table 4-3.

Table 4-3 Potentially Affected Endangered Species

Common Name	Scientific Name	Status	Conservation Measure(s)
Whooping crane	*Grus americana*	Endangered	1 If whooping cranes are sighted within 1-mile (2 km) radius of any work site, all construction activities would be modified or curtailed until the bird(s) have left the area, USFWS would be contacted on how to proceed, and the TAT Fish and Wildlife Division would be notified. The Bureau of Indian Affairs (BIA) will provide an identification guide for on-site personnel.
			2 The operator, with BIA oversight, will establish a three-year post-construction monitoring program for whooping cranes in both spring and fall migration seasons (spring: April 1 to May 15; fall: September 10 to October 31) to identify habitat use. Four locations will be established, at the discretion of the USFWS discretion.
Piping plover	*Charadrius melodus*	Threatened	1 No drilling or production activities within the first 1,000 feet (305 meters) from Lake Sakakawea high high water mark (HHWM; 1,854 feet [565] meters MSL). If a physical topographic barrier does not exist from the site selected to 1,000 feet (305 meters) from the HHWM, the site surveys to ensure species' absence would be conducted, if the location is within 0.5 mile (0.8 km) of HHWM.

Table 4-3 Potentially Affected Endangered Species

Common Name	Scientific Name	Status	Conservation Measure(s)
			2 No drilling or production activities within (excluding pipelines and transportation/utility corridors) within 150 feet (46 meters) from wetlands, perennial, and intermittent streams (as identified at the onsite meeting).
			3 Closed loop drilling systems would be implemented on the FBIR boundary lands over which BIA has jurisdiction.
Red knot	*Calidris canutus rufa*	Threatened	1 No drilling or production activities within the first 1,000 feet (305 meters) from the Lake Sakakawea HHWM (1,854 feet [565 meters] MSL).
			2 No drilling or production activities (excluding pipelines and transportation/utility corridors) within 150 feet (46 meters) from wetlands, perennial, and intermittent streams (as identified at the onsite meeting).
			3 Closed loop drilling systems would be implemented on the FBIR boundary lands over which BIA has jurisdiction.
Dakota skipper	*Hesperia dacotae*	Threatened	1 Possible high quality habitat identified from the Habitat Suitability Model (HSM) will be verified via field quantitative vegetation surveys[1] per requirements in Figure 5 and Appendix A of the Addendum BABE. Field verified high quality habitat would not be modified or disturbed unless Dakota skipper occupancy surveys result in no detections, per USFWS (2015b) requirements. Detailed field habitat survey requirements are included in Appendix A of the Addendum BABE.
			2 Possible quality habitat identified from the HSM will be verified via qualitative field ecological system surveys[2] per requirements in Figure 5 and Appendix A of the Addendum BABE. Follow-up quantitative vegetation surveys, if necessary, would be conducted and field verified high quality habitat would only be modified or developed if Dakota skipper occupancy surveys result in no detections, per USFWS (2015b) requirements. Detailed field habitat survey requirements are included in Appendix A of the Addendum BABE.
			3 Habitat that is possibly disturbed, not likely or not present identified from the HSM will be verified via qualitative field ecological system surveys[3] per requirements in Figure 5 and Appendix A. Follow-up quantitative vegetation surveys, if necessary, would be conducted and field verified high quality habitat would only be modified or disturbed if Dakota skipper occupancy surveys results in no detections, per USFWS (2015b) requirements. Detailed field habitat survey requirements are included in Appendix A of the Addendum BABE.

Table 4-3 Potentially Affected Endangered Species

Common Name	Scientific Name	Status	Conservation Measure(s)
Northern long-eared bat	*Myotis septentrionalis*	Threatened	1 If forested upland habitat is identified during the onsite meeting, generally BIA would require operators to leave the habitat intact to the greatest extent possible. If any tree (with a diameter of greater than 2 to 3 inches) removal activities cannot be avoided between April and September, then northern long-eared bat occupancy surveys would be conducted.
			2 If any suitable roost sites, possible hibernacula, or the species are observed during the onsite meeting, then any steps taken to avoid and minimize disturbance of this habitat would be documented.

Notes
1 If less than 0.25 acre within direct disturbance and not within 0.62 mile of a larger complex, then third-party representative can complete Dakota skipper documentation to comply with the Addendum BABE, per BIA requirements, for proposed development.
2 If adjacent habitat is inaccessible to confirm whether its prairie habitat, and HSM indicates adjacent prairie possible habitat, and the project area cannot be moved to reduce direct impacts to prairie habitat less than 25 percent, then additional survey permissions must be obtained for adjacent areas and subsequent surveys must be completed.
3 If survey permissions cannot be obtained, then confirmation will be limited to the area of possible direct impacts. The use of the HSM and line of sight observations for potential prairie patches and unsuitable habitat are acceptable.

References

Cardno. 2014. Programmatic Biological Assessment and Biological Evaluation for Fort Berthold Indian Reservation Oil and Gas Development. Bureau of Indiana Affairs. Aberdeen, SD.

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USFWS. 2011. Response to Request for Scoping Comments, Programmatic Biological Assessment. North Dakota Ecological Services Field Office. Bismarck, ND.

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APPENDIX A

Emissions Calculations

Emissions Summary

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

Table 3-1. Transloading Emissions - Controlled PTE

ID	Description	PM		PM_{10}		$PM_{2.5}$		SO_2		NO_X		VOC		CO		n-Hexane		HAPs		H2S	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG	Fugitives	--	--	--	--	--	--	--	--	--	--	2.92	12.80	--	--	0.44	1.92	0.47	2.05	3.51E-05	1.54E-04
LOAD	Crude Oil Export (Truck)	--	--	--	--	--	--	--	--	--	--	44.26	77.90	--	--	2.28	4.01	2.37	4.17	5.31E-04	9.34E-04
TK-2101	Tank TK-2101 Transload Fill	--	--	--	--	--	--	--	--	--	--	2.35	4.44	--	--	0.12	0.23	0.13	0.24	2.82E-05	5.32E-05
TK-2102	Tank TK-2102 Transload Fill	--	--	--	--	--	--	--	--	--	--	2.35	4.44	--	--	0.12	0.23	0.13	0.24	2.82E-05	5.32E-05
FL-1	Transloading Flare	--	--	--	--	--	--	4.57E-03	0.01	0.18	0.42	2.21	4.26	0.70	1.28	0.11	0.19	0.11	0.19	2.48E-05	4.36E-05
Maintenance Startup and Shutdown																					
MSS-LL	Landing Losses TK-2101 - TK 2102	--	--	--	--	--	--	--	--	--	--	226.56	3.47	--	--	--	--	12.14	0.19	2.85E-03	4.37E-05
MSS-DEGAS	Tank Vent Degassing	--	--	--	--	--	--	--	--	--	--	13.99	0.44	--	--	--	--	0.75	0.75	1.76E-04	5.52E-06
TOTAL		**--**	**--**	**--**	**--**	**--**	**--**	**4.57E-03**	**0.01**	**0.18**	**0.42**	**294.65**	**107.75**	**0.70**	**1.28**	**3.07**	**6.57**	**16.09**	**7.83**	**3.68E-03**	**1.29E-03**
Total Applicable to Major Source Threshold (40 CFR §52.21(b)(1))		**--**	**--**	**--**	**--**	**--**	**--**	**4.57E-03**	**0.01**	**0.18**	**0.42**	**291.73**	**94.95**	**0.70**	**1.28**	**2.63**	**4.65**	**15.63**	**5.78**	**3.64E-03**	**1.13E-03**

Emissions Summary

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

Table 3-2. Transloading Emissions - Uncontrolled

ID	Description	PM		PM_{10}		$PM_{2.5}$		SO_2		NO_X		VOC		CO		n-Hexane		HAPs		H2S	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG	Fugitives	--	--	--	--	--	--	--	--	--	--	2.92	12.80	--	--	0.44	1.92	0.47	2.05	3.51E-05	1.54E-04
LOAD	Crude Oil Export (Truck)	--	--	--	--	--	--	--	--	--	--	147.54	259.68	--	--	7.59	13.37	7.91	13.92	1.77E-03	3.11E-03
TK-2101	Tank TK-2101 Transload Fill	--	--	--	--	--	--	--	--	--	--	2.35	4.44	--	--	0.12	0.23	0.13	0.24	2.82E-05	5.32E-05
TK-2102	Tank TK-2102 Transload Fill	--	--	--	--	--	--	--	--	--	--	2.35	4.44	--	--	0.12	0.23	0.13	0.24	2.82E-05	5.32E-05
FL-1	Transloading Flare	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maintenance Startup and Shutdown																					
MSS-LL	Tank Landing Losses	--	--	--	--	--	--	--	--	--	--	226.56	3.47	--	--	--	--	12.14	0.19	2.85E-03	4.37E-05
MSS-DEGAS	Tank Vent Degassing	--	--	--	--	--	--	--	--	--	--	13.99	0.44	--	--	--	--	0.75	0.75	1.76E-04	5.52E-06
TOTAL		**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**395.72**	**285.26**	**--**	**--**	**8.28**	**15.74**	**21.52**	**17.38**	**4.89E-03**	**3.42E-03**

Emissions Summary

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

Table 4-1. Transloading Emissions - Greenhouse Gases (GHG) [1]

ID	Description	CO2		CH_4		N_2O		HFC		PFC		SF_6		CO_2e	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG	Fugitives	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LOAD	Crude Oil Export (Truck)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TK-2101	TK-2101 Transload Fill	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TK-2102	TK-2102 Transload Fill	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FL-1	Transloading Flare	348.66	702.97	1.66E-03	0.01	3.33E-04	1.46E-03	--	--	--	--	--	--	348.80	703.58
		--	--	--	--	--	--								
Maintenance Startup and Shutdown		--	--	--	--	--	--								
MSS-LL	Tank Landing Losses	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MSS-DEGAS	Tank Vent Degassing	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL		**348.66**	**702.97**	**1.66E-03**	**7.29E-03**	**3.33E-04**	**1.46E-03**	**--**	**--**	**--**	**--**	**--**	**--**	**348.80**	**703.58**

[1]Represents both controlled and uncontrolled GHG.

Crude Loading Emissions

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

EPN: LOAD
Captured emissions are represented under EPN FL-1.

Description	Loading Type	Leak Check Type	Control Device	Loading Rate gal/hr	Loading Rate gal/yr	Loading Rate bbl/yr	S-Factor	M_V[4] lb/lb-mole	T[1] °F	T °R	P[2] psia	VOC Content % wt	L_L lb/1000 gal	Capture Efficiency[3] %
Crude Oil (11.8 RVP)	Trucks: Dedicated Normal Service	No Annual Leak Test	Flare	21,000	73,920,000	1,760,000	0.60	68.20	41.52	501.12	6.91	100%	7.03	70.00%

	Pre-controlled Emissions		Captured Emissions		Uncaptured Emissions	
Description	Total Hourly VOC Emissions lb/hr	Total Annual VOC Emissions tpy	Total Hourly VOC Emissions lb/hr	Total Annual VOC Emissions tpy	Total Hourly VOC Emissions lb/hr	Total Annual VOC Emissions tpy
Crude Oil (11.8 RVP)	147.54	259.68	103.28	181.77	44.26	77.90

Crude Oil RVP	11.80	psia
Crude Oil Antoine Const. A	10.43	dimensionless
Crude Oil Antoine Const. B	4260	°R

n-
1. Temperature is from Tanks 4.09d, average annual ambient temperature for Williston, ND
2. Annual true vapor pressure from AP-42, Figure 7.1-16, and Equation 1-24.
3. From AP-42, Chapter 5.2, pg. 5.2-6, for tank trucks not passing an annual leak test.
4. From speciated W&S emissions profile.

HAP Uncaptured Transload Emissions

Component	Emissions (lb/hr)	Emissions (ton/year)
n-Hexane	2.28	4.01
Benzene	0.09	0.16
Toluene	1.48E-03	2.60E-03
2,2,4-Trimethylpentane	--	--
Ethylbenzene	--	--
m-Xylene	--	--
H2S	5.31E-04	9.34E-04
Total HAP	**2.37**	**4.17**

CALCULATIONS

Loading Losses **LL = 12.46 SPM /T**

Where:
LL = average loading loss, lb/10^3 gallons of liquid loaded
S = saturation factor (See AP-42, Table 5.2-1)
P = true vapor pressure of liquid loaded , psia
MV = molecular weight of vapors, lb-lbmole
T = temperature of bulk liquid loaded,°R

Captured Emissions **E = LL * LR/1000 * (cap eff)**

Where:
E = emissions
LL = average loading loss, lb/10^3 gallons of liquid loaded
cap eff = capture efficiency
LR = loading rate, gal/hr or gal/yr

Uncaptured Emissions **E = LL * LR/1000 * (1-cap eff)**

Where:
E = emissions
LL = average loading loss. lb/10^3 gallons of liquid loaded
eff = overall reduction efficiency
cap eff = capture efficiency

Floating Roof Tank Emissions

Company Name	**Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Name	**Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**
Equipment Name	Crude Feed Tank TK-2101
EPN	TK-2101

This spreadsheet is not intended to be used in the following situations:

1. **To estimate losses from unstable or boiling stocks or from mixtures of hydrocarbons or petrochemicals for which the vapor pressure is not known or cannot readily be predicted;**
2. **To estimate losses from closed internal or closed domed external floating roof tanks (tanks vented only through a pressure/vacuum vent); or**
3. **To estimate losses from tanks in which the materials used in the rim seal and/or deck fittings are either deteriorated or significantly permeated by the stored liquid.**

INPUT DATA

Tank Data

Tank Type (Internal, External floating roof)	Internal Floating Roof			
Tank Shell Construction	Welded Tank			
Tank Deck Construction	Welded Tank			
Deck Seam Length (Bolted Decks Only)		ft		
Welded Tank Rim-Seal System	Mechanical-shoe seal			
Mechanical-shoe seal type	Primary only			
Diameter, D	134.25	ft		
Height, H (or length for horizontal tanks)	55.83	ft		
Shell Paint Color	White	dimensionless		
Shell Paint Condition	Good	dimensionless		
Roof Paint Color	White	dimensionless		
Roof Paint Condition	Good	dimensionless		
Annual Throughput, Q_{ANN}	880,000	bbl/yr	36,960,000	gal/yr
Maximum pumping rate, PR_M	500	bbl/hr	21,000	gal/hr
Number of fixed roof support columns, N_C	0	dimensionless (for an external floating roof tank, the value will be 0)		
Effective column diameter, F_C	0	ft (1.1 for 9-inch by 7 inch built-up columns, 0.7 for 8 inch diameter pipe columns, and 1.0 if column construction details are not known)		
Shell Condition	Light Rust			
Deck Fitting Factor	Input Deck Fittings	(Enter Data into Fitting Factor Table)		
Maximum Tank Capacity (based on dimensions)	140,765	bbl	5,912,112	gal
Maximum throughput, Q_{MAX} (Eq. V-2)	880,000	bbl/yr	**Eq. V-2**	**Q_{MAX} = PR_M x 8,760**

Average Ambient wind speed at tank site, v	0	mph (see table 7.1-9, for internal or domed external floating roof tank, the value will be 0)

Average Meteorological Data

Daily Min. Ambient Temp., T_{AN}	29.04	°F	T_{AX} =	488.7116667	°R	284.4138889	°K
Daily Max. Ambient Temp., T_{AX}	53.82	°F	T_{AN} =	513.486666	°R	309.1888882	°K
Daily Total Solar Insolation, I	1217.5	Btu/(ft^2-day)					
Atmospheric Pressure, P_A	13.82	psia (default is 14.7)					

Maximum Meteorological Data

Daily Min. Ambient Temp., T_{AN}	56.5	°F	T_{AX} =	516.17	°R	311.8722222	°K
Daily Max. Ambient Temp., T_{AX}	84.8	°F	T_{AN} =	544.47	°R	340.1722222	°K
Daily Total Solar Insolation, I	2193	Btu/(ft^2-day)					
Atmospheric Pressure, P_A	13.82	psia (default is 14.7)					

Material Data

Product stored	Crude oil	
Product Factor, K_C	0.4	dimensionless (0.4 for crude oils, 1.0 for all other organic liquids)

Component	Weight Percent (%)	Density (lb-gal)	Liquid MW (lb/lb-mol)	Antoine's Coefficients A	B	C	D	E	Vapor MW (lb/lb-mol)	Material Type	Vapor Calculation Type
Crude Oil (RVP 11.8)	100%	7.1	207	10.4	4259.8	0	0	0	68.200	Petroleum Liquid	Antoine 2-coefficients

ANNUAL CALCULATIONS (AP-42, Chapter 7.1, 11/06)

Speciation Annual Emission

Component	Vapor Mass Fraction	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Crude Oil (RVP 11.8)	1.00	2.35	4.44
Total Emissions		**2.35**	**4.44**
	Annual Average	**Maximum Hourly**	

Floating Roof Tank Emissions

Company Name	**Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Name	**Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**
Equipment Name	Crude Feed Tank TK-2101
EPN	TK-2101

HAP Tank Emissions

Component	Emissions (lb/hr)	Emissions (ton/year)
n-Hexane	0.12	0.23
Benzene	4.84E-03	0.01
Toluene	7.85E-05	1.48E-04
2,2,4-Trimethylpentane	--	--
Ethylbenzene	--	--
m-Xylene	--	--
H2S	2.82E-05	5.32E-05
Total HAP	**0.13**	**0.24**

	4.4377	**tpy**	**2.3541**	lb/hr		
Total loss, L_T (Eq. 2-1)	**8,875**	**lb/yr**	**20,622**	**lb/yr**	**Eq. 2-1**	**$L_T = L_R + L_{WD} + L_F + L_D$**
					where:	L_T = total loss, lb/yr
						L_R = rim seal loss, lb/yr
						L_{WD} = withdrawal loss, lb/yr
						L_F = deck fitting loss, lb/yr
						L_D = deck seam loss (internal floating roof tanks only) loss, lb/yr
Rim seal loss, L_R (Eq. 2-2)	**3,787**		**8,952**	**lb/yr**	**Eq. 2-2**	**$L_R = (K_{Ra} + K_{Rb}\ v^n) D P^* M_V K_C$**
					where:	L_R = rim seal loss, lb/yr
Zero wind speed rim seal loss factor, K_{Ra} (Table 7.1-8)	5.8		5.8	lb-mole/ft yr		K_{Ra} = zero wind speed rim seal loss factor, lb-mole/ft-yr (from Table 7.1-8)
Wind speed dependent rim seal loss factor, K_{Rb} (Table 7.1-8)	0.3		0.3	lb-mole/(mph)^n ft yr		K_{Rb} = wind speed dependent rim seal loss factor, lb-mole/(mph)^n ft yr (from Table 7.1-8)
Average ambient wind speed at tank site	-		-	mph		v = average ambient wind speed at tank site, mph
Seal-related wind speed exponent, n (Table 7.1-8)	2.1		2.1	dimensionless		n = seal-related wind speed exponent, dimensionless (from Table 7.1-8)
						D = tank diameter, ft
						P^* = vapor pressure function, dimensionless
Vapor molecular weight, M_V (Eq. 1-22)	68.20		68.20	lb/lb-mol		M_V = average vapor molecular weight, lb/lb-mole (See Calculation Table Below)
						K_C = product factor (0.4 for crude oils and 1 for all other organic liquids)
Vapor pressure function, P* (Eq. 2-3)	0.1783		0.4214	dimensionless	**Eq. 2-3**	**$P^* = P_{VA} / P_A / [1 + (1 - (P_{VA} / P_A))^{0.5}]^2$**
					where:	P* = vapor pressure function, dimensionless
						P_{VA} = vapor pressure at daily average liquid surface temperature, psia
						P_A = atmospheric pressure, psia
Vapor pressure at daily avg. liquid temperature, P_{VA} (Eq. 1-23)	7.10		11.53	psia		P_{VA} = vapor pressure at daily average liquid surface temperature, psia (See Table Below)
Withdrawal loss, L_{WD} (Eq. 2-4)	**263**		**263**	**lb/yr**	**Eq. 2-4**	**$L_{WD} = (0.943)\ Q\ C_S\ W_L\ [1 + N_C\ F_C / D] / D$**
					where:	L_{WD} = withdrawal loss, lb/yr
						0.943 = constant, 1,000 ft^3 gal / bbl^2
						Q = annual throughput (tank capacity [bbl] times annual turnover rate), bbl/yr
Shell clingage factor, C_S (Table 7.1-10)	0.0060		0.0060	bbl/1,000 ft^2		C_S = shell clingage factor, bbl/1,000 ft^2; see Table 7.1-10
Average calculated organic liquid density, W_L	7.10		7.10	lb/gal		W_L = average organic liquid density, lb/gal
						D = tank diameter, ft
						N_C = number of fixed roof support columns, dimensionless
						F_C = effective column diameter, ft
Deck fitting loss, L_F (Eq. 2-5)	**4825.04**		**11406.18**	**lb/yr**	**Eq. 2-5**	**$L_F = F_F\ P^*\ M_V\ K_C$**
					where:	L_F = deck fitting loss, lb/yr
						F_F = total deck fitting loss factor, lb-mole/yr
						P^* = vapor pressure function, dimensionless
						M_V = average vapor molecular weight, lb/lb-mole
						K_C = product factor (0.4 for crude oils and 1 for all other organic liquids)
Total deck fitting loss factor, F_F (Eq. 2-6)	992.1		992.1	lb-mole/yr	**Eq. 2-6**	**$F_F = [(N_{F1}\ K_{F1}) + (N_{F2}\ K_{F2}) + \ldots + (N_{Fnf}\ K_{Fnf})]$**
					where:	N_{Fi} = number of deck fittings of a particular type (i=0, 1, 2, …, n_f), dimensionless
						K_{Fi} = deck fitting loss factor for a particular type fitting (i = 0, 1, 2, ..., n_f), lb-mole/yr
						n_f = total number of different types of fittings, dimensionless

Floating Roof Tank Emissions

Company Name	**Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Name	**Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**
Equipment Name	Crude Feed Tank TK-2101
EPN	TK-2101

Eq. 2-7 $K_{Fi} = K_{Fai} + K_{fbi} (K_V V)^{mi}$

where:
K_{Fi} = loss factor for a particular type of deck fitting, lb-mole/yr
K_{Fai} = zero wind speed loss factor for a particular type of fitting, lb-mole/yr
K_{fbi} = wind speed dependent loss factor for a particular type of fitting, lb-mole/(mph)^m yr
m_i = loss factor for a particular type of deck fitting, dimensionless
i = 1, 2, …, n, dimensionless
K_V = fitting wind speed correction factor, dimensionless
V = average ambient wind speed, mph

Deck seam loss, L_D (Eq. 2-9)(For Internal floating roof tank only	**0**	**0**	**lb/yr**
Deck seam loss per unit seam length factor, K_D	0	0	lb-mole/ft-yr
Deck seam length factor, S_D (default)	0.2	0.2	ft/ft^2

Eq. 2-9 $L_D = K_D S_D D^2 P^* M_V K_C$

where:
L_D = deck seam loss, lb/yr
K_D = deck seam loss per unit seam length factor, lb-mole/ft-yr
S_D = deck seam length factor, ft/ft^2
D = tank diameter, ft
P* = vapor pressure function, dimensionless
M_V = average vapor molecular weight, lb/lb-mole
K_C = product factor (0.4 for crude oils and 1 for all other organic liquids)

$S_D = L_{seam} / A_{deck}$ (see Table 7.1-16)
L_{seam} = total length of deck seams, ft
A_{deck} = area of deck, ft^2
$A_{deck} = \pi D^2/4$

Average Vapor Pressure and Vapor Molecular Weight

Component	Liquid Moles	x_i Liquid Mole Fraction	P_{iA} Avg. Vapor Pressure of Component	P_{VA}, PX_i Partial Vapor Pressure (Eq. 1-23)	y_i Vapor Mole Fraction	M_V Vapor Molecular Weight (Eq. 1-22)	Z_{Vi} Vapor Weight Fraction	W_L Density	P_{iAMAX} Avg. Vapor Pressure of Component	P_{VAMAX}, PX_i Partial Vapor Pressure (Eq. 1-23)	y_{imax} Vapor Mole Fraction	M_{Vmax} Vapor Molecular Weight (Eq. 1-22)	Z_{Vimax} Vapor Weight Fraction	W_{Lmax} Density
	(lb-mol)		(psia)	(psia)		(lb/lb-mol)		(lb/gal)	(psia)	(psia)		(lb/lb-mol)		(lb/gal)
Crude Oil (RVP 11.8)	0.00483	1.00	7.10	7.10	1.00	68.20	1.00	0.14	11.53	11.53	1.00	68.20	1.00	0.14
Totals	**0.00483**	**1.00**		**7.10**	**1.00**	**68.20**	**1.00**	**7.10**		**11.53**	**1.00**	**68.20**	**1.00**	**7.10**

	6.15304	**23.1147**	°C
	43.1	73.6	°F
	279.30	296.26	K
Daily average liquid surface temperature, T_{LA} (Eq. 1-26)	502.7	533.3	°R
Paint solar absorptance, a (Table 7.1-6)	0.17	0.17	dimensionless
Daily average ambient temperature, T_{AA} (Eq. 1-27)	501.10	530.32	°R
Liquid bulk temperature, T_B (Eq. 1-28)	501.12	530.34	°R

Eq. 1-26 $T_{LA} = 0.44T_{AA} + 0.56_{TB} + 0.0079aI$

where:
T_{LA} = daily average liquid surface temperature, °R
T_{AA} = daily average ambient temperature, °R
T_B = liquid bulk temperature, °R
a = tank paint solar absorptance, dimensionless (from Table 7.1-6)
I = daily total solar insolation factor, Btu/(ft^2-day) (from Table 7.1-7)

Eq. 1-27 $T_{AA} = (T_{AX} + T_{AN})/2$

where:
T_{AA} = daily average ambient temperature, °R
T_{AX} = daily maximum ambient temperature, °R
T_{AN} = daily minimum ambient temperature, °R

Eq. 1-28 $T_B = T_{AA} + 6a - 1$

where:
T_B = liquid bulk temperature, °R
T_{AA} = daily average ambient temperature, °R
a = tank paint solar absorptance, dimensionless (from Table 7.1-6)

$\log_{10}P_{iA} = A+B/T+C*\log_{10}T_{LA}+D*T_{LA}+E*T_{LA}^2$

where:
PiA = vapor pressure of component, mmHg
A,B,C,D = Regression coefficients for chemical compound
T_{LA} = daily average liquid surface temperature, K

Floating Roof Tank Emissions

Company Name	**Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Name	**Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**
Equipment Name	Crude Feed Tank TK-2101
EPN	TK-2101

Vapor pressure at daily avg. liquid temperature, P_{VA} (Eq. 1-23)	7.10	11.53	psia	**Eq. 1-23**	**$P_{VA} = SPx_i$**
				where:	P_{VA} = vapor pressure at daily average liquid surface temperature, psia
					Px_i = partial pressure of individual component i, psia
Vapor molecular weight, M_V (Eq. 1-22)	68.20	68.20	lb/lb-mol	**Eq. 1-22**	**$M_V = SM_iy_i$**
				where:	M_V = vapor molecular weight, lb/lb-mole
					M_i = vapor molecular weight of individual component i, lb/lb-mole
					y_i = vapor mole fraction of component
					$y_i = (P_{xi}/P_{VA})$
					y_i = vapor mole fraction of component
					Px_i = partial pressure of individual component i, psia
					P_{VA} = vapor pressure at daily average liquid surface temperature, psia
					$Z_{Vi} = y_iM_i/M_V$
					Z_{Vi} = Weight fraction of vapor
					y_i = vapor mole fraction of component
					M_i = vapor molecular weight of individual component i, lb/lb-mole
					M_V = vapor molecular weight, lb/lb-mole
					$W_L = 1/\Sigma$ (weight fraction of liquid/liquid component density)
					W_L = average organic liquid density, lb/gal

Table 7.1-12 DECK-FITTING LOSS FACTORS, K_{Fa}, K_{Fb}, AND m, AND TYPICAL NUMBER OF DECK FITTINGS, N_F

Fitting Type and Construction Details	Kfa lb-mole/yr	K_{Fb} lb-mole/(mph)^m-yr	m dimensionless	K_F lb-mole/yr	$N_F * K_F$	INPUT DATA: number of deck fitting of a particular type, N_F (dimensionless)
Access hatch (24-inch diameter well)						
Bolted cover, gasketed	1.6	0	0	1.60	0.00	0.00
Unbolted cover, ungasketed	36	5.9	1.2	36.00	36.00	1.00
Unbolted cover, gasketed	31	5.2	1.3	31.00	0.00	0.00
Fixed roof support column well						
Round pipe, ungasketed sliding cover	31			31.00	0.00	0.00
Round pipe, gasketed sliding cover	25			25.00	0.00	0.00
Round pipe, flexible fabric sleeve seal	10			10.00	0.00	0.00
Built-up column, ungasketed sliding cover	51			51.00	0.00	0.00
Built-up column, gasketed sliding cover	33			33.00	594.00	18.00
Unslotted guide-pole and well (8" diameter unslotted pole, 21" diameter well)						
Ungasketed sliding cover	31	150	1.4	31.00	0.00	0.00
Ungasketed sliding cover, with pole sleeve	25	2.2	2.1	25.00	0.00	0.00
Gasketed sliding cover	25	13	2.2	25.00	0.00	0.00
Gasketed sliding cover with pole wiper	14	3.7	0.78	14.00	0.00	0.00
Gasketed sliding cover with pole sleeve	8.6	12	0.81	8.60	0.00	0.00
Slotted guide-pole/sample well (8" diameter slotted pole, 21" diameter well)						
Ungasketed or gasketed sliding cover	43	270	1.4	43.00	0.00	0.00
Ungasketed or gasketed sliding cover, with float	31	36	2	31.00	0.00	0.00
Gasketed sliding cover, with pole wiper	41	48	1.4	41.00	0.00	0.00
Gasketed sliding cover, with pole sleeve	11	46	1.4	11.00	0.00	0.00
Gasketed sliding cover, with pole sleeve and pole wiper	8.3	4.4	1.6	8.30	8.30	1.00
Gasketed sliding cover, with float & pole wiper	21	7.9	1.8	21.00	0.00	0.00
Gasketed sliding cover, with float, pole sleeve, & pole wiper	11	9.9	0.89	11.00	0.00	0.00
Gauge-float well (automatic gauge)						
Unbolted cover, ungasketed	14	5.4	1.1	14.00	14.00	1.00
Unbolted cover, gasketed	4.3	17	0.38	4.30	0.00	0.00
Bolted cover, gasketed	2.8	0	0	2.80	0.00	0.00
Gauge-hatch/sample port						
Weighted mechanical actuation, gasketed	0.47	0.02	0.97	0.47	0.00	0.00
Weighted mechanical actuation, ungasketed	2.3	0	0	2.30	0.00	0.00
Slit fabric seal, 10% open area	12			12.00	12.00	1.00

Floating Roof Tank Emissions

Company Name	**Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Name	**Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**
Equipment Name	Crude Feed Tank TK-2101
EPN	TK-2101

Vacuum breaker						
Weighted mechanical actuation, ungasketed	7.8	0.01	4.0	7.80	0.00	0.00
Weighted mechanical actuation, gasketed	6.2	1.2	0.94	6.20	0.00	0.00
Stub drain (1" diameter)						
	1.2			1.20	0.00	0.00
Deck leg (3" diameter)						
Adjustable, internal floating deck	7.9			7.90	229.10	29.00
Adjustable, pontoon area - ungasketed	2.0	0.37	0.91	2.00	0.00	0.00
Adjustable, pontoon area - gasketed	1.3	0.08	0.65	1.30	0.00	0.00
Adjustable, pontoon area - sock	1.2	0.14	0.65	1.20	0.00	0.00
Adjustable, center area - ungasketed	0.82	0.53	0.14	0.82	0.00	0.00
Adjustable, center area - gasketed	0.53	0.11	0.13	0.53	0.00	0.00
Adjustable, center area - sock	0.49	0.16	0.14	0.49	0.00	0.00
Adjustable, double-deck roofs	0.82	0.53	0.14	0.82	0.00	0.00
Fixed	0	0	0	0.00	0.00	0.00
Rim vent						
Weighted mechanical actuation, ungasketed	0.68	1.80	1.0	0.68	0.68	1.00
Weighted mechanical actuation, gasketed	0.71	0.10	1.0	0.71	0.00	0.00
Ladder well						
Sliding cover, ungasketed	98			98.00	98.00	1.00
Sliding cover, gasketed	56			56.00	0.00	0.00

Total deck fitting loss factor, F_F (Eq. 2-6)	**992.080**	**lb-mole/yr**

Floating Roof Tank Emissions

Company Name	**Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Name	**Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**
Equipment Name	Crude Feed Tank TK-2102
EPN	TK-2102

This spreadsheet is not intended to be used in the following situations:

1. **To estimate losses from unstable or boiling stocks or from mixtures of hydrocarbons or petrochemicals for which the vapor pressure is not known or cannot readily be predicted;**
2. **To estimate losses from closed internal or closed domed external floating roof tanks (tanks vented only through a pressure/vacuum vent); or**
3. **To estimate losses from tanks in which the materials used in the rim seal and/or deck fittings are either deteriorated or significantly permeated by the stored liquid.**

INPUT DATA

Tank Data

Tank Type (Internal, External floating roof)	Internal Floating Roof				
Tank Shell Construction	Welded Tank				
Tank Deck Construction	Welded Tank				
Deck Seam Length (Bolted Decks Only)		ft			
Welded Tank Rim-Seal System	Mechanical-shoe seal				
Mechanical-shoe seal type	Primary only				
Diameter, D	134.25	ft			
Height, H (or length for horizontal tanks)	55.83	ft			
Shell Paint Color	White	dimensionless			
Shell Paint Condition	Good	dimensionless			
Roof Paint Color	White	dimensionless			
Roof Paint Condition	Good	dimensionless			
Annual Throughput, Q_{ANN}	880,000	bbl/yr	36,960,000	gal/yr	
Maximum pumping rate, PR_M	500	bbl/hr	21,000	gal/hr	
Number of fixed roof support columns, N_C	0	dimensionless (for an external floating roof tank, the value will be 0)			
Effective column diameter, F_C	0	ft (1.1 for 9-inch by 7 inch built-up columns, 0.7 for 8 inch diameter pipe columns, and 1.0 if column construction details are not known)			
Shell Condition	Light Rust				
Deck Fitting Factor	Input Deck Fittings	(Enter Data into Fitting Factor Table)			
Maximum Tank Capacity (based on dimensions)	140,765	bbl	5,912,112	gal	
Maximum throughput, Q_{MAX} (Eq. V-2)	880,000	bbl/yr	**Eq. V-2**	**$Q_{MAX} = PR_M \times 8{,}760$**	

Average Ambient wind speed at tank site, v	0	mph (see table 7.1-9, for internal or domed external floating roof tank, the value will be 0)					
Average Meteorological Data							
Daily Min. Ambient Temp., T_{AN}	29.042	°F	T_{AX} =	488.7116667	°R	284.4138889	°K
Daily Max. Ambient Temp., T_{AX}	53.817	°F	T_{AN} =	513.486666	°R	309.1888882	°K
Daily Total Solar Insolation, I	1217.5	Btu/(ft^2-day)					
Atmospheric Pressure, P_A	13.8185	psia (default is 14.7)					
Maximum Meteorological Data							
Daily Min. Ambient Temp., T_{AN}	56.5	°F	T_{AX} =	516.17	°R	311.8722222	°K
Daily Max. Ambient Temp., T_{AX}	84.8	°F	T_{AN} =	544.47	°R	340.1722222	°K
Daily Total Solar Insolation, I	2193	Btu/(ft^2-day)					
Atmospheric Pressure, P_A	13.8185	psia (default is 14.7)					

Material Data

Product stored	Crude oil	
Product Factor, K_C	0.4	dimensionless (0.4 for crude oils, 1.0 for all other organic liquids)

Component	Weight Percent (%)	Density (lb-gal)	Liquid MW (lb/lb-mol)	Antoine's Coefficients A	B	C	D	E	Vapor MW (lb/lb-mol)	Material Type	Vapor Calculation Type
Crude Oil (RVP 11.8)	100%	7.1	207	10.4	4259.8	0	0	0	68.20	Petroleum Liquid	Antoine 2-coefficients

ANNUAL CALCULATIONS (AP-42, Chapter 7.1, 11/06)

Speciation Annual Emission

Component	Vapor Mass Fraction		Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Crude Oil (RVP 11.8)	1.00		2.35	4.44
Total Emissions			**2.35**	**4.44**

Floating Roof Tank Emissions

Company Name	**Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Name	**Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**
Equipment Name	Crude Feed Tank TK-2102
EPN	TK-2102

HAP Tank Emissions

Component	Emissions (lb/hr)	Emissions (ton/year)
n-Hexane	0.12	0.23
Benzene	4.84E-03	0.01
Toluene	7.85E-05	1.48E-04
2,2,4-Trimethylpentane	--	--
Ethylbenzene	--	--
m-Xylene	--	--
H2S	2.82E-05	5.32E-05
Total HAP	**0.13**	**0.24**

	Annual Average		Maximum Hourly			
	4.4377	tpy	**2.3541**	lb/hr		
Total loss, L_T (Eq. 2-1)	**8,875**	**lb/yr**	**20,622**	**lb/yr**	**Eq. 2-1**	**$L_T = L_R + L_{WD} + L_F + L_D$**
					where:	L_T = total loss, lb/yr
						L_R = rim seal loss, lb/yr
						L_{WD} = withdrawal loss, lb/yr
						L_F = deck fitting loss, lb/yr
						L_D = deck seam loss (internal floating roof tanks only) loss, lb/yr
Rim seal loss, L_R (Eq. 2-2)	**3,787**		**8,952**	**lb/yr**	**Eq. 2-2**	**$L_R = (K_{Ra} + K_{Rb}\ v^n)\ D\ P^*\ M_V\ K_C$**
					where:	L_R = rim seal loss, lb/yr
Zero wind speed rim seal loss factor, K_{Ra} (Table 7.1-8)	5.8		5.8	lb-mole/ft yr		K_{Ra} = zero wind speed rim seal loss factor, lb-mole/ft-yr (from Table 7.1-8)
Wind speed dependent rim seal loss factor, K_{Rb} (Table 7.1-8)	0.3		0.3	lb-mole/(mph)^n ft yr		K_{Rb} = wind speed dependent rim seal loss factor, lb-mole/(mph)^n ft yr (from Table 7.1-8)
Average ambient wind speed at tank site	-		-	mph		v = average ambient wind speed at tank site, mph
Seal-related wind speed exponent, n (Table 7.1-8)	2.1		2.1	dimensionless		n = seal-related wind speed exponent, dimensionless (from Table 7.1-8)
						D = tank diameter, ft
						P^* = vapor pressure function, dimensionless
Vapor molecular weight, M_V (Eq. 1-22)	68.2005		68.2005	lb/lb-mol		M_V = average vapor molecular weight, lb/lb-mole (See Calculation Table Below)
						K_C = product factor (0.4 for crude oils and 1 for all other organic liquids)
Vapor pressure function, P* (Eq. 2-3)	0.1783		0.4214	dimensionless	**Eq. 2-3**	**$P^* = P_{VA} / P_A / [1 + (1 - (P_{VA} / P_A))^{0.5}]^2$**
					where:	P* = vapor pressure function, dimensionless
						P_{VA} = vapor pressure at daily average liquid surface temperature, psia
						P_A = atmospheric pressure, psia
Vapor pressure at daily avg. liquid temperature, P_{VA} (Eq. 1-23)	7.0979		11.5293	psia		P_{VA} = vapor pressure at daily average liquid surface temperature, psia (See Table Below)
Withdrawal loss, L_{WD} (Eq. 2-4)	**263**		**263**	**lb/yr**	**Eq. 2-4**	**$L_{WD} = (0.943)\ Q\ C_S\ W_L\ [1 + N_C\ F_C / D] / D$**
					where:	L_{WD} = withdrawal loss, lb/yr
						0.943 = constant, 1,000 ft^3 gal / bbl^2
						Q = annual throughput (tank capacity [bbl] times annual turnover rate), bbl/yr
Shell clingage factor, C_S (Table 7.1-10)	0.0060		0.0060	bbl/1,000 ft^2		C_S = shell clingage factor, bbl/1,000 ft^2; see Table 7.1-10
Average calculated organic liquid density, W_L	7.10		7.10	lb/gal		W_L = average organic liquid density, lb/gal
						D = tank diameter, ft
						N_C = number of fixed roof support columns, dimensionless
						F_C = effective column diameter, ft
Deck fitting loss, L_F (Eq. 2-5)	**4825.04**		**11406.18**	**lb/yr**	**Eq. 2-5**	**$L_F = F_F\ P^*\ M_V\ K_C$**
					where:	L_F = deck fitting loss, lb/yr
						F_F = total deck fitting loss factor, lb-mole/yr
						P^* = vapor pressure function, dimensionless
						M_V = average vapor molecular weight, lb/lb-mole
						K_C = product factor (0.4 for crude oils and 1 for all other organic liquids)
Total deck fitting loss factor, F_F (Eq. 2-6)	992.1		992.1	lb-mole/yr	**Eq. 2-6**	**$F_F = [(N_{F1}\ K_{F1}) + (N_{F2}\ K_{F2}) + \ldots + (N_{Fnf}\ K_{Fnf})]$**
					where:	N_{Fi} = number of deck fittings of a particular type (i=0, 1, 2, …, n_f), dimensionless
						K_{Fi} = deck fitting loss factor for a particular type fitting (i = 0, 1, 2, ..., n_f), lb-mole/yr
						n_f = total number of different types of fittings, dimensionless

Floating Roof Tank Emissions

Company Name	**Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Name	**Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**
Equipment Name	Crude Feed Tank TK-2102
EPN	TK-2102

Eq. 2-7 $K_{Fi} = K_{Fai} + K_{fbi} (K_V V)^{mi}$

where:
K_{Fi} = loss factor for a particular type of deck fitting, lb-mole/yr
K_{Fai} = zero wind speed loss factor for a particular type of fitting, lb-mole/yr
K_{fbi} = wind speed dependent loss factor for a particular type of fitting, lb-mole/(mph)^m yr
m_i = loss factor for a particular type of deck fitting, dimensionless
i = 1, 2, …, n, dimensionless
K_V = fitting wind speed correction factor, dimensionless
V = average ambient wind speed, mph

Deck seam loss, L_D (Eq. 2-9)(For Internal floating roof tank on	**0**	**0**	**lb/yr**
Deck seam loss per unit seam length factor, K_D	0	0	lb-mole/ft-yr
Deck seam length factor, S_D (default)	0.2	0.2	ft/ft^2

Eq. 2-9 $L_D = K_D S_D D^2 P^* M_V K_C$

where:
L_D = deck seam loss, lb/yr
K_D = deck seam loss per unit seam length factor, lb-mole/ft-yr
S_D = deck seam length factor, ft/ft^2
D = tank diameter, ft
P* = vapor pressure function, dimensionless
M_V = average vapor molecular weight, lb/lb-mole
K_C = product factor (0.4 for crude oils and 1 for all other organic liquids)

$S_D = L_{seam} / A_{deck}$ (see Table 7.1-16)
L_{seam} = total length of deck seams, ft
A_{deck} = area of deck, ft^2
$A_{deck} = \pi D^2/4$

Average Vapor Pressure and Vapor Molecular Weight

Component	Liquid Moles	x_i Liquid Mole Fraction	P_{iA} Avg. Vapor Pressure of Component	P_{VA}, PX_i Partial Vapor Pressure (Eq. 1-23)	y_i Vapor Mole Fraction	M_V Vapor Molecular Weight (Eq. 1-22)	Z_{Vi} Vapor Weight Fraction	W_L Density	P_{iAMAX} Avg. Vapor Pressure of Component	P_{VAMAX}, PX_i Partial Vapor Pressure (Eq. 1-23)	y_{imax} Vapor Mole Fraction	M_{Vmax} Vapor Molecular Weight (Eq. 1-22)	Z_{Vimax} Vapor Weight Fraction	W_{Lmax} Density
	(lb-mol)		(psia)	(psia)		(lb/lb-mol)		(lb/gal)	(psia)	(psia)		(lb/lb-mol)		(lb/gal)
Crude Oil (RVP 11.8)	0.00483	1.000	7.0979	7.0979	1.00	68.2005	1.00	0.1408	11.5293	11.5293	1.00	68.2005	1.00	0.1408
Totals	**0.00483**	**1.00**		**7.0979**	**1.00**	**68.2005**	**1.00**	**7.1000**		**11.5293**	**1.00**	**68.2005**	**1.00**	**7.1000**
	6.15304		**23.1147** °C											
	43.1		73.6 °F											
	279.30		296.26 K											

Daily average liquid surface temperature, T_{LA} (Eq. 1-26)	502.7	533.3	°R
Paint solar absorptance, a (Table 7.1-6)	0.17	0.17	dimensionless
Daily average ambient temperature, T_{AA} (Eq. 1-27)	501.0991663	530.32	°R
Liquid bulk temperature, T_B (Eq. 1-28)	501.1191663	530.34	°R

Eq. 1-26 $T_{LA} = 0.44T_{AA} + 0.56_{TB} + 0.0079aI$

where:
T_{LA} = daily average liquid surface temperature, °R
T_{AA} = daily average ambient temperature, °R
T_B = liquid bulk temperature, °R
a = tank paint solar absorptance, dimensionless (from Table 7.1-6)
I = daily total solar insolation factor, Btu/(ft^2-day) (from Table 7.1-7)

Eq. 1-27 $T_{AA} = (T_{AX} + T_{AN})/2$

where:
T_{AA} = daily average ambient temperature, °R
T_{AX} = daily maximum ambient temperature, °R
T_{AN} = daily minimum ambient temperature, °R

Eq. 1-28 $T_B = T_{AA} + 6a - 1$

where:
T_B = liquid bulk temperature, °R
T_{AA} = daily average ambient temperature, °R
a = tank paint solar absorptance, dimensionless (from Table 7.1-6)

$\log_{10}P_{iA} = A+B/T+C*\log_{10}T_{LA}+D*T_{LA}+E*T_{LA}^2$

where:
PiA = vapor pressure of component, mmHg
A,B,C,D = Regression coefficients for chemical compound
T_{LA} = daily average liquid surface temperature, K

Floating Roof Tank Emissions

Company Name	**Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Name	**Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**
Equipment Name	Crude Feed Tank TK-2102
EPN	TK-2102

Vapor pressure at daily avg. liquid temperature, P_{VA} (Eq. 1-23)	7.0979	11.5293	psia	**Eq. 1-23**	**$P_{VA} = SPx_i$**
				where:	P_{VA} = vapor pressure at daily average liquid surface temperature, psia
					Px_i = partial pressure of individual component i, psia
Vapor molecular weight, M_V (Eq. 1-22)	68.2005	68.2005	lb/lb-mol	**Eq. 1-22**	**$M_V = SM_iy_i$**
				where:	M_V = vapor molecular weight, lb/lb-mole
					M_i = vapor molecular weight of individual component i, lb/lb-mole
					y_i = vapor mole fraction of component
					$y_i = (P_{xi}/P_{VA})$
					y_i = vapor mole fraction of component
					Px_i = partial pressure of individual component i, psia
					P_{VA} = vapor pressure at daily average liquid surface temperature, psia
					$Z_{Vi} = y_iM_i/M_V$
					Z_{Vi} = Weight fraction of vapor
					y_i = vapor mole fraction of component
					M_i = vapor molecular weight of individual component i, lb/lb-mole
					M_V = vapor molecular weight, lb/lb-mole
					$W_L = 1/\Sigma$ (weight fraction of liquid/liquid component density)
					W_L = average organic liquid density, lb/gal

Table 7.1-12 DECK-FITTING LOSS FACTORS, K_{Fa}, K_{Fb}, AND m, AND TYPICAL NUMBER OF DECK FITTINGS, N_F

INPUT DATA

Fitting Type and Construction Details	Kfa lb-mole/yr	K_{Fb} lb-mole/(mph)^m-yr	m dimensionless	K_F lb-mole/yr	$N_F * K_F$	number of deck fitting of a particular type, N_F (dimensionless)
Access hatch (24-inch diameter well)						
Bolted cover, gasketed	1.6	0	0	1.60	0.00	0.00
Unbolted cover, ungasketed	36	5.9	1.2	36.00	36.00	1.00
Unbolted cover, gasketed	31	5.2	1.3	31.00	0.00	0.00
Fixed roof support column well						
Round pipe, ungasketed sliding cover	31			31.00	0.00	0.00
Round pipe, gasketed sliding cover	25			25.00	0.00	0.00
Round pipe, flexible fabric sleeve seal	10			10.00	0.00	0.00
Built-up column, ungasketed sliding cover	51			51.00	0.00	0.00
Built-up column, gasketed sliding cover	33			33.00	594.00	18.00
Unslotted guide-pole and well (8" diameter unslotted pole, 21" diameter well)						
Ungasketed sliding cover	31	150	1.4	31.00	0.00	0.00
Ungasketed sliding cover, with pole sleeve	25	2.2	2.1	25.00	0.00	0.00
Gasketed sliding cover	25	13	2.2	25.00	0.00	0.00
Gasketed sliding cover with pole wiper	14	3.7	0.78	14.00	0.00	0.00
Gasketed sliding cover with pole sleeve	8.6	12	0.81	8.60	0.00	0.00
Slotted guide-pole/sample well (8" diameter slotted pole, 21" diameter well)						
Ungasketed or gasketed sliding cover	43	270	1.4	43.00	0.00	0.00
Ungasketed or gasketed sliding cover, with float	31	36	2	31.00	0.00	0.00
Gasketed sliding cover, with pole wiper	41	48	1.4	41.00	0.00	0.00
Gasketed sliding cover, with pole sleeve	11	46	1.4	11.00	0.00	0.00
Gasketed sliding cover, with pole sleeve and pole wiper	8.3	4.4	1.6	8.30	8.30	1.00
Gasketed sliding cover, with float & pole wiper	21	7.9	1.8	21.00	0.00	0.00
Gasketed sliding cover, with float, pole sleeve, & pole wiper	11	9.9	0.89	11.00	0.00	0.00
Gauge-float well (automatic gauge)						
Unbolted cover, ungasketed	14	5.4	1.1	14.00	14.00	1.00
Unbolted cover, gasketed	4.3	17	0.38	4.30	0.00	0.00
Bolted cover, gasketed	2.8	0	0	2.80	0.00	0.00

Floating Roof Tank Emissions

Company Name	**Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Name	**Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**
Equipment Name	Crude Feed Tank TK-2102
EPN	TK-2102

Gauge-hatch/sample port						
Weighted mechanical actuation, gasketed	0.47	0.02	0.97	0.47	0.00	0.00
Weighted mechanical actuation, ungasketed	2.3	0	0	2.30	0.00	0.00
Slit fabric seal, 10% open area	12			12.00	12.00	1.00
Vacuum breaker						
Weighted mechanical actuation, ungasketed	7.8	0.01	4.0	7.80	0.00	0.00
Weighted mechanical actuation, gasketed	6.2	1.2	0.94	6.20	0.00	0.00
Stub drain (1" diameter)						
	1.2			1.20	0.00	0.00
Deck leg (3" diameter)						
Adjustable, internal floating deck	7.9			7.90	229.10	29.00
Adjustable, pontoon area - ungasketed	2.0	0.37	0.91	2.00	0.00	0.00
Adjustable, pontoon area - gasketed	1.3	0.08	0.65	1.30	0.00	0.00
Adjustable, pontoon area - sock	1.2	0.14	0.65	1.20	0.00	0.00
Adjustable, center area - ungasketed	0.82	0.53	0.14	0.82	0.00	0.00
Adjustable, center area - gasketed	0.53	0.11	0.13	0.53	0.00	0.00
Adjustable, center area - sock	0.49	0.16	0.14	0.49	0.00	0.00
Adjustable, double-deck roofs	0.82	0.53	0.14	0.82	0.00	0.00
Fixed	0	0	0	0.00	0.00	0.00
Rim vent						
Weighted mechanical actuation, ungasketed	0.68	1.80	1.0	0.68	0.68	1.00
Weighted mechanical actuation, gasketed	0.71	0.10	1.0	0.71	0.00	0.00
Ladder well						
Sliding cover, ungasketed	98			98.00	98.00	1.00
Sliding cover, gasketed	56			56.00	0.00	0.00

Total deck fitting loss factor, F_F (Eq. 2-6)	**992.080**	**lb-mole/yr**

Flare Emissions - Pilot

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

EPN: FL-1

Inputs	Units	Value	Source
Hours of Operation	hrs	8760	Conservative assumption
Natural Gas Heat Content	Btu/scf	2,516	40 CFR 98 Table C-1 (Propane Gas)
Natural Gas Volume	scf/hr	100.00	Conservative assumption
Natural Gas Heat Load	MMBtu/hr	0.25	= [Natural Gas Volume (scf/hr)] * [Natural Gas Heat Content (Btu/scf)] * [1 MMBtu / 10^6 Btu]

Pollutant	Emission Factor	Unit	Source
CO	0.08	lb/MMBtu	AP-42 Section 1.5, Table 1.5-1, converted assuming 91.5 MMBtu/10^3 gal
NO_X	0.14	lb/MMBtu	
SO_2	--	lb/MMBtu	Mass Balance
VOC	0.57	lb/MMBtu	AP-42 Section 13.5 Industrial Flares
CO_2 (Pilot)	135.49	lb/MMBtu	40 CFR 98 Table C-1 (propane gas), converted assuming 2.2046 lb / kg
CH_4 (Pilot)	0.01	lb/MMBtu	40 CFR 98 Table C-2 (fuel gas), converted assuming 2.2046 lb / kg
N_2O (Pilot)	1.32E-03	lb/MMBtu	40 CFR 98 Table C-2 (fuel gas), converted assuming 2.2046 lb / kg

Pollutant	**GWP in CO_2 Equivalent**	**Source**
CO_2	1	GHG MRR Table A-1
CH_4	25	GHG MRR Table A-1
N_2O	298	GHG MRR Table A-1

Total Emissions

	Pilot - Natural Gas	
Pollutant[1]	lb/hr[2]	tons/yr[3]
CO	0.02	0.09
NO_X	0.04	0.16
CO_2	34.09	149.32
CH_4	1.66E-03	0.01
N_2O	3.33E-04	1.46E-03
CO_2e[4]	34.23	149.93
VOC	0.14	0.63

[1] Non-Smoking Flare

Sample Calculation

[2] Emission Rate (lb/hr) = Emission Factor (lb/MMBtu) * Flared Gas (MMBtu/hr)

[3] Emission Rate (tpy) = Emission Rate (lb/hr) * Operating Hours (hours/year) * (1 ton / 2000 lbs)

[4] Equation A-1 of Subpart A of Part 98. CO2 equivalent tpy = ∑(GHG compound emissions in tpy * GWP)

Flare Emissions - Loading

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

EPN: FL-1

Inputs	Units	Value	Source
Hours of Operation	hrs	8760	Conservative assumption
Loading Vapor Heat Content	Btu/scf	3,794.38	ProMax estimated stream properties
Loading Vapor Molecular Weight	lb/lb-mol	68.20	ProMax estimated stream properties
Captured Loading Vapor Mass	lb/hr	103.28	Loading calculations
	tpy	181.77	Loading calculations
Captured Loading Vapor Volume	scf/hr	574.40	= [Captured Loading Vapor Mass (lb/hr)] / [Loading Vapor Molecular Weight (lb/lb-mol)] * [379.3 scf/lb-mol]
	scf/yr	2,021,892	= [Captured Loading Vapor Mass (tpy)] * [2,000 lb/ton] / [Loading Vapor Molecular Weight (lb/lb-mol)] * [379.3 scf/lb-mol]
Captured Loading Vapor Heat Load	MMBtu/hr	2.18	= [Captured Loading Vapor Volume (scf/hr)] * [Loading Vapor Heat Content (Btu/scf)] * [1 MMBtu / 10^6 Btu]
	MMBtu/yr	7,671.82	= [Captured Loading Vapor Volume (scf/yr)] * [Loading Vapor Heat Content (Btu/scf)] * [1 MMBtu / 10^6 Btu]
Loading Vapor Carbon Content	lb C/lb vapor	0.83	ProMax

Pollutant	Emission Factor	Unit	Source
CO	0.31	lb/MMBtu	AP-42 Section 13.5 Industrial Flares
NO_X	0.07	lb/MMBtu	AP-42 Section 13.5 Industrial Flares
SO_2	--	lb/MMBtu	Mass Balance

Loading Vapor Controlled Emissions

Pollutant	Captured Vapor		Controlled Emissions[2]	
	wt %[1]	DRE%	lb/hr	tpy
VOC	100%	98%	2.07	3.64
Benzene	0.21%	98%	4.24E-03	0.01
n-hexane	5.15%	98%	0.11	0.19
H2S	0.001%	98%	2.48E-05	4.36E-05
Total HAPs	5.36%	98%	0.11	0.19

[1] Weight percent from ProMax

[2] Controlled emissions = Captured Emissions * wt % * (100% - DRE%)

Loading Vapor GHG Emissions

Pollutant	GHG Emissions		Source
	lb/hr	tpy	
CO_2	314.57	553.65	= [Loading Vapor Mass (mass/time)] * [Loading Vapor Carbon Content (lb C/lb vapor)] * [MW CO2 (44.01 lb/lb-mol) / MW C (12.0107 lb/lb-mol)]
CH_4	--	--	No methane in loading vapor
N_2O	--	--	No nitrogen in loading vapor
CO_2e	314.57	553.65	= ∑(GHG compound emissions * GWP)

Pollutant	GWP in CO_2 Equivalent	Source
CO_2	1	GHG MRR Table A-1
CH_4	25	GHG MRR Table A-1
N_2O	298	GHG MRR Table A-1

Total Emissions

	Loading Vapors[2]	
Pollutant[1]	lb/hr[3]	tons/yr[4]
CO	0.68	1.19
NO_X	0.15	0.26
SO_2	4.57E-03	0.01
CO_2	314.57	553.65
CH_4	--	--
N_2O	--	--
CO_2e[5]	314.57	553.65
VOC	2.07	3.64
Benzene	4.24E-03	0.01
n-Hexane	0.11	0.19
HAPs	0.11	0.19

[1] Non-Smoking Flare

[2] VOC emissions calculated with Export Transload Emissions

Sample Calculation

[3] Emission Rate (lb/hr) = Emission Factor (lb/MMBtu) * Flared Gas (MMBtu/hr)

[4] Pilot Emission Rate (tpy) = Emission Rate (lb/hr) * Operating Hours (hours/year) * (1 ton / 2000 lbs)
Loading Vapors Emission Rate (tpy) = Emission Factor (lb/MMBtu) * Flared Gas (MMBtu/yr) / 2,000 tpy

[5] Equation A-1 of Subpart A of Part 98. CO2 equivalent tpy = ∑(GHG compound emissions in tpy * GWP)

Flare Summary

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

EPN: FL-1

Total Emissions

Pollutant[1]	Pilot - Natural Gas[1]		Loading Vapors[2]		Total[3]	
	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
CO	0.02	0.09	0.68	1.19	0.70	1.28
NO_X	0.04	0.16	0.15	0.26	0.18	0.42
SO_2	--	--	4.57E-03	0.01	4.57E-03	0.01
CO_2	34.09	149.32	314.57	553.65	348.66	702.97
CH_4	1.66E-03	0.01	--	--	1.66E-03	0.01
N_2O	3.33E-04	1.46E-03	--	--	3.33E-04	1.46E-03
CO_2e^5	34.23	149.93	314.57	553.65	348.80	703.58
VOC	0.14	0.63	2.07	3.64	2.21	4.26
Benzene	--	--	4.24E-03	0.01	4.24E-03	0.01
n-Hexane	--	--	0.11	0.19	0.11	0.19
H2S	--	--	2.48E-05	4.36E-05	2.48E-05	4.36E-05
HAPs	--	--	0.11	0.19	0.11	0.19

Sample Calculation
[1] See Flare Emissions - Pilot table for detailed emission calculations.
[2] See Flare Emissions - Loading table for detailed emission calculations.
[3] Total Emissions = Pilot + Loading Emissions

Physical Properties

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**

Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

Process Streams	Crude Oil[1]	Working and Standing Emisisons[2]	
Mass Fraction			
Nitrogen	0.00E+00	0.00E+00	
CO2	0.00E+00	0.00E+00	
Methane	0.00E+00	0.00E+00	
Ethane	3.84E-05	3.55E-03	
Propane	8.16E-04	0.02	
Isobutane	5.28E-03	0.04	
n-Butane	0.06	0.28	
Isopentane	0.12	0.19	
n-Pentane	0.24	0.28	
i-C6	0.33	0.14	
n-Hexane	0.17	0.05	
Benzene	0.01	2.05E-03	
Cyclohexane	0.02	3.79E-03	
i-C7	0.04	1.61E-03	
n-Heptane	2.22E-03	1.99E-04	
Toluene	5.76E-04	3.33E-05	
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	
n-Octane	1.46E-04	4.65E-06	
Ethylbenzene	0.00E+00	0.00E+00	
m-Xylene	0.00E+00	0.00E+00	
3-Methyloctane	0.00E+00	0.00E+00	
n-Nonane	0.00E+00	0.00E+00	
H2S	0.00E+00	0.00E+00	
Water	0.00E+00	0.00E+00	
C10+	0.00E+00	0.00E+00	
Mole Fraction			
Nitrogen	0.00E+00	0.00E+00	
CO2	0.00E+00	0.00E+00	
Methane	0.00E+00	0.00E+00	
Ethane	1.00E-04	8.06E-03	
Propane	1.45E-03	0.02	
Isobutane	7.12E-03	0.04	
n-Butane	0.08	0.33	
Isopentane	0.13	0.18	
n-Pentane	0.26	0.26	
i-C6	0.30	0.11	
n-Hexane	0.15	0.04	
Benzene	0.01	1.79E-03	
Cyclohexane	0.02	3.07E-03	
i-C7	0.03	1.10E-03	
n-Heptane	1.74E-03	1.35E-04	
Toluene	4.90E-04	2.47E-05	
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	
n-Octane	1.00E-04	2.78E-06	
Ethylbenzene	0.00E+00	0.00E+00	
m-Xylene	0.00E+00	0.00E+00	
3-Methyloctane	0.00E+00	0.00E+00	
n-Nonane	0.00E+00	0.00E+00	
H2S	0.00E+00	0.00E+00	
Water	0.00E+00	0.00E+00	
C10+	0.00E+00	0.00E+00	
Molecular Weight	78.37	68.20	lb/lbmol
Gross Ideal Gas Heating Valu	4326.29	3794.38	Btu/ft^3

1. Speciated site-specific crude assay (Bakken Crude) analysis, IBP-160 Deg. F Cut. See Appendix C for analysis.
2. Based on ProMax process simulation of tank W&S emissions from speciated site-specific crude assay.

Fugitive Emissions

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

EPN: FUG

Background Information
Total fugitive component counts are based on equipment counts at the facility.

Emissions Estimate

Liquid Equipment/Service	Oil and Gas Production Operations Emission Factor[a] (Light Oil)	Oil and Gas Production Operations Emission Factor[a] (Gas)	# Light Oil Components	# Gas Components	Reduction Factor[b]	Short-Term Total Emissions[c]	Annual Total Emissions[d]
	(lb/hr/component)	(lb/hr/component)				(lb/hr)	(ton/yr)
Valves	0.0055	0.00992	270	30	0%	1.78	7.81
Flanges	0.000243	0.00086	188	22	0%	0.06	0.28
Open-Ended Lines	0.00309	0.00441	0	0	0%	0.00	0.00
Connectors	0.000463	0.00044	0	0	0%	0.00	0.00
Other	0.0165	0.0194	57	7	0%	1.08	4.71
Total TOC						**2.92**	**12.80**

[a] Emission factors are converted from kg/hr/component taken from EPA document EPA-453/R-95-017; November, 1995; pp.2-15.

[b] No reduction from LDAR monitoring is being claimed.

[c] Controlled Short-Term ER (lb/hr) = (100% - Reduction Factor) * Σ(Number of Components * Emissions Factor [lb/hr/component]).

[d] Controlled Annual ER (tpy) = Controlled Short-Term ER (lb/hr) * 8,760 (hr/yr) / 2,000 (lb/ton).

Fugitive HAP Emissions

Component	Light Oil (lb/hr)	Light Oil (ton/year)	Gas (lb/hr)	Gas (ton/year)	Total (lb/hr)	Total (ton/year)
n-Hexane	0.41	1.82	0.02	0.10	0.44	1.92
Benzene	0.03	0.12	9.29E-04	4.07E-03	0.03	0.12
Toluene	1.42E-03	0.01	1.51E-05	6.61E-05	1.44E-03	0.01
2,2,4-Trimethylpentane	--	--	--	--	--	--
Ethylbenzene	--	--	--	--	--	--
m-Xylene	--	--	--	--	--	--
H2S	2.96E-05	1.30E-04	5.42E-06	2.38E-05	3.51E-05	1.54E-04
Total HAP	**0.44**	**1.94**	**0.02**	**0.11**	**0.47**	**2.05**

MSS Roof Landing Emissions

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

EPN: MSS-LL

This section calculates standing idle and refilling emissions from landing of the floating roof tank.

Note:
1. This section only calculates the standing and refilling losses from floating roof tank landings. For fixed roof tanks, standing idle emissions are estimated as normal standing storage (breathing) losses, as specified in API 19.1. Similarly, refilling emissions for fixed roof tanks are accounted for in the estimate of normal working losses that result from fixed roof tank throughput, as specified in API 19.1. In that these filling losses are not included in the estimation of tank cleaning emissions for fixed roof tanks.
2. The tank calculations are applied to product stored at ambient temperature. For heated tanks or tanks storing hot product, please provide more explanation on the input parameters used such as vapor pressure of heated product, Antoine's constant etc., and how they are derived.
3. Enter information into the yellow boxes.

4. VOC and H2S control efficiencies may be entered (if applicable).
5. Use site specific analysis for input parameters such as weight percents, molecular weight, stock liquid density etc., of the liquid / product stored.
6. Use the box provided below for entering any notes necessary (such as the source/justification for any calculation inputs).
7. Make sure to answer the control device question.
8. Make sure to select the correct VOC Type and Emission Type from the pull down menus below.

Hourly Emissions			Annual Emissions	
Name	TK2101 & TK 2102 Landing Loss			
Tank No.:	TK2101 & TK2102			
Product stored:	Crude Oil			
Type of floating roof	IFR			
Paint solar absorptance based on tank color (α)	0.17			
Liquid Heel Type	Full			
Solar Insolation factor (I) (Btu/ft2-d)	1217.5			
Tank Capacity (bbl)	140765			
Max. True Vapor Pressure (psia) (P)	11.53	Max > Avg	Avg. True Vapor Pressure (psia) (P)	7.10
Tank Diameter (ft) (D)	134.25			
Vapor Molecular Wt. (lb/lb mol) (M_v)	68.20			
Number of idle days (n_d)	4			
Max. Temperature (°F) (T)	84.8	Max > Avg	Avg. Temperature (°F) (T)	53.82
Min. daily ambient temperature (°F)	56.5		Min. Avg temperature (°F)	29.04
B (Antoine's Equation Constant)	4,259.79		B (Antoine's Equation Constant)	4,260
Stock Liquid Density (lb/gal)	7.10			
Height of Liquid Heel (ft) (h_l)	1.33			
Tank Leg Height (ft)	4			
Tank Filling Rate (gph)	21,000			
Frequency / Number of roof Landings (events/yr)	2			

Tank Color / Paint factor (α)	0.17			
Saturation factor based on heel type	0.60			
Solar insolation Factor (I) (Btu/ft2-d)	1,218			
Type of floating roof	IFR			
Vapor Space Volume (ft^3) (V_v)	37747.41			
Ht of Vapor Space under roof (ft) (h_v)	2.67			
Daily Temp. Range (°R) ΔT_v	26.17		Daily Temp. Range (°R) ΔT_v	23.63
Vapor Space Expansion Factor (K_E)	0.73		Vapor Space Expansion Factor (K_E)	0.22
Standing Idle Saturation Factor (K_S)	0.38		Standing Idle Saturation Factor (K_S)	0.50

MSS Roof Landing Emissions

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

EPN: MSS-LL

Internal Floating Roof Tank Emissions (IFR)

IFR Standing Idle Losses (lb/event) L_s	5645.15
IFR Filling Losses (lb/event) L_f	3046.16
IFR with liquid heel: (lb/event)	8691.31
Max. Hourly Emissions: (lb/hr)	226.56

Internal Floating Roof Tank Emissions (IFR)

IFR Standing Idle Losses (lb/event) L_s	1482.42
IFR Filling Losses (lb/event) L_f	1988.41
IFR with liquid heel: (lb/event)	3470.83
Avg. Annual Emissions (tpy)	3.47

Drain Dry Tank Emissions (IFR)

Drain Dry Standing Idle Loss (lb) L_s	0.00
Drain Dry Filling Loss (lb) L_f	0.00
Drain Dry Tanks: (lb/event)	0.00
Max. Hourly Emissions: (lb/hr)	0.00

Drain Dry Tank Emissions (IFR)

Drain Dry Standing Idle Loss (lb) L_s	0.00
Drain Dry Filling Loss (lb) L_f	0.00
Drain Dry Tanks: (lb/event)	0.00
Avg. Annual Emissions (tpy)	0.00

VOC Wt%	100.00
H_2S Wt%	0.00126
HAP Wt%	5.36

Type of control device	
Are tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(A) uncontrolled
VOC Control Efficiency	
H_2S Control Efficiency	

Emissions before control and before wt% reduction

Type of Losses	Max. hourly emissions lb/hr	Avg. Annual emissions tpy
IFR Losses	226.56	3.47
EFR Losses	0.00	0.00
Drain dry losses	0.00	0.00
Total Losses	226.56	3.47

Vapors Captured by Control Device

Air contaminant	Max. hourly emissions lb/hr	Avg. Annual emissions tpy
Total VOC	0.00	0.00
Total H_2S	0.00	0.00
Total HAP	0.00	0.00

Planned MSS Emissions

Air contaminant	**Max. hourly emissions lb/hr**	**Avg. Annual emissions tpy**
Total VOC	**226.56**	**3.47**
Total H_2S	**2.85E-03**	**4.37E-05**
Total HAP	**12.14**	**0.19**

Notes:

MSS Tank Degassing Emissions

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

EPN: MSS Tank Degassing

Planned MSS - Forced Ventilation / Vapor space purge / Degassing for Fixed Roof and Floating Roof Tanks

This section calculates planned MSS emissions due to forced ventilation for both floating roof and fixed roof tanks.

Note:
1. Enter information into the yellow boxes.
2. The tank calculations are applied to product stored at ambient temperature. For heated tanks or tanks storing hot product, please provide more explanation on the input parameters used such as vapor pressure of heated product, Antoine's constant etc., and how they are derived.

3. VOC and H2S control efficiencies may be entered (if applicable).
4. Use site specific analysis for input parameters such as weight percents, molecular weight, stock liquid density etc., of the liquid / product stored.

5. Use the box provided below for entering any notes necessary (such as the source/justification for any calculation inputs).
6. Make sure to answer the control device question.
7. Make sure to select the correct VOC Type and Emission Type from the pull down menus below.

Hourly emissions			Annual emissions	
Tank No.:	TK-2101 & TK-2102			
Product stored:	Crude Oil			
Type of tank roof	IFR			
Tank Capacity (bbl)	140,765			
Max. True Vapor Pressure (psia) (P)	11.53	Max > Avg	Avg. True Vapor Pressure (psia) (P)	7.10
Tank Diameter (ft) (D)	134			
Vapor Molecular Wt. (lb/lb mol) (M_v)	68			
Max. Temperature (°F) (T)	85	Max > Avg	Avg. Temperature (°F) (T)	54
Height of the tank (ft)	4			
Forced Ventilation Blower rate (ft^3/hr)	173			
Saturation factor (S) Full liquid Heel	0.6			
Duration of activity / Hours of operation per year	96			

Vapor Space Volume (ft^3) (V_v)	56621.12
Height of Vapor Space under roof (ft)* (h_v)	4.00
Max. Emissions (lb/event)	4569.24
Max. Hourly Emissions (lb/hr)	13.99
Avg. Emissions (lb/event)	2982.62
Avg. Hourly Emissions (lb/hr)	9.13
Avg. Annual emissions (tpy)	0.44

VOC Wt%	100.00
H_2S Wt%	0.00126
HAP Wt%	5.36

Type of Control Device	
Are tank vapors (A) uncontrolled; (B) controlled by a flare, vapor combustor, thermal oxidizer, or vapor recovery unit (VRU); or (C) controlled by another type of control device?	(A) uncontrolled
VOC Control Efficiency	
H_2S Control Efficiency	

Emissions before control and before wt% reduction

Type of Losses	Max. hourly emissions lb/hr	Avg. Annual emissions tpy
Vapor Space Purge / Degassing	13.99	0.44

Vapors Captured by Control Device

Air Contaminant	Max. hourly emissions lb/hr	Avg. Annual emissions tpy
Total VOC	0.00	0.00
Total H_2S	0.00	0.00
Total HAP	0.00	0.00

Planned MSS Emissions

Air Contaminant	Max. hourly emissions lb/hr	Avg. Annual emissions tpy
Total VOC	**13.99**	**0.44**
Total H_2S	**1.76E-04**	**5.52E-06**
Total HAP	**0.75**	**0.02**

Source: U.S. EPA Report AP-42, Fifth Edition, Supplement D,9 Table 7.1-2; except the Antoine's equation constants, A and B, are from API MPMS 19.2.1"
* These are suggested values to be used in the absence of actual data.

Calculations / Equations used

(Reference : Evaporative loss from the cleaning of storage tanks, Technical report Nov. 2007, #2568 (Evaporative loss from the storage tanks) and AP-42 Chapter 7).

Maximum Hourly Emissions:

$$\text{Max. Emissions}\left(\frac{\text{lb}}{\text{event}}\right) = \left(\frac{P * Vv}{R * T}\right) * MV * (S = 0.6)$$

IF (Forced Ventilation Blower rate (ft^3/hr) < Vapor Space Volume (ft^3) (V_v))
then

$$\text{Max. Hourly Emissions (lb/hr)} = \frac{\text{Max. Emissions (lb/event)}}{\frac{\text{Vapor Space Volume } (ft^3)\ (Vv)}{\text{Forced Ventilation Blower rate } (ft^3/hr)}}$$

otherwise
Max. Hourly Emissions (lb/hr) = Max. Emissions (lb/event)

Average Annual Emissions:

ProMax Input Values

Company Name: **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**
Site Location: **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**

Process Streams		Trucked In Oil
Composition	**Status:**	Solved
Phase: **Total**	**From Block:**	--
	To Block:	Crude Oil Tanks
		Mole Fraction
Nitrogen		0*
CO2		0*
Methane		0*
Ethane		0.0001*
Propane		0.00145*
Isobutane		0.00712*
n-Butane		0.08419*
Isopentane		0.12903*
n-Pentane		0.26406*
i-C6		0.29947*
n-Hexane		0.15271*
Benzene		0.01102*
Cyclohexane		0.01809*
i-C7		0.03043*
n-Heptane		0.00174*
Toluene		0.00049*
2,2,4-Trimethylpentane		0*
n-Octane		0.0001*
Ethylbenzene		0*
m-Xylene		0*
3-Methyloctane		0*
n-Nonane		0*
H2S		0*
Water		0*
Gas C10+		0*
Oil C10+		0*

Process Streams		Trucked In Oil
Properties	**Status:**	Solved
Phase: **Total**	**From Block:**	--
	To Block:	Crude Oil Tanks
Property	**Units**	
Temperature	°F	47.0437*
Pressure	psig	0*
Liquid Volumetric Flow	Mbbl/d	4.75278
Std Liquid Volumetric Flow	Mbbl/d	4.8219*

APPENDIX B

Tribal NSR Synthetic Minor Forms

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY
40 CFR 49.151

Application for New Construction

(Form NEW)

Please check all that apply to show how you are using this form:

- ☒ **Proposed Construction of a New Source**
- ☐ **Proposed Construction of New Equipment at an Existing Source**
- ☐ **Proposed Modification of an Existing Source**
- ☐ **Other – Please Explain**

Use of this information request form is voluntary and not yet approved by the Office of Management and Budget. The following is a check list of the type of information that Region 8 will use to process information on your proposed project. While submittal of this form is not required, it does offer details on the information we will use to complete your requested approval and providing the information requested may help expedite the process. Use of application forms for this program is currently under Office of Management and Budget review and these information request forms will be replaced/updated after that review is completed.

Please submit information to following two entities:

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 8
1595 Wynkoop Street, 8P-AR
Denver, CO 80202-1129
R8airpermitting@epa.gov

For more information, visit:
http://www.epa.gov/caa-permitting/tribal-nsr-permitting-region-8

The Tribal Environmental Contact for the specific reservation:

If you need assistance in identifying the appropriate Tribal Environmental Contact and address, please contact:
R8airpermitting@epa.gov

A. GENERAL SOURCE INFORMATION

1. (a) Company Name (Who owns this facility?) **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.** (b) Operator Name (Is the company that operates this facility different than the company that owns this facility? What is the name of the company?) **Thunder Butte Petroleum Services, Inc. (TBPS)**		2. Facility Name **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**	
3. Type of Operation **Truck Unloading and Crude Storage**		4. Portable Source? ☐ Yes ☒ No 5. Temporary Source? ☐ Yes ☒ No	
6. NAICS Code **424710**		7. SIC Code **5171**	
8. Physical Address (Or, home base for portable sources) **37685 247th Ave SW** **Plaza, ND 58771**			
9. Reservation* **Fort Berthold Indian Reservation**	10. County* **Ward**	11a. Latitude (decimal format)* **47.974722**	11b. Longitude (decimal format)* **-101.869167**
12a. Quarter Quarter Section* **NW 1/4**	12b. Section* **19**	12c. Township* **152 North**	12d. Range* **87 West**

*Provide all proposed locations of operation for portable sources

B. PREVIOUS PERMIT ACTIONS (Provide information in this format for each permit that has been issued to this source. Provide as an attachment if additional space is necessary)

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

C. CONTACT INFORMATION

Company Contact (Who is the primary contact for the company that owns this facility?) **Richard Mayer**	Title **Chief Executive Officer**
Mailing Address **P.O Box 1227 New Town, ND 58763**	
Email Address **rmayer@mhanation.com**	
Telephone Number **(701) 862-2540**	Facsimile Number **(701) 862-3078**

Operator Contact (Is the company that operates this facility different than the company that owns this facility? Who is the primary contact for the company that operates this facility?) **Richard Mayer**	Title **Chief Executive Officer**
Mailing Address **P.O Box 1227 New Town, ND 58763**	
Email Address **rmayer@mhanation.com**	
Telephone Number **(701) 862-2540**	Facsimile Number **(701) 862-3078**

Permitting Contact (Who is the person primarily responsible for Clean Air Act permitting for the company? We are seeking one main contact for the company. Please do not list consultants.) **Richard Mayer**	Title **Chief Executive Officer**
Mailing Address **P.O Box 1227 New Town, ND 58763**	
Email Address **rmayer@mhanation.com**	
Telephone Number **(701) 862-2540**	Facsimile Number **(701) 862-3078**

Compliance Contact (Is the person responsible for Clean Air Act compliance for this company different than the person responsible for Clean Air Act permitting? Who is the person primarily responsible for Clean Air Act compliance for the company? We are seeking one main contact for the company. Please do not list consultants.) **Richard Mayer**	Title **Chief Executive Officer**
Mailing Address **P.O Box 1227 New Town, ND 58763**	
Email Address **rmayer@mhanation.com**	
Telephone Number **(701) 862-2540**	Facsimile Number **(701) 862-3078**

D. ATTACHMENTS

Include all of the following information (see the attached instructions)

*Please do not send Part 71 Operating Permit Application Forms in lieu of the check list below.

☒ **FORM SYNMIN -** New Source Review Synthetic Minor Limit Request Form, if synthetic minor limits are being requested.

☒ Narrative description of the proposed production processes. This description should follow the flow of the process flow diagram to be submitted with this application.

☒ Process flow chart identifying all proposed processing, combustion, handling, storage, and emission control equipment.

☒ A list and descriptions of all proposed emission units and air pollution-generating activities.

☒ Type and quantity of fuels, including sulfur content of fuels, proposed to be used on a daily, annual and maximum hourly basis.

☒ Type and quantity of raw materials used or final product produced proposed to be used on a daily, annual and maximum hourly basis.

☒ Proposed operating schedule, including number of hours per day, number of days per week and number of weeks per year.

☒ A list and description of all proposed emission controls, control efficiencies, emission limits, and monitoring for each emission unit and air pollution generating activity.

☒ **Criteria Pollutant Emissions -** Estimates of Current Actual Emissions, Current Allowable Emissions, Post-Change Uncontrolled Emissions, and Post-Change Allowable Emissions for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates.

These estimates are to be made for each emission unit, emission generating activity, and the project/source in total. Note, there are no insignificant emission units or activities in this permitting program, only exempted units and activities. Please see the regulation for a list of exempted units and activities.

☒ **Air Quality Review**

☒ **ESA (Endangered Species Act)**

☒ **NHPA (National Historic Preservation Act)**

E. TABLE OF ESTIMATED EMISSIONS

The following tables provide the total emissions in tons/year for all pollutants from the calculations required in Section D of this form, as appropriate for the use specified at the top of the form.

E(i) – Proposed New Source

Pollutant	Potential Emissions (tpy)	Proposed Allowable Emissions (tpy)
PM	---	---
PM_{10}	---	---
$PM_{2.5}$	---	---
SO_2	---	**0.01**
NO_x	---	**0.42**
CO	---	**1.28**
VOC	**285.26**	**94.95**
Pb	---	---
Fluorides	---	---
H_2SO_4	---	---
H_2S	**3.42E-03**	**1.13E-03**
TRS	---	---
RSC	---	---

PM - Particulate Matter
PM_{10} - Particulate Matter less than 10 microns in size
$PM_{2.5}$ - Particulate Matter less than 2.5 microns in size
SO_2 - Sulfur Oxides
NOx - Nitrogen Oxides
CO - Carbon Monoxide
VOC - Volatile Organic Compound
Pb - Lead and lead compounds
Fluorides - Gaseous and particulates
H_2SO_4 - Sulfuric Acid Mist
H_2S - Hydrogen Sulfide
TRS - Total Reduced Sulfur
RSC - Reduced Sulfur Compounds

Emissions calculations must include fugitive emissions if the source is one the following listed sources, pursuant to CAA Section 302(j):

(a) Coal cleaning plants (with thermal dryers);
(b) Kraft pulp mills;
(c) Portland cement plants;
(d) Primary zinc smelters;
(e) Iron and steel mills;
(f) Primary aluminum ore reduction plants;
(g) Primary copper smelters;
(h) Municipal incinerators capable of charging more than 250 tons of refuse per day;
(i) Hydrofluoric, sulfuric, or nitric acid plants;
(j) Petroleum refineries;
(k) Lime plants;
(l) Phosphate rock processing plants;
(m) Coke oven batteries;
(n) Sulfur recovery plants;
(o) Carbon black plants (furnace process);
(p) Primary lead smelters;
(q) Fuel conversion plants;
(r) Sintering plants;
(s) Secondary metal production plants;
(t) Chemical process plants
(u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
(v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(w) Taconite ore processing plants;
(x) Glass fiber processing plants;
(y) Charcoal production plants;
(z) Fossil fuel-fired steam electric plants of more that 250 million British thermal units per hour heat input, and
(aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

E(ii) – Proposed New Construction at an Existing Source or Modification of an Existing Source

Pollutant	Current Actual Emissions (tpy)	Current Allowable Emissions (tpy)	Post-Change Potential Emissions (tpy)	Post-Change Allowable Emissions (tpy)
PM				
PM_{10}				
$PM_{2.5}$				
SO_2				
NO_x				
CO				
VOC				
Pb				
Fluorides				
H_2SO_4				
H_2S				
TRS				
RSC				

PM - Particulate Matter
PM_{10} - Particulate Matter less than 10 microns in size
$PM_{2.5}$ - Particulate Matter less than 2.5 microns in size
SO_2 - Sulfur Oxides
NOx - Nitrogen Oxides
CO - Carbon Monoxide
VOC - Volatile Organic Compound
Pb - Lead and lead compounds
Fluorides - Gaseous and particulates
H_2SO_4 - Sulfuric Acid Mist
H_2S - Hydrogen Sulfide
TRS - Total Reduced Sulfur
RSC - Reduced Sulfur Compounds

The public reporting and recordkeeping burden for this collection of information is estimated to average 20 hours per response, unless a modeling analysis is required. If a modeling analysis is required, the public reporting and recordkeeping burden for this collection of information is estimated to average 60 hours per response .Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

OMB Control No. Pending

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY
40 CFR 49.151

Application For Synthetic Minor Limit

(Form SYNMIN)

Use of this information request form is voluntary and not yet approved by the Office of Management and Budget. The following is a check list of the type of information that Region 8 will use to process information on your proposed project. While submittal of this form is not required, it does offer details on the information we will use to complete your requested approval and providing the information requested may help expedite the process. Use of application forms for this program is currently under Office of Management and Budget review and these information request forms will be replaced/updated after that review is completed.

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R8airpermitting@epa.gov

For more information, visit:
http://www.epa.gov/caa-permitting/tribal-nsr-permitting-region-8

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R8airpermitting@epa.gov

A. GENERAL INFORMATION

Company Name (Who owns this facility?) **Mandan, Hidatsa, and Arikara (MHA) Nation dba Thunder Butte Petroleum Services, Inc.**	Facility Name **Thunder Butte Petroleum Services/MHA Nation Truck Loading and Storage Facility**
Company Contact (Who is the primary contact for the company that owns this facility?) **Richard Mayer**	Title **Chief Executive Officer**
Mailing Address **P.O Box 1227 New Town, ND 58763**	
Email Address **rmayer@mhanation.com**	
Telephone Number **(701) 862-2540**	Facsimile Number **(701) 862-3078**

B. ATTACHMENTS

For each criteria air pollutant, hazardous air pollutant and for all emission units and air pollutant-generating activities to be covered by a limitation, include the following:

☒ **Item 1 -** The proposed limitation and a description of its effect on current actual, allowable and the potential to emit.
☒ **Item 2 -** The proposed testing, monitoring, recordkeeping, and reporting requirements to be used to demonstrate and assure compliance with the proposed limitation.
☒ **Item 3 -** A description of estimated efficiency of air pollution control equipment under present or anticipated operating conditions, including documentation of the manufacturer specifications and guarantees.
☒ **Item 4 -** Estimates of the Post-Change Allowable Emissions that would result from compliance with the proposed limitation, including all calculations for the estimates.
☒ **Item 5 –** Estimates of the potential emissions of Greenhouse Gas (GHG) pollutants.

APPENDIX C

Laboratory Analyses

Crude Assay ANALYSIS

BAKKEN CRUDE

THUNDER BUTTE PETROLEUM SERVICES

WHEN YOU NEED TO BE SURE

SGS

Sample Identification

- **Thunder Butte Petroleum Services**
- Bakken Crude
- SGS File # 260961

SGS Thunder Butte Petroleum Services

BAKKEN CRUDE

■PIONA-DHA Analysis

- IBP-160 Deg. F Cut
- 160-212 Deg. F Cut
- 212-330 Deg. F Cut
- 330-380 Deg. F Cut

File: C:\HPCHEM\2\DATA\260961A\001F0101.D\001F0101_FID1_A.CDF 2/21/2012 8:40:14 AM
Sample: 260961A Operator:
Parameter: C:\HPCHEM\HCE30\NAPHTHA2 Bakken Crude, C5-160°F cut, PIONA

Summary by Group

Group	%Wgt	%Vol	%Mol
Paraffin	48.044	49.848	50.407
I-Paraffins	34.750	35.326	33.419
Olefins	0.000	0.000	0.000
Naphthenes	16.040	13.958	15.023
Aromatics	1.166	0.868	1.151
Oxygenates	0.000	0.000	0.000
* Unidentified	0.001	0.001	0.001
* Plus	0.000	0.000	0.000

(*) Not included in normalization.
Recovery = 100.00

File: C:\HPCHEM\2\DATA\260961A\001F0101.D\001F0101_FID1_A.CDF 2/21/2012 8:40:14 AM
Sample: 260961A Operator:
Parameter: C:\HPCHEM\HCE30\NAPHTHA2

Summary by Carbon

C#	%Wgt	%Vol	%Mol
C2	0.004	0.007	0.010
C3	0.082	0.107	0.145
C4	6.815	7.727	9.112
C5	39.018	40.481	42.104
C6	49.899	47.847	45.353
C7	4.168	3.817	3.266
C8	0.014	0.012	0.009

Recovery = 100.00

File: C:\HPCHEM\2\DATA\260961A\001F0101.D\001F0101_FID1_A.CDF 2/21/2012 8:40:14 AM
Sample: 260961A Operator:
Parameter: C:\HPCHEM\HCE30\NAPHTHA2

Composite by Carbon

Group	C#	%Wgt	%Vol	%Mol
Paraffin	C2	0.004	0.007	0.010
	C3	0.082	0.107	0.145
	C4	6.283	7.102	8.400
	C5	24.516	25.614	26.406
	C6	16.934	16.802	15.271
	C7	0.225	0.215	0.174
I-Paraffins	C4	0.533	0.626	0.712
	C5	11.997	12.668	12.922
	C6	20.218	20.115	18.233
	C7	1.996	1.911	1.548
	C8	0.007	0.006	0.005
Naphthenes	C5	2.505	2.199	2.776
	C6	11.639	10.106	10.747
	C7	1.889	1.647	1.495
	C8	0.007	0.006	0.005
Aromatics	C6	1.108	0.825	1.102
	C7	0.058	0.044	0.049

Recovery = 100.00

File: C:\HPCHEM\2\DATA\260961A\001F0101.D\001F0101_FID1_A.CDF 2/21/2012 8:40:14 AM
Sample: 260961A Operator:
Parameter: C:\HPCHEM\HCE30\NAPHTHA2

Component List

	Pk#	Time	Group	Component	%Wgt	%Vol	%Mol
	1	4.207	P2	Ethane	0.004	0.007	0.010
	2	4.370	P3	Propane	0.082	0.107	0.145
	3	4.623	I4	i-Butane	0.533	0.626	0.712
	4	4.838	P4	n-Butane	6.283	7.102	8.400
	5	4.948	I5	2,2-Dimethylpropane	0.017	0.019	0.019
*	6	5.589	?	Unidentified	0.001	0.001	0.001
	7	5.632	I5	i-Pentane	11.979	12.649	12.903
	8	6.064	P5	n-Pentane	24.516	25.614	26.406
	9	6.871	I6	2,2-Dimethylbutane	0.165	0.167	0.149
	10	7.732	N5	Cyclopentane	2.505	2.199	2.776
	11	7.775	I6	2,3-Dimethylbutane	0.994	0.983	0.897
	12	7.915	I6	2-Methylpentane	11.530	11.551	10.398
	13	8.377	I6	3-Methylpentane	7.528	7.414	6.789
	14	9.020	P6	n-Hexane	16.934	16.802	15.271
	15	10.050	I7	2,2-Dimethylpentane	0.088	0.085	0.068
	16	10.188	N6	Methylcyclopentane	9.679	8.459	8.938
	17	10.337	I7	2,4-Dimethylpentane	0.296	0.288	0.230
	18	10.618	I7	2,2,3-Trimethylbutane	0.012	0.012	0.010
	19	11.379	A6	Benzene	1.108	0.825	1.102
	20	11.696	I7	3,3-Dimethylpentane	0.026	0.025	0.020
	21	11.929	N6	Cyclohexane	1.960	1.647	1.809
	22	12.466	I7	2-Methylhexane	0.599	0.577	0.464
	23	12.582	I7	2,3-Dimethylpentane	0.293	0.276	0.227
	24	12.776	N7	1,1-Dimethylcyclopentane	0.205	0.177	0.162
	25	13.049	I7	3-Methylhexane	0.642	0.611	0.498
	26	13.507	N7	1c,3-Dimethylcyclopentane	0.475	0.418	0.376
	27	13.710	N7	1t,3-Dimethylcyclopentane	0.370	0.323	0.293
	28	13.785	I7	3-Ethylpentane	0.040	0.037	0.031
	29	13.910	N7	1t,2-Dimethylcyclopentane	0.757	0.659	0.599
	30	14.905	P7	n-Heptane	0.225	0.215	0.174
	31	16.690	N7	Methylcyclohexane	0.074	0.063	0.059
	32	16.998	I8	2,2-Dimethylhexane	0.005	0.005	0.004
	33	17.851	N7	Ethylcyclopentane	0.007	0.006	0.006
	34	18.747	N8	1c,2t,4-Trimethylcyclopentane	0.003	0.003	0.002
	35	19.507	N8	1t,2c,3-Trimethylcyclopentane	0.004	0.003	0.003
	36	20.181	A7	Toluene	0.058	0.044	0.049
	37	21.674	I8	2-Methylheptane	0.001	0.001	0.001

(*) Not included in normalization.
Recovery = 100.00

APPENDIX D

John Zink Flare Specifications

II. Design Basis

The John Zink® Vapor Combustion System is based on proprietary technology and sound engineering. Terminal loading characteristics and other design data as furnished by the customer are summarized below:

Products Handled ..... Crude
Minimum Truck Rack Loading ..... 350 GPM
Maximum Truck Rack Loading ..... 1,050 GPM
Maximum Vapor Flow Rate into Combustor ..... 140 scfm
Inlet Pressure to combustor inlet ..... 12" W.C.
Vapor Inlet Temperature ..... -10 to 100 °F
Heating Value (max / min) ..... 0 / 1,517 Btu/scf
Maximum Heat Release ..... 9.71 MMBtu/hr
Pilot propane gas usage ..... 21 scfh
Assist gas usage ..... 0 scfm(1)
Area Electrical Classification
- Combustor Support Skid ..... Unclassified (Non-Hazardous)
- Vapor Combustor ..... Unclassified (Non-Hazardous)
- Motor Type ..... TEFC
- Motor Starter Enclosure Type (skid mounted) ..... NEMA 3R
- Control Panel Enclosure Type (skid mounted) ..... NEMA 4

Ambient Temperature ..... -40°F to 110°F
Earthquake Zone ..... 2014 North Dakota State Building Code, Cat A
Wind Velocity ..... 110 mph ASCE 7 05
Electrical Power ..... 480 V, 3 Ph, 60 Hz and 120 V, 1 Ph, 60 Hz
Pilot Gas ..... Propane @ 30 psig
Instrument Air ..... None Required
Power ..... 480 V /3 ph/ 60 & 120 V /1 ph/ 60

1. With vapors above 300 btu/scf, no assist gas is required.
2. Standard materials of construction are used in the fabrication of this equipment.

Arcadis U.S., Inc.

630 Plaza Drive

Suite 100

Highlands Ranch, Colorado 80129

Tel 720 344 3500

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www.arcadis.com