State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
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August 28, 2023

FID NO.: 816009590
Email Delivery Only

Matthew Gunn,

Superior Refining Company LLC
13609 E Ayesbury St.
Wichita, KS 67228-8755

SUBJECT: Letter of Noncompliance

Dear Matthew Gunn:

This letter is to inform Superior Refining Company LLC (SRC) that the Department of Natural Resources (department) has obtained information that indicates SRC located in Superior, Wisconsin may not be in compliance with its air pollution control construction permits 12-DCF-256 issued March 15, 2013, 16-RAB-184 issued 02/16/2018, 19-RAB-057 issued 09/27/2019, and 20-RAB-080 issued 10/09/2020 and Wisconsin's air pollution control rules. These areas of noncompliance were documented during an announced routine Partial Compliance Evaluation (PCE) conducted in June 2023, semiannual monitoring reports submitted in 2022 and 2023, and next business day deviation notifications (and follow up reports) submitted between June 12 – August 21, 2023. The department alleges these specific areas of noncompliance:

1. Construction permit 20-RAB-080 condition I.Va.1.c.(7) [ss. NR 405.08 and 439.04(1)(d) Wis. Adm. Code]
    a. Failure to maintain records of each tank cleaning event including the dates the event occurred and the reason for the event, for the cleaning events completed on tanks T88 and T100 in 2021.

2. Construction permit 16-RAB-184 condition I.S.1.c.(4) [ss. NR 420.03(5)(b) and NR 439.04(1)(d) Wis. Adm. Code]
    a. Failure to maintain records of ozone season tank inspections for T68 and T69 in June 2021, T40 and T41 in September 2021, and T25 in July 2022.

3. Construction permit 20-RAB-080 condition I.Va.1.b.(4)(a) – (b) [s. 285.65(3) Wis. Stats. and ss. NR 439.055(3)(a), (4), and 407.09(4)(a)1. Wis. Adm. Code]
    a. Failure to calibrate the device for measuring the storage temperature in tanks T42, T88, T90, T91, T100, T114, T118, and T119 on a minimum annual basis.

4. Construction permit 16-RAB-184 condition I.E.1.a.(3)(a) [s. NR 405.08, Wis. Adm. Code]
    a. Failure to limit SO_2 emissions during a planned startup of the sulfur recovery unit (SRU, P20) to no more than 1,659 lbs. The startup event from June 9-12, 2023, exceeded this limit.

5. Construction permit 16-RAB-184 condition I.E.1.a.(1)(h)(i) [s. NR 405.08 Wis. Adm. Code]
    a. Failure to limit a planned startup period of the SRU (P20) to no longer than 30 hours after startup commences. The startup event from June 9-12, 2023, exceeded this limit.

6. Construction permit 16-RAB-184 condition I.E.1.a.(6)(a) [s. 285.65(7) and (13), Wis. Stats, and 40 CFR §60.102a(f)(1)(i) and §63.1568(a)]
    a. Failure to limit SO_2 emissions from P20 to 250 ppmvd at zero percent excess air. This limit was exceeded June 9-12, 2023, June 17, 2023, and June 18, 2023, due to unstable system conditions

experienced during restart activities.

7. Construction permit 16-RAB-184 condition I.E.1.b.(2) [s. 285.65(3), Wis. Stats.]
    a. Failure to operate the SRU and tail gas treatment unit (TGTU, P20) at all times acid gas is being routed to the SRU. The SRU and TGTU did not operate at all times acid gas was routed to the SRU on June 9-12, 2023, June 17, 2023, and June 18, 2023, due to unstable system conditions experienced during restart activities.

8. Construction permit 16-RAB-184 condition I.E.1.b.(13) [s. NR 439.11(1)(e), Wis. Adm. Code and s. 285.65(3) Wis. Stats.]
    a. Failure to implement the sulfur shedding procedures of the SRU/PMO plan or route off-gases from the sour water stripper and amine acid gas to the flare and caustic scrubber following a period where the SRU/TGTU (P20) "is reasonably anticipated to be non-operational for 3 hours or longer". The sulfur shedding procedures were not implemented after 3 hours of downtime on June 9-12, 2023, and June 17, 2023.

9. Construction permit 16-RAB-184 condition I.E.1.a.(8) [s. NR 417.07(2)(g), Wis. Adm. Code]
    a. Failure to limit SO_2 emissions from the SRU (P20) to 6,743 pounds in any 24-hour period or 843 pounds in any 3-hour period. The SO_2 emission limitations for P20 were exceeded on June 9-12, 2023, June 17, 2023, and June 18, 2023, due to unstable system conditions experienced during restart activities.

10. Construction permit 16-RAB-184 conditions I.E.2.a.(1)(b) and I.E.2.a.(2) [ss. NR 405.08 and 431.05 Wis. Adm. Code]
    a. Failure to limit visible emissions from S14 to 10% opacity on a 6-minute average basis, failure to limit visible emissions to 20% opacity. Visible emission limitations were exceeded on S14 on June 17, 2023, and June 18, 2023, due to unstable system conditions experienced during restart activities.

11. Construction permit 16-RAB-184 conditions I.E.2.a.(1)(a)(ii), I.E.2.b.(3), I.E.5.a.(1)(a)(ii), I.E.5.b. (3), I.E.7.a.(1)(a)(ii), I.E.7.b.(2), I.E.1.b.15 [s. NR 405.08 Wis. Adm. Code]
    a. Failure to operate the TGC (P20) with sufficient temperature and oxygen content to convert sulfur compounds to SO_2. The TGC operated with insufficient temperature and oxygen on June 17, 2023, and June 18, 2023, due to unstable system conditions experienced during restart activities.

12. Construction permit 16-RAB-184 condition I.E.1.a.(1)(b) [s. NR 405.08, Wis. Adm. Code]
    a. Failure to limit sulfur dioxide emissions, when sulfur input to the SRU is equal to or exceeds 0.250 long tons of sulfur averaged in any hour, to the lower of either 218 ppmvd corrected to 0% O_2, or (when utilizing oxygen enrichment) the value calculated using $E_{BACT} = [k_1 \times (-0.038 \times (\%O_2)^2 + 11.53 \times \%O_2 + 25.6)] - 100$. The SO_2 emission limitations for P20 were exceeded on July 25, 2023, during an unplanned shutdown of the SRU.

13. Construction permit 16-RAB-184 condition I.E.1.a.(1)(e)(i) [s. NR 405.08, Wis. Adm. Code]
    a. Failure to route all sulfur pit emissions (subject to the emission limits in I.E.1.a.(1)(b) and I.E.1.a.(1)(c) except as specified in I.E.1.a.(1)(e)(ii)) so that they are eliminated, controlled, or included and monitored as part of the SRU's emissions. Applicable sulfur pit emissions were not eliminated, controlled, or monitored as required on July 25, 2023, due to an unplanned shutdown of the SRU.

14. Construction permit 16-RAB-184 condition I.E.1.a.(1)(f) [s. NR 405.08, Wis. Adm. Code]
    a. Failure to route the off gases from the sour water stripper and amine acid gas from the amine unit, i.e. acid gas, to the SRU at all times except during periods of planned startup or planned shutdown as defined in I.E.1.a.(1)(h). All off gases were not routed to the SRU due to an unplanned shutdown on the SRU on July 25, 2023.

15. Construction permit 16-RAB-184 condition I.E.1.a.(5)(a) [s. 285.65(2) and (3), Wis. Stats., 40 CFR §60.102a(f)(1).]

a. Failure to route all sulfur pit emissions so that they are eliminated, controlled, or included and monitored as part of the SRU's emissions subject to the NSPS Subpart Ja limit for SO_2, as required by the permittee's Global Consent Decree. This was due to an unplanned shutdown of the SRU on July 25, 2023.

16. Construction permit 16-RAB-184 condition I.E.1.a.(6)(a) [s. 285.65(7) & (13), Wis. Stats.; 40 CFR §60.102a(f)(1)(i) and §63.1568(a)]
    a. Failure to not discharge or cause the discharge of any gases containing SO_2 into the atmosphere in excess of either 250 ppmvd at 0% excess air, or (when utilizing oxygen enrichment) the value calculated using $E_{LS} = k_1 \times (-0.038 \times (\%O_2)^2 + 11.53 \times \%O_2 + 25.6)$. Emissions from P20 exceeded the SO_2 emission limit from July 25 - 27, 2023, due to an unplanned shutdown of the SRU.

17. Construction permit 19-RAB-057 conditions I.WW.1.b.(1) and (2) [s. 285.65(3), (7), and (13) Wis. Stats., and 40 CFR 60.592a(d), Subpart VVa]
    a. Failure to complete initial and subsequent inspections and leak monitoring on 34 added components. The components had not been inventoried into the LDAR database leading to the missed monitoring. Initial monitoring was due by April 21, 2023, with subsequent monthly or quarterly monitoring. The initial monitoring was completed on July 25, 2023.

18. Construction permit 19-RAB-057 conditions I.M.3.a.1.(a) and I.M.3.a.2.(a) [ss. NR 405.08 and NR 431.05, Wis. Adm. Code, and s. 285.65(7), Wis. Stats.]
    a. Failure to limit visible emissions from the FCCU, P31, to no more than 20% opacity or number 1 of the Ringlemann chart except as provided in I.M.3.a.(1)(b) and I.M.3.a.(2)(b):
        i. During periods of startup, shutdown, or hot standby, the permittee may elect to maintain the inlet velocity to the primary internal cyclones of the catalytic cracking unit catalyst regenerator at or above 20 feet per second on an hourly average basis and implement good air pollution control practices to minimize visible emissions.
    b. During startup of the FCCU, P31, on August 4 – 20, 2023 (torch oil first introduced to the FCCU on August 4th, startup by definition ended 40 hours after torch oil is introduced; hydrocarbon first introduced to the FCCU on August 20, 2023) there were numerous 6-minute periods of greater than 20% opacity.

19. Construction permit 19-RAB-057 conditions I.M.4.a.1.b., I.M.4.a.2.b., and I.M.4.a.3.a. [s. NR 405.08, Wis. Adm. Code]
    a. Failure to limit CO emissions from the FCCU, P31, to no more than 500 ppmdv CO corrected to 0% O_2 (1-hour average), except as provided in I.M.4.a.(1)(c), I.M.4.a.(2)(c), and I.M.4.a.(3)(b).
    b. During startup of the FCCU, P31, on August 4 – 20, 2023 (torch oil first introduced to the FCCU on August 4th, startup by definition ended 40 hours after torch oil is introduced; hydrocarbon first introduced to the FCCU on August 20, 2023) there were several 1-hour periods of greater than 500 ppmdv CO.

20. Construction permit 19-RAB-057 condition I.M.1.a.(1)(b) [s. NR 405.08, Wis. Adm. Code]
    a. Failure to limit SO_2 emissions from the FCCU, P31, to no more than 50 ppmvd SO_2 corrected to 0% O_2, on a 7-day rolling average basis, except as provided in I.M.1.a.(1)(c). This SO_2 emission limitation was exceeded during startup of the FCCU on August 4 – 20, 2023.

21. Construction permit 12-DCF-256 conditions I.A.1.a.(1) and I.Aa.1.a.(1) [s. NR 417.05, Wis. Adm. Code, 40 CFR §60.104(a)(1) and §60.103a(h), and ss. 285.65(7) and (13), Wis. Stats.]
    a. Failure to ensure the gas to be burned in any affected flare, and the hydrogen sulfide content of the gas exiting the caustic scrubber does not exceed 162 ppmv, on a 3-hour rolling average basis (except process upset gases or fuel gas released to the flare as a result of relief valve leakage or other emergency malfunctions).
    b. Below-design-standard flow of caustic to the caustic scrubber on August 18, 2023, resulted in elevated hydrogen sulfide emissions being routed to the flare.

Based on this information, the department finds SRC may not be in compliance with air pollution control construction permits construction permits 12-DCF-256, 16-RAB-184, 19-RAB-057, and 20-RAB-080 and Wisconsin's air

pollution control rules. If there is noncompliance, SRC will remain in noncompliance until all requirements of the permit are met. The department requests that SRC submit a written response to this letter, including but not limited to, an explanation of the circumstances that led to the alleged noncompliance and details the steps SRC has taken, and/or will take, to return to compliance and prevent future reoccurrence.

This information is requested in accordance with s. NR 439.03(1), Wis. Adm. Code and must be submitted within 10 days upon receipt of this letter.

If there are any questions regarding this matter, contact me by telephone at (608) 733-0326 or by e-mail at michalee.leuthard@wisconsin.gov.

Sincerely,

Michalee Leuthard

Michalee Leuthard
AIR MANAGEMENT ENGINEER-SEN
Bureau of Air Management

Ec: Mark Darby – Environmental Manager, Superior Refining Company LLC
Dave Beattie – Environmental Specialist, Superior Refining Company LLC
Ross Lovely – Senior Environmental Advisor, Superior Refining Company LLC
Randy Matty – Regional Supervisor, WI DNR Air Management Program

Superior Refining Company LLC

1. Event Information:

Start Date:	6/9/2023
Start Time (24-hr time):	9:55
End Date:	6/12/2023
End Time (24-hr time):	11:15
Duration(hours):	73.33
Description:	SRU and TGTU Startup
Cause:	Initial startup of the SRU and TGTU, malfunctioning tail gas analyzer, and inadvertent bypass of the TGTU amine system.
Action(s):	SRC recognized and reacted to the situation immediately. SRC instrument technicians began work around the clock to troubleshoot the faulty tail gas analyzer. Additional subject matter experts were brought to site to help troubleshoot the issue(s) as well. After the fact, engineering and operations engaged in a root cause analysis to better understand the cause and identified corrective actions to prevent recurrence, which includes installing the proper flow restrictor for the Brimestone analayzer and replacing the TGTU Quench Tower overhead valve, both of which will be completed at the next scheduled shutdown/turnaround.
Comments:	This event is the result of the initial startup of the SRU and TGTU after being shut down for over 5 years. The SRU was brought online to stable condition quickly, however, problems with the tail gas analyzer delayed startup of the TGTU. In addition, once the tail gas analyzer was working properly, SO2 readings remained elevated due to a faulty valve which resulted in the TGTU amine system being inadvertently bypassed. In order to ensure good air pollution control, the most prudent decision from an emissions perspective was to maintain consistent unit charge rates and acid gas/sulfur production. This ensured operation and stability of the SRU could be maintained, thereby avoiding additional SO2 emissions from a SRU shutdown, meltout, and burnout as well as subsequent emissions from a second startup of the SRU. Moreover, maintaining stable operations at the SRU facilitated efficient troubleshooting of the source of the ongoing event.

2. Reporting Information:

Date	Time	Agency	Agency Contact	Caller
6/9/2023	18:06	Wisconsin Emergency Management (WEM / SERC / EPCRA), (800) 943-0003	No name/contact information given	David Beattie
6/9/2023	18:13	Douglas County Emergency Government (LEPC), (715) 817-1899	Dave Sletten (voicemail)	David Beattie
6/9/2023	18:17	Wisconsin Department of Natural Resources (WDNR), (608) 733-0326	Michalee Leuthard (voicemail)	David Beattie
6/9/2023	18:21	Superior Fire Department, (715) 395-1680	Joe	David Beattie
6/9/2023	18:24	Wisconsin Department of Natural Resources (WDNR), (608) 219-2182	Caroline Rice	David Beattie
6/9/2023	18:28	Douglas County Emergency Government (LEPC), (715) 817-1899	Dave Sletten	David Beattie
6/9/2023	18:40	Wisconsin Department of Natural Resources (WDNR), (608) 219-2182	Caroline Rice	David Beattie
6/10/2023	17:55	Wisconsin Department of Natural Resources (WDNR), (608) 219-2182	Caroline Rice (text message)	David Beattie
6/11/2023	20:56	Wisconsin Department of Natural Resources (WDNR), (608) 219-2182	Caroline Rice (text message)	David Beattie
6/12/2023	9:03	Wisconsin Department of Natural Resources (WDNR), (715) 828-8544	Jeff Paddock	David Beattie
6/12/2023	10:49	Wisconsin Department of Natural Resources (WDNR), (608) 733-0326	Michalee Leuthard	David Beattie
6/12/2023	14:58	Wisconsin Department of Natural Resources (WDNR), (608) 733-0326	Michalee Leuthard (email)	David Beattie

Superior Refining Company LLC

3. Applicable Requirements Summary Information:

Source ID: Facility-wide, Total Facility Applicable Requirements

Date: 6/8/2023 Duration (hr): 96 Excess Emissions (lbs): 8083.9

Air Pollutant	Applicable Requirement	Description
Sulfur dioxide	40 CFR Part 355, 40 CFR Part 355 Appendix A40 CFR 355.30(a) & (b)	EPCRA - SO2 Release > 500 Pounds

Superior Refining Company LLC

3. Applicable Requirements Summary Information:

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Duration (hr): 96 Excess Emissions (lbs): 9533.6

Air Pollutant	Applicable Requirement	Description
Sulfur dioxide	2010 Consent Decree, V.H.44.b.i.	SO2 > 150ppm (24-hr rolling average)(Consent Decree)
Sulfur dioxide	16-RAB-184, I.E.1.a.(1)(b)	SO2 > 150ppm (24-hr rolling average)
Greenhouse gases	16-RAB-184, I.E.8.a.(1)	SO2 > 150ppm (24-hr rolling average)

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Duration (hr): 84 Excess Emissions (lbs): 9418.0

Air Pollutant	Applicable Requirement	Description
Sulfur dioxide	40 CFR Part 60, Subpart Ja, 60.102a(f)(1)(i)	SO2 > 250ppm (12-hr rolling average)(NSPS)
NESHAP	16-RAB-184 (40 CFR Part 63, Subpart UUU), III.UUU.(63.1568)(a)(1)	SO2 > 250ppm (12-hr rolling average)
NSPS	16-RAB-184 (40 CFR Part 60, Subpart Ja), III.Ja.2.(60.102a)(f)(1)(i)	SO2 > 250ppm (12-hr rolling average)
Sulfur dioxide	16-RAB-184, I.E.1.a.(6)(a)	SO2 > 250ppm (12-hr rolling average)

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Duration (hr): 74 Excess Emissions (lbs): 8413.6

Air Pollutant	Applicable Requirement	Description
Sulfur dioxide	2010 Consent Decree, V.H.44.a.i.	SO2 > 250ppm (12-hr rolling average)(Consent Decree)

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Duration (hr): 71 Excess Emissions (lbs): 14.1

Air Pollutant	Applicable Requirement	Description
Sulfur dioxide	2010 Consent Decree, V.H.45.a.	Sulfur Pit Emissions
Sulfur dioxide	16-RAB-184, I.E.1.a.(5)(a)	Sulfur Pit Emissions
Sulfur dioxide	16-RAB-184, I.E.1.a.(1)(e)(i)	Sulfur Pit Emissions

3. Applicable Requirements Summary Information:

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Duration (hr): 30 Excess Emissions (lbs): 5930.2

Air Pollutant	Applicable Requirement	Description
Sulfur dioxide	16-RAB-184, I.E.1.a.(3)(a)	SO2 startup emissions greater than 1,659 lbs

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Duration (hr): 3 Excess Emissions (lbs): 275.0

Air Pollutant	Applicable Requirement	Description
Sulfur dioxide	16-RAB-184, I.E.1.a.(8)	SO2 > 6,743 lbs during 24-hr period and/or SO2 > 843 lbs during 3-hr period

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Duration (hr): 50 Excess Emissions (lbs): NA

Air Pollutant	Applicable Requirement	Description
Sulfur dioxide	16-RAB-184, I.E.1.b.(2)	Did not operate TGTU when Acid Gas routed to SRU

4. Applicable Requirements Detailed Information:

Source ID: Facility-wide, Total Facility Applicable Requirements

Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 8083.9

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	40 CFR Part 355	40 CFR Part 355 Appendix A	40 CFR 355.30(a) & (b)	(a) The requirements of this section apply to any facility at which a hazardous chemical is produced, used or stored and (b) at which there is release of a reportable quantity of any extremely hazardous substance or CERCLA hazardous substance at/from the facility.

Comment:

The EPCRA reporting threshold of 500 lbs of SO2 above permitted limits was exceeded during the time period of 18:00 on 6/8/2023 to 18:00 on 6/12/2023 for a total of four (4) 24-hr periods. See attached spreadsheets "6/9/2023 Startup of SRU and TGTU Refinery Wide Excess SO2 and H2S Emissions by Source" for associated emissions.

4. Applicable Requirements Detailed Information:

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 9533.6

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	2010 Consent Decree	V.H.	44.b.i.	When the sulfur input rate to the SRP meets or exceeds 6 long tons per day of Fresh Feed, SO2 emissions shall not exceed 150 ppmvd SO2 at 0% oxygen on a 24-hour rolling average;

Comment:

The Title V and GCD 150 ppm SO2 corrected 24-hr RA was exceeded from 09:00 on 6/9/2013 to 09:00 on 6/13/2023 for a total of four (4) 24-hr periods. See attached spreadsheet "6/9/2023 SRU/TGTU Startup Incinerator CEM Data" for associated emissions.

Greenhouse gases	16-RAB-184	I.E.8.a.	(1)	Best Available Control Technology (BACT): BACT for Process S14/P20 (the SRU/TGTU) is meeting the SO2 BACT for Process S14/P20. The permittee shall comply with condition I.E.1.a.(1) and (4).

Comment:

The Title V and GCD 150 ppm SO2 corrected 24-hr RA was exceeded from 09:00 on 6/9/2013 to 09:00 on 6/13/2023 for a total of four (4) 24-hr periods. See attached spreadsheet "6/9/2023 SRU/TGTU Startup Incinerator CEM Data" for associated emissions.

Sulfur dioxide	16-RAB-184	I.E.1.a.	(1)(b)	When sulfur input to the SRU is equal to or exceeds 0.250 long tons of sulfur averaged in any hour, emissions shall not exceed the limit in I.E.1.a.(1)(b)(i) or I.E.1.a.(1)(b)(ii), whichever is lower: (i)218 parts per million on a dry basis (ppmvd) corrected to 0% O2, averaged over any 24-hour period5 or; (ii)The value calculated using the following equation: EBACT = [k1 x (-0.038 x (%O2)2 + 11.53 x %O2 + 25.6)] - 100 Where: EBACT = Emission limit in ppmvd and corrected to 0% O2,

4. Applicable Requirements Detailed Information:

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 9533.6

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	16-RAB-184	I.E.1.a.	(1)(b)	averaged over any 24-hour period k1 = 1.0 %O2 = O2 concentration of the air/oxygen mixture supplied to the Claus burner, percent by volume (dry basis). If only ambient air is used for the Claus burner use 20.9% for %O2.

Comment:

The Title V and GCD 150 ppm SO2 corrected 24-hr RA was exceeded from 09:00 on 6/9/2013 to 09:00 on 6/13/2023 for a total of four (4) 24-hr periods. See attached spreadsheet "6/9/2023 SRU/TGTU Startup Incinerator CEM Data" for associated emissions.

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 9418.0

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
NESHAP	16-RAB-184 (40 CFR Part 63, Subpart UUU)	III.UUU.	(63.1568)(a)(1)	Meet each emission limitation in Table 29 of this subpart that applies to you. If your sulfur recovery unit is subject to the NSPS for sulfur oxides in §60.104 or §60.102a(f)(1) of this chapter, you must meet the emission limitations for NSPS units.

Comment:

The Title V / Ja 250 ppm SO2 corrected 12-hr RA was exceeded from 09:00 on 06/9/2023 to 21:00 on 6/12/2023 for a total of seven (7) 12-hr periods. See attached spreadsheet "6/9/2023 SRU/TGTU Startup Incinerator CEM Data" for associated emissions.

NSPS	16-RAB-184 (40 CFR Part 60, Subpart Ja)	III.Ja.2.	(60.102a)(f)(1)(i)	For a sulfur recovery plant with an oxidation control system or a reduction control system followed by incineration, the owner or operator shall not discharge or cause the discharge of any gases containing SO2 into the atmosphere in excess of the emission limit calculated using Equation 1 of this section. For Claus units that use only ambient air in the Claus burner or that elect not to monitor O2 concentration of the air/oxygen mixture used in the Claus burner or for non-Claus sulfur recovery plants, this SO2 emissions limit is 250 ppmv (dry basis) at zero percent excess air. ELS = [k1 x (-0.038 x (%O2)2 + 11.53 x %O2 + 25.6)] - 100 Where: ELS = Emission limit for large sulfur recovery plant, ppmv (as SO2, dry basis at zero percent excess air); k1 = Constant factor for emission limit conversion: k1 = 1 for converting to the SO2 limit for a sulfur recovery plant with an oxidation control system or a reduction control system followed by incineration and k1 = 1.2 for converting to the reduced sulfur compounds limit for a sulfur recovery plant with a reduction control system not followed by incineration; and %O2 = O2 concentration of the air/oxygen mixture supplied to the Claus burner, percent by volume (dry basis). If only ambient

4. Applicable Requirements Detailed Information:

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 9418.0

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
NSPS	16-RAB-184 (40 CFR Part 60, Subpart Ja)	III.Ja.2.	(60.102a)(f)(1)(i)	air is used for the Claus burner or if the owner or operator elects not to monitor O2 concentration of the air/oxygen mixture used in the Claus burner or for non-Claus sulfur recovery plants, use 20.9% for %O2.

Comment:

The Title V / Ja 250 ppm SO2 corrected 12-hr RA was exceeded from 09:00 on 06/9/2023 to 21:00 on 6/12/2023 for a total of seven (7) 12-hr periods. See attached spreadsheet "6/9/2023 SRU/TGTU Startup Incinerator CEM Data" for associated emissions.

Sulfur dioxide	40 CFR Part 60, Subpart Ja	60.102a	(f)(1)(i)	For a sulfur recovery plant with an oxidation control system or a reduction control system followed by incineration, the owner or operator shall not discharge or cause the discharge of any gases containing SO2 into the atmosphere in excess of the emission limit calculated using Equation 1 of this section. For Claus units that use only ambient air in the Claus burner or that elect not to monitor O2 concentration of the air/oxygen mixture used in the Claus burner or for non-Claus sulfur recovery plants, this SO2 emissions limit is 250 ppmv (dry basis) at zero percent excess air. ELS = [k1 x (-0.038 x (%O2)2 + 11.53 x %O2 + 25.6)] - 100 Where: ELS = Emission limit for large sulfur recovery plant, ppmv (as SO2, dry basis at zero percent excess air); k1 = Constant factor for emission limit conversion: k1 = 1 for converting to the SO2 limit for a sulfur recovery plant with an oxidation control system or a reduction control system followed by incineration and k1 = 1.2 for converting to the reduced sulfur compounds limit for a sulfur recovery plant with a reduction control system not followed by incineration; and %O2 = O2 concentration of the air/oxygen mixture supplied to the Claus burner, percent by volume (dry basis). If only ambient air is used for the Claus burner or if the owner or operator elects not to monitor O2 concentration of the air/oxygen mixture used in the Claus burner or for non-Claus sulfur recovery plants, use 20.9% for %O2.

Comment:

The Title V / Ja 250 ppm SO2 corrected 12-hr RA was exceeded from 09:00 on 06/9/2023 to 21:00 on 6/12/2023 for a total of seven (7) 12-hr periods. See attached spreadsheet "6/9/2023 SRU/TGTU Startup Incinerator CEM Data" for associated emissions.

Sulfur dioxide	16-RAB-184	I.E.1.a.	(6)(a)	NSPS/NESHAP Limit: (a) The permittee shall not discharge or cause the discharge of any gases containing SO2 into the atmosphere in excess of the emission limit calculated using Equation 1 of this section. For Claus units that use only ambient air in the Claus burner or that elect not to monitor O2 concentration of the air/oxygen mixture used in the Claus burner or for non-Claus sulfur recovery plants, this SO2 emissions limit is 250 ppmv (dry basis) at zero percent excess air. ELS = k1 x (-0.038 x (%O2)2 + 11.53 x %O2 + 25.6) [Eq. 1] Where: ELS = Emission limit for large sulfur recovery plant, ppmv (as

4. Applicable Requirements Detailed Information:

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 9418.0

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	16-RAB-184	I.E.1.a.	(6)(a)	SO2, dry basis at zero percent excess air); k1 = 1.0 %O2 = O2 concentration of the air/oxygen mixture supplied to the Claus burner, percent by volume (dry basis). If only ambient air is used for the Claus burner or if the owner or operator elects not to monitor O2 concentration of the air/oxygen mixture used in the Claus burner or for non-Claus sulfur recovery plants, use 20.9% for %O2.

Comment:

The Title V / Ja 250 ppm SO2 corrected 12-hr RA was exceeded from 09:00 on 06/9/2023 to 21:00 on 6/12/2023 for a total of seven (7) 12-hr periods. See attached spreadsheet "6/9/2023 SRU/TGTU Startup Incinerator CEM Data" for associated emissions.

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 8413.6

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	2010 Consent Decree	V.H.	44.a.i.	The Superior Refinery SRP shall, for all periods of operation of the SRP, comply with 40 C.F.R. § 60.102a(f) at each SRP except during periods of Startup, Shutdown or Malfunction of the respective SRP, or during a Malfunction of a TGU serving as a control device for the SRP. For the purpose of determining compliance with the SRP emission limits of 40 C.F.R. § 60.102a(f), the “Startup/Shutdown” provisions set forth in NSPS Subpart A shall apply to each SRP and not to the independent startup or shutdown of a TGU serving as a control device for the SRP. However, the Malfunction exemption set forth in NSPS Subpart A shall apply to each SRP and to the TGU serving as the control device for the SRP.

Comment:

The GCD 250 ppm SO2 corrected 12-hr RA was exceeded from 20:00 on 6/9/2023 to 22:00 on 6/12/2023 for a total of 74 one-hour periods. See attached spreadsheet "6/9/2023 SRU/TGTU Startup Incinerator CEM Data" for associated emissions.

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 14.1

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	16-RAB-184	I.E.1.a.	(1)(e)(i)	The facility shall route all sulfur pit emissions so that they are

4. Applicable Requirements Detailed Information:

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 14.1

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	16-RAB-184	I.E.1.a.	(1)(e)(i)	eliminated, controlled, or included and monitored as part of the SRU's emissions subject to the emission limits in I.E.1.a.(1)(b) and I.E.1.a.(1)(c) except as specified in I.E.1.a.(1)(e)(ii). (ii)The requirement to eliminate, control or include and monitor all sulfur pit emissions in I.E.1.a.(1)(e)(i) shall not apply during the following periods: (A)During periods of maintenance of the sulfur pit, which shall not exceed 240 hours per year. (B)During planned startup and shutdown periods as defined in I.E.1.a.(1)(h), provided that during such periods the permittee follows the procedures in the SRU/PMO plan required to be developed and implemented under I.E.9.a.(1) and complies with the MSS requirements contained in§63.1568(a)(4) of 40 CFR Part 63, Subpart UUU. (iii) The owner or operator must document the time periods during which the sulfur pit vents were not controlled and measures taken to minimize emissions during these periods. Examples of these measures include not adding fresh sulfur or shutting off vent fans.

Comment:

Visible emissions from the Sulfur Pit vents were observed from 11:00 on 6/9/2023 to 10:00 on 6/12/2023 (71.0 hrs). See attached "Emission Estimates from the Sulfur Pit Incident Occurring On: 6/9/2023" for associated emission calculations.

Sulfur dioxide	2010 Consent Decree	V.H.	45.a.	By no later than the Date of Entry, each of the Murphy Refineries shall route all sulfur pit emissions so that they are eliminated, controlled, or included and monitored as part of the SRP's emissions subject to the NSPS Subpart Ja limit for SO2, 40

Comment:

Visible emissions from the Sulfur Pit vents were observed from 11:00 on 6/9/2023 to 10:00 on 6/12/2023 (71.0 hrs). See attached "Emission Estimates from the Sulfur Pit Incident Occurring On: 6/9/2023" for associated emission calculations.

Sulfur dioxide	16-RAB-184	I.E.1.a.	(5)(a)	Global Consent Decree Limits on Sulfur Pit Emissions: The facility shall route all sulfur pit emissions so that they are eliminated, controlled, or included and monitored as part of the SRU's emissions subject to the NSPS Subpart Ja limit for SO2, 40 CFR §60.102a(f)(1).7 (b) The requirement to eliminate or control all sulfur pit emission in I.E.1.a.(5)(a) shall not apply during periods of maintenance of the sulfur pit, which shall not exceed 240 hours per year. The owner or operator must document the time periods during which the sulfur pit vents were not controlled and measures taken to minimize emissions during these periods. Examples of these measures include not adding fresh sulfur or shutting off vent fans.

Comment:

Visible emissions from the Sulfur Pit vents were observed from 11:00 on 6/9/2023 to 10:00 on 6/12/2023 (71.0 hrs). See attached "Emission Estimates from the Sulfur Pit Incident Occurring On: 6/9/2023" for associated emission calculations.

4. Applicable Requirements Detailed Information:

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)
Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 14.1

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)
Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 5930.2

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	16-RAB-184	I.E.1.a.	(3)(a)	Best Available Control Technology (BACT) emission limitation specific to planned startup periods: (a)Sulfur dioxide emissions during a planned startup as defined in I.E.1.a.(h)(i) may not exceed 1,659 pounds.

Comment:

Acid Gas was initially routed to the SRU at 09:55 on 6/9/2023 commencing a planned startup of the SRU. The startup period commences at the beginning of the hour when the amine acid gas is first routed to the SRU (09:00 on 6/9/2023) and concludes no later than 30 hours after the startup period commences (15:00 on 6/10/2023). The 1,659 of allowed SO2 emissions associated with startup was exceeded at 15:00 on 6/9/2023. Over the course of the entire 30 hour startup period, a total of 7,589.2 lbs of SO2 emissions were released (sum of allowable emissions plus excess emissions) resulting in 5,930.2 lbs of excess SO2 startup emissions. See attached spreadsheet "6/9/2023 SRU/TGTU Startup Incinerator CEM Data" for associated emissions.

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)
Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): 275.0

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	16-RAB-184	I.E.1.a.	(8)	The sulfur dioxide emissions from any Claus sulfur recovery plant (SRU) may not exceed 6,743 pounds of sulfur dioxide in any 24-hour period or 843 pounds of sulfur dioxide in any 3-hour period.

Comment:

The 843 lbs of SO2 in any 3-hr period limit was exceeded from 10:00 to 13:00 on 6/9/2023 for a total of one (1) 3-hr period.

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)
Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): NA

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text

4. Applicable Requirements Detailed Information:

Source ID: P20, Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU) and Tail Gas Combustor (TGC)

Date: 6/9/2023 Excess emissions associated with the following conditions (lbs): NA

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	16-RAB-184	I.E.1.b.	(2)	The permittee shall at all times that acid gas is routed to the SRU operate the SRU and TGTU.

Comment:

Acid gas was being routed to the SRU Reaction Furnace while starting/bypassing the TGTU from 09:55 on 6/9/2023 to 11:55 on 6/11/2023 for a total duration of 50.0 hours.

6/9/2023 SRU and TGTU Startup
Event Chronology

Unit Activity	Date	Time	Rate
Acid Gas to SRU Reaction Furnace (startup period commences at beginning of 09:00 hour)	6/9/2023	09:55	
Sulfur Make	6/9/2023	10:00	7 LTD
Crude Chage (FCCU not yet operating)	6/9/2023	09:55	30,000 BPD
# 2 Duf Charge	6/9/2023	10:00	3,400 BPD
Visible emissions from Sulfur Pit observed and ongoing	6/9/2023	11:00	
Exceeded permitted SRU startup limits for SO2 (1,659 lbs)	6/9/2023	15:00	
Exceeded 500lbs above permitted SRU startup limits for SO2 - EPCRA Reportable	6/9/2023	18:00	
Troubleshooting of Tail Gas analyzer by SRC instrument technicians/operations/maintenance	6/9/2023		
Maintaining current charge rates throughout startup event to ensure stability of SRU while troubshooting	6/9/2023		
Sulfur Make	6/9/2023	18:00	7.6 LTD
Crude Chage (FCCU not yet operating)	6/9/2023	18:00	27,400 BPD
# 2 Duf Charge	6/9/2023	18:00	3,500 BPD
Troubleshooting efforts continue	6/10/2023		
3rd party company (Sulfur Experts) brought to site to help continue troubleshooting analyzer	6/10/2023	21:00	
Troubleshooting by SRC operations/maintenance and Sulfur Experts continues	6/11/2023		
Feed to TGTU, SO2 readings still elevated due to faulty valve causing bypass of TGTU amine system	6/11/2023	11:55	
Visible emissions from Sulfur Pit ceased	6/12/2023	10:00	
Instantaneous SO2 Corrected < 150 ppm	6/12/2023	11:15	
SO2 1-hr average < 150 ppm	6/12/2023	12:00	
Sulfur Make	6/12/2023	12:00	6.7 LTD
Crude Chage (FCCU not yet operating)	6/12/2023	12:00	30,000 BPD

6/9/2023 SRU/TGTU Startup Incinerator CEM Data

Starting Date & Time	SO2 Corr ppmvd 1 hr Avg	SO2 Corr ppmvd 12 hr RA (> 250 ppmvd)	SO2 Corr ppmvd 24 hr RA (> 150 ppmvd)	O2 1 hr Avg	O2 3 hr RA (<2 %)	Stack Temp 1 hr Avg	Stack Temp 3 hr RA (<1180 Deg F)	SO2 Lbs / hr 1 hr Avg	StkFlowQ 1 hr Avg SCFM	H2S Lbs/hr 1 hr Avg	Title V SO2 Lbs / hr 3 hr Sum (> 843 lbs)	Title V SO2 Lbs / hr 24 hr Sum (> 6,743 lbs)	Title V & Subp. Ja 12 hr 250 ppmvd SO2 allowable emissions lbs/hr	Title V & Subp. Ja 12 hr 250 ppmvd SO2 excess emissions lbs/hr	Title V & Subp. Ja 12 hr 250 ppmvd SO2 excess emissions 12 hr sum (lbs)	EPCRA 24 Hr Total SO2 emissions	GCD 12 hr 250 ppmvd allowable emissions	GCD 12 hr 250 ppmvd excess emissions	Title V & GCD 24 hr 150 ppmvd allowable emissions	Title V & GCD 24 hr 150 ppmvd excess emissions	Title V & GCD 24 hr 150 ppmvd excess emissions 24 hr sum	Comments
06/09/2023 09:00	861.4	NA	NA	6.72	6.28	1233.3	1237.7	14.7	2171	0.0	14.7	14.7	4.27	10.43			3.73		2.56	12.14		Acid Gas to SRU Rx Furnace 09:55, Startup period commences at beginning of 9:00 hour
06/09/2023 10:00	20027.3	NA	NA	4.46	5.72	1237.0	1236.6	369.3	2530	0.1	384.0	384.0	4.61	364.70			5.04		2.77	366.54		
06/09/2023 11:00	20333.6	NA	NA	4.32	5.17	1237.4	1235.9	382.1	2560	0.1	766.1	766.1	4.70	377.40			5.15		2.82	379.28		
06/09/2023 12:00	19399.6	NA	NA	4.27	4.35	1237.6	1237.4	366.6	2571	0.1	1118.0	1132.7	4.72	361.90			5.19		2.83	363.79		
06/09/2023 13:00	17605.5	NA	NA	4.30	4.30	1238.0	1237.7	329.3	2551	0.1	1078.1	1462.1	4.68	324.66			5.14		2.81	326.53		
06/09/2023 14:00	14721.4	NA	NA	4.50	4.36	1238.0	1237.9	252.6	2366	0.1	948.5	1714.6	4.29	248.27			4.71		2.57	249.99		Exceeded permitted startup limit at 15:00 (Limit = 1,659 lbs SO2)
06/09/2023 15:00	12844.9	NA	NA	4.55	4.45	1237.8	1237.9	214.6	2324	0.1	796.5	1929.2	4.18	210.41			4.61		2.51	212.08		
06/09/2023 16:00	11319.4	NA	NA	4.48	4.51	1238.0	1237.9	194.2	2379	0.1	661.3	2123.4	4.29	189.90			4.74		2.57	191.62		
06/09/2023 17:00	12654.5	NA	NA	4.38	4.47	1238.0	1237.9	229.1	2492	0.1	637.9	2352.5	4.53	224.61		2352.55	4.99		2.72	226.42		Exceeded 500 lbs of SO2 above permitted startup limits at 18:00
06/09/2023 18:00	12839.7	NA	NA	4.36	4.41	1238.2	1238.0	231.7	2507	0.1	655.1	2584.3	4.58	227.16			5.03		2.75	228.99		
06/09/2023 19:00	12379.8	NA	NA	4.38	4.38	1238.2	1238.1	225.2	2477	0.1	686.1	2809.5	4.55	220.64			4.96		2.73	222.46		
06/09/2023 20:00	12896.2	13973.6	NA	4.37	4.37	1238.1	1238.2	235.6	2493	0.1	692.6	3045.1	4.57	231.06	2991.2		5.00	274.38	2.74	232.89		First 12-hr rolling average
06/09/2023 21:00	12845.6	14972.3	NA	4.36	4.37	1238.3	1238.2	234.9	2511	0.1	695.7	3280.0	4.57	230.31			5.04	296.65	2.74	232.14		
06/09/2023 22:00	11963.3	14300.3	NA	4.35	4.36	1238.1	1238.2	219.3	2518	0.1	689.8	3499.3	4.58	214.75			5.05	284.07	2.75	216.58		
06/09/2023 23:00	12894.2	13662.9	NA	4.31	4.34	1238.3	1238.2	232.1	2501	0.1	686.3	3731.4	4.57	227.52			5.03	270.01	2.74	229.35		
06/10/2023 00:00	11883.9	13036.5	NA	4.33	4.33	1237.5	1238.0	215.6	2484	0.1	667.0	3947.0	4.54	211.05			4.99	255.34	2.72	212.87		
06/10/2023 01:00	14070.6	12742.0	NA	4.31	4.32	1238.2	1238.0	268.7	2612	0.1	716.4	4215.7	4.77	263.91			5.26	262.63	2.86	265.82		
06/10/2023 02:00	13077.0	12604.9	NA	4.47	4.37	1238.4	1238.0	236.9	2493	0.1	721.2	4452.6	4.53	232.36			4.97	245.52	2.72	234.17		
06/10/2023 03:00	12829.7	12603.7	NA	4.46	4.41	1237.7	1238.1	233.9	2506	0.1	739.5	4686.5	4.56	229.38			5.00	246.93	2.74	231.20		
06/10/2023 04:00	13279.0	12767.0	NA	4.45	4.46	1238.3	1238.2	244.4	2528	0.1	715.2	4930.9	4.60	239.76			5.04	252.54	2.76	241.60		
06/10/2023 05:00	13328.5	12823.1	NA	4.49	4.47	1238.4	1238.2	247.0	2547	0.1	725.3	5177.8	4.63	242.35			5.07	254.96	2.78	244.20		
06/10/2023 06:00	13305.9	12878.7	NA	4.51	4.48	1238.1	1238.3	247.5	2550	0.1	738.8	5425.3	4.65	242.85			5.07	256.08	2.79	244.71		
06/10/2023 07:00	13737.6	12991.8	NA	4.46	4.48	1238.1	1238.2	259.1	2577	0.1	753.6	5684.4	4.71	254.37			5.14	261.90	2.83	256.25		
06/10/2023 08:00	14523.0	13127.4	13550.5	4.34	4.43	1238.2	1238.1	279.6	2645	0.1	786.2	5964.1	4.81	274.83	2863.4		5.31	273.66	2.89	276.75	5898.37	First 24-hr rolling average
06/10/2023 09:00	15041.9	13310.4	14141.3	4.19	4.33	1238.7	1238.3	285.3	2603	0.1	824.0	6234.7	4.74	280.55			5.28	275.61	2.84	282.45		
06/10/2023 10:00	13162.3	13410.3	13855.3	4.33	4.29	1238.2	1238.4	252.4	2589	0.1	817.3	6117.7	4.79	247.57			5.20	273.91	2.88	249.48		
06/10/2023 11:00	13397.5	13469.7	13566.3	4.30	4.27	1237.8	1238.2	262.5	2625	0.1	800.2	5998.2	4.90	257.64			5.29	279.48	2.94	259.60		
06/10/2023 12:00	14587.4	13695.0	13365.8	4.26	4.30	1238.5	1238.2	289.4	2648	0.1	804.3	5920.9	4.96	284.44			5.34	287.42	2.98	286.42		
06/10/2023 13:00	14514.9	13732.1	13237.0	4.30	4.29	1238.2	1238.2	283.7	2608	0.1	835.6	5875.3	4.89	278.79			5.25	283.18	2.93	280.75		
06/10/2023 14:00	13325.2	13752.7	13178.8	4.39	4.32	1237.8	1238.2	251.8	2539	0.1	824.9	5874.5	4.72	247.10			5.08	274.61	2.83	248.99		Planned startup period concludes at 15:00 (30 hrs after startup period commenced).
06/10/2023 15:00	10817.3	13585.0	13094.4	4.51	4.40	1238.1	1238.1	195.7	2419	0.1	731.2	5855.6	4.52	191.15			4.81	256.51	2.71	192.96		Planned startup SO2 Emissions - Allowable 1,659 lbs, Excess 5,930.2 lbs, Total 7,589.2 lbs
06/10/2023 16:00	4872.3	12884.5	12825.7	4.70	4.53	1238.4	1238.1	80.8	2230	0.0	528.3	5742.2	4.14	76.63			4.38	221.45	2.49	78.28		
06/10/2023 17:00	2747.3	12002.7	12412.9	4.84	4.68	1237.8	1238.1	41.7	2120	0.0	318.2	5554.8	3.80	37.92		5554.77	4.13	194.14	2.28	39.44		
06/10/2023 18:00	3734.6	11205.1	12041.9	4.85	4.79	1238.9	1238.4	57.2	2136	0.0	179.7	5380.3	3.83	53.39			4.16	182.22	2.30	54.92		
06/10/2023 19:00	3003.8	10310.6	11651.2	4.89	4.86	1238.0	1238.3	45.1	2112	0.0	144.1	5200.2	3.76	41.38			4.10	165.04	2.25	42.89		
06/10/2023 20:00	2877.9	9340.2	11233.8	4.90	4.88	1238.7	1238.5	42.2	2057	0.0	144.5	5006.7	3.66	38.49	2035.0		3.99	145.15	2.20	39.95		
06/10/2023 21:00	3964.9	8417.1	10863.8	4.92	4.91	1238.9	1238.5	58.7	2076	0.0	146.0	4830.6	3.70	55.03			4.02	131.45	2.22	56.51		
06/10/2023 22:00	2970.5	7567.8	10489.1	4.95	4.92	1238.0	1238.5	43.1	2048	0.0	144.0	4654.3	3.63	39.47			3.96	115.97	2.18	40.92		
06/10/2023 23:00	3153.3	6714.1	10091.9	4.95	4.94	1238.9	1238.6	46.3	2082	0.0	148.1	4468.5	3.67	42.63			4.03	104.15	2.20	44.10		
06/11/2023 00:00	3061.9	6753.7	9724.4	4.96	4.95	1238.6	1238.5	44.5	2068	0.0	133.9	4297.5	3.63	40.88			4.00	88.02	2.18	42.33		
06/11/2023 01:00	3118.7	4804.0	9268.0	4.99	4.97	1238.3	1238.6	45.4	2076	0.0	136.2	4074.2	3.64	41.77			4.01	72.98	2.18	43.23		
06/11/2023 02:00	3179.6	3958.5	8855.6	5.01	4.99	1239.5	1238.8	46.0	2069	0.0	135.9	3883.3	3.62	42.37			3.99	59.15	2.17	43.82		
06/11/2023 03:00	3359.3	3337.0	8461.0	5.07	5.02	1238.7	1238.8	47.7	2047	0.0	139.1	3697.0	3.55	44.11			3.93	48.53	2.13	45.53		
06/11/2023 04:00	3192.8	3197.1	8040.8	5.09	5.06	1238.0	1238.7	45.6	2061	0.0	139.2	3498.2	3.57	42.01			3.95	46.59	2.14	43.44		
06/11/2023 05:00	3201.1	3234.9	7618.8	5.19	5.12	1238.8	1238.5	45.4	2061	0.0	138.6	3296.7	3.55	41.85			3.93	46.89	2.13	43.27		
06/11/2023 06:00	3111.4	3182.9	7194.0	5.16	5.15	1238.2	1238.4	44.2	2055	0.0	135.2	3093.4	3.55	40.68			3.92	46.03	2.13	42.10		
06/11/2023 07:00	5018.2	3350.8	6830.7	5.26	5.20	1240.2	1239.1	71.5	2044	0.0	161.1	2905.8	3.56	67.92			3.88	48.09	2.14	69.34		
06/11/2023 08:00	2797.5	3344.1	6342.2	5.14	5.18	1240.7	1239.7	39.2	1993	0.0	154.9	2665.4	3.50	35.70	534.4		3.81	47.15	2.10	37.10	2607.82	
06/11/2023 09:00	3565.5	3310.8	5864.0	4.77	5.06	1239.6	1240.2	49.5	1927	0.0	160.1	2429.5	3.47	45.98			3.77	46.16	2.08	47.37		
06/11/2023 10:00	3133.1	3324.4	5446.1	4.50	4.80	1240.7	1240.3	46.1	2005	0.0	134.7	2223.2	3.68	42.41			3.99	49.05	2.21	43.88		
06/11/2023 11:00	2927.7	3305.6	5009.8	4.26	4.51	1240.2	1240.1	45.7	2066	0.0	141.3	2006.4	3.90	41.83			4.17	50.96	2.34	43.39		Feed to TGTU ~11:55
06/11/2023 12:00	3910.5	3376.3	4565.0	4.66	4.47	1243.7	1241.5	53.9	1817	0.0	145.7	1770.9	3.45	50.44			3.58	44.76	2.07	51.82		
06/11/2023 13:00	2965.7	3363.5	4083.8	5.12	4.68	1243.3	1242.4	39.1	1794	0.0	138.7	1526.3	3.30	35.79			3.43	42.76	1.98	37.11		
06/11/2023 14:00	3446.9	3385.8	3672.2	5.10	4.96	1243.7	1243.6	45.5	1797	0.0	138.4	1320.0	3.30	42.16			3.44	43.20	1.98	43.48		
06/11/2023 15:00	2788.3	3338.2	3337.6	4.82	5.01	1244.6	1243.9	36.8	1757	0.0	121.4	1161.1	3.30	33.51			3.43	42.33	1.98	34.83		
06/11/2023 16:00	3109.4	3331.3	3264.2	4.42	4.78	1244.0	1244.1	41.1	1712	0.0	123.3	1121.4	3.30	37.76			3.42	42.18	1.98	39.08		
06/11/2023 17:00	3035.2	3317.5	3276.2	4.41	4.55	1244.0	1244.2	40.3	1719	0.0	118.2	1120.0	3.32	37.02		1120.02	3.44	42.19	1.99	38.35		
06/11/2023 18:00	4321.9	3418.3	3300.6	4.47	4.43	1244.6	1244.2	58.0	1732	0.0	139.4	1120.8	3.36	54.67			3.45	43.74	2.01	56.02		
06/11/2023 19:00	2781.9	3232.0	3291.4	4.49	4.46	1244.0	1244.2	37.0	1726	0.0	135.4	1112.7	3.32	33.67			3.44	40.98	1.99	35.00		
06/11/2023 20:00	2771.6	3229.8	3287.0	4.49	4.48	1244.8	1244.5	37.1	1739	0.0	132.2	1107.7	3.35	33.79	489.0		3.46	41.26	2.01	35.13		
06/11/2023 21:00	2803.1	3166.3	3238.6	4.47	4.48	1243.8	1244.2	37.5	1734	0.0	111.6	1086.4	3.34	34.14			3.46	40.31	2.01	35.47		
06/11/2023 22:00	2658.6	3126.7	3225.6	4.45	4.47	1244.0	1244.2	35.8	1739	0.0	110.5	1079.2	3.37	32.48			3.47	39.93	2.02	33.83		
06/11/2023 23:00	2684.3	3106.5	3206.0	4.46	4.46	1243.9	1243.9	35.8	1722	0.0	109.2	1068.7	3.34	32.49			3.43	39.23	2.00	33.83		
06/12/2023 00:00	2710.4	3006.5	3191.4	4.50	4.47	1243.8	1243.9	36.3	1742	0.0	108.0	1060.5	3.35	32.99			3.47	38.21	2.01	34.33		
06/12/2023 01:00	3018.1	3010.8	3187.2	4.50	4.49	1244.2	1244.0	40.5	1741	0.0	112.7	1055.6	3.35	37.15			3.46	38.24	2.01	38.49		
06/12/2023 02:00	3218.5	2991.8	3188.8	4.51	4.50	1244.9	1244.3	43.3	1742	0.0	120.1	1052.9	3.36	39.90			3.46	37.98	2.02	41.24		
06/12/2023 03:00	3250.2	3030.3	3184.3	4.57	4.53	1243.8	1244.3	43.5	1737	0.0	127.3	1048.7	3.35	40.14			3.44	38.26	2.01	41.48		
06/12/2023 04:00	3048.8	3025.2	3178.3	4.54	4.54	1244.2	1244.3	41.0	1731	0.0	127.8	1044.2	3.36	37.66			3.43	38.13	2.02	39.00		
06/12/2023 05:00	2560.9	2985.7	3151.6	4.56	4.56	1243.4	1243.8	34.7	1739	0.0	119.2	1033.4	3.39	31.29			3.45	37.71	2.03	32.65		
06/12/2023 06:00	2615.2	2843.5	3130.9	4.54	4.55	1243.9	1243.8	35.3	1730	0.0	111.0	1024.5	3.38	31.95			3.43	35.61	2.03	33.30		
06/12/2023 07:00	2805.5	2845.4	3038.7	4.46	4.52	1244.5	1243.9	38.0	1734	0.0	108.0	991.1	3.39	34.60			3.46	35.90	2.03	35.96		
06/12/2023 08:00	3113.9	2874.0	3051.9	4.45	4.48	1243.9	1244.1	41.5	1704	0.0	114.8	993.3	3.33	38.12	422.9		3.40	35.69	2.00	39.45	944.49	
06/12/2023 09:00	4020.1	2975.4	3070.8	4.24	4.38	1243.5	1244.0	53.3	1709	0.0	132.7	997.1	3.31	49.98			3.45	37.65	1.99	51.30		
06/12/2023 10:00	3992.3	3086.5	3106.6	4.16	4.28	1243.1	1243.5	53.1	1702	0.0	147.8	1004.1	3.32	49.77			3.46	39.21	1.99	51.10		
06/12/2023 11:00	531.0	2907.1	3006.8	4.25	4.22	1243.5	1243.3	7.0	1709	0.0	113.4	965.4	3.30	3.70			3.45	36.68	1.98	5.02		Instantaneous SO2 Corrected < 150ppm ~11:15
06/12/2023 12:00	97.9	2689.4	2847.9	4.28	4.23	1243.0	1243.2	1.3	1701	0.0	61.4	912.8	3.29	-2.00			3.43	33.46	1.98	-0.69		
06/12/2023 13:00	98.6	2446.1	2728.4	4.30	4.28	1244.5	1243.7	1.3	1708	0.0	9.6	875.0	3.30	-2.00			3.44	30.21	1.98	-0.68		
06/12/2023 14:00	90.4	2185.4	2588.6	4.36	4.31	1244.2	1243.9	1.2	1720	0.0	3.8	830.8	3.35	-2.14			3.45	26.71	2.01	-0.80		
06/12/2023 15:00	79.4	1921.2	2475.7	4.32	4.33	1244.0	1244.2	1.1	1717	0.0	3.6	795.0	3.34	-2.28			3.45	23.08	2.00	-0.94		
06/12/2023 16:00	70.8	1673.0	2349.1	4.24	4.31	1243.7	1243.9	1.0	1760	0.0	3.3	754.9	3.46	-2.48			3.56	20.24	2.08	-1.10		
06/12/2023 17:00	67.3	1465.2	2225.4	4.17	4.24	1243.6	1243.7	0.9	1754	0.0	3.0	715.5	3.49	-2.55		715.54	3.56	17.30	2.10	-1.16		
06/12/2023 18:00	62.4	1252.4	2048.0	4.10	4.17	1243.1	1243.5	0.9	1770	0.0	2.8	658.4	3.53	-2.65			3.61	14.46	2.12	-1.24		
06/12/2023 19:00	61.7	1023.8	1934.6	4.10	4.12	1243.0	1243.2	0.9	1771	0.0	2.7	622.3	3.53	-2.66			3.61	11.17	2.12	-1.25		
06/12/2023 20:00	59.6	769.3	1821.6	4.09	4.10	1243.0	1243.0	0.9	1777	0.0	2.6	586.0	3.57	-2.72	82.0		3.62	7.53	2.14	-1.29		
06/12/2023 21:00	56.4	439.0	1707.2	4.13	4.11	1243.0	1243.0	0.8	1762	0.0	2.5	549.3	3.50	-2.71			3.58	2.71	2.10	-1.31		
06/12/2023 22:00	57.1	111.0	1598.8	4.12	4.11	1242.9	1243.0	0.8	1777	0.0	2.5	514.3	3.55	-2.74					2.13	-1.32		
06/12/2023 23:00	57.5	71.6	1489.3	4.15	4.13	1242.7	1242.9	0.8	1768	0.0	2.4	479.2	3.52	-2.71					2.11	-1.30		
06/13/2023 00:00	61.0	68.5	1378.9	4.19	4.15	1242.9	1242.9	0.8	1752	0.0	2.5	443.7	3.44	-2.60					2.07	-1.23		
06/13/2023 01:00	63.1	65.6	1255.8	4.22	4.18	1242.7	1242.8	0.9	1773	0.0	2.5	404.1	3.49	-2.61					2.09	-1.21		
06/13/2023 02:00	60.2	63.0	1124.2	4.17	4.19	1242.6	1242.7	0.9	1792	0.0	2.6	361.7	3.57	-2.71					2.14	-1.28		
06/13/2023 03:00	59.2	61.4	991.3	4.15	4.18	1243.0	1242.8	0.8	1781	0.0	2.6	319.1	3.55	-2.71					2.13	-1.29		
06/13/2023 04:00	56.6	60.2	866.6	4.19	4.17	1242.8	1242.8	0.8	1780	0.0	2.5	278.8	3.53	-2.73					2.12	-1.32		
06/13/2023 05:00	57.4	59.4	762.3	4.19	4.18	1242.6	1242.8	0.8	1775	0.0	2.4	245.0	3.53	-2.72					2.12	-1.31		
06/13/2023 06:00	58.7	59.0	655.7	4.17	4.18	1242.6	1242.7	0.8	1779	0.0	2.4	210.5	3.53	-2.70					2.12	-1.29		
06/13/2023 07:00	62.2	59.1	541.4	4.05	4.13	1242.3	1242.5	0.9	1781	0.0	2.5	173.4	3.58	-2.69					2.15	-1.26		
06/13/2023 08:00	60.5	59.2	414.2	3.90	4.04	1242.0	1242.3	0.9	1769	0.0	2.6	132.8	3.55	-2.69					2.13	-1.27	82.91	
06/13/2023 09:00	79.0	61.0	250.0	3.82	3.93	1242.0	1242.1	1.1	1762	0.0	2.8	80.6	3.45	-2.36					2.07	-0.98		
06/13/2023 10:00	83.9	63.3	87.2	3.74	3.82	1242.2	1242.1	1.2	1766	0.0	3.1	28.7	3.55	-2.36					2.13	-0.94		
06/13/2023 11:00	72.5	64.5	68.1	3.65	3.74	1242.1	1242.1	1.0	1752	0.0	3.3	22.7	3.52	-2.50					2.11	-1.09		
06/13/2023 12:00	67.8	65.1	66.8	3.66	3.68	1242.6	1242.3	1.0	1764	0.0	3.2	22.4	3.54	-2.58					2.12	-1.16		
										H_2S	SO2 3-hr	SO2 24-hr			Title V / Ja 12-hr	SO2 EPCRA		GCD 12-hr			Title V / GCD 24-hr	
									Total Excess Emissions (lbs)	2.6	275.0	–			9418.0	8083.88		8413.6			9533.6	EPCRA SO2 emissions - Allowable1,659 lbs, Excess 8083.9, Total 9742.9 from startup 9,742.9 lbs

12 hr 250ppm excess emission calculation is based on State of Wisconsin prescribed emission calculations (WDNR memo to Murphy Oil dated 05/09/2007 and NR 439.09(10)(c))
Value also used for EPCRA SO2 Emission calculation.

40 CFR 60103a(c)(3) Root Cause Analysis Requirement - For a sulfur recovery plant, each time the SO2 emissions are more than 227 kg (500 lb) greater than the amount that would have been emitted if the SO2 or reduced sulfur oncentration was equal to the applicable emissions limit in § 60.102a(f)(1) or (2) during one or more consecutive periods of excess emissions or any 24-hour period, whichever is shorter.

A GCD Tail Gas Incident is considered equal to or greater than 500 lbs. of EXCESS emissions within a 24 hour period from the SRU/TGTU Incinerator of which only those time periods which are in excess of a SO2 concentration of 250ppm (rolling twelve-hour average) are used [GCD - IV. JJJ].
Hourly Calculation Equation = (StkFlow 1 hr Avg SCFM x 60) x (SO2 Corr ppm 12 hr RA - 250) x (0.169 x 10^{-6}) x [(20.9 - O2 1 hr Avg) / 20.9)]

Value used for EPCRA SO2 Emission calculation. Sum of previous 24 hr excess SO2 emissions using State of Wisconsin prescribed emission calculations (WDNR memo to Murphy Oil dated 05/09/2007 and NR 439.09(10)(c)). Reportable if greater than 500 lbs above permitted limits.

Value used for CERCLA H2S Emission calculation. H2S emissions are calculated for periods when SO2 Corr ppmvd 1 hr Avg exceeds 250ppmvd

Superior Refining Company LLC

GCD 45.b. Report and Emission Estimates from Sulfur Pit Incident Occurring On: 6/9/2023

Start Date (m/dd/yyyy):	6/9/2023
Start Time (24 Hour Time):	11:00
End Date (m/dd/yyyy):	6/12/2023
End Time (24 Hour Time):	10:00
Duration (hours)	71.00
Average Sulfur Make During Event (LTD):	7.1
Estimated Quantity of H2S Emitted	**14.1 Pounds**

Sulfur Pit Emissions Calculation:

Equilibrium Concentration of H2S in sulfur from SRU/TGTU is 300 ppm (per Tim Armstrong and Petrofac eductor sizing basis) Assume 100% H2S is liberated to atmosphere.

DURATION OF EVENT		CONVERT TO DAYS		CONVERT TO LONG TONS		CONVERT TO POUNDS
71.00 Hour / Event	*	Day / 24 Hours	*	7.1 Long Tons / 1 Day	*	2240 lbs / Long Tons

	CONCENTRATION CONVERSION		EMISSIONS
*	300 ppm H2S / 1,000,000 ppm total	=	14.1 lb(s) H2S / Event

Superior Refining Company LLC
Superior, WI Refinery
6/9/2023 Startup of SRU and TGTU
Refinery Wide Excess SO_2 and H_2S Emissions By Source
EPCRA and CERCLA Reporting Threshold

96hr Period from 18:00 on 6/8/2023 to 18:00 on 6/12/2023

DATE	UPSET SOURCE AND/OR DESCRIPTION	EVENT CAUSE	SO_2 LBS INCINERATOR 250 ppm SO_2 Corr 12 hr RA excess emissions	SO_2 LBS FCCU 50 ppm 7 day RA, 25 ppm 365 day RA or 300 lbs/hour excess emissions	REFINERY FUEL GAS SO_2 COMBUSTION DEVICE 162 ppm H2S / 3 hr RA or 60 ppm H2S /365 day RA excess emissions	Flare Gas SO_2 COMBUSTION DEVICE 162 ppm H2S / 3 hr RA excess emissions	H_2S LBS INCINERATOR	REFINERY FUEL GAS H_2S COMBUSTION DEVICE 162 ppm H2S / 3 hr RA or 60 ppm H2S /365 day RA excess emissions	Flare Gas H2S COMBUSTION DEVICE 162 ppm H_2S / 3 hr RA excess emissions	H_2S LBS Sulfur Pit Vent to Atmosphere
6/9/2023	SRU and TGTU	Initial Startup of the SRU and TGTU	8083.9				2.6			14.1
		Subtotals	8083.9				2.6			14.1

Note: The FCCU was not operating at the time of this event and there were no excess emissions from the Refinery Flare or Combustion Devices during this period.

TOTAL FACILITY WIDE SO2 (lbs)
(EPCRA Facility Wide Reportable Quantity ≥ 500 lbs SO2 above permited limits)
8083.9

TOTAL FACILITY WIDE H_2S (lbs)
(EPCRA Facility Wide Reportable Quantity ≥ 100 lbs H_2S total)
16.7

HIGHEST SOURCE H_2S (lbs)
(CERCLA Source Reportable Quantity ≥ 100 lbs H2S source)
14.1

Not CERCLA or EPCRA Reportable for H_2S

Notes for Refinery Flare and SRU/TGTU Incinerator Excess Emission Calculations:

EPCRA Reportable Quantity (500 lbs. above permitted limit) for sulfur dioxide (SO_2) - Refinery Wide
Excess SO2 emissions from the flare result from exceeding the 162 ppm H2S 3 hr Rolling Average permit limit or Acid Gas Flaring and are calculated using 98% destruction efficiency of H2S at the flare.

Excess SO_2 emssions from the SRU/TGTU Incinerator result from exceeding the 250 ppm SO_2 corrected 12 hr rolling average permit limit. However, the WDNR and 2010 GCD require the excess emissions to be calculated different ways. In order to be timely in our notifications, SRC will base EPCRA reporting for the SRU/TGTU Incinerator off of the WDNR calculation, as that will exceed or contribute to an exceedance of 500 lbs. above permitted limits in a 24hr period sooner than the 2010 GCD calculation.

These emissions will be added to any other excess SO2 emissions refinery wide to determine if we are above permitted limits by 500 lbs.

EPCRA Reportable Quantity (100 lbs. above permitted limit) for hydrogen sulfide (H2S) - Refinery Wide
Excess H2S emissions from the flare result from exceeding the 162 ppm H2S 3 hr Rolling Average permit limt and are calculated using 98% destruction efficiency of H_2S at the flare.

These emissions will be added to any other excess H_2S emissions refinery wide to determine if we are above permitted limits by 100 lbs.

CERCLA Reportable Quantity (100 lbs. above permitted limit) for hydrogen sulfide (H2S) - Source Specific
Excess H_2S emissions from the flare result from exceeding the 162 ppm H_2S 3 hr Rolling Average permit limt and are calculated using 98% destruction efficiency of H_2S at the flare.

From:	DNRAMCOMPLIANCEEXTERNALSUBMISSION@Wisconsin.gov
To:	Beattie, David
Cc:	michalee.leuthard@wisconsin.gov; Perkins, Dean S.
Subject:	Deviation Notification Received. Superior Refining Company LLC
Date:	Monday, June 12, 2023 4:37:13 PM

Your Deviation Notification has been successfully uploaded to the WDNR Air program database. Thank you.

It has been given the file name DEVIATION-MALFUNCTION_NOTIFICATION_P20_06122023_816009590.pdf and has been filed for: FID: 816009590 Superior Refining Company LLC.

LINK TO DOCUMENT

** DO NOT REPLY TO THIS EMAIL, if you have questions please contact your assigned compliance inspector **

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Note: In order to fill and save this form electronically, it must be opened using Adobe Reader or Acrobat software. Save a copy of the file, open Adobe Reader, select File > Open and browse for the file you saved.

Air Permit Next Business Day Reporting

State of Wisconsin
Department of Natural Resources
Bureau of Air Management
dnr.wi.gov

Form 4530-182 (R 12/2021)

Notice: Section NR 439.03(4), Wis. Adm. Code, contains various requirements for an owner or operator of a source to report to the department by the next business day any deviation from permit requirements and certain malfunctions or other unscheduled events at the source that were not reported in advance to the department. You may use this form to submit your Report. **Use of this Form is voluntary.** Please note that Reports must be signed by a responsible official, as defined in NR 400.02(136), Wis. Adm. Code. Personally identifiable information collected on this Form may be provided to requesters as required by Wisconsin's Public Records law (ss. 19.31-19.39, Wis. Stats.).

Facility Name:	**Facility Identification No. (FID):**
Superior Refining Company LLC	816009590
Permit No. and Condition(s) Affected: Permit No. Construction Permit 16-RAB-184 I.E.1.a. @ (1)(b)(ii), (1)(e)(i), (3)(a), (5)(a), (6)(a), (8) I.E.1.b.(2). Deviations may be added/updated in final report.	**Permit Process No./Unit Description:** Process No. P20

Start/Stop Time(s) of Deviation/Malfunction/Unscheduled Event:

Start Time: 6/9/2023 (time varies depending on limitation exceeded)

Stop Time: Currently ongoing

Cause(s) of Deviation/Malfunction/Unscheduled Event:

Initial planned startup of Sulfur Recovery Unit (SRU) and Tail Gas Treating Unit (TGTU). Following initial restart of the SRU, the process of routing tail gas from the SRU to the TGTU to achieve compliance with SO2 limitations took longer than expected due to a malfunctioning process analyzer. During this period, tail gas was routed to the Incinerator for combustion, which resulted in limitations being exceeded. Once the analyzer was functioning and able to be placed in cascade (automatic control), tail gas was routed to the TGTU. An additional issue caused by a leaking process valve in the TGTU further delayed obtaining compliance with SO2 limitations at the Incinerator. Visible emissions from the sulfur pit vent have also been present at times.

Corrective Action(s) taken during the period of Deviation/Malfunction/Unscheduled Event to address problems and minimize emissions (including when they were taken and the period of time necessary to correct the Deviation/Malfunction/Unscheduled Event):

Instrument technicians and operations personnel worked to troubleshoot the potential issues around the clock. Subject matter experts were flown in on the evening of 6/10/2023 to provide additional resources with troubleshooting the issue(s). Incinerator was maintained at greater than 1200 deg F and 2 percent Oxygen.

Additional Comments (may include the following: pollutant(s) affected, estimate of excess emissions emitted with basis/calculation of estimate, description of the Deviation/Malfunction/Unscheduled Event, method used to determine the Deviation/Malfunction/ Unscheduled Event, the status of the operation, measures taken during and after Deviation/Malfunction/Unscheduled Event to prevent re-occurrence, and if the facility's Malfunction Prevention and Abatement Plan (MPAP) was revised):

Initial estimated emissions of approximately 9,500 lbs of SO2 which exceeds permitted startup emission limits for the SRU. As of the afternoon of 6/12/2023, our current instantaneous readings at the incinerator have fallen below 150ppm, however it will take additional time to roll out of and come back into compliance with our 12 and/or 24 hour rolling average limits for SO2. A follow up report will be submitted once the event concludes, estimated emissions are finalized, and potential cause and any corrective actions are determined.

Certification

Based on information and belief formed after reasonable inquiry, I certify that the statements and information in this document are true, accurate and complete.

Report prepared by: David Beattie, Superior Refinery Environmental Specialist

Signature of Responsible Official	Title	Date 6/12/2023

Next Business Day Reporting Assistance

What should be reported and by when?

The following information should be reported by the next business day following the onset of a malfunction or unscheduled event as required by NR 439.03(4)(a) and (b), Wis. Adm. Code.

1. Facility Name and FID
2. Permit number and condition deviated (e.g., 555555550-P01, I.B.3.c.(4))
3. Permit process number and unit description (e.g., boiler B10)
4. Cause and duration of the exceedance
5. The period of time considered necessary for correction
6. Measures taken to minimize emissions

The following information should be reported by the next business day for deviations from permit requirements as required by NR 439.03(4)(c), Wis. Adm. Code. Identification of a deviation should be made as soon as practical.

1. Facility Name and FID
2. Permit number and condition deviated (e.g., 555555550-P01, I.B.3.c.(4))
3. Permit process number and unit description (e.g., boiler B10)
4. The probable cause of the deviation
5. Any corrective actions or preventive measures taken, or which will be taken to prevent future

deviations Who needs to submit the report and by when?

The report may be submitted by any facility contact. However, the report shall contain a certification by the responsible official as to its truth, accuracy and completeness according to NR 439.03(10), Wis. Adm. Code. In addition, the report shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate and complete. Responsible official is defined in s. NR 400.02(136), Wis. Adm. Code.

NR 439.03(10), Wis. Adm. Code does not specify a deadline for certification of the report. Uncertified reports are acceptable for purposes of meeting the next business day reporting requirement and may be followed with a certified version as soon as practical.

Where to submit the report?

The facility may submit the report to the DNR Air compliance engineer assigned to the facility by using the Switchboard. The location within switchboard to upload is through the *Air Compliance Actions* button then the *Deviation Notifications* tab on the facility's page. The assigned Air compliance engineer is notified via email upon upload when a facility uses the Switchboard portal to submit reports electronically. Electronic signature assistance can be found at www.dnr.wi.gov and search “NDDReportingQuickInstructions”.

Alternatively, the facility may submit a hard copy of the report to the assigned Air compliance engineer. To find the DNR Air compliance engineer assigned to a facility, log into the DNR Switchboard at www.dnr.wi.gov and search “Switchboard”, select *View Facility Air Data (and Upload)*, click *Facility Home* and then *General*.

How to sign the report?

After the report has been submitted electronically, the responsible official shall either electronically sign the report through the switchboard or mail the wet ink signature to the assigned Air compliance engineer. Electronic signature assistance can be found at www.dnr.wi.gov and search “NDDReportingQuickInstructions”.

NR 439.03(10), Wis. Adm. Code does not specify a deadline for certification of the report. Uncertified reports are acceptable for purposes of meeting the next day reporting requirement and may be followed with a certified version as soon as practical.

Digital Signature Receipt

This is the electronic signature receipt. This receipt contains information about the document submitted, who signed it, when it was signed, and other technical information that may be used by the Department of Natural Resources to prove the authenticity of the document. This receipt is securely stored in the electronic signature system with the submitted document and neither the document nor this receipt can be altered. Electronic signatures are authorized under Wis. Stat. ch. 137 and have the same legal recognition as ink signatures on paper.

Document ID:	41ZNM
Document Description:	Deviation Notification
File Name:	DEVIATION-MALFUNCTION_NOTIFICATION_P20_06122023_816009590.pdf
File Size [KB]:	160
Wisconsin User ID (WAMS):	Mgunn42
User Name:	Matthew B Gunn
User Verified Status:	
Temporary PIN Sent To:	matt.gunn@cenovus.com
Signature ID:	41ZKU
Signature Date/Time:	7/27/2023 6:17:34 PM
Certification Statement:	I certify, under penalty of law, that the information provided in this document is, to the best of my knowledge and belief, true, accurate, and complete. I understand that there are significant civil and criminal penalties, including fines, imprisonment, or both, for submitting false, inaccurate, or incomplete information.

For DNR Use Only:

User IP Address:	67.129.212.82	Public Key Type: RSA-2048	Hash Type: SHA-512
Temporary PIN Hash Value:	ED2378551A0536D6EF647BC5A32723AEB781094E89D213E2D2A3AEA61EED46ED2F4409B0A2911DB55610309E9E436029D71E23213DCD49CBECA5D515D6081AA7		
Public Key Value:	0602000000A40000525341310008000001000100 59ECDBA4CC59467EB36A77E5BF763AC5E70028A76ACD3D14952617B2C914DFB7E50878AD01BC71779B70C111BF52ACD2CE6FE35473D9EADE22066DB1FE905FEEFFD4C70A4B49D80EFAE6E9C40FAF4A91B6E7D209B40F97AF61333B409D1832971C0B1954F48EBF0D07A4280B7E7760BCD284009009F3CF0D898E9968740B247B18628CA811AEB0E7414EDF5A3A91EC355A9B18EF94A1F6E9FAB5B4EAF6FD8E7E7DD318A36B227493AC8B906538441BAAA8020FFD18E7C98AA086E3BA9E3544E71FA9979ABB2198A03D481D38C23A3F1FDDD8ADEA1923F6A91B8A4FBCFEBB005EBC0722E90F7302D14CE32A1D2FD092F10CC9F76A7C24567D8CF75DD3B50C84E6		
Document Hash Value:	E9A830A310176869C0EAE2DDCB737A51B4DEA2FBA40EB57D0C15983CE1022CE983F4221C1D0A3ABF3A7A147A72D38DA6FC4B551645DE838652C848C3752CC82F		
Document Signature Value:	956F8F54A35161E0A9F38C03690FB41EC860A71FA2A60A0FFD14F348E971DEB3B6C91B6617732128C43C26540DA183A7AD9D0BE632F6F4D2FF857CFE6C2B8D783BF8505EE67DCE028A4A38FAD7680A735BD9F9ACFE26B425B700714BC6330FB2CAB49058E5C2F24E76FB025E960E4004503B1D504CD6765DCBB12709A8B60F294B4A425B095ED8191C16633A159AF30D2607C288CA0DF0B6F46569D2BEF81DD299B9262580108A9B949582E64A042913448746A46D335E32181F5A86F0F8B43319C69550113B164AED0DBB61125445C0A35B95997D51E4A7C1B3396E145C595E8D63214112CA43AB5ED731673EADE22441FCD54141B3EB788E4F7C5290A33434		

From:	Beattie, David
To:	Leuthard, Michalee J - DNR; Paddock, Jeffrey J - DNR; Douglas County - DMA
Subject:	6/9/2023 Superior Refinery SRU Startup EPCRA Report
Date:	Friday, July 28, 2023 4:38:26 PM
Attachments:	image001.png 2023.06.09 SRU and TGTU Startup EPCRA Report.pdf 2023.06.09 SRU and TGTU Startup Event Report.pdf

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All-
Attached is a follow-up report for our 6/9/2023 EPCRA event which necessitated notification to the State of WI spill/release line and follow-up with all of you.
Also attached is the full deviation report for air compliance that was submitted to Michalee.

Please let me know if you have any questions.

Thanks,
Dave

David Beattie
Environmental Specialist
Environmental - Superior Refinery
Downstream
Office: 715.398.8455 | Cell: 218.348.9051
David.Beattie@cenovus.com

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http://www.cenovus.com

From: Leuthard, Michalee J - DNR
To: Paddock, Jeffrey J - DNR
Subject: FW: 6/9/2023 SRU and TGTU Startup Update
Date: Monday, June 12, 2023 3:19:56 PM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png

Jeff,
Please see the below update from Superior Refinery. 100 ppm SO2 (or around 4 lb SO2/hr) is reflective of more typical operating conditions for this unit. I'll keep you updated with any enforcement implications and when I receive an official deviation report from the site.

Thanks,

Michalee Leuthard
She/her
Air Management Engineer - Compliance
Phone: 608-733-0326
michalee.leuthard@wisconsin.gov

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dnr.wi.gov

From: Beattie, David <David.Beattie@cenovus.com>
Sent: Monday, June 12, 2023 2:58 PM
To: Leuthard, Michalee J - DNR <michalee.leuthard@wisconsin.gov>
Subject: 6/9/2023 SRU and TGTU Startup Update

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Hi Michalee-

Just wanted to give you a quick update following our call this morning.
Late in morning a valve was discovered in the TGTU unit causing the elevated SO2 emissions.
Since that was discovered and corrected SO2 reading have been reading around 100ppm.
It will take us several hours to roll out of our 12 and/or 24 hr SO2 averages but we're hopeful the low readings will continue, we have the initial issues resolved, and both the SRU and TGTU remain operating.

We are still trying to troubleshoot some visible emissions from the sulfur pit but seem to be making progress on that as well.

I'll be submitting the initial WAMS notification shortly.

Please let me know if you have any questions or want to discuss anything further.

Thanks,
Dave

David Beattie
Environmental Specialist
Environmental - Superior Refinery
Downstream
Office: 715.398.8455 | Cell: 218.348.9051
David.Beattie@cenovus.com

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http://www.cenovus.com

From: Rice, Caroline M - DNR
To: Paddock, Jeffrey J - DNR
Cc: Hedman, Curtis J - DHS
Subject: RE: WI SPILL #19222 ID 20230609NO16-1 - SULFER DIOXIDE [GAS - AEROSOL]
Date: Monday, June 12, 2023 8:35:32 AM

Sounds good. I believe his number is in the SERTS, but it is 218-348-9051.

Please let me know if you have any questions.

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Caroline Rice
(she/her/hers)
Phone number: (608) 219-2182
Email: caroline.rice@wisconsin.gov

-----Original Message-----
From: Paddock, Jeffrey J - DNR <jeffrey.paddock@wisconsin.gov>
Sent: Monday, June 12, 2023 8:34 AM
To: Rice, Caroline M - DNR <caroline.rice@wisconsin.gov>
Cc: Hedman, Curtis J - DHS <Curtis.Hedman@dhs.wisconsin.gov>
Subject: RE: WI SPILL #19222 ID 20230609NO16-1 - SULFER DIOXIDE [GAS - AEROSOL]

Thank you Caroline!

I'd like to be kept in the loop on when the emissions get back to their normal rate but they can talk directly to their air contact. I can also speak directly with David from this point on so you don't have to, I'll give him a call this morning.

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Jeff Paddock
Phone: 715-828-8544
Jeffrey.Paddock@Wisconsin.gov

-----Original Message-----
From: Rice, Caroline M - DNR <caroline.rice@wisconsin.gov>
Sent: Monday, June 12, 2023 8:28 AM
To: Paddock, Jeffrey J - DNR <jeffrey.paddock@wisconsin.gov>
Cc: Hedman, Curtis J - DHS <Curtis.Hedman@dhs.wisconsin.gov>
Subject: RE: WI SPILL #19222 ID 20230609NO16-1 - SULFER DIOXIDE [GAS - AEROSOL]

David provided updates through the weekend. The last update I received was on Sunday night. At that time emissions were down to 30-40 lbs per hour (normal emissions for the facility are 4-5 lbs per hour). Below I have my full summary.

20230609NO16-1 - SULFER DIOXIDE [GAS - AEROSOL] I spoke with David Beattie regarding the sulfur dioxide release. The release was on going at the time of the report. The emission rate was 200-250 lbs per hour, their normal emission rate is 4-5 lbs per hour. They notified their DNR air program contact (left a voicemail, did not speak with her), the county EM, and the local fire department. I sent Curtis, DHS On-call Chem, a text notifying him of the situation. Curtis notified the local health officer. David provided updates through the weekend. On Saturday emissions were down to under 50 lbs per hour. Saturday night subject matter experts arrived on site to help

troubleshoot. Emissions were down to 30-40 lbs per hour on Sunday night.

Should I ask David to communicate with you moving forward or with their air program contact?

Thank you,
Caroline

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Caroline Rice
(she/her/hers)
Phone number: (608) 219-2182
Email: caroline.rice@wisconsin.gov

-----Original Message-----
From: Paddock, Jeffrey J - DNR <jeffrey.paddock@wisconsin.gov>
Sent: Monday, June 12, 2023 8:21 AM
To: Rice, Caroline M - DNR <caroline.rice@wisconsin.gov>
Cc: Hedman, Curtis J - DHS <Curtis.Hedman@dhs.wisconsin.gov>
Subject: RE: WI SPILL #19222 ID 20230609NO16-1 - SULFER DIOXIDE [GAS - AEROSOL]

Hi Caroline, did David get back to you?

Thank you

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Jeff Paddock
Phone: 715-828-8544
Jeffrey.Paddock@Wisconsin.gov

-----Original Message-----
From: Rice, Caroline M - DNR <caroline.rice@wisconsin.gov>
Sent: Friday, June 9, 2023 6:43 PM
To: Paddock, Jeffrey J - DNR <jeffrey.paddock@wisconsin.gov>
Cc: Hedman, Curtis J - DHS <Curtis.Hedman@dhs.wisconsin.gov>
Subject: FW: WI SPILL #19222 ID 20230609NO16-1 - SULFER DIOXIDE [GAS - AEROSOL]

Good afternoon,

I spoke with David Beattie regarding the sulfur dioxide release. The release is ongoing, David anticipates they will have it fixed tonight or tomorrow morning. They have notified their DNR air program contact (left a voicemail, did not speak with her), the county EM, and the local fire department. I sent Curtis, DHS On-call Chem, a text notifying him of the situation. David will notify me when the issue is resolved and I will send a follow-up email.

Please reach out with any questions or concerns.

Thank you,
Caroline

We are committed to service excellence.
Visit our survey at http://dnr.wi.gov/customersurvey to evaluate how I did.

Caroline Rice
(she/her/hers)

Phone number: (608) 219-2182
Email: caroline.rice@wisconsin.gov

-----Original Message-----
From: dnrlehotline@wisconsin.gov <dnrlehotline@wisconsin.gov>
Sent: Friday, June 9, 2023 6:22 PM
To: Rice, Caroline M - DNR <caroline.rice@wisconsin.gov>
Subject: WI SPILL #19222 ID 20230609NO16-1 - SULFER DIOXIDE [GAS - AEROSOL]

SERTS ID:
20230609NO16-1

Reported:
06/09/2023 18:13

Occurred:
06/09/2023 18:00

Substance:
SULFER DIOXIDE [GAS - AEROSOL]
Released Amt: 2355 lb
Recovered Amt: 0 lb
(AMOUNTS ARE OFTEN ESTIMATED)

Reported by:
DAVID BEATTIE
SUPERIOR REFINERY
david.beattie@cenavus.com
(218) 348-9051
Also RP Contact

Location:
NO REGION
DOUGLAS COUNTY
SUPERIOR, CITY OF
SUPERIOR REFINERY
2407 STINSON AVE

Responsible Party:
SUPERIOR REFINERY
2407 STINSON AVE
SUPERIOR, WI
(218) 348-9051

Cause:
EQUIPMENT FAILURE

Cause Description:
THE 500 POUND LIMIT WAS EXCEEDED AT 6PM. AIR RELEASE IS ONGOING. 2355 POUNDS WAS WHAT THEY WERE AT WHEN WE WERE CONTACTED.

Environmental Impact:
ENVIRONMENTAL IMPACT UNKNOWN AT THIS TIME.

Comments:
COMPANY IS CURRENTLY WORKING TO STOP THE LEAK.

Cleanup:
CLEAN-UP PROGRESS UNKNOWN OR CLEAN-UP NOT STARTED.

Notified CAROLINE RICE - SPOKE WITH AT 6:11PM by Phone

Submitted by:
KATHERINE SOLTYS
(800) 943-0003
dnrlehotline@wisconsin.gov

Sent to:
anita.smith@wisconsin.gov
bart.sponseller@wisconsin.gov
bradleya.johnson@wisconsin.gov
brownfields@badriver-nsn.gov
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