Reviewer NCM
cc:
Modeler
D.E.
File A0001383
IMP FID F000531

Sinclair Casper Refining Company

July 15, 2015

7015 0640 0007 5519 7560

Mr. Cole Anderson, NSR Program Manager
Air Quality Division
Wyoming Department of Environmental Quality
Herschler Building
122 West 25th Street
Cheyenne, Wyoming 82002

RECEIVED
JUL 20 2015
AIR QUALITY DIVISION

Re: Sinclair Casper Refining Company (SCRC)
Construction Permit Application for Boiler #2 and a 230 kW emergency generator

Dear Mr. Anderson:

Permit MD-15042 was issued on February 11, 2014 to install Boiler #1, a 99.2 MMBtu/hr fuel gas fired boiler. Upon startup of Boiler #1, Boiler #4 will be permanently taken out of service and Boiler #5 will be placed on hot standby. SCRC plans to start Boiler #1 next summer.

With this correspondence, SCRC is submitting an application to install Boiler #2, a second 99.2 MMBtu/hr fuel gas fired boiler. Upon startup of Boiler #2, Boiler #5 will be permanently taken out of service and Boiler #6 will be placed on hot standby. This boiler will circulate hot water/steam to keep it warm but will only be fired in the event one of the other boilers is out of service.

Boiler #2 will use an electric motor driver on the combustion air and flue gas recycle fan so that we will have one boiler that can start up in the event of a complete refinery shutdown including the other boilers. This is referred to as a "cold start" boiler. This project will also include a 230 kW natural gas fired emergency generator to power the combustion air fan and flue gas recycle fan in the event of a power outage. The emergency generator will be sized to power the boiler area control room pressurization system and HVAC system, the UPS power system for the DCS control racks in the boiler area, and air movement fans in the weather protection buildings for #1 and #2 boilers.

This project combined with our new crude unit project will completely eliminate fuel oil combustion at Casper Refinery. SCRC currently has one crude heater (B-1 #4) and two boilers (#4 and #5) that are capable of burning fuel oil in addition to fuel gas. SCRC notified DEQ that we will no longer burn fuel oil in B-3 #4 crude heater in an October 16, 2014 letter. B-1 #4 and B-3 #4 crude heaters will both be permanently removed from service upon startup of our new crude unit (Permit P0014446). As discussed above, Boiler #4 will be permanently removed from service upon startup of Boiler #1 and Boiler #5 will be permanently removed from service upon startup of Boiler #2.

5700 East Hwy 20/26, Casper, WY 82601 // P.O. Box 510 Evansville, WY 82636
307-265-2800

Emissions from the refinery will decrease with the new boiler. The new boiler will be more efficient than the old boilers and will use less fuel gas. A low NOx burner and flue gas recirculation will result in lower NOx emissions. Elimination of fuel oil combustion will result in lower SO2 and particulate emissions. This project will not affect emissions from any other process unit as steam is not a bottleneck.

SCRC has tentative plans to install one more boiler over the next few years to replace the remaining boilers (#6 and #7). Ancillary equipment such as the steam header will be sized to accommodate the additional boiler. The end goal is to replace all four of our old boilers with fuel efficient, lower emitting boilers with enough steam capacity to provide for day to day operations and backup capacity in the event one boiler is down. An application for the remaining boiler will be submitted if plans are finalized.

The generator engine will be subject to the requirements of 40 CFR 60 Subpart JJJJ. This subpart limits operation for the purpose of maintenance checks and readiness testing to 100 hours per year. This engine will be run for approximately 1 hour per week for these purposes. There is no limit on operating hours for emergency situations. The emergency generator will be equipped with a catalytic muffler in order to meet the Subpart JJJJ emission limits. The emission limits are compared to the certified emissions from the Olympian G230LG6 generator in the following table. The Olympian certification sheet is attached.

	NOx (g/hp-hr)	CO (g/hp-hr)	VOC (g/hp-hr)
Subpart JJJJ limits[1]	2.0	4.0	1.0
Olympian G230LG6	0.02	0.23	0.04

[1] Emission limits for emergency generators ≥ 130 hp from Subpart JJJJ Table 1.

Emissions were calculated using Olympian and AP-42 Chapter 3.3 emission factors, a maximum non-emergency operating schedule of 100 hours per year, a full power fuel consumption rating of 2775 scf/hr, and a maximum rating of 374 horsepower. Complete emission calculations including HAPs and Greenhouse Gasses are attached.

Sinclair will be available to discuss this permit application and project with the Division. Please contact Mr. Steve Pate, Environmental, Health and Safety Manager, at (307) 232-2439 or Stewart Griner, Environmental Engineer, at (307) 232-2476 with any questions or comments regarding this transmittal.

Sincerely,

Jim Ruble
Refinery Manager
Sinclair Casper Refining Company

attachment

cc: file

electronic copies:
Chris Hanify
Sam Greene
Joe Maffuccio

SINCLAIR CASPER REFINING COMPANY

CONSTRUCTION PERMIT APPLICATION

BOILER #2 AND EMERGENCY GENERATOR PROJECT

TABLE OF CONTENTS

1.0 Introduction

SCRC plans to install Boiler #2, a 99.2 MMBtu/hr fuel gas fired boiler, and a 230 kW natural gas fired emergency generator.

This construction permit application is intended to satisfy all construction permit requirements as listed in the Wyoming Air Quality Standards and Regulations (WAQS&R). The refinery is currently operating under the parameters as set forth in Operating Permit # 30-151-1.

In addition, on June 30, 2008 SCRC entered into a Consent Decree (CD) with the state of Wyoming and the United States Environmental Protection Agency (Civil Action No. 08CV 020-D). SCRC believes this permit application does not conflict with any of the consent decree provisions as listed in the CD.

This application has been divided into the following sections:

Section 2: Contains the permit application forms required by WDEQ/AQD.

Section 3: Provides a project overview and process description.

Section 4: Presents the proposed permit limitations associated with the project.

Section 5: Addresses permit requirements as listed in WAQS&R Chapter 6: Permitting Requirements.

Section 6: Addresses construction permit requirements for new sources as listed in WAQS&R Chapter 5, Section 2, New Source Performance Standards.

Section 7: Addresses National Emissions Standards for Hazardous Air Pollutants as listed in 40 CFR Part 61.

Section 8: Addresses National Emissions Standards for Hazardous Air Pollutants for Affected Facilities listed in WAQS&R Chapter 5, Section 3 and 40 CFR Part 63.

Section 9: Addresses Compliance Assurance Monitoring provisions as listed in 40 CFR Part 64.

Section 10: Addresses Chemical Accident Prevention provisions as listed in 40 CFR Part 68.

Section 11: Addresses Protection of Stratospheric Ozone provisions as listed in 40 CFR Part 82.

Appendices: Technical support information is provided in the following appendices.

Appendix A: Potential Emissions
Appendix B: SO_2 Emissions Calculations
Appendix C: NOx Emissions Calculations
Appendix D: PM Emissions Calculations
Appendix E: CO Emissions Calculations
Appendix F: VOC Emissions Calculations
Appendix G: Greenhouse Gas Calculations
Appendix H: HAP Emissions Calculations
Appendix I: Fugitive Emission Calculations
Appendix J: Emergency Generator Emission Calculations
Appendix K: Emergency Generator Green House Gas Calculations
Appendix L: Natrona County NOx and VOC Emissions from WRAP Database
Appendix M: BACT Analysis for NOx Emissions from Boiler #2

2.0 Permit Application Forms

Revised 5/12/2015

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY

Air Quality Division

New Source Review Permit Application Form Cover Sheet

Is this a revision to an existing application?

Yes _____ No X

Previous Application #: _____

Date of Application: 7/15/2015

COMPANY INFORMATION:

Company Name: Sinclair Casper Refining Company
Address: PO Box 510
City: Evansville State: Wyoming Zip Code: 82636
Country: USA Phone Number: 307-265-2800

FACILITY INFORMATION:

Facility Name: Sinclair Casper Refinery
New Facility or Existing Facility: Existing
Facility Description:
Facility Class: Title V Operating Status: Operating
Facility Type: Petroleum Refinery

For Oil & Gas Production Sites ONLY:
First Date of Production (FDOP)/Date of Modification:
Single well or multiple well facility?
Does production at this facility contain H2S?*
If yes, contact the Division.
API Number(s):

NAICS Code: 324110 Petroleum Refineries

FACILITY LOCATION:

Enter the facility location in either the latitude/longitude area or section/township/range area. Both are not required.

Physical Address: 5700 East Highway 20-26
City: Casper Zip Code: 82609
State: WY County: Natrona

OR

Latitude: Longitude: County:
Quarter Quarter: Quarter:
Section: Township: Range:

For longitude and latitude, use NAD 83/WGS84 datum and 5 digits after the decimal (i.e. 41.12345, -107.56789)

CONTACT INFORMATION:

Note that an Environmental AND NSR Permitting Contact is required for your application to be deemed complete by the agency.

Title: Mr. First Name: Steve
Last Name: Pate
Company Name: Sinclair Casper Refining Company
Job Title: Environmental Health and Safety Manager
Address: PO Box 510
City: Evansville State: Wyoming
Zip Code: 82636
Primary Phone No.: 307-265-2800 E-mail: spate@sinclairoil.com
Mobile Phone No.: 307-232-2439 Fax No.: 307-232-2461
Contact Type: Environmental contact Start Date: 7/8/1982

Name of the contact to whom the permit will be issued: Jim Ruble, Refinery Manager

Additional Contact Type (if needed):

Title: Mr. First Name: Stewart

Last Name: Griner

Company Name: Sinclair Casper Refining Company

Job Title: Environmental Engineer

Address: PO Box 510

City: Evansville State: Wyoming

Zip Code:

Primary Phone No.: 307-265-2800 E-mail: sgriner@sinclairoil.com

Mobile Phone No.: 307-232-2476 Fax No.: 307-232-2461

Contact Type: NSR Permitting contact Start Date: 10/29/2007

FACILITY APPLICATION INFORMATION:

General Info:

Has the facility changed location or is it a new/ greenfield facility?	No
Has a Land Use Planning document been included in this application?	No
Is the facility located in a sage grouse core area?*	No
If the facility is in a sage grouse core area, what is the WER number?	

** For questions about sage grouse core area, contact WY Game & Fish Department.*

Federal Rules Applicability - Facility Level:

Prevention of Significant Deterioration (PSD):	Yes
Non-Attainment New Source Review:	No

Modeling Section:

Has the Air Quality Division been contacted to determine if modeling is required?	Yes
Is a modeling analysis part of this application?	No
Is the proposed project subject to Prevention of Significant Deterioration (PSD) requirements?	No
Has the Air Quality Division been notified to schedule a pre-application meeting?	Yes
Has a modeling protocol been submitted to and approved by the Air Quality Division?	No
Has the Air Quality Division received a Q/D analysis to submit to the respective FLMs to determine the need for an AQRV analysis?	No

Required Attachments:

Facility Map	☑	
Process Flow Diagram	☑	
Modeling Analysis (if applicable)	☐	N/A
Land Use Planning Document	☐	N/A
Detailed Project Description	☑	
Emissions Calculations	☑	

I, Jim Ruble (Responsible Official (Printed Name)) Refinery Manager (Title)

an Official Representative of the Company, state that I have knowledge of the facts herein set forth and that the same are true and correct to the best of my knowledge and belief. I further certify that the operational information provided and emission rates listed on this application reflect the anticipated emissions due to the operation of this facility. The facility will operate in compliance with all applicable Wyoming Air Quality Standards and Regulations.

Signature: (ink) Date: 7/15/15

Specific Emission Unit Attributes:

Fugitives

Company Equipment ID: BL-4500
Company Equipment Description: #2 Boiler

Operating Status: Not Yet Installed
Initial Construction Commencement Date:
Initial Operation Commencement Date:
Most Recent Construction/ Modification Commencement Date: November 2015

Most Recent Operation Commencement Date: June 2017

Select reason(s) for this emissions unit being included in this application (must be completed regardless of date of installation or modification):

Reason: Modification

If reason is ***Reconstruction*** or ***Temporary Permit*** or ***Other,*** please explain below:

Type of Fugitive Emission: Other

SCC Codes: List all Source Classification Code(s) (SCC) that describe the process(es) performed by the emission source (e.g., 1-02-002-04).

30688801

Potential Operating Schedule: Provide the operating schedule for this emission unit.

Hours/day: 24
Hours/year: 8760

Control Equipment: No

If yes, please fill out and attach the appropriate Control Device and Release Point Information worksheets.

Best Available Control Technology (BACT): Was a BACT Analysis completed for this emission unit?

☑ Yes ☐ No

Pollutant: VOC

Proposed BACT: Compliance with 40 CFR 60 Subpart GGGa

*If yes, attach BACT Analysis with this application.

Lowest Achievable Emission Rate (LAER): Was a LAER Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant:

Proposed LAER:

*If yes, attach LAER Analysis with this application.

Federal and State Rule Applicability:

New Source Performance Standards (NSPS): Subject to subpart

New Source Performance Standard are listed under 40 CFR 60-Standards of Performance for New Stationary Sources.

NSPS Subpart: *40 CFR 60 Subpart GGGa*

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 61): Not Affected

National Emissions Standards for Hazardous Air Pollutants (NESHAP Part 61) are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Part 61 NESHAP Subpart:

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63): Not Affected

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63) standards are listed under 40 CFR 63

Part 63 NESHAP Subpart:

Prevention of Significant Deterioration (PSD): Not Affected

These rules are found under WAQSR Chapter 6, Section 4.

Non-Attainment New Source Review: Not Affected

These rules are found under WAQSR Chapter 6, Section 13.

Specific Emission Unit Attributes:

Boiler

Company Equipment ID: BL-4500
Company Equipment Description: #2 Boiler

Operating Status: Not Yet Installed
Initial Construction Commencement Date:
Initial Operation Commencement Date:
Most Recent Construction/ Modification Commencement Date: November 2015

Most Recent Operation Commencement Date: June 2017

Select reason(s) for this emissions unit being included in this application (must be completed regardless of date of installation or modification):

Reason: Modification

If reason is ***Reconstruction*** or ***Temporary Permit*** or ***Other,*** please explain below:

Heat Input Rating (MMBtu/hr):
Primary Fuel Type: Refinery Fuel Gas
Secondary Fuel Type: Pipeline Grade Natural Gas
Model Name and Number: Rentech 100% Membrane Wall D-Style
Serial Number Tracking Table:
Manufacturer Name: Rentech
Serial Number: TBD
Effective Date:
Boiler Type: Package Boiler
Type of Service: Industrial
Btu Content: 1200 Btu/scf, HHV (Nominal)
Units: BTU/scf
Fuel Sulfur Content: 162 (3 hr avg); 60 ppm (365 day avg) as H2S
Units: ppm
Fuel Ash Content (%): Negligible

SCC Codes: List all Source Classification Code(s) (SCC) that describe the process(es) performed by the emission source (e.g., 1-02-002-04).

10200701

Potential Operating Schedule: Provide the operating schedule for this emission unit.

Hours/day: 24
Hours/year: 8760

Control Equipment: No

If yes, please fill out and attach the appropriate Control Device and Release Point Information worksheets.

Best Available Control Technology (BACT): Was a BACT Analysis completed for this emission unit?

☑ Yes ☐ No

Pollutant: NOx

Proposed BACT: Low NOx Burners/Flue Gas Recirculation designed to meet 0.035 lb NOx/MMBtu (HHV)

*If yes, attach BACT Analysis with this application.

Lowest Achievable Emission Rate (LAER): Was a LAER Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant:

Proposed LAER:

*If yes, attach LAER Analysis with this application.

Federal and State Rule Applicability:

New Source Performance Standards (NSPS): Subject to subpart

New Source Performance Standard are listed under 40 CFR 60- Standards of Performance for New Stationary Sources.

NSPS Subpart: *40 CFR 60 Subparts Dc (Initial notification only), Ja, and GGGa.*

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 61): Not Affected

National Emissions Standards for Hazardous Air Pollutants (NESHAP Part 61) are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Part 61 NESHAP Subpart:

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63): Subject to subpart

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63) standards are listed under 40 CFR 63

Part 63 NESHAP Subpart: 40 CFR 63 Subpart DDDDD

Prevention of Significant Deterioration (PSD): Not Affected

These rules are found under WAQSR Chapter 6, Section 4.

Non-Attainment New Source Review: Not Affected

These rules are found under WAQSR Chapter 6, Section 13.

Specific Emission Unit Attributes:

Engine

Company Equipment ID: E-9
Company Equipment Description: Boiler House Emergency Generator

Operating Status: Not Yet Installed
Initial Construction Commencement Date:
Initial Operation Commencement Date:
Most Recent Construction/ Modification Commencement Date: November 2015

Most Recent Operation Commencement Date: June 2017

Select reason(s) for this emissions unit being included in this application (must be completed regardless of date of installation or modification):

Reason: Modification

If reason is ***Reconstruction*** or ***Temporary Permit*** or ***Other,*** please explain below:

Name Plate Rating: 374 Units: hp
Site Rating: 374 Units: hp
Primary Fuel Type: Pipeline Grade Natural Gas
Secondary Fuel Type:
Model Name and Number: Olympian G230LG6
Engine Type: 4 Stroke Rich Burn
Serial Number Tracking Table:
Serial Number: TBD Order Date: TBD
Manufacturer Name: Olympian
Construction/Installation Commencement Date: November 2015 (estimated)
Operation Commencement/ Start-up Date: September 2016 (estimated)
Manufacture Date:
Btu Content: 1020 Btu/scf, HHV (AP-42) Units: BTU/scf
Fuel Sulfur Content: 0.0004% (typical) Units: %
Type of Service: Emergency
Is diesel engine EPA Tier Certified? * If yes, list EPA Tier Rating

SCC Codes: List all Source Classification Code(s) (SCC) that describe the process(es) performed by the emission source (e.g., 1-02-002-04).

20200202

Potential Operating Schedule: Provide the operating schedule for this emission unit.

Hours/day: 24
Hours/year: 100

Control Equipment: No

If yes, please fill out and attach the appropriate Control Device and Release Point Information worksheets.

Best Available Control Technology (BACT): Was a BACT Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed BACT: _____

*If yes, attach BACT Analysis with this application.

Lowest Achievable Emission Rate (LAER): Was a LAER Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed LAER: _____

*If yes, attach LAER Analysis with this application.

Federal and State Rule Applicability:

New Source Performance Standards (NSPS): Subject to subpart

New Source Performance Standard are listed under 40 CFR 60- Standards of Performance for New Stationary Sources.

NSPS Subpart: *40 CFR 60 Subpart JJJJ*

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 61): Not Affected

National Emissions Standards for Hazardous Air Pollutants (NESHAP Part 61) are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Part 61 NESHAP Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63): Subject, but exempt

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63) standards are listed under 40 CFR 63

Part 63 NESHAP Subpart: 40 CFR 63 Subpart ZZZZ

Prevention of Significant Deterioration (PSD): Not Affected

These rules are found under WAQSR Chapter 6, Section 4.

Non-Attainment New Source Review: Not Affected

These rules are found under WAQSR Chapter 6, Section 13.

Pollutant Emissions Form
(submit one for each emission unit)

Emissions Information- The following tables request information needed to determine the applicable requirements and the compliance status of this emission unit with those requirements.

			Efficiency Standards				
		Pre-Controlled Potential Emissions (tons/yr)	Potential to Emit (PTE)	Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
Criteria Pollutants:							
1.)	Particulate emissions (PE/PM) (formerly particulate matter, PM)	3.2	N/A		0.74	3.2	AP-42
1a.)	Particulate emissions (PE/PM) (formerly particulate matter, PM)	0.0013	N/A		0.026	0.0013	AP-42
2.)	PM #10 microns in diameter (PE/PM10)	3.2	N/A		0.74	3.2	AP-42
2a.)	PM #10 microns in diameter (PE/PM10)	0.0013	N/A		0.026	0.0013	AP-42
3.)	PM #2.5 microns in diameter (PE/PM2.5)	3.2	N/A		0.74	3.2	AP-42
3a.)	PM #2.5 microns in diameter (PE/PM2.5)	0.0013	N/A		0.026	0.0013	AP-42
4.)	Sulfur dioxide (SO2)	3.6	0.037	gr/dscf	0.8	3.6	Other
4a.)	Sulfur dioxide (SO2)	0.00008	N/A		0.0016	0.00008	AP-42
5.)	Nitrogen Oxides (NOx)	15.2	0.035	lb/MMBtu	3.47	15.2	Manufacturer Data
5a.)	Nitrogen Oxides (NOx)	0.08	2.0	gr/hp-hr	1.6	0.08	Manufacturer Data
6.)	Carbon monoxide (CO)	15.7	50	ppm	3.6	15.7	Manufacturer Data
6a.)	Carbon monoxide (CO)	0.16	4.0	gr/hp-hr	3.3	0.16	Manufacturer Data
7.)	Volatile organic compounds (VOC)	2.3	N/A		0.53	2.3	AP-42
7a.)	Volatile organic compounds (VOC)	0.04	1.0	gr/hp-hr	0.8	0.04	Manufacturer Data
8.)	Lead (Pb)	1.70E-03			3.88E-04	1.70E-03	Other
9.)	Total Hazardous Air Pollutants (HAPs)	0.92	N/A		0.210046	0.92	Other
10.)	Fluoride (F)	N/A	N/A		N/A	N/A	
11.)	Hydrogen Sulfide (H2S)	N/A	N/A		N/A	N/A	
12.)	Mercury (Hg)	7.80E-04	N/A		1.78E-04	7.80E-04	Other
13.)	Total Reduced Sulfur (TRS)	N/A	N/A		N/A	N/A	
14.)	Sulfuric Acid Mist (SAM)	N/A	N/A		N/A	N/A	

Provide your calculations as an attachment and explain how all process variables and emissions factors were selected.

Pollutant Emissions Form
(submit one for each emission unit)

Hazardous Air Pollutants (HAPs) and Toxic Air Contaminents

Pollutants:		Pre-Controlled Potential Emissions (tons/yr)	Efficiency Standards: Potential to Emit (PTE)	Efficiency Standards: Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
1.)	Arsenic	3.10E-04	N/A		7.08E-05	3.10E-04	Other
2.)	Beryllium	6.50E-05	N/A		1.48E-05	6.50E-05	Other
3.)	Cadmium	6.50E-04	N/A		1.48E-04	6.50E-04	Other
4.)	Chromium	2.60E-03	N/A		5.94E-04	2.60E-03	Other
5.)	Cobalt	4.80E-05	N/A		1.10E-05	4.80E-05	Other
6.)	Lead	1.70E-03	N/A		3.88E-04	1.70E-03	Other
7.)	Manganese	2.20E-03	N/A		5.02E-04	2.20E-03	Other
8.)	Mercury	7.80E-04	N/A		1.78E-04	7.80E-04	Other
9.)	Nickel	3.30E-03	N/A		7.53E-04	3.30E-03	Other
10.)	Anthracene	2.20E-06	N/A		5.02E-07	2.20E-06	Other
11.)	Chrysene	7.00E-07	N/A		1.60E-07	7.00E-07	Other
12.)	Flouranthene	3.50E-06	N/A		7.99E-07	3.50E-06	Other
13.)	Flourene	1.30E-05	N/A		2.97E-06	1.30E-05	Other
14.)	Naphthalene	2.40E-04	N/A		5.48E-05	2.40E-04	Other
15.)	Phenanthrene	1.50E-05	N/A		3.42E-06	1.50E-05	Other
16.)	Benzo(a)pyrene	2.60E-05	N/A		5.94E-06	2.60E-05	Other
17.)	Acetaldehyde	6.50E-03	N/A		1.48E-03	6.50E-03	Other
17a.)	Acetaldehyde	3.79E-04	N/A		8.00E-03	3.79E-04	AP-42
18.)	Phosphorus	9.60E-04	N/A		2.19E-04	9.60E-04	Other
19.)	Benzene	2.60E-02	N/A		5.94E-03	2.60E-02	Other
19a.)	Benzene	2.15E-04	N/A		4.00E-03	2.15E-04	AP-42
20.)	Formaldehyde	2.30E-02	N/A		5.25E-03	2.30E-02	Other
20a.)	Formaldehyde	2.79E-03	N/A		5.60E-02	2.79E-03	AP-42
21.)	Toluene	6.10E-02	N/A		1.39E-02	6.10E-02	Other
21a.)	Toluene	7.59E-05	N/A		2.00E-03	7.59E-05	AP-42
22.)	Ethylbenzene	7.00E-03	N/A		1.60E-03	7.00E-03	Other
23.)	Hexane	7.60E-01	N/A		1.74E-01	7.60E-01	Other
24.)	Xylenes	1.10E-02	N/A		2.51E-03	1.10E-02	Other
24a.)	Xylene	2.65E-05	N/A		1.00E-03	2.65E-05	AP-42
25.)	Phenol	1.70E-03	N/A		3.88E-04	1.70E-03	Other
26.)	Acrolein	7.40E-03	N/A		1.69E-03	7.40E-03	Other
27.)	Selenium	3.90E-04	N/A		8.90E-05	3.90E-04	Other
28.)	Tetrachloroethane	3.44E-06	N/A		1.00E-04	3.44E-06	AP-42
29.)	Butadiene	9.02E-05	N/A		2.00E-03	9.02E-05	AP-42
30.)	Acrolein	3.58E-04	N/A		7.00E-03	3.58E-04	AP-42
31.)	Butyr/isobutyraldehyde	6.36E-06	N/A		1.00E-04	6.36E-06	AP-42
32.)	Methanol	4.16E-04	N/A		8.00E-03	4.16E-04	AP-42
33.)	Methyl Chloride	5.60E-06	N/A		1.00E-04	5.60E-06	AP-42
34.)	PAH	1.92E-05	N/A		4.00E-04	1.92E-05	AP-42

Revised 5/12/2015

Pollutant Emissions Form
(submit one for each emission unit)

Greenhouse Gases (GHGs)

			Efficiency Standards				
		Pre-Controlled Potential Emissions (tons/yr)	Potential to Emit (PTE)	Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
Pollutants:							
1.)	CO2	51,117	N/A		11,671	51,117	AP-42
1a.)	CO2	0.0147	N/A		0.29	0.0147	AP-42
2.)	CH4 (CO2e)	20.6	N/A		4.7	20.6	AP-42
2a.)	CH4 (CO2e)	0.000644	N/A		0.01	0.000644	AP-42
3.)	N20 (CO2e)	84.5	N/A		19.3	84.5	AP-42
4.)							
5.)							
6.)							
7.)							
8.)							

Release Point Information:

Complete the table below for ***each*** release point. Please include release point information for each emission unit. Multiple attachments may be necessary. A release point is a point at which emissions from an emission unit are released into the ambient (outside)air. List each individual release point on a separate pair of lines (release point ID and description). ***For longitude and latitude, use NAD 83/WGS84 datum and 5 digits after the decimal (i.e. 41.12345, -107.56789)***

Stack Release Point Information	
Company Release Point ID:	Release Point Type: Vertical
BL-4500	Release Point Latitude: 42.85902
	Release Point Longitude: -106.24130
Company Release Point Description:	Base Elevation (ft): 5126
#2 Boiler	Stack Height (ft): 75
	Stack Diameter (ft): 3 ft 2 in
	Exit Gas Velocity (ft/s): 49
	Exit Gas Temp (F): 288
	Exit Gas Flow Rate (acfm): 23,100
Company Release Point ID:	Release Point Type: Vertical
E-9	Release Point Latitude: 42.85874
	Release Point Longitude: -106.24117
Company Release Point Description:	Base Elevation (ft): 5126
Boiler House Emergency Generator	Stack Height (ft): TBD
	Stack Diameter (ft): 0.2917
	Exit Gas Velocity (ft/s): 360
	Exit Gas Temp (F): 1350
	Exit Gas Flow Rate (acfm): 1442
Company Release Point ID:	Release Point Type:
	Release Point Latitude:
	Release Point Longitude:
Company Release Point Description:	Base Elevation (ft):
	Stack Height (ft):
	Stack Diameter (ft):
	Exit Gas Velocity (ft/s):
	Exit Gas Temp (F):
	Exit Gas Flow Rate (acfm):
Company Release Point ID:	Release Point Type:
	Release Point Latitude:
	Release Point Longitude:
Company Release Point Description:	Base Elevation (ft):
	Stack Height (ft):
	Stack Diameter (ft):
	Exit Gas Velocity (ft/s):
	Exit Gas Temp (F):
	Exit Gas Flow Rate (acfm):

Complete the table below for each fugitive (area, volume, line) release point. List each individual release point on a separate line.

Fugitive Release Point Information	
Company Release Point ID:	Release Point Latitude: 42.85902
BL-4500 Fugitive	Release Point Longitude: -106.2413
	Release Height (ft): 5130
Company Release Point Description:	
Company Release Point ID:	Release Point Latitude:
	Release Point Longitude:
	Release Height (ft):
Company Release Point Description:	
Company Release Point ID:	Release Point Latitude:
	Release Point Longitude:
	Release Height (ft):
Company Release Point Description:	
Company Release Point ID:	Release Point Latitude:
	Release Point Longitude:
	Release Height (ft):
Company Release Point Description:	

Control Equipment:

Flue Gas Recirculation

Manufacturer: Rentech
Date Installed: TBD
Model Name and Number: Robinson Industries Arrangement 3
Company Control Equipment ID: N/A
Company Control Equipment Description:

Pollutant(s) Controlled:
☐ CO ☑ NOx ☐ Pb ☐ SO2 ☐ VOC ☐ PM
☐ PM (FIL) ☐ PM Condensible ☐ PM 10 (FIL) ☐ PM 2.5 (FIL) ☐ PM 10 ☐ PM 2.5
☐ Other

NOTE: The following fields require numeric values unless otherwise denoted with an asterisk*

Design Control Efficiency (%): 65* Capture Efficiency (%): N/A
Operating Control Efficiency (%): 65*
☐ This is the only control equipment on this air contaminant source
If not, this control equipment is: ☐ Primary ☑ Secondary ☐ Parallel
List all other emission units that are also vented to this control equipment:* N/A
List all release point IDs associated with this control equipment:* BL-4500

* Combined with Low NOx Burners; Assuming 0.1 lb/MMBtu for a conventional burner
** Assuming typical fuel gas temperature for inlet and stack temperature for outlet

Control Equipment:

Low NOx Burner

Manufacturer: COEN
Date Installed: TBD
Model Name and Number: Variflame
Company Control Equipment ID: N/A
Company Control Equipment Description:

Pollutant(s) Controlled:

☐ CO	☑ NOx	☐ Pb	☐ SO2	☐ VOC	☐ PM	
☐ PM (FIL)	☐ PM Condensible	☐ PM 10 (FIL)	☐ PM 2.5 (FIL)	☐ PM 10	☐ PM 2.5	
☐ Other						

NOTE: The following fields require numeric values unless otherwise denoted with an asterisk*

Design Control Efficiency (%): 65*
Capture Efficiency (%): N/A
Operating Control Efficiency (%): 65*
Inlet Gas Temp (F): 100**
Outlet Gas Temp (F): 500**
Burner Type:* Low NOx Burner

☐ This is the only control equipment on this air contaminant source

If not, this control equipment is: ☑ Primary ☐ Secondary ☐ Parallel

List all other emission units that are also vented to this control equipment:* N/A

List all release point IDs associated with this control equipment:* BL-4500

* Combined with FGR; Assuming 0.1 lb/MMBtu for a conventional burner

** Assuming typical fuel gas temperature for inlet and stack temperature for outlet

Figure 2.1 Refinery Process Flow Diagram

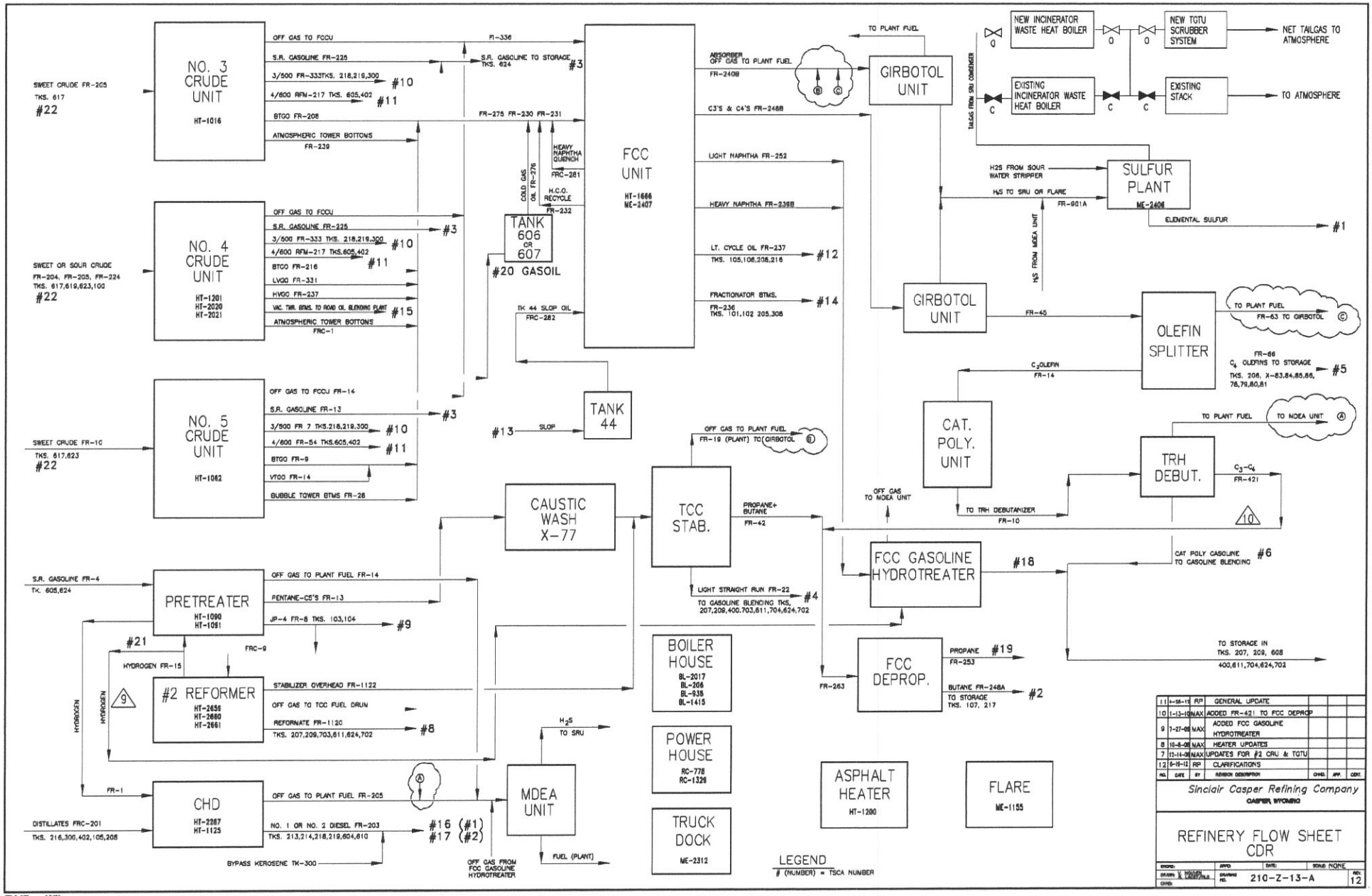
NO. 3 CRUDE UNIT
HT-1016
SWEET CRUDE FR-205
TKS. 617
#22
OFF GAS TO FCCU
FI-336
S.R. GASOLINE FR-225
S.R. GASOLINE TO STORAGE TKS. 624
#3
3/500 FR-333TKS. 218,219,300
#10
4/600 RFM-217 TKS. 605,402
#11
BTGO FR-208
FR-275 FR-230 FR-231
ATMOSPHERIC TOWER BOTTOMS
FR-239
NO. 4 CRUDE UNIT
HT-1201
HT-2020
HT-2021
SWEET OR SOUR CRUDE
FR-204, FR-205, FR-224
TKS. 617,619,623,100
#22
OFF GAS TO FCCU
S.R. GASOLINE FR-225
#3
3/500 FR-333 TKS. 218,219,300
#10
4/600 RFM-217 TKS.605,402
#11
BTGO FR-216
LVGO FR-331
HVGO FR-237
VAC. THR. BTMS. TO ROAD OIL BLENDING PLANT
#15
ATMOSPHERIC TOWER BOTTOMS
FRC-1
NO. 5 CRUDE UNIT
HT-1062
SWEET CRUDE FR-10
TKS. 617,623
#22
OFF GAS TO FCCU FR-14
S.R. GASOLINE FR-13
#3
3/500 FR 7 TKS.218,219,300
#10
4/600 FR-54 TKS.605,402
#11
BTGO FR-9
VTGO FR-14
BUBBLE TOWER BTMS FR-28
FCC UNIT
HT-1666
NC-2407
COLD GAS OIL FR-276
HEAVY NAPHTHA QUENCH FRC-281
H.C.O. RECYCLE FR-232
TANK 606 OR 607
#20 GASOIL
TK 44 SLOP OIL FRC-282
#13 SLOP
TANK 44
ABSORBER OFF GAS TO PLANT FUEL FR-2408
C3'S & C4'S FR-2488
LIGHT NAPHTHA FR-252
HEAVY NAPHTHA FR-2388
LT. CYCLE OIL FR-237
TKS. 105,106,208,216
#12
FRACTIONATOR BTMS.
FR-236
TKS. 101,102 205,308
#14
TO PLANT FUEL
GIRBOTOL UNIT
NEW INCINERATOR WASTE HEAT BOILER
NEW TGTU SCRUBBER SYSTEM
NET TAILGAS TO ATMOSPHERE
TAILGAS FROM SRU CONDENSER
EXISTING INCINERATOR WASTE HEAT BOILER
EXISTING STACK
TO ATMOSPHERE
H2S FROM SOUR WATER STRIPPER
H2S TO SRU OR FLARE
FR-901A
SULFUR PLANT
ME-2406
ELEMENTAL SULFUR
#1
H2S FROM MDEA UNIT
GIRBOTOL UNIT
FR-45
OLEFIN SPLITTER
TO PLANT FUEL
FR-63 TO GIRBOTOL
FR-66
C4 OLEFINS TO STORAGE
TKS. 206, X-83,84,85,86, 76,79,80,81
#5
C3OLEFIN FR-14
CAT. POLY. UNIT
TO PLANT FUEL
TO MDEA UNIT
TRH DEBUT.
C3-C4 FR-421
OFF GAS TO MDEA UNIT
TO TRH DEBUTANIZER FR-10
OFF GAS TO PLANT FUEL FR-19 (PLANT) TO GIRBOTOL
CAUSTIC WASH X-77
TCC STAB.
PROPANE+ BUTANE FR-42
FCC GASOLINE HYDROTREATER
#18
CAT POLY GASOLINE TO GASOLINE BLENDING #6
LIGHT STRAIGHT RUN FR-22
#4
TO GASOLINE BLENDING TKS. 207,209,400,703,611,704,624,702
TO STORAGE IN TKS. 207, 209, 608 400,611,704,624,702
S.R. GASOLINE FR-4
TK. 605,624
PRETREATER
HT-1090
HT-1091
OFF GAS TO PLANT FUEL FR-14
PENTANE-C5'S FR-13
JP-4 FR-8 TKS. 103,104
#9
#21
HYDROGEN FR-15
FRC-9
#2 REFORMER
HT-2656
HT-2660
HT-2661
STABILIZER OVERHEAD FR-1122
OFF GAS TO TCC FUEL DRUM
REFORMATE FR-1120
TKS. 207,209,703,611,624,702
#8
HYDROGEN
BOILER HOUSE
BL-2017
BL-206
BL-939
BL-1415
POWER HOUSE
RC-778
RC-1329
TRUCK DOCK
ME-2312
FCC DEPROP.
PROPANE #19
FR-253
FR-263
BUTANE FR-248A
TO STORAGE TKS. 107, 217
#2
ASPHALT HEATER
HT-1200
FLARE
ME-1155
FR-1
CHD
HT-2287
HT-1125
DISTILLATES FRC-201
TKS. 216,300,402,105,208
OFF GAS TO PLANT FUEL FR-205
NO. 1 OR NO. 2 DIESEL FR-203
TKS. 213,214,218,219,604,610
#16 (#1)
#17 (#2)
BYPASS KEROSENE TK-300
MDEA UNIT
H2S TO SRU
FUEL (PLANT)
OFF GAS FROM FCC GASOLINE HYDROTREATER
LEGEND
(NUMBER) = TSCA NUMBER
Sinclair Casper Refining Company
CASPER, WYOMING
REFINERY FLOW SHEET
CDR
210-Z-13-A
12
11 4-26-13 RP GENERAL UPDATE
10 1-13-10 N/AX ADDED FR-421 TO FCC DEPROP
9 7-27-09 N/AX ADDED FCC GASOLINE HYDROTREATER
8 10-8-08 N/AX HEATER UPDATES
7 12-14-06 N/AX UPDATES FOR #2 CRU & TGTU
12 5-18-12 RP CLARIFICATIONS

Figure 2.2 Refinery Plot Plan

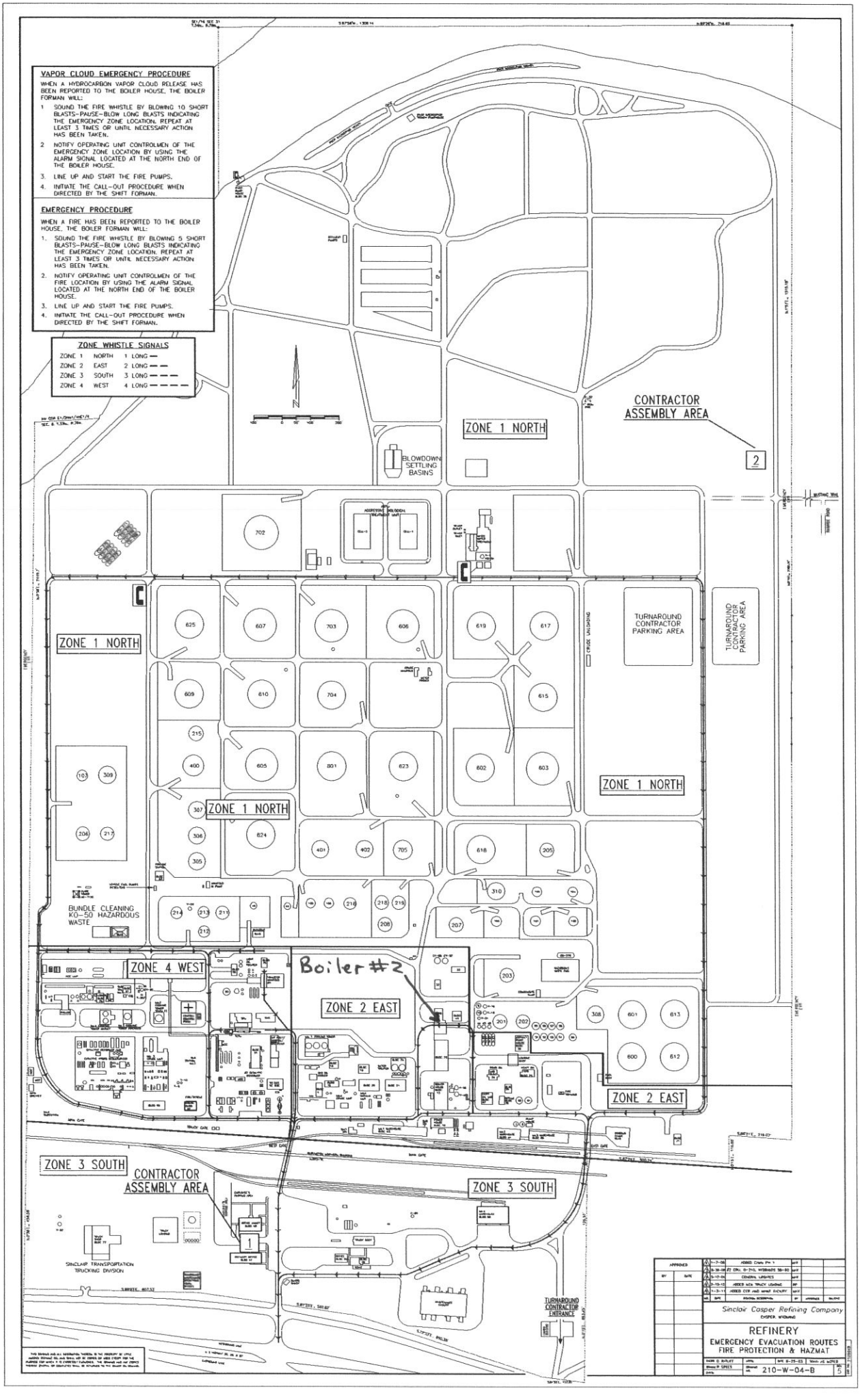
VAPOR CLOUD EMERGENCY PROCEDURE
WHEN A HYDROCARBON VAPOR CLOUD RELEASE HAS BEEN REPORTED TO THE BOILER HOUSE, THE BOILER FORMAN WILL:
1. SOUND THE FIRE WHISTLE BY BLOWING 10 SHORT BLASTS–PAUSE–BLOW LONG BLASTS INDICATING THE EMERGENCY ZONE LOCATION. REPEAT AT LEAST 3 TIMES OR UNTIL NECESSARY ACTION HAS BEEN TAKEN.
2. NOTIFY OPERATING UNIT CONTROLMEN OF THE EMERGENCY ZONE LOCATION BY USING THE ALARM SIGNAL LOCATED AT THE NORTH END OF THE BOILER HOUSE.
3. LINE UP AND START THE FIRE PUMPS.
4. INITIATE THE CALL-OUT PROCEDURE WHEN DIRECTED BY THE SHIFT FORMAN.
EMERGENCY PROCEDURE
WHEN A FIRE HAS BEEN REPORTED TO THE BOILER HOUSE, THE BOILER FORMAN WILL:
1. SOUND THE FIRE WHISTLE BY BLOWING 5 SHORT BLASTS–PAUSE–BLOW LONG BLASTS INDICATING THE EMERGENCY ZONE LOCATION. REPEAT AT LEAST 3 TIMES OR UNTIL NECESSARY ACTION HAS BEEN TAKEN.
2. NOTIFY OPERATING UNIT CONTROLMEN OF THE FIRE LOCATION BY USING THE ALARM SIGNAL LOCATED AT THE NORTH END OF THE BOILER HOUSE.
3. LINE UP AND START THE FIRE PUMPS.
4. INITIATE THE CALL-OUT PROCEDURE WHEN DIRECTED BY THE SHIFT FORMAN.
ZONE WHISTLE SIGNALS
ZONE 1 NORTH 1 LONG —
ZONE 2 EAST 2 LONG — —
ZONE 3 SOUTH 3 LONG — — —
ZONE 4 WEST 4 LONG — — — —
CONTRACTOR ASSEMBLY AREA
2
ZONE 1 NORTH
BLOWDOWN SETTLING BASINS
TURNAROUND CONTRACTOR PARKING AREA
TURNAROUND CONTRACTOR PARKING AREA
ZONE 1 NORTH
ZONE 1 NORTH
ZONE 1 NORTH
BUNDLE CLEANING KO-50 HAZARDOUS WASTE
ZONE 4 WEST
Boiler #2
ZONE 2 EAST
ZONE 2 EAST
ZONE 3 SOUTH
CONTRACTOR ASSEMBLY AREA
1
SINCLAIR TRANSPORTATION TRUCKING DIVISION
ZONE 3 SOUTH
TURNAROUND CONTRACTOR ENTRANCE
Sinclair Casper Refining Company
CASPER, WYOMING
REFINERY
EMERGENCY EVACUATION ROUTES
FIRE PROTECTION & HAZMAT
210-W-04-B
5

Figure 2.3 Refinery Location Drawing

Sinclair Casper Refining Company

3.0 Process Description

3.1 Project Overview

This project consists of a 99.2 MMBtu/hr fuel gas fired boiler and a 230 kW natural gas fired emergency generator.

Upon startup of Boiler #2, Boiler #5 will be permanently taken out of service and Boiler #6 will be placed on hot standby. This boiler will circulate hot water/steam to keep it warm but will only be fired in the event one of the other boilers is out of service.

This project will provide an efficient, reliable source of steam and a backup source of steam. It will not affect production rates or emissions at any other process unit because steam is not a bottleneck in the refinery.

3.2 Modified Equipment

None

3.3 New Equipment

New equipment for this project consists of a new 99.2 MMBtu/hr boiler and a 230 kW natural gas fired emergency generator. The boiler will include ancillary equipment such as water , steam and fuel gas piping, piping components, pumps, valves, and instrumentation.

3.4 Non-Modified Equipment

No other refinery units will experience changes in the method of operation or increases in utilization resulting from the new boiler.

3.5 Unaffected Units

No other units will be affected by this project.

4.0 Permit Limitations

4.1 Proposed Potential to Emit (PTE)

Proposed potential emissions of SO_2, NOx and PM as well as estimated CO, VOC and GHG

emissions are presented in Appendix A. This appendix also includes the change in potential emissions for the project.

PTE and estimated emissions calculations supporting Appendix A are provided in the following Appendices:

Appendix B: SO_2 Emissions Calculations
Appendix C: NOx Emissions Calculations
Appendix D: PM Emissions Calculations
Appendix E: CO Emissions Calculations
Appendix F: VOC Emissions Calculations
Appendix G: Greenhouse Gas Calculations
Appendix J: Emergency Generator Emission Calculations
Appendix K: Emergency Generator Greenhouse Gas Calculations

This project will result in a decrease in potential SO2, NOx, PM and CO emissions due to elimination of fuel oil, higher efficiency and an Ultra Low NOx burner. There will be an increase in potential emissions of VOC and GHG due to a maximum firing rate of 99.2 MMBtu/hr compared to 53.6 MMBtu/hr for the #5 boiler that will be removed. There will be a decrease in actual emissions for all pollutants due to higher efficiency and lower fuel consumption for the new boiler.

5.0 WAQS&R Chapter 6: Permitting Requirements

This section of the application addresses the permit application requirements presented in Chapter 6 of the WAQS&R.

5.1 WAQS&R Chapter 6, Section 2: Permit requirements for construction, modification, and operation

Chapter 6, Section 2(a)(i) states any person who plans to construct, modify or engage in the use of a facility which will cause an increase in the issuance of air contaminants shall obtain a construction permit before any actual work is begun on the facility. This application is intended to satisfy the requirements of Chapter 6, Section 2.

Chapter 6, Section 2(a)(ii) requires facilities subject to Chapter 6, Section 3 operating permit requirements to submit an application to the Division within twelve months of commencing operation. Sinclair will revise and submit its Chapter 6, Section 3 permit application by the required date.

Chapter 6, Section 2(b) details the requirements for applying for a construction permit. These requirements include: submitting the application using forms supplied by the WDEQ/AQD; providing site information, plans, descriptions, specifications, design drawings of the sources; compiling an emissions inventory; and providing a construction schedule.

While Sinclair believes the information provided in this application is sufficient for the Division to proceed with processing the application, detailed design information has not yet been finalized at this time. At the Division's request, Sinclair will provide this information when it becomes finalized.

Chapter 6, Section 2(c) states the requirements which must be met before a construction permit is issued. These requirements are detailed as follows.

5.1.1 WAQS&R Chapter 6, Section 2(c)(i): (Compliance with Applicable Rules & Regulations)

Sinclair intends to comply with all rules and regulations of the WDEQ/AQD and with the intent of the Wyoming Environmental Quality Act.

5.1.2 WAQS&R Chapter 6, Section 2(c)(ii): (Attainment / Maintenance of Ambient Air Quality Requirements

SO2, NOx, CO, PM10 (averaging periods > 1 hour)

SCRC conducted air dispersion modeling for SO2, NOx, CO and PM10 as part of the application for our #5 Crude Unit (Permit MD-7751). The modeling analysis indicated that ambient concentrations are in compliance with Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS). This project will result in a decrease in potential SO2, NOx, PM and CO emissions as well as a decrease in actual emissions for all of these pollutants. SCRC therefore requests the Division to accept modeling performed for MD-6933 as representative for this application.

NO2 and SO2, 1 hour standards

SCRC evaluated the new 1-hour NO2 and SO2 standards using data from our ambient monitoring station. The Sinclair Casper monitoring station is located at the east boundary of our facility in a location selected by DEQ because it is predominantly downwind of the refinery. SCRC has been operating the Sinclair Casper Refining Company monitoring station in its current configuration since July 2011.

Table 5.1 and 5.2 summarize the available 1-hour NO2 and SO2 data supporting this permit application:

Table 5.1 NO2 Concentration Summary

Averaging Period	Standard	2011	2012	2013	2014	2015 (1st Qtr)
1-hr (2nd highest value) (ppbv)	100	42.2	34.0	40.6	39.2	36.6

Table 5.2 SO2 Concentration Summary

Averaging Period	Standard	2011	2012	2013	2014	2015 (1st Qtr)
1-hr (2nd highest value) (ppbv)	75	28.7	33.1	42.6	34.7	20.9

$PM_{2.5}$

SCRC conducted air dispersion modeling for PM2.5 as part of the application for Selective Catalytic Reduction for the FCC Unit (Permit MD-13573). The modeling analysis indicated that ambient concentrations are in compliance with Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS). This project will result in a decrease in potential emissions of PM2.5 and SCRC requests the Division to accept modeling performed for MD-13573 as representative for this application.

Ozone

WAQS&R Chapter 2, Section 6 (b) lists the ambient standard for ozone as:

(b) *The 8-hour primary and secondary standard ozone ambient air quality standards are met at an ambient air quality monitoring site when the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to 0.075 ppm, as determined in accordance with 40 CFR part 50, Appendix P.*

To assess the impact the new boiler project will have on the surrounding area, SCRC used the following strategy:

- SCRC operates an ambient monitoring station located at our east boundary. Ozone concentrations obtained from this monitor were used to develop background ozone concentrations.

- The change in ozone precursors from the refinery (specifically VOC and NOx) associated with the project was compared to the VOC and NOx emissions from other stationary sources in the vicinity of the refinery (ie within the Natrona County, Wyoming area).
- VOC and NOx emissions from stationary sources in Natrona County were obtained from the 2002 Western Regional Air Partnership Database.

Background ozone concentrations were taken from the Sinclair Casper Refining Company monitoring station. The ozone monitor was put in service in July 2011 Table 5.3 summarizes the available ozone background data supporting this permit application:

Table 5.3 Ozone Background Concentration Summary

Averaging Period	Standard	2011	2012	2013	2014	2015 (1st Qtr)
8-hr (4th highest value) (ppbv)	75	61	62	56	57	47

Potential NOx emissions will decrease as a result of this project due to an Ultra Low NOx burner. There will be a negligible increase in potential VOC emissions because the new boiler has a maximum firing rate of 99.2 MMBtu/hr compared to a firing rate of 53.6 MMBtu/hr for #5 Boiler that will be removed.

The county wide NOx and VOC emissions, as listed in Appendix L, are 1234 tpy and 857 tpy respectively. Because this project results in a decrease in NOx emissions, the VOC emissions increase is negligible with respect to county wide VOC emissions, and the background ozone concentrations in the vicinity of the refinery are well below the ambient standard, SCRC does not believe this project will adversely impact the area's compliance status with respect to the ozone standard.

5.1.3 WAQS&R Chapter 6, Section 2(c)(iii): (Significant Deterioration of Existing Ambient Air)

Because the proposed potential emissions are less than the PSD significance thresholds, a PSD analysis is not required (re: Section 5.4).

5.1.4 WAQS&R Chapter 6, Section 2(c)(iv): (Location Standards)

The refinery is located in accordance with proper land use planning as determined by the State of Wyoming and Natrona County.

5.1.5 WAQS&R Chapter 6, Section 2(c)(v): (Best Available Control Technology (BACT) Evaluation)

This section of the WAQS&R requires the use of BACT with consideration of the economic reasonableness of reducing or eliminating the emissions resulting from new or modified sources. BACT considerations for SO_2, NO_2, PM, CO, and VOC emissions follows.

5.1.5.1 SO_2 Emissions

Boiler #2 will be fired with refinery fuel gas and will be subject to the fuel gas concentration limits in 40 CFR 60 Subpart Ja. This Subpart limits annual fuel gas H_2S concentration to 60 ppm and three hour fuel gas H_2S concentration to 162 ppm. Sinclair proposes that limiting fuel gas H_2S concentration to an annual average of 60 ppm be accepted as BACT for SO_2 emissions from this boiler.

5.1.5.2 NOx Emissions

The proposed boiler will include a Low NOx burner and Flue Gas Recirculation. The BACT analysis included in Appendix M evaluates emissions levels of 0.025, 0.030 and 0.035 lb/MMBtu using different flue gas recirculaton rates. Based on the economic analysis included in Appendix M, SCRC is proposing an emission limit of 0.035 lb/MMBtu as BACT.

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

For gaseous fuel fired boilers, SCRC assumes that all PM is less than 2.5 microns, therefore PM, PM_{10}, and $PM_{2.5}$ are equivalent. The use of PM control devices is not typically required on gaseous fired sources which are in attainment areas. Because the PM emissions from the new #2 Boiler are small, Sinclair proposes BACT for PM emissions is no additional control.

5.1.5.4 VOC/HAP/CO Emissions

The new boiler will fire refinery fuel gas to generate thermal energy necessary to produce steam. Boilers are inherently designed for complete combustion; this is accomplished by ensuring high combustion zone temperatures and sufficiently long residence times in the combustion zones. These are also the same combustion conditions necessary to maximize the destruction of VOC and HAP and minimize the formation of CO. Due to their inherent design for complete combustion, SCRC proposes BACT for VOC, HAP and CO emissions from the new boiler is no

additional control.

5.1.6 WAQS&R Chapter 6, Section 2(c)(vi): (Measurement of Emissions)

The refinery has provisions for measuring H_2S concentration in the refinery fuel gas which is fired in the new and existing heaters. The H_2S monitor was installed, certified and is maintained in accordance with Chapter 5, Section 2 of the WAQS&R. No new additional emissions monitoring is required for this project.

5.1.7 WAQS&R Chapter 6, Section 2(c)(vii): (Achievement of Performance Specified in Permit Application)

Sinclair intends to comply with the performance specified in this application.

5.1.8 WAQS&R Chapter 6, Section 2(c)(viii): (Ambient Air Quality Standard Impact on Surrounding States)

As presented in Section 5.1.2, the facility will not adversely impact the WAAQS. Because the emission increases resulting from this project are small and the facility is located close to the center of the state, the impact on surrounding states is considered minimal.

5.2 WAQS&R Chapter 6, Section 2(d): Use of Dispersion Techniques

No dispersion techniques or stack heights exceeding good engineering practice were used in the air dispersion modeling.

5.3 WAQS&R Chapter 6, Section 3: Operating Permits

Sinclair will submit to the Division a revision of its operating permit application incorporating provision of this project within twelve months of commencing operation of Boiler #2.

5.4 WAQS&R Chapter 6, Section 4: Prevention of Significant Deterioration

The potential emissions for all pollutants are less than Prevention of Significant Deterioration (PSD) significance thresholds, therefore, a PSD analysis is not required. As previously discussed, SCRC has tentative plans to install a third boiler over the next few years to replace the remaining boilers (#6 and #7). If these plans are finalized, SCRC will submit an application addressing the third boiler. The

replacement boilers will not result in a PSD emissions increase because the boilers will be more fuel efficient and lower emitting than the existing boilers.

5.5 WAQS&R Chapter 6, Section 5: Permit Requirements for Construction and Modification of NESHAP Sources

The information required in Chapter 6, Section 5(a)(iii)(A)(II) is provided below:

Paragraphs (1) through (3): See Section 2 of the permit application (i.e. WDEQ/AQD forms).

Paragraph (4): The relevant standard is 40 CFR 63 Subpart DDDDD (see Section 8.1 of the permit application).

Paragraph (5): The expected commencement date of construction of this project is November 2015.

Paragraph (6): The expected completion date of the construction of this project is June 2017.

Paragraph (7): Anticipated initial start-up date of the source is June 2017.

Paragraph (8): The types and estimated quantity of HAPs emitted by the source is provided in Appendix H of the permit application.

6.0 New Source Performance Standards: WAQS&R Chapter 5, Section 2

Chapter 5, Section 2 of the WAQS&R addresses performance standards for affected facilities which commenced construction, reconstruction or modification after the applicability date of the standard. The Applicability and non-applicability of these standards as relating to this project are discussed in this section.

6.1 New Source Performance Standards Applicable to this Project

6.1.1 WAQS&R Chapter 5, Section 2 – 40 CFR 60, Subpart J: Standards of Performance for Petroleum Refineries

Fuel Gas Combustion Devices

This regulation is applicable to fuel gas combustion devices which commenced construction, modification or relocation after June 11, 1973. The new boiler will be

required to comply with Subpart Ja rather than this Subpart.

6.1.2 WAQS&R Chapter 5, Section 2 – 40 CFR 60, Subpart Ja: Standards of Performance for Petroleum Refineries

Fuel Gas Combustion Devices

This regulation is applicable to fuel gas combustion devices which commenced construction, modification or relocation after May 14, 2007. This rule limits fuel gas H_2S concentration to a 365 day rolling average of 60 ppm (0.037 grains/dscf) and a 3 hour average of 162 ppm (0.1 grains/dscf). The new boiler will be subject to the provisions of Subpart Ja.

6.1.3 WAQS&R Chapter 5, Section 2 – 40 CFR 60, Subpart GGG: Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries

Piping components associated with this project will be subject to Subpart GGGa rather than this subpart.

6.1.4 WAQS&R Chapter 5, Section 2 – 40 CFR 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

Subpart GGGa applies to affected facilities that commence construction, reconstruction, or modification after November 7, 2006. The group of all the equipment (defined in 60.591a) within a process unit is an affected facility per 60.590A(3).

40 CFR 60.14 defines a modification as any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies. VOC is the pollutant to which the standard applies. The boilerhouse will be modified with the addition of new piping and piping components for fuel gas.

6.1.5 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

Although the new boiler is an affected facility under this standard, there are no applicable requirements other than the initial notifications required under 40 CFR 60.48c(a).

6.1.6 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart JJJJ: Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

The generator engine is subject to the requirements of 40 CFR 60 Subpart JJJJ. This subpart limits operation for the purpose of maintenance checks and readiness testing to 100 hours per year. This engine will be run for approximately 1 hour per week for these purposes. There is no limit on operating hours for emergency situations. The emergency generator will be equipped with a catalytic muffler in order to meet the Subpart JJJJ emission limits.

6.2 New Source Performance Standards Not Applicable to this Project

6.2.1 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart Db: Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

This subpart does not apply because the new boiler is less than 100 MMBtu/hr.

6.2.2 WAQS&R Chapter 5, Section 2 – 40 CFR 60 Subpart J: Standards of Performance for Petroleum Refineries

Claus Sulfur Recovery Plant (SRP)

There are no new or modified SRPs associated with this project. The existing SRP at the refinery is not directly subject to 40 CFR 60 Subpart J. However, it is an affected source per 40 CFR 63 Subpart UUU (i.e. refinery MACT 2) and Sinclair has elected to comply with the provisions of this rule by complying with the emissions limitations and monitoring requirements of 40 CFR 60 Subpart J (see Section 11).

Fluid Catalytic Cracking Unit (FCCU) Catalyst Regenerators

There are no new or modified FCCU Catalyst Regenerators associated with this project. However, the existing FCCU Catalyst Regenerators is an affected source per Operating Permit # 30-151-1, Condition (P60-J1).

6.2.3 WAQS&R Chapter 5, Section 2 – 40 CFR 60, Subpart QQQ: Standards of Performance for VOC Emissions from Petroleum Refinery Wastewater Systems

There are no oily water sewers associated with this project.

7.0 40 CFR 61 (NESHAP)

This section addresses the national emissions standards for hazardous air pollutants. The applicability and non-applicability of these standards as relating to this project are discussed in this section.

7.1 NESHAP Standards Applicable to this Project

7.1.2 40 CFR 61 Subpart M: National Emission Standards for Asbestos

This project may involve the removal of asbestos, therefore the provisions of this standard apply to Sinclair. Sinclair has an ongoing program to manage asbestos in accordance with this standard.

7.2 NESHAP Standards Not Applicable to this Project

7.2.1. 40 CFR 61 Subpart FF: National Emission Standards for Benzene Waste Operations (BWON)

The provisions of this subpart are not applicable because there are no BWON waste streams associated with this project.

7.2.2 40 CFR 61 Subpart J: National Emission Standards for Equipment Leaks (Fugitive Emission Sources) of Benzene

The provisions of this subpart are not applicable because there are no streams in benzene service associated with this project.

8.0 40 CFR 63 (MACT) WAQS&R Chapter 5, Section 3

Chapter 5, Section 3 of the WAQS&R addresses the national emissions standards for hazardous air pollutants for affected facilities. The applicability and non-applicability of

these standards as relating to this project are discussed in this section.

8.1 MACT Standards Applicable to this Project

8.1.1 40 CFR 63 Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters

Subpart DDDDD is applicable to the new boiler because it applies to new, reconstructed, and existing affected sources. The CO emission limit in Subpart DDDDD is applicable to the proposed heater. Subpart DDDDD limits CO emissions to 400 ppm based on a 3-run average for this size heater.

8.1.2 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart GGGGG - National Emission Standards for Hazardous Air Pollutants: Site Remediation

40 CFR 63 Subpart GGGGG (Site Remediation MACT) is applicable to the refinery because site remediation is conducted. There is a potential for contaminated soils to be excavated in conjunction with this project but these activities are expected to be exempt from this subpart because 40 CFR 63.7881(b)(3) exempts site remediation performed under a Resource Conservation and Recovery Act (RCRA) corrective action. Sinclair will follow applicable requirements of the Site Remediation MACT for any remediation associated with this project that is not performed under a RCRA corrective action.

8.1.3 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants: Stationary Reciprocating Internal Combustion Engines

The proposed generator is required to meet the requirements of Subpart ZZZZ by meeting the requirements of 40 CFR 60 subpart JJJJ. No further requirements apply under Subpart ZZZZ.

8.2 MACT Standards Not Applicable to this Project

8.2.1 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart CC - National Emission Standards for Hazardous Air Pollutants From Petroleum Refineries

The storage vessel, equipment leak, miscellaneous process vent, gasoline loading rack and wastewater provisions of 40 CFR 63 Subpart CC are applicable to SCRC. There are no new affected Subpart CC sources associated with this project.

8.2.2 WAQS&R Chapter 5, Section 3 – 40 CFR 63 Subpart UUU - National Emission Standards for Hazardous Air Pollutants for Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units

The FCCU regenerator process vent and sulfur recovery plant process vent provisions of 40 CFR 63 Subpart UUU are applicable to SCRC. There are no new affected Subpart UUU sources associated with this project.

9.0 40 CFR 64 - Compliance Assurance Monitoring (CAM) for Major Stationary Sources

This project has no CAM applicable sources associated with it.

10.0 40 CFR 68 - Chemical Accident Prevention Provisions

The chemical accident prevention provisions are applicable to SCRC. SCRC will include any necessary changes to its Risk Management Plan (RMP) in conjunction with this project.

11.0 40 CFR 82 – Protection of Stratospheric Ozone

The provisions of 40 CFR 82 are applicable to SCRC. SCRC uses licensed contractors to perform maintenance on equipment with Ozone depleting substances in accordance with this standard.

APPENDICES

Appendix A - Potential Emissions

Appendix A
Potential Emissions

POTENTIAL EMISSIONS FOR NEW BOILER

Operating Unit	Emission Source	Firing Rate for Allowable / Estimated Emissions (MMBtu/hr)	SO2 Allowable Emissions TPY	NOx Allowable Emissions TPY	PM Allowable Emissions TPY	CO Estimated Emissions TPY	VOC Estimated Emissions TPY	GHG-CO2e Estimated Emissions TPY
Boiler House	Boiler #2	99.2	3.6	15.2	3.2	15.7	2.3	51,222
Boiler House	Emergency Generator	2.72	0.00008	0.08	0.001	0.2	0.04	0.02
Total			3.6	15.3	3.2	15.9	2.4	51,222
PSD SIGNIFICANCE THRESHOLDS			40.0	40.0	15.0	100.0	40.0	N/A

POTENTIAL EMISSIONS FOR #5 BOILER

Operating Unit	Emission Source	Firing Rate for Allowable / Estimated Emissions (MMBtu/hr)	SO2 Allowable Emissions TPY	NOx Allowable Emissions TPY	PM Allowable Emissions TPY	CO Estimated Emissions TPY	VOC Estimated Emissions TPY	GHG-CO2e Estimated Emissions TPY
Boiler House	Boiler #5 (Removed)	53.6	95.0	70.2	17.2	19.3	1.3	27,677

Note: The 95 tpy SO2 limit in MD-13573 is a combined limit for #4 Boiler, #5 Boiler, B-1 No. 4 Crude Heater and B-3 No. 4 Crude Heater. #4 Boiler will be permanently removed from service upon installation of Boiler #1 (MD-15042) and B-3 No. 4 Crude Heater no longer burns fuel oil.

CHANGE IN POTENTIAL EMISSIONS

	SO2 TPY	NOx TPY	PM TPY	CO TPY	VOC TPY	GHG-CO2e TPY
Boiler House	-91.4	-54.9	-14.0	-3.4	1.1	23,546

Note: Boiler #6 will be placed on hot standby and only fired if one of the other boilers is out of service. There will be a decrease in actual emissions from boiler #5 but potential emissions will not change at this time.

Appendix B - SO_2 Emission Calculations

Appendix B
SO2 Emissions Calculations

Fuel Gas Fired Heaters and Boilers:

Assume:	0.037	gr/dscf = Maximum annual avg H2S in Fuel Gas, NSPS Subpart Ja
	0.1	gr/dscf = Maximum three hour avg H2S in Fuel Gas, NSPS Subpart Ja
	1200	Btu/scf = Estimated Fuel Gas Heat Content (HHV)

Then: SO2 Emissions = (__Btu/hr) x (scf/1200 Btu) x (__ gr-H2S/scf) x (1/7000 lb-H2S/gr-H2S) x (64 lb SO2/34 lb-H2S)

Operating Unit	Emission Source	Firing Rate (MMBtu/hr)	SO2	
			lb/hr	TPY
Boiler House	Boiler #2	99.2	2.2	3.6
Boiler House	Boiler #5 (Removed)	53.6	53.4	95.0

MD-13573

Appendix C - NO_X Emission Calculations

Appendix C
NOx Emissions Calculations

Emission Factor lb NOx/MM Btu	0.035

Calculation: NOx Emissions = (___ MMBtu/hr)x(____ lb NOx/MMBtu)

Operating Unit	Emission Source	Firing Rate (MMBtu/hr)	Emission Factor lb NOx/MM Btu	NOx	
				lb/hr	TPY
Boiler House	Boiler #2	99.2	0.035	3.47	15.2
Boiler House	Boiler #5 (Removed)	53.6	0.23/0.60	23.90	70.2

MD-13573

Appendix D - PM Emission Calculations

Appendix D
Particulate Matter Emissions Calculations

Fuel Gas Fired Heaters:

Basis:

7.6	lb-PM / MMscf (AP-42, 5th Edition, Table 1.4-2) - Total PM incl condensibles
0.0075	lb-PM / MM Btu, 1020 Btu/scf (AP-42, 5th Edition, Table 1.4-2)

Calculation:

PM Emissions = (___ MMBtu/hr)x(____ lb PM/MMBtu)

Operating Unit	Emission Source	Firing Rate (MMBtu/hr)	PM (Estimated)	
			lb/hr	TPY
Boiler House	Boiler #2	99.2	0.74	3.2
Boiler House	Boiler #5 (Removed)	53.6	4.00	17.2

MD-13573

Appendix E - CO Emission Calculations

Appendix E
CO Emissions Calculations

Fuel Gas Fired Heaters:

Basis:

50 ppm CO (vendor estimate)

Then: CO emissions = (___ MMBtu/hr) x (10,000 dscf/MMBtu) x (____ ppm CO/1e6) x (lbmol CO/386.7 scf CO) X (28 lb CO/lbmol CO)

Operating Unit	Emission Source	Firing Rate (MMBtu/hr)	CO (Estimated)	
			lb/hr	TPY
Boiler House	Boiler #2	99.2	3.6	15.7

Basis:

84 lb-CO / MMscf (AP-42, 5th Edition, Table 1.4-1)
0.082 lb-CO / MM Btu, 1020 Btu/scf (AP-42, 5th Edition, Table 1.4-1)

Then: CO emissions = (___ MMBtu/hr) x (0.082 lb-CO / MM Btu)

Operating Unit	Emission Source	Firing Rate (MMBtu/hr)	CO (Estimated)	
			lb/hr	TPY
Boiler House	Boiler #5 (Removed)	53.6	4.4	19.3

Appendix F - VOC Emission Calculations

Appendix F
VOC Emissions Calculations

Fuel Gas Fired Heaters:

Basis:

5.5	lb-VOC / MMscf (AP-42, 5th Edition, Table 1.4-2)
0.0054	lb-VOC / MM Btu, 1020 Btu/scf (AP-42, 5th Edition, Table 1.4-2)

Then: VOC emissions = (___ MMBtu/hr) x (0.0054 lb-VOC / MM Btu)

Operating Unit	Emission Source	Firing Rate (MMBtu/hr)	VOC (Estimated)	
			lb/hr	TPY
Boiler House	Boiler #2	99.2	0.53	2.3
Boiler House	Boiler #5 (Removed)	53.6	0.29	1.3

Appendix G – Greenhouse Gas Calculations

Appendix G
Greenhouse Gas Calculations

Fuel Gas Fired Heaters:

Basis:

120,000	lb-CO2 / MMscf (AP-42, 5th Edition, Table 1.4-1)
117.6	lb-CO2 / MM Btu, 1020 Btu/scf (AP-42, 5th Edition, Table 1.4-1)
2.30	lb-CH4 / MMscf (AP-42, 5th Edition, Table 1.4-1)
0.002	lb-CH4 / MM Btu, 1020 Btu/scf (AP-42, 5th Edition, Table 1.4-1)
0.64	lb-N2O / MMscf (AP-42, 5th Edition, Table 1.4-1)
0.001	lb-N2O / MM Btu, 1020 Btu/scf (AP-42, 5th Edition, Table 1.4-1)

Then:
CO2 emissions = (___ MMBtu/hr) x (117.6 lb-CO2 / MM Btu)
CH4 emissions = (___ MMBtu/hr) x (0.002 lb-CH4 / MM Btu)
N2O emissions = (___ MMBtu/hr) x (0.001 lb-N2O / MM Btu)

Operating Unit	Emission Source	Firing Rate (MMBtu/hr)	CO2 (Estimated)		CH4 (Estimated)		N2O (Estimated)	
			lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Boiler House	Boiler #2	99.2	11,670.6	51,117.2	0.2	1.0	0.1	0.3
Boiler House	Boiler #5 (Removed)	53.6	6,305.9	27,619.8	0.1	0.5	0.0	0.1

Boiler #2	Global Warming Potential	TPY	CO2e
CO2	1	51,117.2	51,117.2
CH4	21	1.0	20.6
N20	310	0.3	84.5
Total			51,222.3

Boiler #5 (Removed)	Global Warming Potential	TPY	CO2e
CO2	1	27,619.8	27,619.8
CH4	21	0.5	11.1
N20	310	0.1	45.7
Total			27,676.5

Appendix H - HAP Emission Calculations

Appendix H
HAP Emission Calculations

Operating Unit	Emissions Source	Firing Rate (MMBtu/hr)	Arsenic TPY	Beryllium TPY	Cadmium TPY	Chromium TPY	Cobalt TPY	Copper TPY	Lead TPY	Manganese TPY	Mercury TPY	Nickel TPY
Boiler House	Boiler #2	99.2	3.1E-04	6.5E-05	6.5E-04	2.6E-03	4.8E-05	2.0E-03	1.7E-03	2.2E-03	7.8E-04	3.3E-03

Operating Unit	Emissions Source	Firing Rate (MMBtu/hr)	Anthracene TPY	Chrysene TPY	Fluoranthene TPY	Fluorene TPY	Naphthalene TPY	Phenanthrene TPY	Benzo(a)pyrene TPY	Acetaldehyde TPY	Phosphorus TPY
Boiler House	Boiler #2	99.2	2.2E-06	7.0E-07	3.5E-06	1.3E-05	2.4E-04	1.5E-05	2.6E-05	6.5E-03	9.6E-04

Operating Unit	Emissions Source	Firing Rate	Benzene TPY	Formaldehyde TPY	Toluene TPY	Ethylbenzene TPY	Hexane TPY	Xylenes TPY	Phenol TPY	Acrolein TPY	Selenium TPY
Boiler House	Boiler #2	99.2	2.6E-02	2.3E-02	6.1E-02	7.0E-03	7.6E-01	1.1E-02	1.7E-03	7.4E-03	3.9E-04

Operating Unit	Emissions Source	Total TPY
Boiler House	Boiler #2	0.92

HAP Emission Factors for Heaters

Category	HAP	Emission Factor lb/MMBtu	Source
Metals	Arsenic	0.00000072	3
	Beryllium	0.00000015	1
	Cadmium	0.0000015	1
	Chromium	0.000006	1
	Cobalt	0.00000011	2
	Copper	0.0000045	1
	Lead	0.000004	1
	Manganese	0.000005	1
	Mercury	0.0000018	3
	Nickel	0.0000075	3
	Phosphorus	0.0000022	2
	Selenium	0.0000009	1
PAH	Anthracene	5E-09	1
	Chrysene	1.6E-09	1
	Fluoranthene	8E-09	1
	Fluorene	0.00000003	1
	Naphthalene	0.00000056	2
	Phenanthrene	3.5E-08	1
	Benzo(a)pyrene	0.00000006	1
VOC	Acetaldehyde	0.000015	1
	Benzene	0.00006	1
	Formaldehyde	0.000052	1
	Toluene	0.00014	1
	Ethylbenzene	0.000016	3
	Hexane	0.00176	2
	Xylenes	0.000025	3
	Phenol	0.000004	2
	Acrolein	0.000017	3

Emission Factor Sources:

1 EER Report: Air Toxics Emissions Factors for Petroleum Industry Combustion Devices, November 20, 1997, Energy and Environmental Research Corp.

2 MACT Floor Presentation: MACT Floor Analysis Presentation" to BWG by Jim Eddinger, January 13-14, 1998 (compilation of data from EPA database by ERG)

3 API Study: "Air Toxics Emissions Factors for Combustion Sources Using Petroleum-Based Fuels" Vol. 1, Development of Emission Factors Using API/WSPA Approach, October 17, 1997, Table ES-1

Appendix I - Fugitive Emission Calculations

Appendix I
Fugitive Emissions Calculations

Re: Protocol for Equipment Leak Emission Estimates
(EPA-453/R-95-017, Table 2-10: Screening Value Correlations)
Valves / others = 500 ppm, Pumps = 2000 ppm
(EPA-453/R-95-017, Table 2-2: Refinery Average Emission Factors) - Connectors
AP-42, 4 ed, (Fugitive Emission Factors, Table 9.1-2) - Drains

	Pump Seals	Valves	Flanges / Connectors	Drains	Others	VOC Emission Rate (TPY)
New Crude Unit						
Quantity	0	50	30	0	0	
Emissions Factor (lb/hr-source)	0.0114	0.00052	0.00055	0.0175	0.0001	
Emissions (TPY)	0.0	0.11	0.07	0.0	0.000	0.19

Notes: Fugitive emission component counts are estimated

Appendix J – Emergency Generator Emission Calculations

Emission Calculations for Olympian G230LG6 Emergency Generator

	g/hp-hr	Basis	hp	lb/hr	hours/yr	tpy
NOx	2.0	NSPS JJJJ Table 1	374	1.6	100	0.08
CO	4.0	NSPS JJJJ Table 1	374	3.3	100	0.16
VOC	1.0	NSPS JJJJ Table 1	374	0.8	100	0.04

	lb/MMBtu	Basis	MMBtu/hr*	lb/hr	hrs/yr	tpy
SO_2	0.000588	AP-42 Table 3.2-3	2.72	0.0016	100	0.00008
PM**	0.0095	AP-42 Table 3.2-3	2.72	0.026	100	0.0013

*Based on 2775 scf/hr (manufacturer's specifications) and 1020 Btu/scf (AP-42).

**Per AP-42 Table 3.2-3, filterable PM is ≤ 1.0 μm so PM, PM2.5, and PM10 are equivalent.

	lb/MMBtu	Basis*	MMBtu/hr	lb/hr	hrs/yr	tpy
Tetrachloroethane	0.0000253	AP-42 Table 3.2-3	2.72	0.0001	100	3.44E-06
Butadiene	0.000663	AP-42 Table 3.2-3	2.72	0.002	100	9.02E-05
Acetaldehyde	0.00279	AP-42 Table 3.2-3	2.72	0.008	100	3.79E-04
Acrolein	0.00263	AP-42 Table 3.2-3	2.72	0.007	100	3.58E-04
Benzene	0.00158	AP-42 Table 3.2-3	2.72	0.004	100	2.15E-04
Butyr/isobutyraldehyde	0.0000468	AP-42 Table 3.2-3	2.72	0.0001	100	6.36E-06
Formaldehyde	0.0205	AP-42 Table 3.2-3	2.72	0.056	100	2.79E-03
Methanol	0.00306	AP-42 Table 3.2-3	2.72	0.008	100	4.16E-04
Methyl Chloride	0.0000412	AP-42 Table 3.2-3	2.72	0.0001	100	5.60E-06
PAH	0.000141	AP-42 Table 3.2-3	2.72	0.0004	100	1.92E-05
Toluene	0.000558	AP-42 Table 3.2-3	2.72	0.002	100	7.59E-05
Xylene	0.000195	AP-42 Table 3.2-3	2.72	0.001	100	2.65E-05

*HAPS that are below detection level were not included. 0.09 0.004

Appendix K - Emergency Generator Green House Gas Calculations

Emergency Generator Greenhouse Gas Calculations

Fuel Gas Fired Heaters:

Basis:

110	lb-CO2 / MMscf (AP-42, 5th Edition, Table 1.4-1)
0.11	lb-CO2 / MM Btu, 1020 Btu/scf (AP-42, 5th Edition, Table 1.4-1)
0.23	lb-CH4 / MMscf (AP-42, 5th Edition, Table 1.4-1)
0.0002	lb-CH4 / MM Btu, 1020 Btu/scf (AP-42, 5th Edition, Table 1.4-1)

Then: CO2 emissions = (___ MMBtu/yr) x (___ lb-CO2 / MM Btu) x (ton/2000 lb)
CH4 emissions = (___ MMBtu/yr) x (___ lb-CH4 / MM Btu) x (ton/2000 lb)

Operating Unit	Emission Source	Firing Rate * (MMBtu/yr)	CO2 (Estimated) TPY	CH4 (Estimated) TPY	CO2e TPY
Boiler House	Emergency Generator	272	1.47E-02	3.07E-05	1.53E-02

* 2200 scf/hr x 1020 Btu/scf x 100 hr/yr x MMbtu/1e6 Btu

Emergency Generator	Global Warming Potential	TPY	CO2e
CO2	1	1.47E-02	1.47E-02
CH4	21	3.07E-05	6.44E-04
Total			1.53E-02

Appendix L - Natrona County NOx and VOC Emissions from WRAP Database

Appendix I

Summary of 2002 NOx and VOC Emissions from WRAP Database[1] for Natrona County

PLANT ID	PLANT	2002 Annual VOC Emissions	2002 Annual NOX Emissions
5602500005	Casper Refinery	62.82	
5602500005	Casper Refinery	3.10	57.10
5602500005	Casper Refinery	3.15	
5602500005	Casper Refinery	93.63	
5602500005	Casper Refinery	93.63	
5602500005	Casper Refinery	17.31	5.61
5602500005	Casper Refinery	0.50	28.48
5602500005	Casper Refinery	0.69	24.04
5602500005	Casper Refinery	0.64	21.15
5602500005	Casper Refinery	0.24	4.36
5602500005	Casper Refinery	0.32	5.85
5602500005	Casper Refinery	0.50	26.48
5602500005	Casper Refinery	0.17	3.04
5602500005	Casper Refinery	0.16	2.84
5602500005	Casper Refinery	0.28	5.17
5602500005	Casper Refinery	0.19	3.44
5602500005	Casper Refinery	0.10	1.80
5602500005	Casper Refinery	0.05	0.86
5602500005	Casper Refinery	0.21	3.79
5602500005	Casper Refinery	0.50	9.11
5602500005	Casper Refinery	0.33	9.48
5602500005	Casper Refinery	0.52	28.02
5602500005	Casper Refinery	0.32	9.11
5602500005	Casper Refinery	0.29	5.50
5602500005	Casper Refinery	1.39	3.76
5602500005	Casper Refinery	0.61	1.16
5602500005	Casper Refinery	0.05	1.00
5602500005	Casper Refinery	297.84	
5602500005	Casper Refinery	0.08	2.08
5602500006	Mills Harry Thorson Plant		
5602500006	Mills Harry Thorson Plant		
5602500006	Mills Harry Thorson Plant		
5602500006	Mills Harry Thorson Plant		
5602500006	Mills Harry Thorson Plant		28.52
5602500006	Mills Harry Thorson Plant		10.33
5602500006	Mills Harry Thorson Plant		
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5602500006	Mills Harry Thorson Plant		
5602500006	Mills Harry Thorson Plant		
5602500006	Mills Harry Thorson Plant		
5602500020	Casper Extraction Plant	3.60	
5602500020	Casper Extraction Plant	0.02	4.69
5602500020	Casper Extraction Plant	0.00	0.03
5602500020	Casper Extraction Plant	0.00	0.03
5602500020	Casper Extraction Plant	0.46	8.38
5602500020	Casper Extraction Plant	0.53	9.72
5602500020	Casper Extraction Plant	0.23	126.11
5602500020	Casper Extraction Plant	0.64	146.80
5602500020	Casper Extraction Plant	34.31	108.34
5602500020	Casper Extraction Plant	11.76	311.65
5602500020	Casper Extraction Plant	3.56	94.38
5602500020	Casper Extraction Plant	2.27	60.12
5602500020	Casper Extraction Plant	34.30	0.41
5602500020	Casper Extraction Plant	3.17	0.41
5602500020	Casper Extraction Plant		7.56
5602500020	Casper Extraction Plant		0.70
5602500020	Casper Extraction Plant	14.09	
5602500020	Casper Extraction Plant	0.02	0.32
5602500020	Casper Extraction Plant	0.47	8.63
5602500020	Casper Extraction Plant	0.01	0.21
5602500020	Casper Extraction Plant	0.04	0.64
5602500020	Casper Extraction Plant	0.70	
5602500020	Casper Extraction Plant	2.04	0.16
5602500035	Cave Gulch Gas Conditioning Plant	0.00	0.08
5602500035	Cave Gulch Gas Conditioning Plant	0.01	0.32
5602500035	Cave Gulch Gas Conditioning Plant	10.39	2.54
5602500035	Cave Gulch Gas Conditioning Plant	10.38	7.42
5602500035	Cave Gulch Gas Conditioning Plant	1.32	4.81
5602500035	Cave Gulch Gas Conditioning Plant	2.22	3.68
5602500035	Cave Gulch Gas Conditioning Plant	6.90	0.40
5602500035	Cave Gulch Gas Conditioning Plant	2.92	
5602500035	Cave Gulch Gas Conditioning Plant	0.40	
5602500040	Casper Balefill	9.41	
5602500040	Casper Balefill		
5602500040	Casper Balefill		
5602500040	Casper Balefill	0.00	0.00
5602500040	Casper Balefill	0.00	0.02
5602500042	Casper Pump Station	0.53	
5602500042	Casper Pump Station	1.41	
5602500042	Casper Pump Station	2.86	
5602500042	Casper Pump Station	40.55	
5602500042	Casper Pump Station	35.03	
5602500042	Casper Pump Station	0.08	
5602500042	Casper Pump Station	0.06	
5602500042	Casper Pump Station	40.55	
5602500046	Hospital Waste Incinerator	0.16	11.48
5602500046	Hospital Waste Incinerator	0.12	8.53
5602500046	Hospital Waste Incinerator		1.14
5602500046	Hospital Waste Incinerator	0.08	0.98
5602500046	Hospital Waste Incinerator	0.08	1.01
5602500046	Hospital Waste Incinerator		0.44
Total		857.30	1234.21

[1] Western Regional Air Partnership Database, 2002, Plan 02d,
Point Source Detail Report; Individual Unit & Release Point Details

Appendix M – BACT Analysis for NOx Emissions from Boiler #2

Appendix M
BACT Analysis for NOx Emissions from Boiler #2

SCRC performed an economic analysis to demonstrate the additional cost to reduce emissions from 0.035 lb/MMBtu to 0.030 and 0.025 lb/MMBtu. SCRC obtained information from the vendor on flue gas recirculation rates necessary to meet different emission levels and the associated costs. The following tables summarize the analysis:

Table 1 – Cost Effectiveness

NOx Emission Limit (lb/MMBtu)	Flue Gas Recirculation Rate[1] ($\%_v$)	Power required for FGR fan[1] (hp)	Steam required for FGR fan turbine[2] (lb/hr)	Fuel gas required for FGR[3] (MMBtu/hr)
0.035	18	88	4980.8	7.47
0.030	21	102.6	5807.2	8.71
0.025	25	122.2	6916.5	10.37

[1] Provided by boiler/burner manufacturers. Hp was scaled up from a 67.38 MMBtu/hr example.
[2] Based on 56.6 lb/bhp-hr from steam turbine vendor
[3] Based on 1.5 MMBtu/hr per 1000 lbs of steam at an estimated 85% fired efficiency.

Table 1a – Cost Effectiveness

NOx Emission Limit (lb/MMBtu)	Emissions at 99.2 MMBtu/hr[b] (tpy)	Fuel Gas Cost for FGR[a, b] ($/year)	Water Treating Cost for FGR[c] ($/year)	Cost per Ton Removed ($/ton)
0.035	15.20	$261,791	$5,236	Baseline
0.030	13.03	$305,224	$6,105	$20,416
0.025	10.86	$363,532	$7,271	$23,912

[a] Based on a typical purchased gas price of $4/MMBtu. See discussion below.
[b] Based on 8760 hours per year.
[c] SCRC's cost for water and water treating is approximately $0.12/1000 lbs steam.

Table 2 – Incremental Cost Effectiveness

NOx Emission Limit (lb/MMBtu)	Flue Gas Recirculation Rate ($\%_v$)	Additional Power required for FGR fan (hp)	Additional Steam required for FGR fan turbine (lb/hr)	Additional fuel gas required for FGR (MMBtu/hr)
0.035	18	88	4980.8	7.47
0.030	21	14.6	826.4	1.24
0.025	25	19.6	1109.3	1.66

Table 2a – Incremental Cost Effectiveness

NOx Emission Limit (lb/MMBtu)	Tons removed (tpy)	Additional Fuel Gas Cost ($/year)	Additional Water Treating Cost ($/year)	Incremental Cost per Ton Removed ($/ton)
0.035	-	-	-	Baseline
0.030	2.17	$43,433	$869	$20,416
0.025	2.17	$58,308	$1,166	$27,407

SCRC has been working for years to remove more valuable propanes and butanes from our refinery fuel system in order to reduce the total amount of refinery fuel gas produced. To date, WDEQ has approved three projects that were developed for this purpose (waivers AP-7Y1, AP-0779, and AP-11890). The most recent was for a project to capture off spec propane from our refinery fuel gas system for sale to Kinder Morgan which started operation in late 2011. With these projects in operation, the refinery expects to be in the position of having to purchase natural gas on the open market to supplement our refinery produced fuel gas to meet our total fuel gas requirements once Boiler #1 (AQD Permit MD-15042) is in operation. As noted above, fuel gas cost used in our economic evaluation for NOx removal is based on the typical price for purchased natural gas that SCRC uses for budgeting purposes.

Based on the technical feasibility issues and the costs discussed above, SCRC proposes that 0.035 lb/MMBtu is BACT for the new boiler.