DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

Permit Application Analysis
A0009930

April 8, 2020

NAME OF FIRM:	Sinclair Wyoming Refining Company (CMP001243)
NAME OF FACILITY:	Sinclair Refinery (F000758)
FACILITY LOCATION:	N½ Section 21, T21N, R86W Latitude: 41.77937, Longitude: -107.11020 100 East Lincoln Highway Sinclair, Carbon County, Wyoming
TYPE OF OPERATION:	Petroleum Refinery
RESPONSIBLE OFFICIAL:	Michael Whatley, Refinery Manager
MAILING ADDRESS:	P.O. Box 277 Sinclair, WY 82334
TELEPHONE NUMBER:	(801) 524-2729
REVIEWERS:	Alicia Boltz, NSR Permit Engineer Nathan Hensel, Air Quality Modeler

1.0 PURPOSE OF APPLICATION

Sinclair Wyoming Refining Company submitted an application to modify operations at the Sinclair Refinery by replacing the existing Fluid Catalytic Cracking Unit (FCCU) feed heater (780 FCC Heater H2) with a new heater (HET040). The Sinclair Refinery is located at 100 East Lincoln Highway, in Sinclair, Carbon County, Wyoming.

2.0 PROJECT DESCRIPTION

2.1 New Equipment

2.1.1 FCCU Feed Heater 6HT-104

The existing FCCU Feed Heater will be replaced with a 102.7 MMBtu/hr FCCU Feed Heater 6HT-104 (HET040) equipped with Ultra Low-NO_x Burners (ULNB).

2.1.2 Fugitive Components

There will be additions of piping components (FUG014) associated with the new heater described in this permitting action.

2.2 Modified / Non-Modified Equipment

There are no modified or non-modified equipment associated with this permitting action.

2.2.1 FCCU

The FCCU will not be modified by the installation and operation of the new FCCU Feed Heater 6HT-104. The FCCU gasoil charge rate capacity is currently limited by charge pump capacity and air blower capacity. Even though the new FCCU Feed Heater 6HT-104 will have increased firing rate, there will be no change to the gasoil processing capacity or intermediate stream production capacity from the FCCU. There may be reductions in actual emissions from the FCCU regeneration process vent as a result of operating the new FCCU Feed Heater 6HT-104.

2.2.2 Upstream and Downstream Process Units

There will be no physical changes to any of the process units upstream or downstream of the FCCU in conjunction with this project. Because there will be no change to the gasoil processing capacity or intermediate stream production capacity from the FCCU, there will be no operational changes to any of the process units upstream or downstream of the FCCU in conjunction with this project.

2.3 Unaffected Equipment

The following units will have no increase in actual or potential emissions resulting from the installation and operation of the equipment included in this permitting action. These units are listed below:

- 581 Crude Unit / 583 Vacuum Unit
- 582 Crude Unit / 582 Vacuum Unit
- Light Ends Fractionator
- 781 Reformer
- #1 and #2 Hydrogen Plants
- #1 Hydro-desulfurization Unit
- #2 Hydro-desulfurization Unit
- #3 Hydro-desulfurization Unit
- #4 Hydro-desulfurization Unit
- Fluid Catalytic Cracking Unit
- Hydrocracking / Renewable Diesel Unit
- Gas Recovery Unit
- Saturate Gas Recovery Unit
- Alkylation Unit
- Catalytic Polymerization Unit
- Delayed Coking Unit
- Sulfur Recovery Plants
- Asphalt Plant
- Cooling Towers
- Flares / Flare Gas Recovery System
- Boilerhouse
- Crude / Product / Intermediate / Utility Storage Tanks
- Loading Racks

- Oily Water System
- Units with internal combustion engines
    - Generators
    - Compressors
    - Pumps

3.0 ESTIMATED EMISSIONS

Estimated emissions from the proposed modification are shown in Table 3-1. The only new sources associated with this project are HET040 and fugitive emissions (FUG014).

Table 3-1: Sinclair Refinery Non-GHG Emissions, tpy

IMPACT AQD ID	Emission Unit	SO_2	NO_x	$PM/PM_{10}/PM_{2.5}$	CO	VOC
HET040	102.7 MMBtu/hr Feed Heater 6HT-104	3.9	13.5	3.4	15.7	2.4
FUG014	Fugitive Leaks	--	--	--	--	0.2
Project Total		**3.9**	**13.5**	**3.4**	**15.7**	**2.6**

SO_2 = sulfur dioxide
NO_x = nitrogen oxides
PM = particulate matter
PM_{10} = particulate matter 10 microns in size or less
$PM_{2.5}$ = particulate matter 2.5 microns in size or less
CO = carbon monoxide
VOC = volatile organic compounds

Table 3-2: Sinclair Refinery GHG Emissions, tpy

IMPACT AQD ID	Sinclair ID	CH_4	N_2O	CO_2	CO_2e
HET040	102.7 MMBtu/hr Feed Heater 6HT-104	3.0	0.6	58,509.5	58,761.2
FUG014	Fugitive Leaks	0.2	--	--	6.2
Total		**3.2**	**0.6**	**58,509.5**	**58,767.4**

GHG = greenhouse gases
CH_4 = methane (x25 global warming potential)
N_2O = nitrous oxide (x298 global warming potential)
CO_2 = carbon dioxide (x1 global warming potential)
CO_2e = carbon dioxide equivalent (CH_4*25+N_2O*298+CO_2*1)

4.0 CHAPTER 6, SECTION 4 – PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

The Sinclair Refinery is a major stationary source under Chapter 6, Section 4 of the Wyoming Air Quality Standards and Regulations (WAQSR), as the facility is a named source (petroleum refinery) which emits or has the potential to emit one hundred tons per year or more of a regulated NSR pollutant. The proposed permitting action is not subject to Prevention of Significant Deterioration (PSD) review under Chapter 6, Section 4 of the WAQSR as a physical change in or change in the method of operation at the facility does not result in a significant emission increase of an NSR regulated pollutant and a significant net emissions increase of that pollutant. SWRC provided project potential emissions for the new/modified emission units as well as the affected but non-modified emission units and past actual emissions for the modified emission units and the affected but non-modified emission units in the permit application. The applicability for the Sinclair Refinery is shown in Table 4-2.

Table 4-1: PSD Emissions Increase Tabulation						
IMPACT AQD ID	Emission Unit	SO_2	NO_x	$PM/PM_{10}/PM_{2.5}$	CO	VOC
Emissions Increases						
HET040	102.7 MMBtu/hr Feed Heater 6HT-104	3.9	13.5	3.4	15.7	2.4
FUG014	Fugitive Leaks	--	--	--	--	0.2
Total New Sources		**3.9**	**13.5**	**3.4**	**15.7**	**2.6**
Past Actual Emissions						
HET040	780 FCC Heater H2	2.0	19.5	0.6	7.0	0.5
Summary						
Emissions Increase		**1.9**	**-6.0**	**2.7**	**8.7**	**2.2**

Table 4-2: PSD Applicability			
NSR Pollutant	Project Emissions	PSD Significant Emission Rates	**PSD Review Required**
SO_2	1.9	40	No
NO_x	-6.0	40	No
$PM/PM_{10}/PM_{2.5}$	2.7	25/15/10	No
CO	8.7	100	No
VOC	2.2	40	No
CO_2e [1]	47,667	75,000	No

[1] A project cannot trigger PSD by itself based solely on its greenhouse gas emissions (CO_2e).

Based on the net emissions change (as shown in Table 4-2), the proposed modification at the Sinclair Refinery is not subject to PSD requirements as the net emissions change for each NSR regulated pollutant is less than the significant emission rate as defined in Chapter 6, Section 4 of the WAQSR.

5.0 CHAPTER 6, SECTION 3 – MAJOR SOURCE APPLICABILITY (TITLE V)

The Sinclair Refinery is a "major source" as defined by Chapter 6, Section 3 of the WAQSR. Sinclair Wyoming Refining Company will be required to modify their operating permit in accordance with Chapter 6, Section 3 WAQSR.

6.0 CHAPTER 6, SECTION 2 – BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

Per the requirements of Chapter 6, Section 2 of the WAQSR, all facilities must demonstrate the use of BACT for new or modified equipment.

6.1 $PM/PM_{10}/PM_{2.5}$ Emissions

6.1.1 Process Heater

The use of only gaseous fuels and good combustion practices has been identified as BACT for $PM/PM_{10}/PM_{2.5}$ for the FCCU Feed Heater 6HT-104 (HET040). This source fires refinery fuel gas and/or purchased natural gas to generate thermal energy necessary to indirectly heat process fluids and are inherently designed for complete combustion; this is accomplished by ensuring high combustion zone temperatures, sufficiently long residence times in the combustion zones and operating with excess oxygen. Accordingly, SWRC proposes BACT for $PM/PM_{10}/PM_{2.5}$ emissions from refinery fuel gas/ purchased natural gas fired combustion sources is no additional control. SWRC proposes that use of good combustion practices be accepted as BACT for $PM/PM_{10}/PM_{2.5}$ emissions from this source.

The Division considers good combustion practices as representative of BACT for $PM/PM_{10}/PM_{2.5}$ emissions for the FCCU Feed Heater 6HT-104 (HET040).

6.2 CO Emissions

6.2.1 Process Heater

The use of only gaseous fuels and good combustion practices has been identified as BACT for CO for the FCCU Feed Heater 6HT-104 (HET040). This source fires refinery fuel gas and/or purchased natural gas to generate thermal energy necessary to indirectly heat process fluids and are inherently designed for complete combustion; this is accomplished by ensuring high combustion zone temperatures, sufficiently long residence times in the combustion zones and operating with excess oxygen. These are also the same combustion conditions necessary to minimize the formation of CO. Accordingly, SWRC proposes BACT for CO emissions from refinery fuel gas/ purchased natural gas fired combustion sources is no additional control. SWRC proposes that use of good combustion practices be accepted as BACT for CO emissions from this source.

The Division considers good combustion practices as representative of BACT for CO emissions for the FCCU Feed Heater 6HT-104 (HET040).

6.3 VOC/CH_4 Emissions

6.3.1 Process Heater

The use of only gaseous fuels and good combustion practices has been identified as BACT for VOC/CH_4 for the FCCU Feed Heater 6HT-104 (HET040). This source fires refinery fuel gas and/or purchased natural gas to generate thermal energy necessary to indirectly heat process fluids and are inherently designed for complete combustion; this is accomplished by ensuring high combustion zone temperatures, sufficiently long residence times in the combustion zones and operating with excess oxygen. These are also the same combustion conditions necessary to maximize the destruction of VOC/CH_4. Accordingly, SWRC proposes that use of good combustion practices be accepted as BACT for VOC/CH_4 emissions from this source.

The Division considers good combustion practices as representative of BACT for VOC/CH_4 emissions for the FCCU Feed Heater 6HT-104 (HET040).

6.3.2 Fugitive Emission Sources

SWRC has proposed the use of its current Leak Detection and Repair (LDAR) program, as required by the NSPS and MACT rules, to control VOC and CH_4 emissions from fugitive sources. The Division considers using the current LDAR program to control VOC and CH_4 emissions as representative of BACT.

6.4 GHGe Emissions

6.4.1 Process Heater

The FCCU Feed Heater 6HT-104 (HET040) will fire refinery fuel gas and/or purchased natural gas and is inherently designed for complete combustion; this is accomplished by ensuring high combustion zone temperatures, sufficiently long residence times in the combustion zones and operating with excess oxygen. These are also the same combustion conditions necessary to minimize the formation of CH_4 and N_2O.

As previously documented in Prevention of Significant Deterioration Final Permit #PSD-WY-000002-1-11.001, the use of lower carbon content gaseous fuels with good combustion and maintenance practices and energy efficient design has been accepted as BACT for GHGe emissions. Accordingly, SWRC proposes the use of these same fuels and design/combustion practices to be accepted as BACT for GHGe emissions from this source.

The Division considers use of lower carbon content gaseous fuels with good combustion and maintenance practices and energy efficient design as representative of BACT for GHGe emissions for the FCCU Feed Heater 6HT-104 (HET040).

6.5 NO_x Emissions

6.5.1 Process Heater

The FCCU Feed Heater 6HT-104 (HET040) will be equipped with Ultra Low-NO_x burners meeting an emission limit of 0.030 lb/MMBtu. SWRC proposes operation of this heater with Ultra Low-NO_x burners be accepted as BACT for NO_x emissions from this source. It is important to note that because there is no increase in NO_x emissions associated with this permitting action, a BACT analysis for NO_x is not required. However, SWRC has included a BACT analysis for the new heater to reinforce its goal of installing the best performing low NO_x burners available on new and modified process heaters.

6.6 SO_2/H_2S Emissions

6.6.1 Process Heater

The FCCU Feed Heater 6HT-104 (HET040) will fire refinery fuel gas and/or purchased natural gas meeting the fuel gas provision of NSPS Ja. SWRC proposes that the fuel gas H_2S concentration limits of NSPS Ja be accepted as BACT for SO_2/H_2S emissions from this source.

The Division considers use of fuel gas H_2S concentration limits of NSPS Ja as representative of BACT for SO_2/H_2S emissions for the FCCU Feed Heater 6HT-104 (HET040).

7.0 NEW SOURCE PERFORMANCE STANDARDS (NSPS)

The FCCU Feed Heater 6HT-104 (HET040) associated with this project will be subject to 40 CFR part 60, subpart Ja – *Standards of Performance for Petroleum Refineries for which Construction, Reconstruction, or Modification Commenced After May 14, 2007*. Subpart Ja limits fuel gas H_2S concentration to an annual average of 0.037 gr/dscf (60 ppm) and a three (3) hour average of 0.1 gr/dscf (162 ppm) at the refinery.

All new piping components associated with new equipment will be subject to the requirements of 40 CFR part 60, subpart GGGa – *Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for which Construction, Reconstruction, or Modification commenced after November 7, 2006*. This subpart establishes standards for equipment leaks at petroleum refineries for which construction, reconstruction, or modification commenced after November 7, 2006.

8.0 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPs)

Fugitive equipment leaks are subject to the requirements of 40 CFR part 63, subpart CC – *National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries*.

The Sinclair Refinery is subject to Subpart DDDDD of 40 CFR part 63. This permitting action does not change the applicability of this subpart.

9.0 LAND USE PLANNING AND GREATER SAGE GROUSE PROTECTION

9.1 Land Use Planning

In accordance with Chapter 6, Section 2(c) of the Wyoming Air Quality Standards and Regulations, the New Source Review program reviews permit applications to determine if the applicant has demonstrated, to the satisfaction of the Division of Air Quality, that the proposed facility will be located in accordance with proper land use planning as determined by the appropriate state or local agency charged with such responsibility. Sinclair Wyoming Refining Company is located in accordance with zoning as defined by the town of Sinclair.

9.2 Greater Sage-Grouse Core Area Protection

The Governor's Executive Order (EO) 2019-3 directs state agencies to consider the impact of proposed and modified facility sites on the Greater Sage-Grouse's habitat. Based upon review by the Division this facility is located outside of any sage grouse core areas and is greater than two (2) miles from a known occupied lek.

10.0 PROJECTED IMPACT ON AMBIENT AIR QUALITY

SWRC completed modeling to show that the installation of this FCCU heater (HET040) would have insignificant effect on ambient air quality. The results of this modeling as compared to the significant impact levels (SILs) is shown in Table 10-1.

Table 10-1: Maximum Modeled Values Compared to the SILs

Pollutant	Averaging Time	Model Impact ($\mu g/m^3$)	SIL ($\mu g/m^3$)
NO_x	Annual	0.05	1.0
PM_{10}	24-Hour	0.23	5.0
	Annual	0.01	1.0
$PM_{2.5}$	24-Hour	0.23	1.2
	Annual	0.01	0.3
CO	1-hour	4.38	2,000
	8-Hour	2.19	500
SO_2	1-Hour	1.09	7.8
	3-Hour [1]	0.67	25.0
	24-Hour [1]	0.26	5.0
	Annual	0.02	1.0

Based upon these values, the Division has determined that the installation of HET040 will not cause or contribute to the exceedance of any applicable ambient standards.

11.0 PROPOSED PERMIT CONDITIONS

The Division proposes to issue an air quality permit to Sinclair Wyoming Refining Company for the modification of the Sinclair Refinery with the following permit conditions:

1. That authorized representatives of the Division of Air Quality be given permission to enter and inspect any property, premise or place on or at which an air pollution source is located or is being constructed or installed for the purpose of investigating actual or potential sources of air pollution and for determining compliance or non-compliance with any rules, standards, permits or orders.

2. That all substantive commitments and descriptions set forth in the application for this permit, unless superseded by a specific condition of this permit, are incorporated herein by this reference and are enforceable as conditions of this permit.

3. That Sinclair Wyoming Refining Company shall file a complete application to modify their Operating Permit within twelve (12) months of commencing operation, in accordance with Chapter 6, Section 3(c)(i)(B) of the WAQSR. Where an existing operating permit would prohibit such construction or change in operation, the owner or operator must obtain a permit revision before commencing operation.

4. That all notifications, reports and correspondence required by this permit shall be submitted to the Stationary Source Compliance Program Manager. Submissions may be done electronically through https://airimpact.wyo.gov to satisfy requirements of this permit.

5. That written notification of the actual date of initial start-up for each source is required fifteen (15) days after start-up in accordance with Chapter 6, Section 2(i)(ii) of the WAQSR.

6. That the date of commencement of construction shall be reported to the Administrator within thirty (30) days of commencement. In accordance with Chapter 6, Section 2(h) of the WAQSR, approval to construct or modify shall become invalid if construction is not commenced within twenty-four (24) months after receipt of such approval or if construction is discontinued for a period of twenty-four (24) months or more. The Administrator may extend the period based on satisfactory justification of the requested extension.

7. That performance tests be conducted, in accordance with Chapter 6, Section 2(j) of the WAQSR, within thirty (30) days of achieving a maximum design rate but not later than ninety (90) days following initial startup, and a written report of the results be submitted. The operator shall provide fifteen (15) days prior notice of the test date. If a maximum design rate is not achieved within ninety (90) days of startup, the Administrator may require testing be done at the rate achieved and again when a maximum rate is achieved.

8. Initial performance testing, as required by Condition 7 of this permit, shall be conducted on the following sources:

   i. FCCU Feed Heater 6HT-104 (HET040):

      NO_x and CO Emissions: Performance testing shall consist of three (3) 1-hour tests following EPA Reference Methods 1-4, 7E, and 10.

   A test protocol shall be submitted for review and approval prior to testing. Results shall be submitted to this Division within forty-five (45) days of completion.

9. That the FCCU Feed Heater 6HT-104 (HET040) shall be limited to the emissions in the table below:

IMPACT AQD ID	Source	NO_x			CO		
		lb/MMBtu	lb/hr	tpy	lb/MMBtu	lb/hr	tpy
HET040	FCCU Feed Heater 6HT-104	0.030	3.1	13.5	0.035	3.6	15.7

10. That every twelve (12) calendar months, or as otherwise specified by the Administrator, the FCCU Feed Heater 6HT-104 (HET040) shall be tested to verify compliance with the NO_x and CO limits set forth in this permit. Periodic tests are required within twelve (12) calendar months after completion of the initial performance test or the last periodic test. Testing shall be conducted in accordance with EPA Reference Methods 1-4, 7E, and 10. A test protocol shall be submitted for review and approval prior to testing. Notification of the test date shall be provided to the Division fifteen (15) days prior to testing. Results shall be submitted to the Division within forty-five (45) days of completing the tests.

11. Sinclair Wyoming Refining Company shall comply with the applicable requirements of 40 CFR part 60, subpart Ja.

12. Sinclair Wyoming Refining Company shall comply with the applicable requirements of 40 CFR part 60, subpart GGGa.

13. Sinclair Wyoming Refining Company shall comply with the applicable requirements of 40 CFR part 63, subpart CC.

14. Sinclair Wyoming Refining Company shall comply with the applicable requirements of 40 CFR part 63, subpart DDDDD.

15. All conditions from previously issued permits and waivers for the Sinclair Refinery shall remain in effect unless superseded by a specific condition of this permit.