

This document sets forth the legal and factual basis for permit conditions, with references to applicable statutory and regulatory provisions, including provisions under the federal tribal New Source Review program, 40 C.F.R. §§ 49.151 - 49.161.

1.0 GENERAL INFORMATION

(A). Applicant and Stationary Source Information

Owner	Facility (SIC Code: 1311)
Summit Petroleum Corporation Robert J. Long, President 1315 S. Mission Rd. P.O. Box 265 Mt. Pleasant, Michigan 48804	Summit Petroleum – Rosebush 4725 N. Isabella Road Rosebush, Michigan 48878

(B). Contact Information

Responsible Official: Robert J. Long, President
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(C). Background and Facility Description

Summit Petroleum Corporation owns and operates a natural gas sweetening plant in Isabella County near Rosebush, Michigan. Sour natural gas from approximately 100 surrounding wells is gathered and transported to the plant via pipeline. Two of the wells share an access driveway with, and are within a quarter of a mile of, the Rosebush Plant. These wells, which are included in the application as part of the source,¹ are equipped with natural gas engine driven pump jacks

¹ Summit included the two wells as part of the source based upon its understanding of the decision in *Summit Petroleum Corporation v. EPA*, 690 F.3d 733 (6th Cir. 2012). Because EPA has not yet finalized its approach to aggregation in light of that decision, EPA will accept the source designation as proposed in the application for purposes of this permitting action. However, EPA may base aggregation on different factors for future permitting at this and other facilities.

that pump fluids from the reservoir. The remainder of the wells are located within 8 miles of the sweetening plant.

The wells produce crude oil as the primary product, but brine and sour natural gas are associated with the oil production. Sour natural gas contains sulfur compounds, primarily hydrogen sulfide. Hydrogen sulfide, heavy hydrocarbons, and water vapor are removed from the gas in order to make saleable, pipeline quality natural gas.

The inlet sour gas is piped to a two-stage caustic soda/hydrogen sulfide removal process. The caustic unit removes up to 98% of the hydrogen sulfide in the form of sodium hydrosulfide (NAHS) which is trucked from the site. The gas is then compressed in a natural gas fired engine driven compressor and enters an amine sweetening process for the purpose of removing the remaining hydrogen sulfide, which is sent to an incinerator for destruction. The natural gas goes to a dew point control unit for removal of natural gas liquids, which are trucked from the site in pressurized container trucks. Pipeline quality natural gas (sweet, dry) is compressed up to pipeline pressure via a natural gas engine driven compressor and then transported to markets via pipeline.

The sweetening plant has the potential to emit over 2,033 tons of sulfur dioxide (SO₂) per year. The primary source of SO₂ emissions is the amine sweetening unit/incinerator at the plant. Summit had obtained a permit from the Michigan Department of Environmental Quality (MDEQ) in an attempt to limit the SO₂ emissions to 98 tons per year (tpy), which is below the major source threshold. However, MDEQ is not the permitting authority for Summit because the facility is located within the exterior boundaries of the Saginaw Chippewa's Isabella Reservation. Therefore, Summit is applying for an after-the-fact federal synthetic minor permit to limit allowable emissions of SO₂ from the sweetening plant to 98 tpy.

The application for the after-the-fact federal synthetic minor permit states that the plant does not emit hazardous air pollutants in quantities above the major source threshold.

Facility Emissions:

Table 1. Total Facility Potential to Emit and Actual Emissions Summary

	PM tpy	PM ₁₀ tpy	PM _{2.5} tpy	SO _x tpy	NO _x tpy	CO tpy	VOC tpy	Lead tpy	Single HAP tpy	All HAPs tpy	GHG CO ₂ e tpy
Potential Emissions		0.44		2033.82	48.01	18.64	15.84			0.90	18,000
Actual Emissions (2011)		0.22		19.61	22.83	8.60	9.37			0.43	

(D). Area Classification

Summit Petroleum is located near Rosebush, Michigan, within the exterior boundaries of the Saginaw Chippewa's Isabella Reservation. The EPA is responsible for issuing and enforcing any air quality permits for this source until such time as the Tribe or State has EPA approval to do so.

The facility is located in Isabella County, which is designated in attainment with National Ambient Air Quality Standards for all criteria pollutants. There are no PSD Class 1 areas within 100 kilometers of the Summit Petroleum facility or the Isabella Reservation.

2.0 PROCESS DESCRIPTION

(A) Description of Permit Action

Summit Petroleum has applied for a limitation on the source under which SO₂ emissions will not exceed 98 tpy on a 12-month rolling basis as determined at the end of each calendar month. The permittee shall not operate EUSWEETENING unless the caustic contactor is installed, maintained, and operated as designed in either one or two stage mode. In no event shall SO₂ emissions from EUSWEETENING exceed the limit specified in the permit during a malfunction of the caustic contactor. The minimum sulfur recovery efficiency of the caustic contactor shall not be less than 74% for inlet sulfur quantities in excess of 2 long tons per day when in use. The permittee shall record the caustic agent feed rate into the caustic contactor.

The permittee shall monitor the mass flow rate of hydrogen sulfide entering the amine unit. The calculation of the mass flow rate shall be based on daily hydrogen sulfide concentration measurements taken via colorimetric or other approved method and continuous volumetric flow rate measurement using an orifice meter or other approved gas measurement device. In addition, the permittee shall, on a monthly basis, analyze the gas entering the amine unit to determine the concentration of sulfur containing compounds other than hydrogen sulfide via gas chromatograph.

The permittee shall calculate SO₂ emissions via the following formula:

$$\text{SO}_2 \text{ emissions (pounds/day)} = VXFm(0.1689)$$

V is the flow rate of gas to the amine unit in million cubic feet per day

X is the concentration of hydrogen sulfide in parts per million

Fm is the ratio of total sulfur to sulfur from hydrogen sulfide in the gas to the incinerator

0.1689 is the density of SO₂ gas at standard conditions in pounds per cubic feet

Note: Although treated as virtually identical, the amount of hydrogen sulfide (and other sulfur compounds) removed in the amine unit actually is slightly greater than the amount in the acid gas that goes to the incinerator for destruction because a very small amount of sulfur compounds remain in the residue gas and/or the liquid product from the downstream refrigeration process. It is much better to perform the measurement of sulfur in the gas stream to the amine unit rather than in the acid gas stream to the incinerator, because the latter is highly corrosive and not conducive to reliable and accurate measurement.

The permittee shall maintain records for a minimum of five years of the following:

- Daily hydrogen sulfide concentration of the gas going to the amine unit
- Monthly measurement of total sulfur in the gas stream to the amine unit
- Daily volume of gas going to the amine unit
- Daily mass flow rate of hydrogen sulfide going to the amine unit (and the incinerator)
- Daily SO₂ emissions from the incinerator
- Daily caustic soda feed rates into the two-stage process

Sulfur dioxide emissions are controlled via a two-stage caustic soda/hydrogen sulfide removal process (CECAUSTICUNIT) as part of the air pollution control equipment. The CECAUSTICUNIT unit can remove hydrogen sulfide entering the facility in the form of sodium hydrosulfide, which will be trucked from the site for removal. The efficiency can be adjusted so that the mass flow rate of hydrogen sulfide to the incinerator does not exceed the proposed limit of 98 tons per year.

The total volume of sour natural gas entering the plant is measured continuously at the inlet using an orifice flow meter. The inlet stream hydrogen sulfide concentration is measured with a stain-tube detector daily. The stream is also analyzed monthly by a certified laboratory to determine the ratio of total sulfur to sulfur in hydrogen sulfide, the result being called the mercaptan factor. The mercaptan factor is used to account for sulfur compounds, primarily mercaptans, which are not detected by the stain-tube method. This data enables calculation of total inlet equivalent hydrogen sulfide and total sulfur at the inlet of the caustic unit. Similar numbers are measured at the outlet of the caustic unit (inlet to the amine unit). This enables calculation of the efficiency of the caustic unit CECAUSTICUNIT). Summit Petroleum is required to maintain all raw data and calculations at the facility for five years. The feed rate of the caustic soda into the caustic unit shall be recorded on a daily basis and maintained at the facility for five years. Summit Petroleum has requested that the minimum sulfur recovery efficiency of the two stage caustic contactor shall not be less than 74% for inlet sulfur quantities in excess of 2 long tons per day. The amine unit then removes virtually 100% of the remaining hydrogen sulfide and sends it to the flare for combustion to SO₂. Together, the removal of sulfur at the caustic and amine units should assure compliance with the 98 ton per year limit at the incinerator.

Summit Petroleum shall monitor and record the exhaust gas temperature at the outlet of the combustion chamber on the incinerator on a continuous basis. The monitoring system shall be equipped with an audio alarm which shall be set to go off when the exhaust temperature at the outlet of the combustion chamber falls below 1400°F. Summit Petroleum shall maintain the temperature in the combustion chamber at no lower than 1400°F during normal operations. During startup, acid gas feed to the incinerator from the process shall not commence until the temperature at the outlet of the combustion chamber exceeds 1400°F. If the temperature falls below 1400°F, Summit Petroleum must try to bring the temperature back to 1400°F within 45 minutes. If the temperature remains below 1400°F for more than 45 minutes or falls below 1300°F, Summit Petroleum shall automatically commence shut-in of EUSWEETENING within one second. If the temperature falls below 1200°F, Summit Petroleum shall automatically commence diverting the flow of acid gas to the emergency flare. Summit shall not divert acid gas to the flare for more than 45 minutes.

Summit Petroleum shall not operate EUSWEETENING unless the required temperature monitoring and recording devices are in proper condition and are operating. All temperature monitoring data shall be kept on file for a period of at least five years and made available to the EPA upon request.

Summit Petroleum will monitor and record the oxygen content of the exhaust gases at the outlet of the combustion chamber of the incinerator on a continuous basis. The monitoring system shall be equipped with an audio alarm which shall be set to go off when the oxygen content at the outlet of the combustion chamber falls below 5.0 percent, by volume. During startup, acid gas feed to the incinerator from EUSWEETENING shall not commence until the oxygen content at the outlet of the combustion chamber exceeds 5.0 percent. If the oxygen content falls below 5.0 percent, Summit Petroleum must try to bring the oxygen content back up to 5.0 percent within 45 minutes. If the oxygen content is not at least 5.0 percent after 45 minutes, then Summit Petroleum shall automatically commence shut-in of EUSWEETENING within one second and shall automatically commence diverting the flow of acid gas to the emergency flare. Summit shall not divert acid gas to the flare for more than 45 minutes.

Summit Petroleum shall not operate EUSWEETENING unless the required oxygen monitoring and recording devices are in proper condition and are operating. All oxygen monitoring data shall be kept on file for a period of five years and made available to EPA upon request.

Summit Petroleum has a flare which serves as a collection system for minor streams that send any gas to the flare under normal operations and emissions, and for emergency relief from acid gas from the amine system, relief valves, storage tank pop-off, dehydration unit vent, compressor relief valves, and other vents and blowdown lines. The flare has a continuously burning pilot (sweetened fuel) and automatic re igniter system to maintain uninterrupted operations.

Summit Petroleum will not send the untreated sour gas from the wells to the flare except in the event of an emergency. Summit Petroleum will not send acid gas from the amine process to the flare except as allowed by the permit. Summit Petroleum shall not send acid gas to the flare for more than 45 minutes. In the event of an emergency, Summit Petroleum shall shut-in EUSWEETENING. Summit Petroleum will not operate EUSWEETENING unless all emergency relief valves, all storage tanks, and all dehydrators are vented to the flare, an incinerator, or a vapor recovery system.

(B). Table 2. Emission Unit Summary:

Emission Unit	EUENG01 Amine sweetening compression	EUENG02 Pipeline compression	EUENG03 Refrigerant compression
Unit type	Internal Combustion Engine (ICE)	ICE	ICE
Manufacturer/Model	Cooper Energy DPC-360	Cooper Energy DPC-230	Cooper Energy DP-165
Power Rating	360 hp	230 hp	165 hp
Fuel Type	Natural gas	Natural gas	Natural gas

Emission Unit	EUENG04 Well compression	EUENG05 Well compression
Unit type	ICE	ICE
Manufacturer/Model	Arrow C-96	Arrow C-96
Power Rating	21.4 hp	21.4 hp
Fuel Type	Natural gas	Natural gas

Emission Unit	EUSWEETENING
Unit type	Sour gas sweetening process; H2S removal from natural gas
Manufacturer/Model	C.E. Natco
Raw Material	Sour Natural Gas

(C). Permitting History

On May 3, 2006, the Michigan Department of Environmental Quality (MDEQ) issued a permit to install (Number 631-82I) to Summit Petroleum for its natural gas sweetening plant. The MDEQ does not have authority to issue permits to sources located within the exterior boundaries of Indian reservations.

On August 29, 2012, Summit Petroleum Corporation submitted to EPA an application for an after-the-fact synthetic minor air construction permit pursuant to 40 C.F.R. §§ 49.151-49.161.

(D). Pollution Control Equipment

SO₂ emissions are controlled via a two-stage caustic soda/hydrogen sulfide removal process. This unit can remove hydrogen sulfide entering the facility in the form of sodium hydrosulfide, a material that will be trucked from the site. By adjusting the contact time of sour gas with the caustic soda solution, the efficiency can be raised or lowered. The permittee will monitor and record the feed rate of the caustic agent into the caustic contactor. The feed rate and contact time into the caustic contactor shall be determined by the daily hydrogen sulfide stream and efficiency level of the caustic removal process. The operator can therefore adjust the efficiency so that the mass flow rate of hydrogen sulfide that eventually goes to the incinerator does not exceed the proposed limit of 98 tpy. Summit Petroleum monitors the flare temperature and the oxygen levels in the incinerator. The two-stage removal process equipment is constructed of commercially available pipe, fittings, and other components and there are no available manufacturer's specifications and guarantees.

(E). Endangered Species Act

According to U.S. Fish and Wildlife distribution lists, there are no endangered or threatened species or critical habitat present in Isabella County. Therefore, further analysis and consultation is not required under Section 7(a) of the Endangered Species Act.

3.0 APPLICABLE REQUIREMENTS

(A) Prevention of Significant Deterioration (PSD)

This source is a major source of SO₂ subject to the requirements of 40 C.F.R. § 52.21 based on its potential to emit and the definition of “major source” in 40 C.F.R. § 52.21. Summit had obtained a synthetic minor permit to install from MDEQ; however, the permit is invalid because MDEQ is not the permitting authority for Summit. Therefore, Summit is applying for an after-the-fact synthetic minor permit under EPA’s tribal minor New Source Review program, codified at 40 C.F.R. § 49.151, *et seq.*

(B) Restrictions on Potential to Emit

Potential to emit is defined in 40 C.F.R. § 52.21 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. Summit Petroleum has requested a SO₂ emission limitation condition be placed into the permit to restrict its SO₂ emissions to 98 tpy.

The minimum sulfur recovery efficiency of this facility shall not be less than 74% for inlet sulfur quantities in excess of 2 long tons per day (see discussion of caustic unit and amine unit efficiency in Section 2.0(A)). As discussed below, Summit Petroleum is not subject to the New Source Performance Standard for Onshore Natural Gas Processing which requires a minimum 74% sulfur recovery efficiency. However, Summit Petroleum has requested that the 74% minimum sulfur recovery efficiency limit be included in this permit.

(C) New Source Performance Standards (NSPS)

40 C.F.R. Part 60, Subpart LLL – Standards of Performance for SO₂ Emissions from Onshore Natural Gas Processing for which Construction, Reconstruction, or Modification Commenced After January 20, 1984, and On or Before August 23, 2011 does not apply to Summit Petroleum. The sour gas sweetening plant, at which hydrogen sulfide is removed from natural gas and disposed of by incineration, was installed on September 1, 1983. 40 C.F.R. § 60.640(d) states that the provisions of Subpart LLL apply to each affected facility identified in paragraph (a) of the section which commences construction or modification after January 20, 1984.

(D) National Emissions Standards for Hazardous Air Pollutants (NESHAP)

According to Summit Petroleum’s application, the facility-wide total actual HAP emissions (based on 2011 data) is 0.43 tpy and the facility-wide total potential to emit HAPs is 0.90 tpy. Because both the actual and potential HAP emissions are below the 10 tpy single HAP threshold and the 25 tpy combined HAP threshold for NESHAP applicability, there are no NESHAPs that apply to this source at this time.