cenovus ENERGY | Superior Refinery

September 21, 2023

Wisconsin Department of Natural Resources
Attn: Michalee Leuthard
3911 Fish Hatchery Rd
Fitchburg, WI 53711

Re: Response to August 28, 2023 Letter of Noncompliance

Dear Michalee Leuthard:

On August 28, 2023, Wisconsin Department of Natural Resources ("WDNR" or "the Department") issued a Letter of Noncompliance alleging noncompliance with specific conditions of 12-DCF-256 issued March 15, 2013, 16-RAB-184 issued February 16, 2018, 19-RAB-057 issued September 27, 2019, 20-RAB-080 issued October 9, 2020, and Wisconsin's air pollution control rules. WDNR indicated a response was due within 10 days upon receipt of the Letter of Noncompliance, however, an extension was requested by Superior Refining Company ("SRC") and granted by WDNR until September 21, 2023. SRC submits the following information in response to your request. The format of the responses follows the original Letter of Noncompliance dated August 28, 2023 for clarity of review.

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.*

        Response: SRC believes it initially miscommunicated that Tanks T88 and T100 had been cleaned in 2021. Tanks T88 and T100 were not cleaned 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.*

        Response:

        T68
        Tank 68 was storing Volatile Organic Liquid (VOL) in June 2021 and maintained a relatively constant level throughout the month (as submitted in the Air Emissions Inventory for 2021). Based on existing records for other tanks in June 2021 and the presence of T68 ozone inspection records for May 2021 and July 2021 (already provided to the Department as part of the PCE), SRC is confident a passing inspection took place even though the specific record cannot be located.

        T69
        Tank 69 was out of service in June 2021 and an ozone inspection was, therefore, not required, which is why no record exists of said inspection occurring. As shown in Appendix A, T69 was de-inventoried for winterization consolidation on November 10, 2018 and did not return to service until May 29, 2023.

T40
Tank 40 was out of service in September 2021 and an ozone inspection was, therefore, not required, which is why no record exists of said inspection occurring. As shown in Appendix B, T40 was emptied for its 10-year inspection on December 21, 2019 and did not return to service until December 21, 2021.

T41
Tank 41 was out of service in September 2021 and an ozone inspection was, therefore, not required, which is why no record exists of said inspection occurring. As shown in Appendix C, T41 was de-inventoried for winterization consolidation on November 27, 2018 and did not return to service until March 17, 2023.

T25
Tank 25 was storing Sweet Crude Oil in July 2022 and maintained a relatively constant level throughout the month (as submitted in the Air Emissions Inventory for 2022). Based on existing records for other tanks in July 2022 and the presence of T25 ozone inspection records for June 2022 and August 2022 (already provided to the Department as part of the PCE), SRC is confident a passing inspection took place even though the specific record cannot be located.

3. *Construction permit 20-RAB-080 condition I.Va.1.b.(4)(a) – (b) [s. 285.65(3) Wis. Stats. And ss. NR439.055(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.*

    Response: These tanks were either not in service during the last several years, had not been built or were only recently permitted. Each measuring device is on a schedule for preventative maintenance as specified in 19-RAB-057 and 20-RAB-080. Relevant information for each tank in question is summarized in the table below:

Affected Tank	Construction Permit	Permit Applicability Date (initial operation)	Date Returned to Service	Temperature Sensor to be Calibrated/Validated or Replaced By Date
T42	19-RAB-057	Not yet returned to crude service		
T88	20-RAB-080	02/27/2023	06/29/2023	06/29/2024
T90	20-RAB-080	01/27/2023	06/22/2023	06/22/2024
T91	20-RAB-080	02/27/2023	06/29/2023	06/29/2024
T100	19-RAB-057	02/27/2023	03/30/2023	03/30/2024
T114	20-RAB-080	05/11/2023	05/11/2023	05/11/2024
T118	19-RAB-057	Not yet constructed		
T119	19-RAB-057	08/05/2023	07/26/2023	07/26/2024

4. *Construction permit 16-RAB-184 condition I.E.1.a.(3)(a) [s. NR 405.08, Wis. Adm. Code]*
    a. *Failure to limit SO2 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.*

    Response: In 2018, the Superior refinery experienced an explosion and subsequent fire that damaged many process units and other equipment. The refinery is just now restarting operations. Allegations 4 through 22 are generally attributable to the commissioning and shakedown of the rebuilt refinery.

    As for Allegation 4, SRC self-reported this event involving its Sulfur Recovery Unit (SRU, P20). The details were previously reported to WDNR. See Appendix D. In summary, this was an isolated event related to the recommissioning of the SRU after 5 years and is not an ongoing issue. SRC implemented good air pollution control practices to minimize emissions during this event by maintaining consistent unit charge rates to support an acid gas/sulfur production of ~ 7 LTD. This charge rate achieved the minimum sulfur make necessary for stable operation during the refinery restart. This maintained operational stability of the SRU, thereby avoiding additional SO_2 emissions from a SRU shutdown, meltout, and burnout, as well as additional emissions that would otherwise be experienced from a second startup of the SRU/TGTU. Maintaining minimum stable operations at the SRU also facilitated efficient troubleshooting of the source and improved safety during the refinery restart process. There was no reasonable way to have known about the tail gas analyzer and faulty TGTU Quench Tower Overhead valve prior to recommissioning. The SRU remains in compliance.

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.*

    This event is described in the response to Allegation 4 and Appendix D. Continuing the SRU troubleshooting beyond 30 hours was consistent with good air pollution control practices to minimize emissions for the reasons described above in Allegation 4. This recommissioning-related issue has not reoccurred and the SRU remains in compliance.

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 SO2 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.*

    The June 9-12 event is addressed in response to Allegations 4 and 5, and in Appendix D.

    The 6/17-6/18 incident was the result of a single event attributed to the shakedown of the refinery during recommissioning. The details were previously reported to the department. See Appendix E. On June 17, 2023, operations started the No. 2 Duf Amine Contactor circulation at full rates which added H_2S-loaded amine to the system. This increased rich amine flow to the still column, generating a rapid increase in acid gas feed rates to the SRU Reaction Furnace. When the H_2S:SO_2 ratio was disrupted as a result, higher mass flow of H_2S and SO_2 flowed through the TGTU, which was not able to absorb all the H_2S. The H_2S that went through the TGTU due to increased flow passed directly to the Incinerator. As the Incinerator combusted more H_2S, SO_2

readings increased and eventually the Incinerator shut down on high temperature. The high H_2S load subsequently snuffed out the TGTU Feed Heater, resulting in the shutdown of the TGTU. No. 2 Duf Amine Contactor circulation was stopped to help stabilize and bring the units back to normal operating conditions. When the SRU/TGTU regained stability, the No. 2 Duf Amine Contactor circulation was started again at slower rates and although additional instability and brief shutdowns occurred, the slower rates allowed the TGTU to be brought back online with normal operating conditions while maintaining amine circulation.

The initial upset of the SRU/TGTU was unexpected as procedures were being followed bringing the No. 2 Duf Amine Contactor online. Once the upset occurred, however, SRC reacted quickly to stop circulation in the No. 2 Duf Amine Contactor, modify procedures, and return the SRU/TGTU to stable operation safely, efficiently, and by minimizing air emissions. This commissioning-related issue has not reoccurred and the SRU remains in compliance.

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.*

    Response: These events are addressed in response to Allegations 4, 5 and 6. More details are set forth in Appendices E and F.

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.*

    Response: These events are addressed in response to Allegations 4, 5 and 6. More details are set forth in Appendices E and F.

    SRC believes that sulfur shedding was not required during these events. During an SRU and/or TGTU shutdown there is an initial determination whether the shutdown is *reasonably anticipated* to persist for 3 hours or longer. That determination is made based on engineering judgment at the time of the malfunction/shutdown. If a shutdown, in fact, persists beyond the 3-hour threshold, whether and how quickly abatement/sulfur shedding can be implemented must be assessed in the context of maintaining safety and good air pollution control. Throughout the events, sufficient feed of the SRU must be maintained (*i.e.* sulfur shedding not required) in order to maintain reliable operation and good air pollution control.

    June 9-12, 2023 Event
    The event of June 9-12, 2023 was reported to the Department. At that time SRC explained that in order to ensure good air pollution control, the most prudent decision from an emissions perspective was to maintain consistent unit charge rates to support an acid gas/sulfur production of ~7 LTD for stable operations. This ensured that operational 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. Maintaining stable operations at the SRU also facilitated efficient troubleshooting of the ongoing event which required a minimum level of feed in order to diagnose and resolve the issues causing the shutdown. Further consideration was given to the concern that meltout and burnout of the SRU (which are a required part of shutting the unit down) would have resulted in far greater air emissions, based on best engineering judgment. This was a reasonable response under these circumstances.

June 17, 2023 Event
Based on best engineering judgment, the SRU/TGTU was reasonably expected to be operational within 3 hours. Relying on the subject matter expert working on the issue for SRC, the TGTU heater was relit at 19:00, which was less than 3-hours from the initial shutdown. See Appendix F. However, the TGTU Feed Heater did not reach temperatures sufficient to accept and treat tail gas until 21:26. After bringing the TGTU back online, additional unforeseen circumstances led to two more brief periods of downtime for the TGTU before the upset event ended. Neither of the latter two events approached 3 hours of downtime. This was a reasonable response under these circumstances.

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 SO2 emissions from the SRU (P20) to 6,743 pounds in any 24-hour period or 843 pounds in any 3-hour period. The SO2 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.*

    Response: These events are addressed in response to Allegations 4, 5, 6, and 8. More details are set forth in Appendices E and F.

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.*

    Response: SRC self-reported these events. The cause of these events was identified and communicated to the Department (see Appendix E), and the SRU is operating consistent with this permit condition. These events are addressed in response to Allegations 4, 5, 6, and 8. More details are set forth in Appendices E and F.

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 SO2. 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.*

    These events are addressed in response to Allegations 4, 5, 6, and 8. More details are set forth in

Appendices E and F. As demonstrated in the e-mail from the subject matter expert in Appendix F, the Tail Gas Combustor was brought up to temperature as quickly and safely as possible under the circumstances.

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% O2, or (when utilizing oxygen enrichment) the value calculated using EBACT = [k1 x (-0.038 x (%O2)2 + 11.53 x %O2 + 25.6)] – 100. The SO2 emission limitations for P20 were exceeded on July 25, 2023, during an unplanned shutdown of the SRU.*

       Response: SRC self-reported the July 25, 2023 event. See, Appendix G. This involved an unplanned shutdown and subsequent unplanned startup[1] required to repair a necessary piece of equipment. The SRU is operating in conformance with this permit condition.

       To summarize the event, a leak was discovered in the Waste Heat Boiler of the SRU. In order to investigate the leak and repair the Waste Heat Boiler, the SRU had to be shut down and subsequently restarted upon completion of the inspection and maintenance activities. As prescribed by procedure, acid gas was routed to the flare to facilitate shutdown of the SRU in order to repair the Waste Heat Boiler. When the leak was discovered in the Waste Heat Boiler, the refinery reduced process unit charge rates/implemented sulfur shedding prior to the controlled shutdown of the SRU to minimize emissions during shutdown and restart of the SRU/TGTU. To minimize emissions, the TGTU continued operating for a short period of time after the SRU shutdown. Shutdown procedures were followed throughout the SRU shutdown.

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.*

       Response: SRC self-reported the July 25, 2023 event.

       SRC informed the Department in its 7/27/2023 Sulfur Pit Deviation Event Report cover letter dated August 25, 2023 as follows: "[b]ased on observation and engineering judgment, it seems as if there were no actual emissions from the sulfur pit, but we are filing this report out of an abundance of caution." SRC further explained, "[o]n 7/25/2023 Superior Refining Company LLC (SRC) began a shutdown of the SRU, which was necessary to repair a leak in the Waste Heat Boiler. Between 7/27/2023 (11:30) and 8/1/2023 (22:30), no visible emissions were observed from the sulfur pit. Nonetheless, the vent from the sulfur pit to atmosphere was necessarily open while the Reaction Furnace was shut down and, therefore, venting from the sulfur pit to atmosphere was possible." See, Appendix G.

[1] "Unplanned shutdown" and "unplanned startup" are used throughout as defined by 16-RAB-184. The shutdown to fix the Waste Heat Boiler was a controlled and designed shutdown, which was performed according to normal operating procedures in accordance with best engineering and environmental management practices.

In normal operations, a vacuum is created on the vapor space in the sulfur pit by the eductor, which routes gases from the sulfur pit to the SRU Reaction Furnace. As part of best environmental management practices during the meltout/burnout procedure of the shutdown of the SRU, natural gas was used to sweep and melt out the SRU between 09:55 on 7/25/2023 and 11:30 on 7/27/2023. No acid gas was lined to the system during that window of time and all SulTraps were blocked in to allow for clearing of as much H_2S as possible from the sulfur pit while the sulfur pit was still routed to the Reaction Furnace.

It is important to note that no visible emissions were observed from the sulfur pit during this unplanned maintenance event. The SRU has several ground-level H_2S detectors adjacent to the sulfur pit, none of which recorded any H_2S emissions during that timeframe. Moreover, SRC's engineering assessment is that any H_2S remaining in the sulfur pit after the natural gas purge should have remained in the sulfur pit until the eductor pulled a vacuum upon restart of the SRU and routing of emissions back to the Reaction Furnace. Nonetheless, SRC has taken a conservative approach and reported a deviation when the atmospheric vent was open.

This process remains in compliance with this permit condition.

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.*

       Response: SRC self-reported the July 25, 2023 event. This was an isolated, unplanned shutdown and subsequent unplanned startup required to repair a necessary piece of equipment.

       To summarize the event, a leak was discovered in the Waste Heat Boiler of the SRU. In order to investigate the leak and repair the Waste Heat Boiler, the SRU had to be shut down and restarted upon completion of the inspection and maintenance activities. As prescribed by procedure, acid gas was routed to the flare to facilitate shutdown of the SRU in order to repair the Waste Heat Boiler. When the leak was discovered in the Waste Heat Boiler, the refinery reduced process unit charge rates/implemented sulfur shedding prior to the controlled shutdown of the SRU to minimize emissions during shutdown and restart of the SRU/TGTU. To minimize emissions, the TGTU continued operating for a short period of time after the SRU shutdown. Shutdown procedures were followed throughout the SRU shutdown.

       Nonetheless, routing acid gas to the flare is a necessary component of an SRU shutdown. Directing acid gas to the flare gas caustic scrubber/flare is the first step in response to an SRU/TGTU shutdown and/or malfunction reasonably expected to last 3 hours or longer as set forth in Superior Refinery's Sulfur Plant Malfunction Prevention and Abatement Plan (MPAP) and represents good pollution control. See, Appendix H, s. 3.1.1 ("SRU MPAP").

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 SO2, as required by the permittee's Global Consent Decree. This was due to an unplanned shutdown of*

the SRU on July 25, 2023.

Response: SRC self-reported the July 25, 2023 event. These events are addressed in response to Allegation 13. More details are set forth in Appendix G. The SRU is operating consistent with this permit condition.

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 SO2 into the atmosphere in excess of either 250 ppmvd at 0% excess air, or (when utilizing oxygen enrichment) the value calculated using ELS = k1 x (-0.038 x (%O2)2 + 11.53 x %O2 + 25.6). Emissions from P20 exceeded the SO2 emission limit from July 25 - 27, 2023, due to an unplanned shutdown of the SRU.*

       Response: SRC self-reported the July 25, 2023 event. The SRU is operating consistent with this permit condition. These events are addressed in response to Allegations 12 and 14.

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.*

       Response: SRC self-reported the April 21, 2023 event.

       The Superior Refinery has recently restarted operations after a significant recovery effort following the 2018 fire incident. Inventorying and inspecting every LDAR component has been an enormous undertaking. During LDAR inventory QA/QC, the LDAR contractor at site discovered that 34 components (2 pumps / 32 valves) associated with the closed drain system blowdown sump had been tagged in the field and identified on P&IDs but had not been entered into the LDAR database which resulted in missed inspections/monitoring. SRC was notified of the discovery by our LDAR contractor on 7/26/2023. Based on an in-service date of 3/22/2023, required initial inspection/monitoring was due within 30 days (4/21/2023). Once discovered, the components were added to the LDAR database and subsequently monitored. None of the components were found to be leaking.

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.*

       Response: SRC is not certain whether this inquiry includes a specific allegation of non-compliance or if the paragraph is asking whether periods of startup, shutdown and hot standby

should count toward the total number of periods during which opacity exceeded a permit limitation. To the extent that the Department alleges non-compliance with opacity requirements, SRC has voluntarily reported and regularly updated the Department with respect to the periods of opacity in its ongoing startup of the FCCU after five years of extended shutdown following the fire of 2018. Allegations of elevated opacity readings are addressed in paragraph 18.b., below. To the extent that this paragraph 18.a. seeks to determine the inlet velocity to the primary internal cyclones of the catalytic cracking unit catalyst regenerator and/or the implementation of good air pollution control practices to minimize visible emissions, SRC responds to that question in the following paragraph.

Electing construction permit 19-RAB-057 conditions I.M.3.a.(1)(b) and I.M.3.a.(2)(b)(ii), the inlet velocity to the primary internal cyclones of the catalytic cracking unit catalyst regenerator remained at or above 20 feet per second on an hourly average basis from the beginning of the startup effort. See, Appendix I. Therefore, opacity during periods of startup, shutdown and hot standby should not be used in determining compliance with I.M.3.a.(1)(a) or I.M.3.a.(2)(a).

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.*

Response: As reported to the Department, there have been periods of elevated opacity during the ongoing efforts to return the FCCU to stable operation after five years of being shutdown following the fire of 2018. SRC had previously reported to the Department that "[s]tartup of the FCCU began at 07:00 on 8/3/2023 when torch oil was introduced to the FCCU Regenerator to start heating up the structure." See, Appendix J. Furthermore, that, by definition, initial startup of the FCCU ended at 23:00 on 8/4/2023, forty hours after the introduction of torch oil.

Because the efforts to return the FCCU to stable operation are ongoing, it is premature to identify any specific period of opacity exceeding the limits set forth in construction permit 19-RAB-057 conditions I.M.3.a.1.(a) and I.M.3.a.2.(a) as compliant or non-compliant due to the potential Hot Standby periods of the FCCU.

Hot standby is defined as follows in I.M.3.a.1.(c)(iii): "[a] hot standby period commences at the beginning of the hour in which torch oil is introduced and fresh and/or recycle feed is being reduced from the unit for the purpose of reducing the unit's operating temperature for hot standby. A hot standby concludes when, after introduction of fresh and/or recycle feed to the riser, the CO emissions from Process S15/P31 are less than 500ppmvd corrected to 0% O_2 on a 1-hour average basis and no later than 40 hours after the introduction of fresh and/or recycle feed."

After the defined startup period ended at 23:00 on 8/4/2023, there were time periods that qualify as hot standby. Because SRC has implemented good air pollution control practices by maintaining inlet velocity to the primary internal cyclones of the catalytic cracking unit catalyst regenerator of at least 20 feet per second on an hourly average basis, opacity during periods of hot standby should not be characterized as periods of non-compliance pursuant to construction permit 19-RAB-057 conditions I.M.3.a.(1)(b) and I.M.3.a.(2)(b)(ii).

SRC will have a clearer understanding of anticipated opacity during normal operations once the

FCCU returns to stable operation.

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% O2 (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).*

    Response: There have been instances of elevated CO emissions from the FCCU, P31. However, those events appear consistent with the allowances provided for in construction permit 19-RAB-057 conditions I.M.4.a.(1)(c), I.M.4.a.(2)(c), and I.M.4.a.(3)(b). Specifically, I.M.4.a.(1)(c) and I.M.4.a.(3)(b) exclude periods of startup, shutdown or hot standby from compliance with the hourly CO limit as long as the oxygen concentration in the exhaust gas from the catalyst regenerator is maintained at or above 1 volume percent (dry basis) on an hourly average basis; and I.M.4.a.(2)(c) excludes periods of startup, shutdown or hot standby from compliance with the hourly CO limit "provided that during such periods the refinery implements good air pollution control practices to minimize CO emissions." The oxygen concentration in the exhaust gas from the catalyst regenerator has been maintained at or above 1 volume percent (dry basis) on an hourly average basis for good air pollution control practices to minimize CO emissions during the ongoing effort to return the FCCU to stable operation after five years of an extended shutdown following the fire of 2018.

    Pursuant to construction permit 19-RAB-057 conditions I.M.4.a.(1)(c) and I.M.4.a.(3)(b), the oxygen concentration in the exhaust gas from the catalyst regenerator is maintained at or above 1 volume percent (dry basis) on an hourly average basis. See, Appendix K. Moreover, pursuant to construction permit 19-RAB-057 condition I.M.4.a.(2)(c), the refinery has implemented additional good air pollution control practices to minimize CO emissions such as onsite support from industry FCCU SMEs and technology licensors, maintaining exhaust gas oxygen levels above 1 volume % (dry basis) and using combustion promotor. Therefore, emissions during periods of startup, shutdown and hot standby should not be used in determining compliance with 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.

    Startup of the FCCU began at 07:00 on 8/3/2023 when torch oil was introduced to the FCCU Regenerator to start heating up the structure. See, Appendix J. By definition, the initial startup of the FCCU ended at 23:00 on 8/4/2023, forty hours after the introduction of torch oil. Because the efforts to return the FCCU to stable operation are ongoing, it is premature to identify any specific period of elevated CO as compliant or non-compliant.

    Hot standby is defined as follows in I.M.3.a.1.(c)(iii): "[a] hot standby period commences at the beginning of the hour in which torch oil is introduced and fresh and/or recycle feed is being reduced from the unit for the purpose of reducing the unit's operating temperature for hot standby. A hot standby concludes when, after introduction of fresh and/or recycle feed to the riser, the CO emissions from Process S15/P31 are less than 500ppmvd corrected to 0% O_2 on a 1-hour average basis and no later than 40 hours after the introduction of fresh and/or recycle feed."

    After the defined startup period ended at 23:00 on 8/4/2023, there have been time periods that qualify as hot standby. Because the oxygen concentration in the exhaust gas from the catalyst regenerator has maintained at or above 1 volume percent (dry basis) on an hourly average basis for good air pollution control practices to minimize CO emissions, CO concentrations during

periods of hot standby cannot be counted as periods of non-compliance pursuant to 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.

SRC will have a clearer understanding of normal CO levels once the FCCU returns to stable operation.

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.*

Response: There have been instances of elevated CO emissions from the FCCU, P31. However, those events appear consistent with the allowances provided for in construction permit 19-RAB-057 conditions I.M.4.a.(1)(c), I.M.4.a.(2)(c), and I.M.4.a.(3)(b). Specifically, I.M.4.a.(1)(c) and I.M.4.a.(3)(b) exclude periods of startup, shutdown or hot standby from the hourly CO limit as long as the oxygen concentration in the exhaust gas from the catalyst regenerator is maintained at or above 1 volume percent (dry basis) on an hourly average basis; and I.M.4.a.(2)(c) excludes periods of startup, shutdown or hot standby from the hourly CO limit "provided the during such periods the refinery implements good air pollution control practices to minimize CO emissions." The oxygen concentration in the exhaust gas from the catalyst regenerator has been maintained at or above 1 volume percent (dry basis) on an hourly average basis for good air pollution control practices to minimize CO emissions during the ongoing effort to return the FCCU to stable operation after five years of an extended shutdown following the fire of 2018.

Pursuant to construction permit 19-RAB-057 conditions I.M.4.a.(1)(c) and I.M.4.a.(3)(b), the oxygen concentration in the exhaust gas from the catalyst regenerator is maintained at or above 1 volume percent (dry basis) on an hourly average basis. See, Appendix K. Moreover, pursuant to construction permit 19-RAB-057 condition I.M.4.a.(2)(c), the refinery has implemented additional good air pollution control practices to minimize CO emissions such as onsite support from industry FCCU SMEs and technology licensors, maintaining exhaust gas oxygen levels above 1 volume % (dry basis) and using combustion promotor. Therefore, emissions during periods of startup, shutdown and hot standby should be considered consistent with 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.

Startup of the FCCU began at 07:00 on 8/3/2023 when torch oil was introduced to the FCCU Regenerator to start heating up the structure. See, Appendix J. Furthermore, as reported to the Department, that, by definition, initial startup of the FCCU ended at 23:00 on 8/4/2023, forty hours after the introduction of torch oil. Because the efforts to return the FCCU to stable operation are ongoing, it is premature to identify any specific period of CO exceeding the limits set forth in 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] as compliant or non-compliant.

Hot standby is defined as follows in I.M.3.a.1.(c)(iii): "[a] hot standby period commences at the beginning of the hour in which torch oil is introduced and fresh and/or recycle feed is being reduced from the unit for the purpose of reducing the unit's operating temperature for hot standby. A hot standby concludes when, after introduction of fresh and/or recycle feed to the riser, the CO emissions from Process S15/P31 are less than 500ppmvd corrected to 0% O_2 on a 1-hour average basis and no later than 40 hours after the introduction of fresh and/or recycle feed."

After the defined startup period ended at 23:00 on 8/4/2023, there have been time periods that qualify as hot standby. Because the oxygen concentration in the exhaust gas from the catalyst regenerator has maintained at or above 1 volume percent (dry basis) on an hourly average basis for good air pollution control practices to minimize CO emissions, CO concentrations during periods of hot standby should not be counted as periods of non-compliance pursuant to 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.

SRC will have a clearer understanding of CO emission levels during normal operation once the FCCU returns to stable operation.

20. *Construction permit 19-RAB-057 condition I.M.1.a.(1)(b) [s. NR 405.08, Wis. Adm. Code]*
    a. *Failure to limit SO2 emissions from the FCCU, P31, to no more than 50 ppmvd SO2 corrected to 0% O2, on a 7-day rolling average basis, except as provided in I.M.1.a.(1)(c). This SO2 emission limitation was exceeded during startup of the FCCU on August 4 – 20, 2023.*

    Response: There have been instances of elevated nominal SO_2 7-day rolling average values when corrected to 0% O_2. However, those events appears consistent with the allowances provided for in construction permit 19-RAB-057 condition I.M.1.a.(1)(c).

    Construction permit 19-RAB-057 condition I.M.1.a.(1)(b) sets forth a limit of 50 ppmvd SO_2 corrected to 0% O_2, on a 7-day rolling average "except as provided in I.M.1.a.(1)(c)." 19-RAB-057 condition I.M.1.a.(1)(c) exclude periods of startup, shutdown or hot standby from compliance with the hourly SO_2 7-day rolling average limit as long as SRC "implements good air pollution control practices to minimize SO_2 emissions." Good air pollution control practices to minimize SO_2 emissions through the use of DeSOx catalyst were implemented during the ongoing effort to return the FCCU to stable operation after five years of an extended shutdown following the fire of 2018. Therefore, emissions during periods of startup, shutdown and hot standby shall not be used in determining compliance with construction permit 19-RAB-057 conditions I.M.1.a.(1)(b).

    SRC has previously reported to the Department that "[s]tartup of the FCCU began at 07:00 on 8/3/2023 when torch oil was introduced to the FCCU Regenerator to start heating up the structure." See, Appendix J. Furthermore, as reported to the Department, that [b]y definition, initial startup of the FCCU ended at 23:00 on 8/4/2023, forty hours after the introduction of torch oil. Because the efforts to return the FCCU to stable operation are ongoing, it is premature to identify any specific period of SO_2 exceeding the limits set forth in construction permit 19-RAB-057 condition I.M.1.a.(1)(b) [s. NR 405.08, Wis. Adm. Code] as compliant or non-compliant.

    Hot standby is defined as follows in I.M.3.a.1.(c)(iii): "[a] hot standby period commences at the beginning of the hour in which torch oil is introduced and fresh and/or recycle feed is being reduced from the unit for the purpose of reducing the unit's operating temperature for hot standby. A hot standby concludes when, after introduction of fresh and/or recycle feed to the riser, the CO emissions from Process S15/P31 are less than 500ppmvd corrected to 0% O_2 on a 1-hour average basis and no later than 40 hours after the introduction of fresh and/or recycle feed."

    After the defined startup period ended at 23:00 on 8/4/2023, there have been time periods that qualify as hot standby. Because good air pollution control practices to minimize SO_2 emissions have been implemented, SO_2 concentrations during periods of hot standby cannot be counted as

periods of non-compliance pursuant to construction permit 19-RAB-057 condition I.M.1.a.(1)(b) [s. NR 405.08, Wis. Adm. Code].

SRC will have a clearer understanding of normal SO_2 levels once the FCCU returns to stable operation.

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).*

    Response: SRC has self-reported three independent events related to hydrogen sulfide content of the gas exiting the Flare Gas Caustic Scrubber. The flare is now operating consistent with this permit condition.

    April 1, 2023 Event
    On 4/1/2023 around 02:20, caustic for the flare gas scrubber became spent before SRC Operations could change to a fresh tank. The Superior Refinery is in the process of restarting after five years of extended shutdown after the fire in 2018. Moreover, crude oil was introduced on or about 3/22/2023. Operators faced a learning curve training themselves on how to make a timely caustic changeout. After the event, SRC Environmental added indication of the H_2S readings to additional screens in the distributed control system to make it easier for operators to monitor the relevant data and discussed the issue with operators to increase awareness and what can be done to limit an exceedance. See, Appendix L.

    July 25, 2023 Event
    SRC self-reported the July 25, 2023 event. See, Appendix G. This was an isolated, unplanned shutdown and subsequent unplanned startup required to repair a necessary piece of equipment.

    To summarize the event, a leak was discovered in the Waste Heat Boiler of the SRU. In order to investigate the leak and fix the Waste Heat Boiler, the SRU had to be shut down and restarted upon completion of the inspection and maintenance activities. As prescribed by procedure, acid gas was routed to the flare to facilitate shutdown of the SRU in order to repair the Waste Heat Boiler. When the leak was discovered in the Waste Heat Boiler, the refinery reduced process unit charge rates/implemented sulfur shedding prior to the controlled shutdown of the SRU to minimize emissions during shutdown and restart of the SRU/TGTU. To minimize emissions, the TGTU continued operating for a short period of time after the SRU shutdown. Shutdown procedures were followed throughout the SRU shutdown.

    Nonetheless, the load on the Flare Gas Caustic Scrubber overwhelmed the caustic prior to SRC Operations being able to switch to fresh caustic. The normal alarm set point that signals the need for a caustic change was not being tripped because the caustic was being exhausted so quickly. SRC changed the alarm set point to notify Operations sooner of the need to change caustic. With that corrective action in place, SRC was able to limit the number of Flare Gas Caustic Scrubber deviations associated with the SRU shutdown on 7/25/2023.

August 18, 2023 Event
This event was previously reported to the Department. See, Appendix M. In summary of the event, lower than normal caustic flow caused less than optimal treatment of flare gas and, consequently, elevated H_2S readings. This was an isolated event that operators responded to as quickly as possible to restore designed caustic flow, including flushing pumps, demisters, and bypassing the air cooler.

The flare is now operating in compliance with this permit condition.

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.*

SRC is unsure what permit obligation the Department is referencing. Construction Permit 12-DCF-256 condition I.A.1.a.(2) requires the Superior Refinery "to treat all gases directed to the flare within the caustic flare gas scrubber (see I.Aa.). The scrubber shall be designed to comply with Part 60, Subpart Ja. This shall be designed to handle the normal flare load, amine unit outages and SRP upsets going to the flare." SRC alleges that it is in compliance with 12-DCF-256 condition I.A.1.a.(2).

If you have any questions about our response or anything pertaining to the alleged noncompliance in your August 28, 2023 communication, please do not hesitate to reach out to me.

Sincerely,

Matt Gunn

Matt Gunn
GM Refining
Superior Refining Company

Appendix A

Tank 69 - Out-of-Service Documentation

Husky Energy

SUPERIOR REFINERY

Floating Roof Vacuum Breaker Opening Report

Tank ID

69

Reason for Vacuum Breaker Opening

Deinventoring tank for winterization consolidation

When was the vacuum breaker opened?

Date: 11/10/18 Time: 05:50 Height: 5'11"

When were the roof legs set?

Date: 11/10/18 Time: 06:55 Height: 4'6"

When was the minimum level in the tank reached? (End of Withdrawal)

Date: 11/11/18 Time: 04:00 Height: 0'2.5"

Comments on emptying:

Emptying was done continuously. Lost suction at 2.5 inches. Remainder will be removed with a vacuum truck.

When did refilling commence?

Date: 5-29-2023 Time: 04:30

When was the vacuum breaker closed?

Date: 5-30-2023 Time: 20:25 Height: 5'5"

Comments on refilling:

Appendix B

Tank 40 Out-of-Service Documentation

Husky Energy

SUPERIOR REFINERY

Floating Roof Vacuum Breaker Opening Report

Tank ID

Tk 40

Reason for Vacuum Breaker Opening

Taking out of service for its 10-year inspection.
Tank has a conservation vent.

When was the vacuum breaker opened?

Date: 12/21/19 Time: 11:30 Height: N/A

When were the roof legs set?

Date: 12/21/19 Time: 18:45 Height: 6'-6"

When was the minimum level in the tank reached? (End of Withdrawal)

Date: 12/21/19 Time: 21:30 Height: 1'-1"

Comments on emptying:

Remaining product will be removed with a vacuum truck.

When did refilling commence?

Date: 12/21/21 Time: 09:10

When was the vacuum breaker closed?

Date: 12/21/21 Time: 15:30 Height: N/A

Comments on refilling:

Refilling was done continuously.
Tank has a conservation vent.

Appendix C

Tank 41 Out-of-Service Documentation

Husky Energy

SUPERIOR REFINERY

Floating Roof Vacuum Breaker Opening Report

Tank ID

41

Reason for Vacuum Breaker Opening

Deinventoring tank for winterization consolidation

When was the vacuum breaker opened?

Date: 11/27/18 Time: 08:30 Height: 7'-0"

When were the roof legs set?

Date: 11/27/18 Time: 09:30 Height: 6'6"

When was the minimum level in the tank reached? (End of Withdrawal)

Date: 11/30/18 Time: 14:00 Height: 0'-0"

Comments on emptying:

Emptying was done continuously.

When did refilling commence?

Date: 3/17/23 Time: 18:23

When was the vacuum breaker closed?

Date: 3/19/23 Time: 17:00 Height: 7' 0"

Comments on refilling:

Tank was filled continuously.

Appendix D -

2023.06.09 SRU and TGTU Startup Event Report

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

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

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	12629.7	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	5753.7	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. ⊿⊔].
Hourly Calculation Equation = (Stk/Flow 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

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Bureau of Air Management
dnr.wi.gov

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:	0602000000A400005253413100080000010001005 9ECDBA4CC59467EB36A77E5BF763AC5E70028A76ACD3D14952617B2C914DFB7E50878AD01BC71779B70C111BF52ACD2CE6FE35473D9EADE22066DB1FE905FEEFFD4C70A4B49D80EFAE6E9C40FAF4A91B6E7D209B40F97AF61333B409D1832971C0B1954F48EBF0D07A4280B7E7760BCD284009009F3CF0D898E9968740B247B18628CA811AEB0E7414EDF5A3A91EC355A9B18EF94A1F6E9FAB5B4EAF6FD8E7E7DD318A36B227493AC8B906538441BAAA8020FFD18E7C98AA086E3BA9E3544E71FA9979ABB2198A03D481D38C23A3F1FDDD8ADEA1923F6A91B8A4FBCFEBB005EBC0722E90F7302D14CE32A1D2FD092F10CC9F76A7C24567D8CF75DD3B50C84E6		
Document Hash Value:	E9A830A310176869C0EAE2DDCB737A51B4DEA2FBA40EB57D0C15983CE1022CE983F4221C1D0A3ABF3A7A147A72D38DA6FC4B551645DE838652C848C3752CC82F		
Document Signature Value:	956F8F54A35161E0A9F38C03690FB41EC860A71FA2A60A0FFD14F348E971DEB3B6C91B6617732128C43C26540DA183A7AD9D0BE632F6F4D2FF857CFE6C2B8D783BF8505EE67DCE028A4A38FAD7680A735BD9F9ACFE26B425B700714BC6330FB2CAB49058E5C2F24E76FB025E960E4004503B1D504CD6765DCBB12709A8B60F294B4A425B095ED8191C16633A159AF30D2607C288CA0DF0B6F46569D2BEF81DD299B9262580108A9B949582E64A042913448746A46D335E32181F5A86F0F8B43319C69550113B164AED0DBB61125445C0A35B95997D51E4A7C1B3396E145C595E8D63214112CA43AB5ED731673EADE22441FCD54141B3EB788E4F7C5290A33434		

Appendix E -

June 17, 2023 Incinerator and TGTU Shutdown Event Report

Superior Refining Company LLC

1. Event Information:

Start Date:	6/17/2023
Start Time (24-hr time):	14:56
End Date:	6/19/2023
End Time (24-hr time):	1:08
Duration(hours):	34.20
Description:	Incinerator and TGTU Shutdown
Cause:	Rapid increase in Acid Gas rates while bringing No. 2 Duf Amine Contactor online caused instability in the SRU and TGTU and shutdown of the Incinerator and TGTU Feed Heater.
Action(s):	Stopped amine circulation to stablilze the SRU and TGTU and come back into compliance. When amine circulation came online again, it was brought online at lower rates. 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 modifying No. 2 Duf Amine Contactor startup procedures to specify starting at slower rates and inreasing rates more slowly.
Comments:	On 6/17/2023, operations started the No. 2 Duf Amine Contactor circulation and H2 introduction at full rates which added H2S-loaded amine to the system. This increased rich amine flow to the Still column, generating a rapid increase in acid gas rates to the SRU Reaction Furnace. When the H2S:SO2 ratio was disrupted as a result, higher mass flow of H2S and SO2 flowed through the TGTU, which was not able to absorb all of the H2S. The H2S that went through the TGTU due to increased flow passed directly to the Incinerator. As the Incinerator combusted more H2S, SO2 readings increased and eventually the Incinerator shut down on high temperature. The high H2S load subsequently snuffed out the TGTU Feed Heater, resulting in the shut down of the TGTU. No. 2 Duf Amine Contactor circulation was stopped to help stabilize and bring the units back into compliance. When the SRU/TGTU regained stability, the No. 2 Duf Amine Contactor circulation was started again at slower rates and although additional instability and brief shutdowns occured, the slower rates allowed the TGTU to be brought back online and into compliance while maintaining amine circulation.

2. Reporting Information:

Date	Time	Agency	Agency Contact	Caller
6/17/2023	17:14	Wisconsin Emergency Management (WEM / SERC / EPCRA), (800) 943-0003	Brett	David Beattie
6/17/2023	17:19	Douglas County Emergency Government (LEPC), (715) 817-1899	Dave Sletten	David Beattie
6/17/2023	17:21	Superior Fire Department, (715) 395-1680	Bob	David Beattie
6/17/2023	17:24	Wisconsin Department of Natural Resources (WDNR), (608) 733-0326	Michalee Leuthard (voicemail)	David Beattie
6/19/2023	14:30	Wisconsin Department of Natural Resources (WDNR), (715) 828-8544	Jeff Paddock	David Beattie
6/20/2023	10:34	Wisconsin Department of Natural Resources (WDNR), (608) 733-0326	Michalee Leuthard	David Beattie

3. Applicable Requirements Summary Information:

Source ID: Facility-wide, Total Facility Applicable Requirements

Date: 6/16/2023 Duration (hr): 48 Excess Emissions (lbs): 2899.6

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

3. Applicable Requirements Summary Information:

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

Date: 6/16/2023 Duration (hr): 72 Excess Emissions (lbs): 3457.8

Air Pollutant	Applicable Requirement	Description
Sulfur dioxide	16-RAB-184, I.E.1.a.(1)(b)	SO2 > 150ppm (24-hr rolling average)
Sulfur dioxide	2010 Consent Decree, V.H.44.b.i.	SO2 > 150ppm (24-hr rolling average)(Consent Decree)
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: 6/17/2023 Duration (hr): 48 Excess Emissions (lbs): 3415.5

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

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

Date: 6/17/2023 Duration (hr): 32 Excess Emissions (lbs): 2984.9

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: 6/17/2023 Duration (hr): 9 Excess Emissions (lbs): NA

Air Pollutant	Applicable Requirement	Description
Particulate matter	16-RAB-184, I.E.5.a.(1)(a)(ii)	Insufficient temperature and/or Oxygen
Hydrogen sulfide	16-RAB-184, I.E.7.b.(2)	Insufficient temperature and/or Oxygen
Sulfur dioxide	16-RAB-184, I.E.1.b.(15)	Insufficient temperature and/or Oxygen
Visible emissions	16-RAB-184, I.E.2.a.(1)(a)(ii)	Insufficient temperature and/or Oxygen
Visible emissions	16-RAB-184, I.E.2.b.(3)	Insufficient temperature and/or Oxygen
Hydrogen sulfide	16-RAB-184, I.E.7.a.(1)(a)(ii)	Insufficient temperature and/or Oxygen

3. Applicable Requirements Summary Information:

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

Date: 6/17/2023 Duration (hr): 3.3 Excess Emissions (lbs): NA

Air Pollutant	Applicable Requirement	Description
Visible emissions	16-RAB-184, I.E.2.a.(1)	Opacity greater than 20%
Visible emissions	16-RAB-184, I.E.2.a.(1)(b)	Opacity greater than 10%

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

Date: 6/17/2023 Duration (hr): 6 Excess Emissions (lbs): 1266.4

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: 6/17/2023 Duration (hr): 5.7 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: 6/17/2023 Excess emissions associated with the following conditions (lbs): 2899.6

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 17:00 on 6/16/2023 to 17:00 on 6/18/2023 for a total of two (2) 24-hr periods. See attached spreadsheets "6/17-18/2023 TGTU Shutdown Refinery Wide Excess SO2 and H2S Emissions by Source" and "6/17-18/2023 TGTU Shutdown Incinerator CEM Data" 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: 6/17/2023 Excess emissions associated with the following conditions (lbs): 3457.8

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
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 16:00 on 6/16/2013 to 16:00 on 6/19/2023 for a total of three (3) 24-hr periods. See attached spreadsheet "6/17-18/2023 TGTU Shutdown Incinerator CEM Data" for associated emissions.

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 16:00 on 6/16/2013 to 16:00 on 6/19/2023 for a total of three (3) 24-hr periods. See attached spreadsheet "6/17-18/2023 TGTU Shutdown 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: 6/17/2023 Excess emissions associated with the following conditions (lbs): 3457.8

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 16:00 on 6/16/2013 to 16:00 on 6/19/2023 for a total of three (3) 24-hr periods. See attached spreadsheet "6/17-18/2023 TGTU Shutdown Incinerator CEM Data" for associated emissions.

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

Date: 6/17/2023 Excess emissions associated with the following conditions (lbs): 3415.5

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
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 04:00 on 06/17/2023 to 04:00 on 6/18/2023 and from 09:00 on 06/18/2023 to 09:00 on 6/19/2023 for a total of four (4) 12-hr periods. See attached spreadsheet "6/17-18/2023 TGTU Shutdown Incinerator CEM Data" 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: 6/17/2023 Excess emissions associated with the following conditions (lbs): 3415.5

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
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 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 04:00 on 06/17/2023 to 04:00 on 6/18/2023 and from 09:00 on 06/18/2023 to 09:00 on 6/19/2023 for a total of four (4) 12-hr periods. See attached spreadsheet "6/17-18/2023 TGTU Shutdown Incinerator CEM Data" for associated emissions.

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)	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:

4. Applicable Requirements Detailed Information:

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

Date: 6/17/2023 Excess emissions associated with the following conditions (lbs): 3415.5

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
				The Title V / Ja 250 ppm SO2 corrected 12-hr RA was exceeded from 04:00 on 06/17/2023 to 04:00 on 6/18/2023 and from 09:00 on 06/18/2023 to 09:00 on 6/19/2023 for a total of four (4) 12-hr periods. See attached spreadsheet "6/17-18/2023 TGTU Shutdown Incinerator CEM Data" for associated emissions.
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 04:00 on 06/17/2023 to 04:00 on 6/18/2023 and from 09:00 on 06/18/2023 to 09:00 on 6/19/2023 for a total of four (4) 12-hr periods. See attached spreadsheet "6/17-18/2023 TGTU Shutdown Incinerator CEM Data" for associated emissions.

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

Date: 6/17/2023 Excess emissions associated with the following conditions (lbs): 2984.9

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 15:00 on 6/17/2023 to 09:00 on 6/18/2023 and from 20:00 on 6/18/2023 to 10:00 on 6/19/2023 for a total of 32 one-hour periods. See attached spreadsheet "6/17-18/2023 TGTU Shutdown Incinerator CEM Data" 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: 6/17/2023 Excess emissions associated with the following conditions (lbs): NA

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Hydrogen sulfide	16-RAB-184	I.E.7.a.	(1)(a)(ii)	Best Available Control Technology (BACT): BACT for Process S14/P20 (the SRU/TGTU) is the use of good combustion practices. (a) Good combustion practices include: (ii) Whenever gases are routed to the TGC, the permittee shall operate the tail gas combustion device with sufficient temperature and oxygen content to convert sulfur compounds to sulfur dioxide.

Comment:

Ten (10) 15-minute periods of less than 1100 deg F. Two (2) 3-hour rolling average periods of less than 1180 deg F. Eleven (11) 15-minute periods of less than 0.5% Oxygen. Three (3) 3-hour rolling average periods of less than 2.0% Oxygen. See attached spreadsheets "06/17-18/2023 TGTU Shutdown Incinerator CEM Data" and "06/17-18/2023 TGTU Shutdown Incinerator 15 Minute Averages (deg F & %O2)".

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Particulate matter	16-RAB-184	I.E.5.a.	(1)(a)(ii)	Best Available Control Technology (BACT): BACT for Process S14/P20 (the SRU/TGTU) is the use of good combustion practices. (a) Good combustion practices shall include: (ii)Whenever acid gas is routed to the TGC, the permittee shall operate the tail gas combustion device with sufficient temperature and oxygen content to convert sulfur compounds to sulfur dioxide.

Comment:

Ten (10) 15-minute periods of less than 1100 deg F. Two (2) 3-hour rolling average periods of less than 1180 deg F. Eleven (11) 15-minute periods of less than 0.5% Oxygen. Three (3) 3-hour rolling average periods of less than 2.0% Oxygen. See attached spreadsheets "06/17-18/2023 TGTU Shutdown Incinerator CEM Data" and "06/17-18/2023 TGTU Shutdown Incinerator 15 Minute Averages (deg F & %O2)".

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	16-RAB-184	I.E.1.b.	(15)	To comply with the good combustion BACT requirement, the permittee shall, whenever gases are routed to the TGC, operate the TGC at a minimum temperature of 1180 deg F and with a minimum of 2.0% oxygen in the exhaust stream averaged over any 3-hour period. Whenever the TGC is required to operate, operate the TGC with a minimum temperature of 1100 deg F and with a minimum of 0.5% oxygen in the exhaust stream averaged over any 15-minute period. The permittee may only use a different minimum temperature or oxygen content if the permittee demonstrates through testing that complete conversion of sulfur compounds to sulfur dioxide occurs at the lower temperature and/or oxygen content and the department approves the new temperature and/or oxygen content limitation in writing.

Comment:

Ten (10) 15-minute periods of less than 1100 deg F. Two (2) 3-hour rolling average periods of less than 1180 deg F. Eleven (11) 15-minute periods of less than 0.5% Oxygen. Three (3) 3-hour rolling average periods of less than 2.0% Oxygen. See attached spreadsheets "06/17-18/2023 TGTU Shutdown Incinerator CEM Data" and "06/17-18/2023 TGTU Shutdown Incinerator 15 Minute Averages (deg F & %O2)".

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Visible emissions	16-RAB-184	I.E.2.b.	(3)	To comply with condition I.E.2.a.(1)(a)(ii), the permittee shall, whenever gases are routed to the TGC, operate the TGC at a minimum temperature of 1180 deg F and with a minimum of

4. Applicable Requirements Detailed Information:

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

Date: 6/17/2023 Excess emissions associated with the following conditions (lbs): NA

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Visible emissions	16-RAB-184	I.E.2.b.	(3)	2.0% oxygen in the exhaust stream averaged over any 3-hour period. Whenever the TGC is required to operate, operate the TGC with a minimum temperature of 1100 deg F and with a minimum of 0.5% oxygen in the exhaust stream averaged over any 15-minute period. The permittee may only use a different minimum temperature or oxygen content if the permittee demonstrates through testing that complete conversion of sulfur compounds to sulfur dioxide occurs at the lower temperature and/or oxygen content and the department approves the new temperature and/or oxygen content limitation in writing.

Comment:

Ten (10) 15-minute periods of less than 1100 deg F. Two (2) 3-hour rolling average periods of less than 1180 deg F. Eleven (11) 15-minute periods of less than 0.5% Oxygen. Three (3) 3-hour rolling average periods of less than 2.0% Oxygen. See attached spreadsheets "06/17-18/2023 TGTU Shutdown Incinerator CEM Data" and "06/17-18/2023 TGTU Shutdown Incinerator 15 Minute Averages (deg F & %O2)".

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Hydrogen sulfide	16-RAB-184	I.E.7.b.	(2)	To comply with condition I.E.7.a.(1)(a)(ii), the permittee shall, whenever gases are routed to the TGC, operate the TGC at a minimum temperature of 1180 deg F and with a minimum of 2.0% oxygen in the exhaust stream averaged over any 3-hour period. Whenever the TGC is required to operate, operate the TGC with a minimum temperature of 1100 deg F and with a minimum of 0.5% oxygen in the exhaust stream averaged over any 15-minute period. The permittee may only use a different minimum temperature or oxygen content if the permittee demonstrates through testing that complete conversion of sulfur compounds to sulfur dioxide occurs at the lower temperature and/or oxygen content and the department approves the new temperature and/or oxygen content limitation in writing.

Comment:

Ten (10) 15-minute periods of less than 1100 deg F. Two (2) 3-hour rolling average periods of less than 1180 deg F. Eleven (11) 15-minute periods of less than 0.5% Oxygen. Three (3) 3-hour rolling average periods of less than 2.0% Oxygen. See attached spreadsheets "06/17-18/2023 TGTU Shutdown Incinerator CEM Data" and "06/17-18/2023 TGTU Shutdown Incinerator 15 Minute Averages (deg F & %O2)".

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Visible emissions	16-RAB-184	I.E.2.a.	(1)(a)(ii)	Good combustion practices include: (ii) Whenever gases are routed to the TGC, the permittee shall operate the tail gas combustion device with sufficient temperature and oxygen content to convert sulfur compounds to sulfur dioxide.

Comment:

Ten (10) 15-minute periods of less than 1100 deg F. Two (2) 3-hour rolling average periods of less than 1180 deg F. Eleven (11) 15-minute periods of less than 0.5% Oxygen. Three (3) 3-hour rolling average periods of less than 2.0% Oxygen. See attached spreadsheets "06/17-18/2023 TGTU Shutdown Incinerator CEM Data" and "06/17-18/2023 TGTU Shutdown Incinerator 15 Minute Averages (deg F & %O2)".

4. Applicable Requirements Detailed Information:

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

Date: 6/17/2023 Excess emissions associated with the following conditions (lbs): NA

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Visible emissions	16-RAB-184	I.E.2.a.	(1)(b)	The BACT emission limit: Emissions shall not exceed 10% opacity on a 6-minute average basis.

Comment:

Opacity was assumed to be greater than 10% from 14:56 to 17:56 on 6/17/2023 and 20:39 to 20:57 on 6/18/2023 for a total of 3.3 hours. Assumed opacity was determined by time periods when the general trend for excess Oxygen at the Incinerator was at or near 0% (there are times during these periods where excess Oxygen is greater than 0%).

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Visible emissions	16-RAB-184	I.E.2.a.	(1)	Emissions shall not exceed 20% opacity or number 1 on the Ringlemann chart.

Comment:

Opacity was assumed to be greater than 10% from 14:56 to 17:56 on 6/17/2023 and 20:39 to 20:57 on 6/18/2023 for a total of 3.3 hours. Assumed opacity was determined by time periods when the general trend for excess Oxygen at the Incinerator was at or near 0% (there are times during these periods where excess Oxygen is greater than 0%).

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

Date: 6/17/2023 Excess emissions associated with the following conditions (lbs): 1266.4

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 for two (2) 3-hr periods 15:00 to 21:00 on 6/17/2023. See attached spreadsheet "6/17-18/2023 TGTU Shutdown Incinerator CEM Data" for associated emissions.

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

Date: 6/17/2023 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:

4. Applicable Requirements Detailed Information:

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

Date: 6/17/2023 Excess emissions associated with the following conditions (lbs): NA

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text

Acid gas was being routed to the SRU Reaction Furnace while bypassing/restarting the TGTU from 17:41 to 21:26 on 6/17/2023 and from 20:38 to 22:04 and 22:45 to 23:16 on 6/18/2023 for a total duration of 5.7 hours.

6/17-18/2023 TGTU Shutdown
Event Chronology

Unit Activity	Date	Time	Rate
Sulfur Make	6/17/2023	14:00	11.8 LTD
Crude Chage (FCCU not yet operating)	6/17/2023	14:00	32,225 BPD
# 2 Duf Charge	6/17/2023	14:00	7,100 BPD
#2 Duf Amine Contactor circulation started (30gpm) - Acid gas rates started increasing rapidly	6/17/2023	14:05	
SRU Incinerator Shutdown	6/17/2023	14:56	
Sulfur Make	6/17/2023	15:00	22.8 LTD
Crude Chage (FCCU not yet operating)	6/17/2023	15:00	32,250 BPD
# 2 Duf Charge	6/17/2023	15:00	7,100 BPD
Stopped #2 Duf Amine Contactor circulation	6/17/2023	15:55	
SRU Incinerator Startup	6/17/2023	16:15	
Exceeded 500lbs above permitted SRU startup limits for SO2 - EPCRA Reportable	6/17/2023	17:00	
TGTU Shutdown	6/17/2023	17:41	
Feed to TGTU	6/17/2023	21:26	
Instantaneous SO2 Corrected < 150 ppm	6/18/2023	01:16	
SO2 Corrected 1-hr average < 150 ppm	6/18/2023	02:00	
Sulfur Make	6/18/2023	02:00	10.6 LTD
Crude Chage (FCCU not yet operating)	6/18/2023	02:00	31,665 BPD
# 2 Duf Charge	6/18/2023	02:00	6,500 BPD
Sulfur Make	6/18/2023	14:00	11.7 LTD
Crude Chage (FCCU not yet operating)	6/18/2023	14:00	32,300 BPD
# 2 Duf Charge	6/18/2023	14:00	6,500 BPD
#2 Duf Amine Contactor circulation started again at slower rates (17gpm)	6/18/2023	19:25	
Sulfur Make	6/18/2023	20:30	18.5 LTD
Crude Chage (FCCU not yet operating)	6/18/2023	20:30	31800 BPD
# 2 Duf Charge	6/18/2023	20:30	6,500 BPD
TGTU Shutdown	6/18/2023	20:38	
Feed to TGTU	6/18/2023	22:04	
TGTU Shutdown	6/18/2023	22:45	
Feed to TGTU	6/18/2023	23:16	
Instantaneous SO2 Corrected < 150 ppm	6/19/2023	01:08	
SO2 Corrected 1-hr average < 150 ppm	6/19/2023	02:00	
Sulfur Make	6/19/2023	02:00	11.7 LTD
Crude Chage (FCCU not yet operating)	6/19/2023	02:00	31,200 BPD

6/17-18/2023 TGTU Shutdown 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 Rolling Sum (> 843 lbs)	Title V SO2 Lbs / hr 24 hr Rolling 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 excess 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
06/16/2023 15:00	74.1	78.0	75.4	3.49	3.47	1241.8	1241.9	1.1	1817	0.00	3.4	27.6	3.71	-2.61					2.23	-1.13		
06/16/2023 16:00	73.9	77.7	75.3	3.54	3.50	1242.3	1242.1	1.1	1802	0.00	3.3	27.3	3.65	-2.57					2.19	-1.11		
06/16/2023 17:00	72.1	77.5	75.2	3.56	3.53	1242.0	1242.0	1.1	1810	0.00	3.2	27.0	3.68	-2.62					2.21	-1.15		
06/16/2023 18:00	73.5	77.4	75.4	3.58	3.56	1242.1	1242.1	1.1	1840	0.00	3.2	27.1	3.74	-2.64					2.24	-1.14		
06/16/2023 19:00	74.4	77.1	75.6	3.59	3.58	1242.1	1242.1	1.1	1844	0.00	3.3	27.2	3.73	-2.62					2.24	-1.13		
06/16/2023 20:00	75.6	76.6	75.9	3.58	3.58	1241.8	1242.0	1.1	1830	0.00	3.3	27.3	3.70	-2.58					2.22	-1.10		
06/16/2023 21:00	75.4	75.7	76.1	3.56	3.57	1241.7	1241.9	1.1	1840	0.00	3.4	27.4	3.75	-2.62					2.25	-1.12		
06/16/2023 22:00	74.5	75.1	76.2	3.55	3.56	1241.6	1241.7	1.1	1837	0.00	3.4	27.4	3.72	-2.61					2.23	-1.12		
06/16/2023 23:00	77.0	75.0	76.3	3.57	3.56	1241.0	1241.5	1.2	1853	0.00	3.4	27.5	3.77	-2.61					2.26	-1.10		
06/17/2023 00:00	79.6	75.1	76.6	3.58	3.57	1241.6	1241.4	1.2	1849	0.00	3.5	27.6	3.77	-2.57					2.26	-1.06		
06/17/2023 01:00	80.7	75.5	76.9	3.57	3.57	1241.5	1241.4	1.2	1848	0.00	3.6	27.7	3.75	-2.54					2.25	-1.04		
06/17/2023 02:00	80.7	76.0	77.1	3.56	3.57	1241.3	1241.5	1.2	1846	0.00	3.6	27.8	3.75	-2.54					2.25	-1.04		
06/17/2023 03:00	83.0	76.7	77.4	3.54	3.55	1241.3	1241.4	1.3	1847	0.00	3.7	27.8	3.77	-2.52					2.26	-1.01		
06/17/2023 04:00	82.7	77.4	77.6	3.52	3.54	1241.5	1241.4	1.3	1872	0.00	3.7	27.9	3.81	-2.55					2.29	-1.03		
06/17/2023 05:00	89.7	78.9	78.2	3.50	3.52	1241.4	1241.4	1.4	1847	0.00	3.9	20.9	3.76	-2.41					2.26	-0.91		
06/17/2023 06:00	95.7	80.8	79.1	3.29	3.44	1239.2	1240.7	1.5	1882	0.00	4.1	22.3	3.89	-2.40					2.34	-0.85		
06/17/2023 07:00	93.7	82.4	79.7	3.43	3.41	1243.0	1241.2	1.4	1850	0.00	4.3	23.8	3.79	-2.37					2.27	-0.85		
06/17/2023 08:00	101.0	84.5	80.5	3.40	3.37	1240.5	1240.9	1.5	1860	0.00	4.4	25.3	3.81	-2.27					2.29	-0.75		
06/17/2023 09:00	83.8	85.2	80.5	3.32	3.38	1241.3	1241.6	1.3	1848	0.00	4.2	26.6	3.79	-2.52					2.27	-1.00		
06/17/2023 10:00	83.3	85.9	80.5	3.30	3.34	1241.4	1241.1	1.3	1861	0.00	4.1	27.9	3.84	-2.56					2.30	-1.02		
06/17/2023 11:00	88.4	86.9	80.9	3.27	3.30	1241.8	1241.5	1.3	1810	0.00	3.9	29.2	3.73	-2.41					2.24	-0.92		
06/17/2023 12:00	100.2	88.6	81.9	3.30	3.29	1241.2	1241.5	1.5	1834	0.00	4.1	29.6	3.79	-2.27					2.28	-0.76		
06/17/2023 13:00	100.8	90.3	82.9	3.24	3.27	1241.2	1241.4	1.5	1850	0.00	4.4	30.0	3.84	-2.29					2.31	-0.76		
06/17/2023 14:00	1050.9	171.1	123.5	3.10	3.21	1248.8	1243.8	17.2	1815	0.00	20.2	46.0	4.08	13.09					2.45	14.72		SRU Incinerator Shutdown 14:56
06/17/2023 15:00	26057.2	2335.6	1206.2	0.68	2.34	1211.9	1234.0	382.0	1599	0.10	400.7	426.9	3.67	378.36	367.4		3.92	32.72	2.20	379.83	372.59	
06/17/2023 16:00	27137.6	4590.2	2333.8	1.11	1.63	1044.4	1168.4	421.4	1618	11.32	820.6	847.3	3.88	417.55		756.47	3.88	67.43	2.33	419.10		SRU Incinerator Startup 16:15
06/17/2023 17:00	15102.6	5841.3	2960.1	0.44	0.74	1175.0	1143.8	283.0	1754	0.08	1086.4	1129.2	4.68	278.30			4.35	97.35	2.81	280.17		TGTU Shutdown 17:41
06/17/2023 18:00	24874.0	7906.1	3993.4	0.72	0.76	1053.3	1090.9	567.7	2251	12.80	1272.1	1695.8	5.71	562.03			5.51	168.73	3.42	564.31		
06/17/2023 19:00	34645.4	10785.4	5433.9	0.89	0.68	1102.7	1110.3	685.0	2145	0.18	1535.7	2379.7	4.94	680.04			5.21	219.39	2.97	682.01		
06/17/2023 20:00	29260.6	13215.4	6649.9	2.06	1.22	1234.8	1130.3	613.3	2385	0.16	1866.0	2991.9	5.24	608.05			5.45	282.65	3.14	610.15		
06/17/2023 21:00	4044.9	13545.5	6815.3	2.43	1.79	1258.2	1198.6	71.4	1855	0.02	1369.7	3062.2	4.42	67.02			4.16	221.01	2.65	68.79		Feed to TGTU 21:26
06/17/2023 22:00	190.8	13554.4	6820.2	2.60	2.36	1265.0	1252.7	2.7	1664	0.00	687.5	3063.8	3.59	-0.85			3.69	196.56	2.15	0.59		
06/17/2023 23:00	154.9	13560.0	6823.4	2.41	2.48	1256.3	1259.8	2.2	1645	0.00	76.4	3064.9	3.58	-1.36			3.69	196.41	2.15	0.07		
06/18/2023 00:00	159.8	13565.0	6826.8	2.42	2.47	1255.5	1258.9	2.3	1650	0.00	7.3	3066.0	3.60	-1.30			3.70	196.98	2.16	0.14		
06/18/2023 01:00	131.1	13567.5	6828.9	2.42	2.42	1255.4	1255.7	1.9	1643	0.00	6.4	3066.7	3.59	-1.71			3.68	196.18	2.15	-0.27		Instantaneous SO2 Corrected < 150ppm at ~01:16
06/18/2023 02:00	82.1	13486.7	6828.9	2.44	2.43	1256.4	1255.8	1.2	1658	0.00	5.4	3066.6	3.62	-2.43			3.71	196.56	2.17	-0.98		
06/18/2023 03:00	52.9	11319.7	6827.7	2.44	2.43	1257.5	1256.4	0.8	1642	0.00	3.8	3066.1	3.59	-2.83	2602.5		3.68	162.79	2.16	-1.40		
06/18/2023 04:00	25.5	9060.4	6825.3	2.52	2.46	1255.8	1256.6	0.4	1665	0.00	2.3	3065.3	3.73	-3.35			3.71	130.81	2.24	-1.86		
06/18/2023 05:00	44.6	7805.5	6823.4	3.04	2.66	1241.4	1251.6	0.8	1724	0.00	1.9	3064.7	4.37	-3.59			3.73	112.87	2.62	-1.84		
06/18/2023 06:00	44.6	5736.4	6821.3	3.06	2.87	1242.4	1246.6	0.8	1733	0.00	1.9	3064.0	4.39	-3.61			3.75	82.30	2.64	-1.85		
06/18/2023 07:00	44.6	2853.0	6819.2	3.08	3.06	1242.4	1242.1	0.8	1730	0.00	2.3	3063.4	4.39	-3.60			3.74	38.93	2.63	-1.85		
06/18/2023 08:00	44.6	418.4	6816.9	3.03	3.06	1242.2	1242.4	0.8	1729	0.00	2.3	3062.6	4.38	-3.60			3.75	2.52	2.63	-1.85		
06/18/2023 09:00	44.6	85.0	6815.2	3.02	3.04	1242.4	1242.3	0.8	1735	0.00	2.3	3062.1	4.40	-3.61					2.64	-1.85		
06/18/2023 10:00	44.6	72.8	6813.6	3.04	3.03	1242.7	1242.4	0.8	1737	0.00	2.4	3061.6	4.40	-3.62					2.64	-1.86		
06/18/2023 11:00	63.7	65.2	6812.6	3.22	3.09	1242.2	1242.4	0.9	1759	0.00	2.5	3061.2	3.65	-2.72					2.19	-1.26		
06/18/2023 12:00	58.4	56.8	6810.9	3.26	3.17	1242.0	1242.3	0.9	1755	0.00	2.6	3060.6	3.64	-2.79					2.18	-1.33		
06/18/2023 13:00	57.2	50.6	6809.0	3.26	3.25	1242.3	1242.2	0.8	1763	0.00	2.6	3059.8	3.67	-2.83					2.20	-1.36		
06/18/2023 14:00	56.0	48.4	6767.6	3.24	3.26	1242.1	1242.1	0.8	1767	0.00	2.5	3043.5	3.66	-2.84					2.20	-1.38		
06/18/2023 15:00	55.9	48.7	5684.2	3.25	3.25	1242.2	1242.2	0.8	1753	0.00	2.5	2662.3	3.62	-2.81					2.17	-1.36	2603.03	
06/18/2023 16:00	56.9	51.3	4555.8	3.23	3.24	1241.9	1242.1	0.8	1764	0.00	2.5	2241.7	3.65	-2.82		2143.17			2.19	-1.36		
06/18/2023 17:00	55.8	52.2	3928.9	3.17	3.22	1241.9	1242.0	0.8	1768	0.00	2.5	1959.5	3.67	-2.85					2.20	-1.38		
06/18/2023 18:00	56.8	53.3	2894.8	3.15	3.19	1241.3	1241.7	0.9	1787	0.00	2.5	1392.6	3.74	-2.89					2.24	-1.39		
06/18/2023 19:00	74.8	55.8	1454.4	3.13	3.15	1242.5	1241.9	1.1	1782	0.00	2.8	708.8	3.74	-2.62					2.25	-1.13		
06/18/2023 20:00	7446.9	672.6	545.5	1.99	2.76	1253.7	1245.8	141.1	2008	0.04	143.1	236.6	4.74	136.37	104.0		4.61	7.79	2.84	138.27		TGTU Shutdown 20:38
06/18/2023 21:00	13408.4	1786.3	935.6	1.04	2.05	1231.5	1242.5	273.8	2166	0.07	416.0	438.9	5.10	268.65			5.22	32.06	3.06	270.69		
06/18/2023 22:00	4088.3	2123.3	1098.0	1.84	1.62	1242.2	1242.4	75.2	1877	0.02	490.1	511.4	4.60	70.64			4.34	32.52	2.76	72.48		Feed to TGTU 22:04 TGTU Shutdown 22:45
06/18/2023 23:00	1668.4	2257.0	1161.1	2.13	1.67	1243.7	1239.1	29.6	1835	0.01	378.6	538.8	4.44	25.18			4.18	33.54	2.66	26.96		Feed to TGTU 23:16
06/19/2023 00:00	186.1	2267.6	1162.2	3.05	2.34	1239.5	1241.8	2.8	1791	0.00	107.6	539.3	3.75	-0.96			3.88	31.29	2.25	0.54		
06/19/2023 01:00	118.9	2272.8	1161.7	3.91	3.03	1240.7	1241.3	1.8	1881	0.00	34.2	539.2	3.74	-1.96			3.88	31.36	2.25	-0.47		Instantaneous SO2 Corrected < 150ppm at ~ 01:08
06/19/2023 02:00	78.5	2274.6	1161.5	3.99	3.65	1240.3	1240.1	1.2	1868	0.00	5.7	539.2	3.69	-2.53			3.83	31.03	2.22	-1.06		
06/19/2023 03:00	65.9	2275.5	1162.1	3.99	3.96	1240.4	1240.5	1.0	1880	0.00	3.9	539.4	3.72	-2.74			3.86	31.24	2.23	-1.25		
06/19/2023 04:00	59.4	2275.7	1163.5	3.99	3.99	1240.0	1240.2	0.9	1891	0.00	3.0	539.9	3.75	-2.86			3.88	31.43	2.25	-1.36		
06/19/2023 05:00	55.5	2275.6	1164.0	3.99	3.99	1239.8	1240.1	0.8	1871	0.00	2.7	539.9	3.69	-2.87			3.84	31.09	2.22	-1.40		
06/19/2023 06:00	54.3	2275.4	1164.4	4.00	3.99	1240.4	1240.1	0.8	1894	0.00	2.5	540.0	3.73	-2.92			3.88	31.45	2.24	-1.43		
06/19/2023 07:00	51.4	2273.5	1164.6	4.02	4.00	1240.1	1240.1	0.8	1888	0.00	2.4	539.9	3.75	-2.98			3.87	31.29	2.25	-1.48		
06/19/2023 08:00	52.1	1657.3	1165.0	3.97	4.00	1239.7	1240.1	0.8	1901	0.00	2.4	539.9	3.74	-2.96	341.7		3.90	21.97	2.25	-1.47		
06/19/2023 09:00	40.6	543.3	1164.8	3.91	3.97	1239.8	1239.9	0.6	1910	0.00	2.2	539.8	3.82	-3.20			3.94	4.62	2.29	-1.67		
06/19/2023 10:00	39.1	205.8	1164.6	3.92	3.93	1240.4	1240.0	0.6	1896	0.00	2.0	539.6	3.77	-3.18					2.26	-1.67		
06/19/2023 11:00	39.7	70.1	1163.6	3.90	3.91	1240.1	1240.1	0.6	1889	0.00	1.8	539.2	3.78	-3.18					2.27	-1.67		
06/19/2023 12:00	40.2	58.0	1162.8	3.84	3.89	1240.1	1240.2	0.6	1894	0.00	1.8	539.0	3.79	-3.18					2.28	-1.67		
06/19/2023 13:00	39.7	51.4	1162.1	3.84	3.86	1240.0	1240.0	0.6	1902	0.00	1.8	538.8	3.78	-3.18					2.27	-1.67		
06/19/2023 14:00	36.7	47.9	1161.3	3.85	3.85	1239.3	1239.8	0.6	1894	0.00	1.8	538.5	3.81	-3.25					2.29	-1.73		
06/19/2023 15:00	48.5	46.4	1161.0	4.00	3.90	1239.3	1239.5	0.7	1864	0.00	1.9	538.4	3.66	-2.95					2.20	-1.49	482.21	
06/19/2023 16:00	33.2	44.3	1160.0	4.16	4.00	1242.1	1240.2	0.5	1831	0.00	1.7	538.0	3.54	-3.07					2.12	-1.65		
06/19/2023 17:00	36.2	42.7	1159.2	4.08	4.08	1240.0	1240.5	0.5	1859	0.00	1.7	537.8	3.66	-3.13					2.20	-1.67		
06/19/2023 18:00	30.8	40.7	1158.1	3.97	4.07	1239.0	1240.4	0.5	1876	0.00	1.5	537.4	3.73	-3.27					2.24	-1.78		
06/19/2023 19:00	31.9	39.1	1156.3	4.21	4.09	1242.2	1240.4	0.4	1830	0.00	1.4	536.7	3.53	-3.08					2.12	-1.67		
06/19/2023 20:00	43.3	38.3	847.8	4.23	4.14	1240.7	1240.7	0.6	1844	0.00	1.5	396.2	3.58	-2.96					2.15	-1.53		
06/19/2023 21:00	46.3	38.8	291.0	4.22	4.22	1240.2	1241.0	0.7	1845	0.00	1.7	123.1	3.62	-2.95					2.17	-1.50		
06/19/2023 22:00	36.2	38.6	122.2	4.26	4.24	1240.7	1240.5	0.5	1847	0.00	1.8	48.4	3.59	-3.07					2.15	-1.63		
06/19/2023 23:00	34.1	38.1	54.1	4.29	4.26	1240.7	1240.6	0.5	1842	0.00	1.7	19.3	3.59	-3.10					2.16	-1.67		
										H_2S	SO2 3-hr	SO2 24-hr			Title V / Ja 12-hr	EPCRA		GCD			Title V / GCD	
*Substituted data due to CEMS downtime							**Total Excess Emissions**			**24.8**	**1266.4**	–			**3415.5**	**2899.6**		**2984.9**			**3457.8**	

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

06/17-18/2023 TGTU Shutdown Incinerator
15 Minute Averages (deg F & %O_2)

Period Start:	SRU / TGTU Incinerator Stack Temperature (˚F) (<1100˚F /15 Min Ave)	SRU / TGTU Incinerator Stack Oxygen (% O_2) (<0.5% O_2 /15 Min Ave)	Comments
06/17/2023 12:00	1241.1	3.33	
06/17/2023 12:15	1241.1	3.30	
06/17/2023 12:30	1241.1	3.30	
06/17/2023 12:45	1241.7	3.27	
06/17/2023 13:00	1241.6	3.26	
06/17/2023 13:15	1240.9	3.25	
06/17/2023 13:30	1242.8	3.21	
06/17/2023 13:45	1239.6	3.25	
06/17/2023 14:00	1242.4	3.14	
06/17/2023 14:15	1247.5	3.27	
06/17/2023 14:30	1243.8	3.28	
06/17/2023 14:45	1261.5	2.72	Start of assumed opacity: 14:56 (minute data of excess O2 trending at or near 0%)
06/17/2023 15:00	1318.0	0.31	
06/17/2023 15:15	1299.9	2.39	
06/17/2023 15:30	1244.2	0.01	
06/17/2023 15:00	1318.0	0.31	
06/17/2023 15:15	1299.9	2.39	
06/17/2023 15:30	1244.2	0.01	
06/17/2023 15:45	1092.2	0.01	
06/17/2023 16:00	1010.0	4.12	
06/17/2023 16:15	952.7	0.30	
06/17/2023 16:30	1089.0	0.00	
06/17/2023 16:45	1125.9	0.01	
06/17/2023 17:00	1148.1	0.00	
06/17/2023 17:15	1189.0	0.01	
06/17/2023 17:30	1200.8	0.65	
06/17/2023 17:45	1162.2	1.10	End of assumed opacity: 17:56 (minute data for excess O2 no longer trending at or near 0%)
06/17/2023 18:00	1058.8	0.75	
06/17/2023 18:15	1055.7	0.67	
06/17/2023 18:30	1038.1	0.67	
06/17/2023 18:45	1060.4	0.80	
06/17/2023 19:00	1075.4	0.82	
06/17/2023 19:15	1080.9	0.77	
06/17/2023 19:30	1110.0	0.71	
06/17/2023 19:45	1144.5	1.24	
06/17/2023 20:00	1184.0	1.32	
06/17/2023 20:15	1242.3	2.08	
06/17/2023 20:30	1255.1	2.45	
06/17/2023 20:45	1257.8	2.38	
06/18/2023 19:00	1243.3	3.16	
06/18/2023 19:15	1241.8	3.20	
06/18/2023 19:30	1243.6	3.10	
06/18/2023 19:45	1241.2	3.07	
06/18/2023 20:00	1240.8	3.07	
06/18/2023 20:15	1244.4	2.99	
06/18/2023 20:30	1259.8	1.73	Start of assumed opacity: 20:39 (minute data of excess O2 trending at or near 0%)
06/18/2023 20:45	1269.7	0.17	End of assumed opacity: 20:57 (minute data for excess O2 no longer trending at or near 0%)
06/18/2023 21:00	1208.8	0.68	
06/18/2023 21:15	1247.1	0.95	
06/18/2023 21:30	1230.4	1.42	
06/18/2023 21:45	1239.6	1.09	
06/18/2023 22:00	1239.0	1.60	
06/18/2023 22:15	1250.0	2.13	
06/18/2023 22:30	1240.5	2.24	
06/18/2023 22:45	1239.2	1.42	
06/18/2023 23:00	1245.8	1.68	
06/18/2023 23:15	1241.2	2.20	
06/18/2023 23:30	1246.3	2.31	
06/18/2023 23:45	1241.6	2.33	

Superior Refining Company LLC
Superior, WI Refinery
6/17-18/2023 TGTU Shutdown
Refinery Wide Excess SO^2 and H^2S Emissions By Source
EPCRA and CERCLA Reporting Threshold

48hr Period from 17:00 on 6/16/2023 to 17:00 on 6/18/2023

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
6/17/2023	TGTU Shutdown	Bringing 2 Duf Amine Contactor Online	2899.6				24.8			
		Subtotals	2899.6				24.8			

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)

2899.6

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

24.8

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

24.8

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.

Beattie, David

From: DNRAMCOMPLIANCEEXTERNALSUBMISSION@Wisconsin.gov
Sent: Monday, June 19, 2023 3:44 PM
To: Beattie, David
Cc: michalee.leuthard@wisconsin.gov; Perkins, Dean S.
Subject: Deviation Notification Received. Superior Refining Company LLC

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_06192023_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 **

Clear Data | Print... | Save...

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

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: Construction Permit 16-RAB-184 I.E.1. @ a.(1)(b)(ii), a.(4), a.(6)(a) a.(8); & (b)(2), b.(15) I.E.2. @ a.(1)(a)(ii), a.(1)(b) and a.(1) [sic]; & b.(3) I.E.5. @ a.(1)(a)(ii) & b.(3) I.E.7. @ a.(1)(a)(ii) & b.(2) I.E.8.a.(1) 12 and 24-hr rolling average SO2 Emissions, Minimum Temperature and O2 requirements, Visible Emissions/Opacity. Deviations may be added/updated in final report.	**Permit Process No./Unit Description** Process No. P20 Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU), and Tail Gas Combustor (TGC)/Incinerator

Start/Stop Time(s) of Deviation/Malfunction/Unscheduled Event:
The TGTU shutdown on 6/17/2023 from 17:41 to 21:26 and 6/18/2023 from 20:38 to 22:04 and 22:45 to 23:16. The shutdowns resulted in elevated SO2 readings and exceedances of the 12 and 24-hr rolling average limits for SO2. The TGC/Incinerator also did not maintain temperature and oxygen levels at times. Visible emissions were present from the Incinerator stack at times as a result of the upset.

Cause(s) of Deviation/Malfunction/Unscheduled Event:
The refinery was brining additional processes into operation resulting in operating conditions to change quickly and instability in the SRU/TGTU/TGC.

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):
Charge rates were maintained or reduced to help with stability. The TGTU Feed Heater was restarted as quickly and safely as possible to help bring SO2 emissions back to normal levels within permitted limits.

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):
Operations and Engineering personnel worked quickly to restart the TGTU and stabilize units. Ongoing investigation is taking place to determine the cause and additional safeguards to prevent a similar event from taking place.
Estimated excess SO2 emission of approximately 3,000-3,500 pounds.

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 6/19/2023

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:	41ZWB
Document Description:	Deviation Notification
File Name:	DEVIATION-MALFUNCTION_NOTIFICATION_P20_06192023_816009590.pdf
File Size [KB]:	113
Wisconsin User ID (WAMS):	Mgunn42
User Name:	Matthew B Gunn
User Verified Status:	
Temporary PIN Sent To:	matt.gunn@cenovus.com
Signature ID:	41ZTJ
Signature Date/Time:	7/27/2023 6:18:07 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:	B12F32BB6D4C43AEB97393E26F01302F429161861FC9D6A70FF9BA24414FB3FC23632BFF86BA2CC947A22D266807B94CB5D68A175B11AD9B24C3375D7EAF6943		
Public Key Value:	0602000000A400005253413100080000010001004 5AD72042DD56761AA7E5D52A789100033D04B563261AE2AF4F08CAC0AA82341462474941C0104B561CE877F36A66C3EA4B90DDC3A9E6F87BF15B2137C573A635FD62F24BB9194943760A80DCCD384232E200406FD3745E2F2AD130F3C4118B912CC64456AFFA94525C437B5C9C39BCE5FFD5730B5A7BD2B1B5DCB999DEB49B5D18C60FCA2D443239B97E9D2894BA16606D15F2C239C528B2FB1DF36EF61C1483BBE8187EA18C7AB08662AC4E24A9DE6D6113FAC32003D4A1EBD5630E982F912E8D57952EDA3FC90EF67F9082BF9F5E5005D89FF4272A4CDC288AB92D3D62B34E024BC4AB911FA42FDCB2BECFA91008D68AD73B572FC8D7C3E4C0820C9222FBF		
Document Hash Value:	BB679BBE1330BAEC5295570784FEB5AAB8B17A77EFE969C9EB6E084BBB817DAD992821B4562C48F82D30C82DD7F2755AA85997E43F2286C2FABF8CB3ED2B4F06		
Document Signature Value:	90E3F03BA8DBDB6FD5DA87CEA3E0E10C6F507C42A7FD941B1C911D2CE5A94E4B56FA4612778A6B5372B9659B2EBD3A91127CEC14E92DA191345C2053CEE3050FDDCFD821B66E404E4D477B2E6B702F333B064D56269F4968E271831568B290F88F93FD746E25CD1DB674F4CE1DA1AFE825A9D2AA031D3FECDBA9AD6641EBD1659414D6F09647CB6C2CD6291A9999EE13C52B0F32947EFEEEC33086BC2DEE1E56AE382C3CBAE9351B51F423F4C495920F80925C32D15AE62A16E1FEAABEB0326B88A8570E3F2B1B367F7A3496E95D723B3F1D92D5B6C6A30305B792333334CAF097D1527C563B3263D9B51F47FFF74C0DA37473254E774115F1C481AB7448C012		

Appendix F -

Correspondence Record with SRU/TGTU Subject Matter Expert Naief Salamah

6/17/2023 8:17PM-10:43PM

From: Darby, Mark
To: Beattie, David; Lovely, Ross
Subject: From Naief Salamah: FW: 6/17/23 SRU/TGTU Incinerator Shutdown
Date: Sunday, June 18, 2023 2:22:08 PM
Attachments: image001.png
image002.png

Dave,

Here is an update from Naief from last evening. May be helpful for the event report or at least our understanding of the emission event.

Thanks

Mark Darby
Environmental Manager
Environmental - Superior Refinery
Downstream
Office:1.715.398.8453 | Cell:1.218.525.5848
Mark.Darby@cenovus.com
Superior, Wisconsin
cenovus ENERGY

From: Salamah, Naief <Naief.Salamah@cenovus.com>
Sent: Saturday, June 17, 2023 10:43 PM
To: VanDaele, Kate <Kate.VanDaele@cenovus.com>; Darby, Mark <Mark.Darby@cenovus.com>; Laszewski, Andrew <Andrew.Laszewski@cenovus.com>; Laszewski, Aaron <Aaron.Laszewski@cenovus.com>; ^RLT Superior Refinery <RLTSupRf@cenovus.com>; Gemuend, Jeremy <Jeremy.Gemuend@cenovus.com>
Cc: Beattie, David <David.Beattie@cenovus.com>; Kline, Randy <Randy.Kline@cenovus.com>; Oswskey, Robert <Robert.Oswskey@cenovus.com>
Subject: RE: 6/17/23 SRU/TGTU Incinerator Shutdown

Update:

Significant Sequence of events following SRU Upset

- Incinerator relit @ ~1620hrs and brought back up to operating temperature.
- TGU Feed Heater tripped @~1745hrs
- TGU Feed Heater Relit @~1900hrs.
- Tail Gas on SRU was worked back to Ratio and TGU Reactor inlet temperature increased to prepare for Acid Gas.
- SRU was routed back to TGU @ ~2130hrs

Other events

- TGU Still Regenerator had to be slumped due to Incinerator Trip, unstable operation in SRU and high OVHD Pressure on Still.
- TGU Still Regenerator OVH Accumulator Off Gas Control could not manage pressure and troubleshooting revealed some restriction at or around control valve. Several attempts to steam out valve/line were unsuccessful. OVHD Pressure is now being controlled in bypass.

Currently/Path Forward

- SRU back on Ratio Control
  - Continue to monitor Furnace and Reactor Temperatures
- Tail Gas is back in TGU
  - Continue to increase Feed Heater/Reactor Temperatures to achieve adequate Tail Gas conversion conditions.
- TGU Tail Gas Still Regenerator back online
  - Continue to optimize to achieve adequate regeneration of Amine
  - Control OVHD Pressure with bypass
  - Sample Lean Amine and adjust reboiler and/or strengthen Amine as needed
- **Incinerator Stack Emissions in compliance as of the writing of this email**
  - Maintain SRU Tail Gas Ratio
  - Continue to work TGU to optimal operating conditions

I'd like to commend the team on good job recovering from this condition.

- No injuries or exposures occurred during this upset.

- Quick & effective response by support personnel
- Good coordination with Upstream Units via the shift foreman
- Day shift operators stayed over to help night shift recover the unit with dinner provided

Thanks

Naief S.
CSU Technician
Ops Specialist

From: VanDaele, Kate <Kate.VanDaele@cenovus.com>
Sent: Saturday, June 17, 2023 9:42 PM
To: Darby, Mark <Mark.Darby@cenovus.com>; Laszewski, Andrew <Andrew.Laszewski@cenovus.com>; Laszewski, Aaron <Aaron.Laszewski@cenovus.com>; ^RLT Superior Refinery <RLTSupRf@cenovus.com>
Cc: Beattie, David <David.Beattie@cenovus.com>; Kline, Randy <Randy.Kline@cenovus.com>; Oswskey, Robert <Robert.Oswskey@cenovus.com>; Salamah, Naief <Naief.Salamah@cenovus.com>
Subject: Re: 6/17/23 SRU/TGTU Incinerator Shutdown

Thank you for the updates Mark. They are appreciated.

Get Outlook for iOS

From: Darby, Mark <Mark.Darby@cenovus.com>
Sent: Saturday, June 17, 2023 8:17:06 PM
To: Laszewski, Andrew <Andrew.Laszewski@cenovus.com>; Laszewski, Aaron <Aaron.Laszewski@cenovus.com>; ^RLT Superior Refinery <RLTSupRf@cenovus.com>
Cc: Beattie, David <David.Beattie@cenovus.com>; Kline, Randy <Randy.Kline@cenovus.com>; Oswskey, Robert <Robert.Oswskey@cenovus.com>; Salamah, Naief <Naief.Salamah@cenovus.com>
Subject: RE: 6/17/23 SRU/TGTU Incinerator Shutdown

Just spoke with Naief, he is getting ready to put the feed into the TGTU which should significantly improve the incinerator numbers.

Mark Darby
Environmental Manager
Environmental - Superior Refinery
Downstream
Office:1.715.398.8453 | Cell:1.218.525.5848
Mark.Darby@cenovus.com
Superior, Wisconsin
cenovus ENERGY

Appendix G -

7/25/2023 SRU Shutdown, Meltout, Burnout, Startup Report

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:	44WRI
Document Description:	Deviation Notification
File Name:	DEVIATION-MALFUNCTION_NOTIFICATION_I10_P20_07262023_816009590.pdf
File Size [KB]:	138
Wisconsin User ID (WAMS):	Mgunn42
User Name:	Matthew B Gunn
User Verified Status:	
Temporary PIN Sent To:	matt.gunn@cenovus.com
Signature ID:	44WOQ
Signature Date/Time:	9/13/2023 4:25:55 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: 47.225.237.11 Public Key Type: RSA-2048 Hash Type: SHA-512

Temporary PIN Hash Value:	6CA5BF8B051BFA9B980AB2E7B35175BAC62750110380B5C1C34AD9E680D9B8F7C51E826CB2B2859EF643AB65DC8BBED2EE611542F9D27F328936F5AC8A4F485C
Public Key Value:	0602000000A400005253413100080000010001000100ED3BE35E2DB72E56AED7F9C6561EF9128A7B419B4A4F6FC4D3C9FF4F15C11FBB5E2CE899B1D1BD0E6A1D360F505C76D834336385B83742525D122434168F921DC7D77D9305057113BFFB8F827724E1F404845D39BE7AD09421BEA1823654800A4D128C8ADA07C25376F16AA1BB1CD1EF7C7939DD3392182B612DC4A65EA30430B517053F6BF7D28FC34818EF28F452AE521025552B361804A33C589006A3F19375F0A0A2EDEFECB1338E0A92E817A19EBFBBE47A8D4D8B9EF16414DC1DB2DAD8F2080925297ED9B12B8F13475C6C0775600AB8065777F7B71EBBAD80A15B2B7F9CE923B7EDC5B7634B74C3A6C280D3CA3DC084096F616D7C52A43AB7030018A9
Document Hash Value:	BE4E6E9FC5A20BB491D22E04A2B6E0B1FEB5016C78FDD84B8C59004682EFB5A7B9E29EFA7C01E25E791B7673AE92B86906814CD73247C74C649FD4D005131203
Document Signature Value:	4624F2D18AFCD9CCA5097719E344D6F8AC4E1AD8AD66202ACBA52EBBDC7ED9EEC0367AEBAFBF1C2F64CD7844441715E1F4782B41A4BA9ACEA1EE22187352E25D83E7A2FB72C8EE8B905B4DBD9BB7E9C96D1F5D463FDF47CB18AAABBE1C4FF8DDCA1FCAFDB0D3FFA909E738AA5C1443380824AF800944827984BAF68744C94BA08054A4D028BEB8B32B5AA2E3C11F895231AEFA79DA4D4DA7EA202E868890718196E4BF17E7E14519F6CD357ED024E1A2823BEEAFD70417C47E2DF2EB56F5016BEE5047C8653BC22FF4C45035DC0FFC0245D889FAFA8DA0C98524117186CAA59E0523C635EEAEAE02A4453BB75DA429764FD3B1830B4148C6DA8A6EC987A513B6

Superior Refining Company LLC

1. Event Information:

Start Date:	07/25/2023
Start Time (24-hr time):	9:55
End Date:	08/03/2023
End Time (24-hr time):	10:13
Duration(hours)	216.30
Description:	SRU Shutdown, Meltout, Burnout, and Startup
Cause:	A leak from the SRU Waste Heat Boiler necessitated a shutdown of the SRU in order to investigate and make necessary repairs. Due to the unknown cause of the leak and required cool down of the unit to investigate and make the repairs, sulfur removal from the activated catalyst was required through meltout/burnout prior to cool down.
Action(s):	The TGTU was able to continue operating for a short period of time after the SRU shutdown to help reduce emissions. The refinery undertook sulfur shedding procedures prior to and during the shutdown to help limit emissions. Acid gas was routed to the Flare Gas Caustic Scrubber for the duration of the shutdown. Caustic was replaced and managed throughout the event to help limit emissions.
Comments:	Once meltout, burnout, and unit cool down were complete refinery staff worked around the clock to investigate and make the necessary repairs to the Waste Heat Boiler. Upon successful repair, warm up of the SRU commenced and Acid Gas was routed back to the unit for restart. The Waste Heat Boiler is a necessary component of a functioning SRU and no other option existed but the shutdown and cool down of the unit to repair the leak.

2. Reporting Information:

Date	Time	Agency	Agency Contact	Caller
07/26/2023	10:16	Wisconsin Emergency Management (WEM / SERC / EPCRA), (800) 943-0003	Corey	David Beattie
07/26/2023	10:24	Douglas County Emergency Government (LEPC), (715) 817-1899	Dave Sletten	David Beattie
07/26/2023	10:29	Superior Fire Department, (715) 395-1680	Angie	David Beattie
07/26/2023	10:32	Wisconsin Department of Natural Resources (WDNR), (715) 828-8544	Jeff Paddock	David Beattie
07/26/2023	10:35	Wisconsin Department of Natural Resources (WDNR), (608) 733-0326	Michalee Leuthard	David Beattie
07/26/2023	16:03	Wisconsin Department of Natural Resources (WDNR), WAMS	WAMS Submittal	Ross Lovely
07/31/2023	15:39	Wisconsin Department of Natural Resources (WDNR), e-mail	Michalee Leuthard - email	David Beattie
08/02/2023	16:30	Wisconsin Department of Natural Resources (WDNR), e-mail	Michalee Leuthard - email	David Beattie

3. Applicable Requirements Summary Information:

Source ID: Facility-wide, Total Facility Applicable Requirements

Date: 07/25/2023 **Duration (hr): 48** **Excess Emissions (lbs): 1734.8**

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

Source ID: Facility-wide, Total Facility Applicable Requirements

Date: 07/25/2023 **Duration (hr): 9** **Excess Emissions (lbs): 19.7**

Air Pollutant	Applicable Requirement	Description
Hydrogen sulfide	2010 Consent Decree, V.I.49.c.	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)

3. Applicable Requirements Summary Information:

Source ID: I10, Blowdown (Refinery) Primary Flare

Date: 07/25/2023 **Duration (hr): 9** **Excess Emissions (lbs): 19.3**

Air Pollutant	Applicable Requirement	Description
Sulfur Dioxide	12-DCF-256, I.A.1.a.(1)	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)
Hydrogen Sulfide	12-DCF-256, I.Aa.1.a.(1)	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)

Source ID: I10, Blowdown (Refinery) Primary Flare

Date: 07/25/2023 **Duration (hr): 9** **Excess Emissions (lbs): 19.5**

Air Pollutant	Applicable Requirement	Description
Hydrogen sulfide	40 CFR Part 60, Subpart Ja, 60.103a(h)	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)

3. Applicable Requirements Summary Information:

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

Date: 07/24/2023 **Duration (hr): 48** **Excess Emissions (lbs): 150.6**

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

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

Date: 07/24/2023 **Duration (hr): 24** **Excess Emissions (lbs): 155.9**

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)
Sulfur dioxide	16-RAB-184, I.E.1.a.(6)(a)	SO2 > 250ppm (12-hr rolling average)
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)

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

Date: 07/25/2023 **Duration (hr): 183.5** **Excess Emissions (lbs): 42.2**

Air Pollutant	Applicable Requirement	Description
Sulfur dioxide	16-RAB-184, I.E.1.a.(1)(f)	Acid Gas not routed to SRU

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

Date: 07/27/2023 **Duration (hr): 131** **Excess Emissions (lbs): 0.1**

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.(1)(e)(i)	Sulfur Pit Emissions
Sulfur dioxide	16-RAB-184, I.E.1.a.(5)(a)	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: 08/01/2023 **Duration (hr): 13** **Excess Emissions (lbs): 172.2**

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

4. Applicable Requirements Detailed Information:

Source ID: Facility-wide, Total Facility Applicable Requirements

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 1734.8**

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 08:00 on 7/25/2023 to 08:00 on 7/27/2023 for a total of two (2) 24-hr periods. See attached spreadsheet, "7/25/2023 SRU Shutdown Refinery Wide Excess SO2 and H2S Emissions by Source".

Source ID: Facility-wide, Total Facility Applicable Requirements

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 19.7**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Hydrogen sulfide	2010 Consent Decree	V.I.	49.c.	If prior to the termination of this Consent Decree, a Flaring Device becomes subject to NSPS Subpart Ja for a particular pollutant due to a “modification” (as that term is defined in the final Subpart Ja rule), the modified affected facility shall be subject to and comply with NSPS Subpart Ja, in lieu of NSPS Subpart J, for that regulated pollutant to which a standard applies as a result of the modification.

Comment:

The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for three (3) 3-hr RA periods: 20:00 on 7/25/2023 to 02:00 on 7/26/2023 and 01:00 on 7/27/2023 to 04:00 on 7/27/2023. Total excess emissions from the GCD deviation were 19.7 lbs of SO2 (100% destruction efficiency). See attached "7/25/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

4. Applicable Requirements Detailed Information:

Source ID: I10, Blowdown (Refinery) Primary Flare

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 19.3**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Hydrogen Sulfide	12-DCF-256	I.Aa.1.a.	(1)	The hydrogen sulfide content of the gas exiting the caustic scrubber may not exceed 162 ppmv, based on a 3 hour rolling average basis. See I.A.1.a.(2).

4. Applicable Requirements Detailed Information:

Source ID: I10, Blowdown (Refinery) Primary Flare

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 19.3**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text

Comment:

The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for three (3) 3-hr RA periods: 20:00 on 7/25/2023 to 02:00 on 7/26/2023 and 01:00 on 7/27/2023 to 04:00 on 7/27/2023. Total excess emissions from the Title V/Construction Permit deviation were 19.3 lbs of SO2 and 0.2 lbs of H2S (98% destruction efficiency). See attached "7/25/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

Sulfur Dioxide	12-DCF-256	I.A.1.a.	(1)	Each owner or operator shall not burn in any affected flare any fuel gas that contains H2S in excess of 162 ppmv determined hourly on a 3-hour rolling average basis. The combustion in a flare of process upset gases or fuel gas that is released to the flare as a result of relief valve leakage or other emergency malfunctions is exempt from this limit.

Comment:

The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for three (3) 3-hr RA periods: 20:00 on 7/25/2023 to 02:00 on 7/26/2023 and 01:00 on 7/27/2023 to 04:00 on 7/27/2023. Total excess emissions from the Title V/Construction Permit deviation were 19.3 lbs of SO2 and 0.2 lbs of H2S (98% destruction efficiency). See attached "7/25/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

Source ID: I10, Blowdown (Refinery) Primary Flare

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 19.5**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Hydrogen sulfide	40 CFR Part 60, Subpart Ja	60.103a	(h)	Each owner or operator shall not burn in any affected flare any fuel gas that contains H2S in excess of 162 ppmv determined hourly on a 3-hour rolling average basis. The combustion in a flare of process upset gases or fuel gas that is released to the flare as a result of relief valve leakage or other emergency malfunctions is exempt from this limit.

Comment:

The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for three (3) 3-hr RA periods: 20:00 on 7/25/2023 to 02:00 on 7/26/2023 and 01:00 on 7/27/2023 to 04:00 on 7/27/2023. Total excess emissions from the NSPS Subpart Ja deviation were 19.5 lbs of SO2 and 0.1 lbs of H2S (99% destruction efficiency). See attached "7/25/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

4. Applicable Requirements Detailed Information:

4. Applicable Requirements Detailed Information:

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

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 150.6**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
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, 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 for a total of two (2) 24-hr periods between 11:00 on 7/24/2023 and 00:00 on 8/3/2023, excluding periods when acid gas was routed to the flare (09:55 on 7/25/2023 to 23:26 on 8/1/2023) per the requirements of 16-RAB-084 I.E.1.a.(1).d. See attached spreadsheets: "7/25/2023 - 8/3/2023 SRU Shutdown 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 for a total of two (2) 24-hr periods between 11:00 on 7/24/2023 and 00:00 on 8/3/2023, excluding periods when acid gas was routed to the flare (09:55 on 7/25/2023 to 23:26 on 8/1/2023) per the requirements of 16-RAB-084 I.E.1.a.(1).d. See attached spreadsheets: "7/25/2023 - 8/3/2023 SRU Shutdown Incinerator CEM Data" for associated emissions.

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 for a total of two (2) 24-hr periods between 11:00 on 7/24/2023 and 00:00 on 8/3/2023, excluding periods when acid gas was routed to the flare (09:55 on 7/25/2023 to 23:26 on 8/1/2023) per the requirements of 16-RAB-084 I.E.1.a.(1).d. See attached spreadsheets: "7/25/2023 - 8/3/2023 SRU Shutdown Incinerator CEM Data" for associated emissions.

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

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 155.9**

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: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 155.9**

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 23:00 on 7/24/2023 to 12:00 on 8/2/2023 for a total of two (2) 12-hr periods, excluding periods when acid gas was routed to the flare (09:55 on 7/25/2023 to 23:26 on 8/1/2023) per the requirements of 16-RAB-084 I.E.1.a.(1).d. See attached spreadsheet "7/25/2023 - 8/3/2023 SRU Shutdown Incinerator CEM Data" for detailed information.

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
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 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 23:00 on 7/24/2023 to 12:00 on 8/2/2023 for a total of two (2) 12-hr periods, excluding periods when acid gas was routed to the flare (09:55 on 7/25/2023 to 23:26 on 8/1/2023) per the requirements of 16-RAB-084 I.E.1.a.(1).d. See attached spreadsheet "7/25/2023 - 8/3/2023 SRU Shutdown Incinerator CEM Data" for detailed information.

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)	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

4. Applicable Requirements Detailed Information:

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

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 155.9**

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)	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 23:00 on 7/24/2023 to 12:00 on 8/2/2023 for a total of two (2) 12-hr periods, excluding periods when acid gas was routed to the flare (09:55 on 7/25/2023 to 23:26 on 8/1/2023) per the requirements of 16-RAB-084 I.E.1.a.(1).d. See attached spreadsheet "7/25/2023 - 8/3/2023 SRU Shutdown Incinerator CEM Data" for detailed information.

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
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 23:00 on 7/24/2023 to 12:00 on 8/2/2023 for a total of two (2) 12-hr periods, excluding periods when acid gas was routed to the flare (09:55 on 7/25/2023 to 23:26 on 8/1/2023) per the requirements of 16-RAB-084 I.E.1.a.(1).d. See attached spreadsheet "7/25/2023 - 8/3/2023 SRU Shutdown Incinerator CEM Data" for detailed information.

4. Applicable Requirements Detailed Information:

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

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 172.2**

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 23:00 on 8/1/2023 to 23:00 on 8/2/2023 for a total of 13 one-hour periods. See attached spreadsheet "7/25/2023 - 8/3/2023 SRU Shutdown Incinerator CEM Data" for associated emissions.

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

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 42.2**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	16-RAB-184	I.E.1.a.	(1)(f)	Except during periods of planned startup or planned shutdown as defined in I.E.1.a.(1)(h), the permittee shall at all times route the off-gases from the sour water stripper and amine acid gas from the amine unit, i.e. acid gas, to the SRU.

Comment:

Acid gas was routed to the flare at 09:55 on 7/25/2023 upon shutdown of the SRU. The SRU re-started on 8/1/2023 and acid gas was lined back to the Reaction Furnace at 23:26 on 8/1/2023. The Sour Water Stripper came back online on 8/3/2023 and off-gassed to the flare from 08:13 to 10:13 on 8/3/2023. The total period of time that acid was routed to the flare was 183.5 hours, including 181.5 hours during the SRU shutdown plus 2 hours of off-gassing from the Sour Water Stripper, resulting in excess emissions of 42.2 lbs of SO2 and 0.5 lbs of H2S. See attached spreadsheet, "7/25/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

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

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 0.1**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
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

4. Applicable Requirements Detailed Information:

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

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 0.1**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	2010 Consent Decree	V.H.	45.a.	eliminated, controlled, or included and monitored as part of the SRP's emissions subject to the NSPS Subpart Ja limit for SO2, 40

Comment:

Sulfur pit emissions were vented to atmosphere when the SRU Reaction Furnace shut down at 11:30 on 7/27/2023. Sulfur pit emission were routed back to the SRU Reaction Furnace at 22:30 on 8/1/2023. In order to minimize H2S venting from the sulfur pit during the shutdown, natural gas was used to sweep and melt out the SRU between 09:55 on 7/25/2023 and 11:30 on 7/27/2023. No acid gas was lined to the system during that window of time and all SulTraps were blocked in to allow for a purge of as much H2S as possible from the sulfur pit while the sulfur pit was still routed to the Reaction Furnace. No visible emissions were observed from the sulfur pit during this event. H2S emissions while sulfur pit emissions were routed to atmosphe is conservatively estimated to be 0.07 lbs, based on the engineering assessment of the SRU unit engineer using the available vapor space in the sulfur pit during shutdown. Typically, SRC calculated H2S from sulfur pit emissions using sulfur make, which was not possible for this event because no sulfur was being made. In this situation, during a shutdown, there is no vacuum being pulled on the sulfur pit. Any H2S remaining in the sulfur pit after the natural gas purge should remain there until the eductor pulls a vacuum upon restart and emissions are routed back to the reaction furnace. Nonetheless, SRC estimates that 0.07 lbs could have been emitted while the atmospheric vent was open during the shutdown. See "2023.07.27 Sulfur Pit Event Report" for associated emissions.

Sulfur dioxide	16-RAB-184	I.E.1.a.	(1)(e)(i)	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 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:

Sulfur pit emissions were vented to atmosphere when the SRU Reaction Furnace shut down at 11:30 on 7/27/2023. Sulfur pit emission were routed back to the SRU Reaction Furnace at 22:30 on 8/1/2023. In order to minimize H2S venting from the sulfur pit during the shutdown, natural gas was used to sweep and melt out the SRU between 09:55 on 7/25/2023 and 11:30 on 7/27/2023. No acid gas was lined to the system during that window of time and all SulTraps were blocked in to allow for a purge of as much H2S as possible from the sulfur pit while the sulfur pit was still routed to the Reaction Furnace. No visible emissions were observed from the sulfur pit during this event. H2S emissions while sulfur pit emissions were routed to atmosphe is conservatively estimated to be 0.07 lbs, based on the engineering assessment of the SRU unit engineer using the available vapor space in the sulfur pit during shutdown. Typically, SRC calculated H2S from sulfur pit emissions using sulfur make, which was not possible for this event because no sulfur was being made. In this situation, during a shutdown, there is no vacuum being pulled on the sulfur pit. Any H2S remaining in the sulfur pit after the natural gas purge should remain there until the eductor pulls a vacuum upon restart and emissions are routed back to the reaction furnace. Nonetheless, SRC estimates that 0.07 lbs could have been emitted while the atmospheric vent was open during the shutdown. See "2023.07.27 Sulfur Pit Event Report" for associated emissions.

Sulfur dioxide	16-RAB-184	I.E.1.a.	(5)(a)	Global Consent Decree Limits on Sulfur Pit Emissions: The

4. Applicable Requirements Detailed Information:

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

Date: 07/25/2023 **Excess emissions associated with the following conditions (lbs): 0.1**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	16-RAB-184	I.E.1.a.	(5)(a)	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:

Sulfur pit emissions were vented to atmosphere when the SRU Reaction Furnace shut down at 11:30 on 7/27/2023. Sulfur pit emission were routed back to the SRU Reaction Furnace at 22:30 on 8/1/2023. In order to minimize H2S venting from the sulfur pit during the shutdown, natural gas was used to sweep and melt out the SRU between 09:55 on 7/25/2023 and 11:30 on 7/27/2023. No acid gas was lined to the system during that window of time and all SulTraps were blocked in to allow for a purge of as much H2S as possible from the sulfur pit while the sulfur pit was still routed to the Reaction Furnace. No visible emissions were observed from the sulfur pit during this event. H2S emissions while sulfur pit emissions were routed to atmosphe is conservatively estimated to be 0.07 lbs, based on the engineering assessment of the SRU unit engineer using the available vapor space in the sulfur pit during shutdown. Typically, SRC calculated H2S from sulfur pit emissions using sulfur make, which was not possible for this event because no sulfur was being made. In this situation, during a shutdown, there is no vacuum being pulled on the sulfur pit. Any H2S remaining in the sulfur pit after the natural gas purge should remain there until the eductor pulls a vacuum upon restart and emissions are routed back to the reaction furnace. Nonetheless, SRC estimates that 0.07 lbs could have been emitted while the atmospheric vent was open during the shutdown. See "2023.07.27 Sulfur Pit Event Report" for associated emissions.

7/25/2023 SRU Shutdown
Event Chronology

Unit Activity	Date	Time	Rate
Leak on Waste Heat Boiler (WHB) discovered by operators (Ops beginning to plan for reduced charge rates/sulfur shedding)	07/24/2023	14:55	
Commence reduction in #2 Duf charge	07/24/2023	17:00	
Commence reduction in Crude Oil charge	07/24/2023	18:10	
Sour Water Stripper shut down	07/24/2023	18:37	
#2 Duf charge reduced	07/25/2023	00:30	4,000 BPD
Acid Gas to Flare/SRU Shutdown, Meltout/Burnout Commenced	07/25/2023	09:55	379 MSCFD
Crude charge at sulfur shedding conditions	07/25/2023	09:55	24,000 BPD
All sour gas routed to flare	07/25/2023	09:55	0 LTD
TGTU shut down (was able to remain running temporarily after SRU shutdown)	07/25/2023	11:12	
Exceeded 500lbs above permitted SRU limits for SO2 - EPCRA Reportable	07/26/2023	08:00	
Meltout/Burnout concluded, started cool down of SRU Reaction furnace to allow inspection & repair of WHB	07/27/2023	11:30	
Repair of Waste Heat Boiler complete, deblinding started	07/30/2023		
Final sign-off on WHB repair	07/31/2023		
Commenced warmup of SRU Reaction Furnace	07/31/2023	15:30	
Acid Gas to SRU Reaction Furnace	08/01/2023	23:26	
Feed to TGTU	08/02/2023	00:06	
Instantaneous SO2 Corrected < 150 ppm	08/02/2023	01:26	
Sour Water Stripper startup	08/03/2023	07:52	
Start Sour Water Stripper off-gas to flare	08/03/2023	08:13	
Stop Sour Water Stripper off to flare	08/03/2023	10:13	

7/24/2023 - 8/3/2023 SRU Shutdown 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 Rolling Sum (> 843 lbs)	Title V SO2 Lbs / hr 24 hr Rolling 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 excess 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
07/24/2023 00:00	20.2	28.7	26.0	3.71	3.68	1239.0	1239.4	0.3	2028	0.00	1.0	10.3	4.08	-3.75					2.45	-2.12		
07/24/2023 01:00	20.4	28.0	25.8	3.67	3.70	1238.7	1238.9	0.3	2018	0.00	1.0	10.2	4.04	-3.71					2.43	-2.10		
07/24/2023 02:00	20.1	26.9	25.7	3.66	3.68	1239.3	1239.0	0.3	2023	0.00	1.0	10.2	4.10	-3.77					2.46	-2.13		
07/24/2023 03:00	16.3	24.2	25.5	3.74	3.69	1238.5	1238.8	0.3	2021	0.00	0.9	10.1	4.14	-3.87					2.48	-2.21		
07/24/2023 04:00	19.2	22.4	25.3	3.68	3.69	1238.9	1238.9	0.3	2017	0.00	0.9	10.0	4.04	-3.73					2.42	-2.11		
07/24/2023 05:00	21.8	21.7	25.3	3.61	3.68	1238.3	1238.5	0.4	2042	0.00	0.9	10.0	4.13	-3.77					2.48	-2.12		
07/24/2023 06:00	23.5	21.2	25.4	3.50	3.60	1238.2	1238.4	0.4	2064	0.00	1.1	10.0	4.15	-3.76					2.49	-2.10		
07/24/2023 07:00	21.9	20.7	25.5	3.48	3.53	1238.1	1238.2	0.4	2054	0.00	1.1	10.1	4.22	-3.85					2.53	-2.16		
07/24/2023 08:00	22.3	20.6	25.6	3.58	3.52	1239.5	1238.6	0.4	2051	0.00	1.1	10.1	4.15	-3.78					2.49	-2.12		
07/24/2023 09:00	70.5	20.8	25.6	3.72	3.55	1238.6	1238.7	1.2	2027	0.00	1.9	10.9	4.22	-3.03					2.53	-1.34		
07/24/2023 10:00	24.5	21.2	25.5	3.53	3.56	1238.9	1239.0	0.4	2020	0.00	2.0	10.9	4.08	-3.68					2.45	-2.05		
07/24/2023 11:00	23.9	21.6	25.4	3.52	3.54	1238.5	1238.7	0.4	2014	0.00	2.0	10.8	4.08	-3.69					2.45	-2.06		
07/24/2023 12:00	23.7	21.9	25.3	3.51	3.52	1239.2	1238.9	0.4	2044	0.00	1.2	10.8	4.11	-3.72					2.47	-2.08		
07/24/2023 13:00	23.7	22.1	25.1	3.54	3.52	1239.1	1238.9	0.4	2031	0.00	1.2	10.7	4.11	-3.72					2.47	-2.08		
07/24/2023 14:00	21.7	22.3	24.6	3.56	3.54	1238.9	1239.1	0.4	2021	0.00	1.1	10.5	4.15	-3.79					2.49	-2.13		
07/24/2023 15:00	21.6	22.7	23.4	3.57	3.56	1239.0	1239.0	0.3	2019	0.00	1.1	10.0	4.05	-3.70					2.43	-2.08		
07/24/2023 16:00	23.4	23.1	22.8	3.54	3.56	1238.5	1238.8	0.4	2023	0.00	1.1	9.7	4.17	-3.78					2.50	-2.11		
07/24/2023 17:00	21.5	23.0	22.4	3.57	3.56	1239.4	1239.0	0.3	2023	0.00	1.1	9.6	4.07	-3.72					2.44	-2.09		
07/24/2023 18:00	19.1	22.7	21.9	3.74	3.61	1239.2	1239.0	0.3	2002	0.00	1.0	9.4	4.06	-3.75					2.43	-2.12		
07/24/2023 19:00	17.0	22.3	21.5	3.96	3.75	1240.4	1239.6	0.3	1971	0.00	0.9	9.2	3.97	-3.70					2.38	-2.11		
07/24/2023 20:00	17.4	21.9	21.2	4.03	3.91	1239.9	1239.8	0.3	1967	0.00	0.9	9.1	3.88	-3.61					2.33	-2.06		
07/24/2023 21:00	17.1	21.2	21.0	4.09	4.03	1239.4	1239.9	0.3	1960	0.00	0.8	9.0	3.95	-3.68					2.37	-2.10		
07/24/2023 22:00	17.7	20.7	20.9	4.15	4.09	1241.1	1240.1	0.3	1949	0.00	0.8	9.0	3.81	-3.54					2.29	-2.02		
07/24/2023 23:00	19.1	20.3	20.9	4.13	4.12	1239.8	1240.1	0.3	1945	0.00	0.8	9.0	3.80	-3.51					2.28	-1.99		
07/25/2023 00:00	19.8	19.9	20.9	4.15	4.14	1239.9	1240.3	0.3	1938	0.00	0.9	8.9	3.79	-3.49					2.27	-1.97		
07/25/2023 01:00	20.7	19.7	20.9	4.16	4.14	1240.0	1239.9	0.3	1935	0.00	0.9	8.9	3.86	-3.54					2.32	-2.00		
07/25/2023 02:00	20.7	19.6	20.9	4.19	4.16	1239.5	1239.8	0.3	1938	0.00	0.9	8.9	3.86	-3.54					2.32	-2.00		
07/25/2023 03:00	20.8	19.5	21.1	4.25	4.20	1239.4	1239.6	0.3	1919	0.00	0.9	8.9	3.73	-3.42					2.24	-1.93		
07/25/2023 04:00	23.4	19.5	21.3	4.34	4.26	1239.7	1239.5	0.4	1963	0.00	1.0	9.0	3.85	-3.49					2.31	-1.95		
07/25/2023 05:00	23.9	19.7	21.4	4.39	4.33	1239.2	1239.5	0.4	1974	0.00	1.0	9.0	3.87	-3.50					2.32	-1.95		
07/25/2023 06:00	25.3	20.2	21.5	4.32	4.35	1239.6	1239.5	0.4	1981	0.00	1.1	9.0	3.85	-3.46					2.31	-1.92		
07/25/2023 07:00	24.5	20.9	21.6	4.38	4.36	1239.0	1239.3	0.4	1990	0.00	1.1	9.0	3.88	-3.50					2.33	-1.95		
07/25/2023 08:00	75.3	21.7	21.8	4.45	4.35	1239.6	1239.4	1.2	1984	0.00	2.0	9.8	3.95	-2.76					2.37	-1.18		
07/25/2023 09:00	30.4	22.8	22.0	4.34	4.36	1239.0	1239.2	0.5	1977	0.00	2.0	9.1	3.78	-3.32					2.27	-1.81		Acid Gas to Flare / SRU Shutdown / No Feed to SRU 09:55
07/25/2023 10:00	8.1	N/A	N/A	6.93	5.21	1244.3	1241.0	0.1	1617	0.00	1.7	8.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	12&24 hr limits not applicable until Acid Gas Feed Reintroduced. Total emissions for meltout, burnout, cool down, & heat up included below.
07/25/2023 11:00	5422.8	N/A	N/A	6.38	5.88	1244.0	1242.4	59.8	1647	0.02	60.3	68.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	TGTU Shutdown 11:12
07/25/2023 12:00	2168.1	N/A	N/A	6.46	6.59	1245.3	1244.6	22.8	1628	0.01	82.7	90.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/25/2023 13:00	1288.3	N/A	N/A	6.22	6.35	1245.0	1244.8	13.8	1626	0.00	96.4	104.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/25/2023 14:00	1147.0	N/A	N/A	6.33	6.34	1245.7	1245.3	12.0	1600	0.00	48.6	115.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/25/2023 15:00	1436.3	N/A	N/A	6.29	6.28	1245.7	1245.4	14.7	1564	0.00	40.4	129.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/25/2023 16:00	1888.9	N/A	N/A	6.27	6.30	1246.0	1245.8	19.5	1565	0.01	46.2	149.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/25/2023 17:00	2388.0	N/A	N/A	6.29	6.28	1245.6	1245.8	24.4	1550	0.01	58.6	171.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/25/2023 18:00	2056.2	N/A	N/A	6.21	6.26	1245.5	1245.7	21.4	1578	0.01	65.3	192.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/25/2023 19:00	2179.3	N/A	N/A	6.23	6.24	1245.7	1245.6	22.2	1553	0.01	68.0	215.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/25/2023 20:00	2251.8	N/A	N/A	6.23	6.22	1245.7	1245.6	23.6	1586	0.01	67.3	238.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/25/2023 21:00	2313.8	N/A	N/A	6.19	6.22	1245.6	1245.6	24.6	1593	0.01	70.5	263.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/25/2023 22:00	2374.9	N/A	N/A	6.19	6.20	1245.4	1245.6	25.2	1579	0.01	73.4	288.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/25/2023 23:00	2446.0	N/A	N/A	6.25	6.21	1245.5	1245.5	25.6	1576	0.01	75.4	314.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 00:00	2547.3	N/A	N/A	6.22	6.22	1245.6	1245.5	26.4	1573	0.01	77.1	340.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 01:00	2556.9	N/A	N/A	6.21	6.23	1245.5	1245.5	26.6	1580	0.01	78.6	366.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 02:00	2502.4	N/A	N/A	6.22	6.22	1245.7	1245.6	26.5	1590	0.01	79.5	392.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 03:00	2442.2	N/A	N/A	6.21	6.21	1245.5	1245.6	26.2	1588	0.01	79.3	418.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 04:00	2563.8	N/A	N/A	6.23	6.22	1245.7	1245.6	27.1	1587	0.01	79.7	445.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 05:00	2580.2	N/A	N/A	6.21	6.21	1245.5	1245.6	27.1	1585	0.01	80.4	471.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 06:00	2456.1	N/A	N/A	6.23	6.22	1245.5	1245.5	26.1	1585	0.01	80.4	497.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 07:00	2439.2	N/A	N/A	6.21	6.22	1245.6	1245.5	26.2	1591	0.01	79.5	523.5	N/A	N/A	N/A	523.51	N/A	N/A	N/A	N/A	N/A	Exceeded 500 lbs SO2 emissions above permitted limits at end of 7:00 hour
07/26/2023 08:00	2073.3	N/A	N/A	6.13	6.19	1245.3	1245.5	22.3	1583	0.01	74.6	544.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 09:00	2412.1	N/A	N/A	6.05	6.15	1245.7	1245.6	24.4	1580	0.01	72.8	568.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 10:00	2791.7	N/A	N/A	5.96	6.07	1245.3	1245.5	30.0	1596	0.01	76.7	598.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 11:00	4019.5	N/A	N/A	5.65	5.91	1245.2	1245.4	44.9	1607	0.01	99.3	583.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 12:00	3632.3	N/A	N/A	5.67	5.76	1245.1	1245.2	41.1	1618	0.01	116.0	601.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 13:00	3495.7	N/A	N/A	5.60	5.64	1245.0	1245.1	39.8	1626	0.01	125.8	627.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 14:00	3913.4	N/A	N/A	5.52	5.60	1245.0	1245.0	43.5	1596	0.01	124.4	659.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 15:00	4354.4	N/A	N/A	5.46	5.53	1244.7	1244.9	48.5	1610	0.01	131.8	693.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 16:00	4697.0	N/A	N/A	5.46	5.48	1245.4	1245.0	52.0	1599	0.01	144.0	725.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 17:00	4984.5	N/A	N/A	5.40	5.44	1244.1	1244.7	57.2	1627	0.02	157.7	758.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 18:00	5385.2	N/A	N/A	5.04	5.30	1242.5	1244.0	64.7	1669	0.02	173.9	801.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 19:00	5537.1	N/A	N/A	5.09	5.18	1244.0	1243.5	65.1	1656	0.02	187.0	844.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 20:00	5640.8	N/A	N/A	5.24	5.12	1244.1	1243.5	65.2	1643	0.02	195.0	886.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 21:00	5344.4	N/A	N/A	5.23	5.19	1244.2	1244.1	62.5	1644	0.02	192.8	924.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 22:00	5142.4	N/A	N/A	5.24	5.24	1243.9	1244.1	60.1	1644	0.02	187.9	959.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/26/2023 23:00	5117.2	N/A	N/A	5.24	5.24	1244.1	1244.1	59.3	1644	0.02	182.0	992.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 00:00	5257.1	N/A	N/A	5.26	5.25	1244.0	1244.0	60.2	1645	0.02	179.7	1026.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 01:00	5126.6	N/A	N/A	5.26	5.26	1243.8	1244.0	58.4	1639	0.02	178.0	1058.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 02:00	5029.9	N/A	N/A	5.26	5.26	1243.8	1243.9	57.4	1641	0.02	176.0	1089.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 03:00	4818.1	N/A	N/A	5.25	5.26	1243.8	1243.8	55.3	1643	0.01	171.1	1118.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 04:00	4642.5	N/A	N/A	5.25	5.25	1243.7	1243.8	53.6	1647	0.01	166.3	1145.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 05:00	4353.4	N/A	N/A	5.27	5.26	1243.9	1243.8	51.0	1654	0.01	159.9	1169.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 06:00	4157.5	N/A	N/A	5.39	5.30	1243.2	1243.6	48.3	1646	0.01	152.9	1191.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 07:00	3972.7	N/A	N/A	5.32	5.33	1243.6	1243.6	46.4	1652	0.01	145.6	1211.3	N/A	N/A	N/A	1211.25	N/A	N/A	N/A	N/A	N/A	
07/27/2023 08:00	4768.9	N/A	N/A	5.77	5.49	1246.1	1244.3	50.8	1601	0.01	145.4	1239.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 09:00	4870.0	N/A	N/A	5.91	5.67	1244.4	1244.7	48.2	1565	0.01	145.3	1263.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 10:00	4226.0	N/A	N/A	5.87	5.85	1244.0	1244.8	42.5	1566	0.01	141.5	1276.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 11:00	3081.1	N/A	N/A	7.36	6.38	1248.6	1245.7	27.6	1476	0.01	118.3	1258.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	Meltout/Burnout complete / SRU Rx Furnace cooldown start 11:30 7/27
07/27/2023 12:00	792.5	N/A	N/A	9.39	7.54	1249.0	1247.2	5.3	1373	0.00	75.5	1223.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 13:00	462.9	N/A	N/A	9.62	8.79	1248.9	1248.8	3.1	1378	0.00	36.0	1186.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 14:00	296.9	N/A	N/A	9.72	9.58	1249.1	1249.0	1.9	1360	0.00	10.3	1144.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 15:00	169.6	N/A	N/A	9.78	9.70	1249.4	1249.1	1.1	1350	0.00	6.1	1097.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 16:00	107.5	N/A	N/A	9.84	9.78	1248.4	1249.0	0.7	1358	0.00	3.7	1046.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 17:00	74.5	N/A	N/A	9.75	9.79	1248.1	1248.6	0.5	1358	0.00	2.3	989.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 18:00	36.3	N/A	N/A	9.96	9.85	1248.8	1248.4	0.2	1345	0.00	1.4	924.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 19:00	16.4	N/A	N/A	10.02	9.91	1248.7	1248.5	0.1	1346	0.00	0.8	859.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	

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 Rolling Sum (> 843 lbs)	Title V SO2 Lbs / hr 24 hr Rolling 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 excess 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
07/27/2023 20:00	14.7	N/A	N/A	10.02	10.00	1248.9	1248.8	0.1	1331	0.00	0.4	794.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 21:00	14.2	N/A	N/A	10.03	10.02	1249.1	1248.9	0.1	1320	0.00	0.3	732.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 22:00	-4.9	N/A	N/A	10.03	10.03	1249.4	1249.1	0.0	1332	0.00	0.2	672.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/27/2023 23:00	-51.2	N/A	N/A	10.03	10.03	1249.2	1249.2	0.0	1330	0.00	0.1	612.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 00:00	-56.4	N/A	N/A	10.03	10.03	1249.3	1249.3	0.0	1321	0.00	0.0	552.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 01:00	-61.0	N/A	N/A	10.03	10.03	1249.4	1249.3	0.0	1324	0.00	0.0	494.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 02:00	-61.4	N/A	N/A	10.03	10.03	1249.3	1249.3	0.0	1332	0.00	0.0	436.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 03:00	-60.4	N/A	N/A	10.03	10.03	1248.8	1249.2	0.0	1328	0.00	0.0	381.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 04:00	-63.4	N/A	N/A	10.03	10.03	1249.1	1249.1	0.0	1340	0.00	0.0	327.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 05:00	-69.5	N/A	N/A	10.03	10.03	1249.0	1249.0	0.0	1339	0.00	0.0	276.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 06:00	-70.3	N/A	N/A	10.03	10.03	1249.2	1249.1	0.0	1323	0.00	0.0	228.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 07:00	-69.1	N/A	N/A	10.03	10.03	1249.6	1249.3	0.0	1329	0.00	0.0	182.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 08:00	273.9	N/A	N/A	9.87	9.97	1250.6	1249.8	1.5	1304	0.00	1.5	133.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 09:00	777.5	N/A	N/A	10.03	9.97	1249.9	1250.0	4.6	1309	0.00	6.2	89.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 10:00	333.0	N/A	N/A	10.03	9.97	1249.9	1250.1	2.1	1297	0.00	8.3	48.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 11:00	246.9	N/A	N/A	10.03	10.03	1249.1	1249.6	1.6	1326	0.00	8.3	23.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 12:00	109.3	N/A	N/A	10.03	10.03	1250.0	1249.7	0.7	1312	0.00	4.3	18.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 13:00	157.6	N/A	N/A	10.03	10.03	1250.0	1249.7	1.0	1330	0.00	3.3	16.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 14:00	135.0	N/A	N/A	10.03	10.03	1249.9	1250.0	0.9	1310	0.00	2.6	15.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 15:00	96.2	N/A	N/A	10.03	10.03	1249.7	1249.9	0.6	1305	0.00	2.5	14.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 16:00	77.7	N/A	N/A	10.03	10.03	1249.9	1249.8	0.5	1309	0.00	2.0	14.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 17:00	84.2	N/A	N/A	10.03	10.03	1250.1	1249.9	0.5	1304	0.00	1.6	14.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 18:00	108.1	N/A	N/A	10.03	10.03	1249.9	1249.9	0.7	1308	0.00	1.7	15.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 19:00	252.9	N/A	N/A	10.03	10.03	1249.9	1249.9	1.6	1319	0.00	2.8	16.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 20:00	152.3	N/A	N/A	10.03	10.03	1250.1	1250.0	1.0	1315	0.00	3.3	17.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 21:00	397.3	N/A	N/A	10.03	10.03	1249.2	1249.7	2.6	1337	0.00	5.2	19.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 22:00	318.4	N/A	N/A	10.03	10.03	1249.6	1249.7	2.0	1315	0.00	5.6	21.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/28/2023 23:00	346.7	N/A	N/A	10.03	10.03	1249.4	1249.4	2.2	1317	0.00	6.8	24.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 00:00	382.7	N/A	N/A	10.03	10.03	1249.1	1249.4	2.4	1326	0.00	6.6	26.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 01:00	402.5	N/A	N/A	10.03	10.03	1249.2	1249.2	2.5	1316	0.00	7.1	29.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 02:00	291.2	N/A	N/A	10.03	10.03	1249.5	1249.3	1.8	1321	0.00	6.8	30.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 03:00	245.2	N/A	N/A	10.03	10.03	1249.4	1249.4	1.5	1327	0.00	5.9	32.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 04:00	235.9	N/A	N/A	10.03	10.03	1249.5	1249.5	1.5	1319	0.00	4.9	33.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 05:00	228.5	N/A	N/A	10.03	10.03	1249.3	1249.4	1.5	1329	0.00	4.5	35.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 06:00	215.2	N/A	N/A	10.03	10.03	1248.8	1249.2	1.4	1324	0.00	4.3	36.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 07:00	200.9	N/A	N/A	10.03	10.03	1249.3	1249.1	1.3	1306	0.00	4.1	38.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 08:00	183.9	N/A	N/A	10.03	10.03	1249.1	1249.1	1.2	1304	0.00	3.8	37.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 09:00	58.3	N/A	N/A	10.03	10.03	1249.5	1249.3	0.3	1316	0.00	2.8	33.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 10:00	39.1	N/A	N/A	10.03	10.03	1250.1	1249.6	0.2	1322	0.00	1.7	31.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 11:00	38.8	N/A	N/A	10.03	10.03	1249.9	1249.8	0.2	1297	0.00	0.8	30.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 12:00	57.9	N/A	N/A	10.03	10.03	1249.6	1249.9	0.3	1291	0.00	0.8	29.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 13:00	166.6	N/A	N/A	10.03	10.03	1249.8	1249.8	1.0	1310	0.00	1.6	29.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 14:00	222.7	N/A	N/A	10.03	10.03	1249.9	1249.8	1.4	1285	0.00	2.7	30.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 15:00	229.5	N/A	N/A	10.03	10.03	1250.1	1249.9	1.4	1288	0.00	3.8	31.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 16:00	193.1	N/A	N/A	10.03	10.03	1249.8	1249.9	1.2	1281	0.00	3.9	31.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 17:00	180.1	N/A	N/A	10.03	10.03	1249.7	1249.9	1.1	1276	0.00	3.6	32.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 18:00	156.0	N/A	N/A	10.03	10.03	1249.7	1249.7	0.9	1286	0.00	3.2	32.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 19:00	121.3	N/A	N/A	10.03	10.03	1250.0	1249.8	0.7	1290	0.00	2.8	31.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 20:00	111.4	N/A	N/A	10.03	10.03	1250.3	1250.0	0.7	1301	0.00	2.4	31.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 21:00	104.0	N/A	N/A	10.03	10.03	1250.0	1250.1	0.6	1304	0.00	2.1	29.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 22:00	81.1	N/A	N/A	10.03	10.03	1249.6	1250.0	0.5	1299	0.00	1.8	28.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/29/2023 23:00	63.5	N/A	N/A	10.03	10.03	1249.6	1249.7	0.4	1294	0.00	1.5	26.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 00:00	60.0	N/A	N/A	10.03	10.03	1250.0	1249.7	0.4	1320	0.00	1.3	24.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 01:00	52.0	N/A	N/A	10.03	10.03	1250.0	1249.9	0.3	1319	0.00	1.1	22.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 02:00	42.6	N/A	N/A	10.03	10.03	1250.0	1250.0	0.3	1327	0.00	1.0	20.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 03:00	31.1	N/A	N/A	10.03	10.03	1249.7	1249.9	0.2	1326	0.00	0.8	19.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 04:00	26.8	N/A	N/A	10.03	10.03	1249.6	1249.8	0.2	1332	0.00	0.7	17.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 05:00	21.5	N/A	N/A	10.03	10.03	1249.5	1249.6	0.1	1327	0.00	0.5	16.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 06:00	18.1	N/A	N/A	10.03	10.03	1249.3	1249.5	0.1	1329	0.00	0.4	15.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 07:00	16.6	N/A	N/A	10.03	10.03	1249.3	1249.4	0.1	1323	0.00	0.4	14.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 08:00	16.0	N/A	N/A	10.03	10.03	1249.4	1249.3	0.1	1312	0.00	0.3	13.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 09:00	23.9	N/A	N/A	10.03	10.03	1249.4	1249.4	0.1	1298	0.00	0.4	12.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 10:00	23.8	N/A	N/A	10.03	10.03	1250.1	1249.6	0.2	1307	0.00	0.4	12.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 11:00	25.7	N/A	N/A	10.03	10.03	1250.1	1249.9	0.2	1280	0.00	0.4	12.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 12:00	30.7	N/A	N/A	10.03	10.03	1249.9	1250.0	0.2	1293	0.00	0.5	12.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 13:00	67.1	N/A	N/A	10.03	10.03	1250.2	1250.1	0.4	1306	0.00	0.8	11.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 14:00	118.0	N/A	N/A	10.03	10.03	1250.4	1250.2	0.7	1289	0.00	1.3	11.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 15:00	136.8	N/A	N/A	10.03	10.03	1249.8	1250.1	0.8	1284	0.00	2.0	10.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 16:00	111.0	N/A	N/A	10.03	10.03	1249.9	1250.0	0.7	1283	0.00	2.2	10.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 17:00	83.2	N/A	N/A	10.03	10.03	1249.7	1249.8	0.5	1288	0.00	2.0	9.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 18:00	76.4	N/A	N/A	10.03	10.03	1249.8	1249.8	0.5	1291	0.00	1.7	9.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 19:00	63.9	N/A	N/A	10.02	10.03	1250.2	1249.9	0.4	1298	0.00	1.4	8.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 20:00	55.9	N/A	N/A	10.03	10.03	1249.7	1249.9	0.3	1300	0.00	1.2	8.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 21:00	51.2	N/A	N/A	10.03	10.03	1249.6	1249.9	0.3	1315	0.00	1.0	8.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 22:00	46.6	N/A	N/A	10.03	10.03	1249.6	1249.6	0.3	1312	0.00	0.9	7.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/30/2023 23:00	36.0	N/A	N/A	10.03	10.03	1249.5	1249.6	0.2	1328	0.00	0.8	7.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 00:00	30.1	N/A	N/A	10.03	10.03	1249.4	1249.5	0.2	1325	0.00	0.7	7.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 01:00	25.4	N/A	N/A	10.03	10.03	1249.7	1249.5	0.2	1340	0.00	0.6	7.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 02:00	144.3	N/A	N/A	10.03	10.03	1248.8	1249.3	1.0	1346	0.00	1.3	8.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 03:00	68.7	N/A	N/A	10.03	10.03	1249.6	1249.4	0.5	1349	0.00	1.6	8.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 04:00	18.6	N/A	N/A	10.03	10.03	1249.5	1249.3	0.1	1328	0.00	1.5	8.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 05:00	12.9	N/A	N/A	10.03	10.03	1249.5	1249.5	0.1	1344	0.00	0.7	8.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 06:00	12.5	N/A	N/A	10.03	10.03	1249.2	1249.4	0.1	1344	0.00	0.3	8.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 07:00	12.6	N/A	N/A	10.03	10.03	1249.0	1249.2	0.1	1341	0.00	0.3	8.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 08:00	12.6	N/A	N/A	10.03	10.03	1249.1	1249.1	0.1	1331	0.00	0.3	8.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 09:00	19.2	N/A	N/A	10.03	10.03	1248.9	1249.0	0.1	1319	0.00	0.3	8.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 10:00	21.5	N/A	N/A	10.02	10.03	1249.2	1249.1	0.1	1327	0.00	0.3	8.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 11:00	22.6	N/A	N/A	10.03	10.03	1249.2	1249.1	0.1	1315	0.00	0.4	8.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 12:00	25.7	N/A	N/A	10.03	10.03	1249.3	1249.2	0.2	1309	0.00	0.4	8.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 13:00	94.6	N/A	N/A	10.03	10.03	1249.2	1249.2	0.6	1328	0.00	0.9	8.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 14:00	83.7	N/A	N/A	10.03	10.03	1248.8	1249.1	0.5	1331	0.00	1.3	7.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 15:00	292.0	N/A	N/A	9.23	9.76	1246.5	1248.1	2.1	1408	0.00	3.3	9.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	Started heat up of SRU Rx Furnace 15:33 7/31
07/31/2023 16:00	187.6	N/A	N/A	9.52	9.59	1247.3	1247.5	1.3	1382	0.00	4.0	9.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 17:00	132.1	N/A	N/A	9.47	9.41	1247.6	1247.1	0.9	1381	0.00	4.4	10.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 18:00	96.8	N/A	N/A	9.47	9.48	1247.6	1247.5	0.7	1384	0.00	2.9	10.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 19:00	72.6	N/A	N/A	9.46	9.46	1247.3	1247.5	0.5	1391	0.00	2.1	10.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	

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 Rolling Sum (> 843 lbs)	Title V SO2 Lbs / hr 24 hr Rolling 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 excess 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
07/31/2023 20:00	152.9	N/A	N/A	9.00	9.31	1245.3	1246.7	1.2	1431	0.00	2.4	11.5	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 21:00	5489.3	N/A	N/A	8.82	9.09	1249.6	1247.4	41.4	1405	0.01	43.1	52.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
07/31/2023 22:00	2075.3	N/A	N/A	8.67	8.83	1246.9	1247.2	15.7	1404	0.00	58.3	68.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 00:00	449.1	N/A	N/A	8.31	8.45	1247.9	1247.4	3.5	1413	0.00	60.6	71.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 01:00	390.3	N/A	N/A	8.28	8.32	1248.0	1247.8	3.1	1428	0.00	22.3	74.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 02:00	670.5	N/A	N/A	8.16	8.25	1247.3	1247.7	5.4	1443	0.00	12.0	79.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 03:00	332.2	N/A	N/A	7.87	8.10	1246.0	1247.1	2.8	1465	0.00	11.3	81.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 04:00	231.3	N/A	N/A	7.88	7.97	1247.9	1247.1	2.0	1459	0.00	10.1	82.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 05:00	332.5	N/A	N/A	8.04	7.93	1246.6	1246.8	2.8	1451	0.00	7.5	85.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 06:00	344.9	N/A	N/A	7.79	7.90	1246.4	1246.9	3.0	1473	0.00	7.8	88.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 07:00	425.0	N/A	N/A	7.60	7.81	1246.2	1246.4	3.8	1467	0.00	9.6	92.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 08:00	448.0	N/A	N/A	7.35	7.58	1246.7	1246.4	4.1	1483	0.00	11.0	96.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 09:00	506.3	N/A	N/A	7.26	7.40	1246.1	1246.3	4.5	1488	0.00	12.5	100.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 10:00	509.5	N/A	N/A	7.14	7.25	1246.3	1246.4	4.6	1481	0.00	13.3	105.1	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 11:00	505.1	N/A	N/A	6.91	7.10	1247.7	1246.7	4.7	1496	0.00	13.9	109.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 12:00	616.5	N/A	N/A	6.33	6.79	1245.0	1246.4	6.2	1530	0.00	15.6	115.8	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 13:00	731.9	N/A	N/A	5.76	6.33	1245.7	1246.1	7.7	1549	0.00	18.7	123.4	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 14:00	751.5	N/A	N/A	5.84	5.97	1244.3	1245.0	8.0	1564	0.00	21.9	130.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 15:00	805.0	N/A	N/A	5.60	5.73	1245.5	1245.2	9.1	1593	0.00	24.7	139.3	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 16:00	958.1	N/A	N/A	5.63	5.69	1245.1	1245.0	10.6	1570	0.00	27.6	147.7	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 17:00	1118.7	N/A	N/A	5.65	5.63	1245.2	1245.3	12.4	1581	0.00	32.1	158.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 18:00	1261.5	N/A	N/A	5.66	5.65	1245.1	1245.1	14.1	1581	0.00	37.1	172.0	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 19:00	1465.9	N/A	N/A	5.69	5.67	1245.1	1245.2	16.3	1581	0.00	42.7	187.6	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 20:00	1610.6	N/A	N/A	5.70	5.68	1245.0	1245.1	17.9	1571	0.00	48.2	204.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 21:00	1507.7	N/A	N/A	5.63	5.68	1242.8	1244.3	17.1	1590	0.00	51.3	220.9	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
08/01/2023 22:00	1817.1	N/A	N/A	4.86	5.40	1240.9	1242.9	22.7	1649	0.01	57.8	202.2	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	Total lbs SO2 from meltout, burnout, cool down, & heat up: 2,227.50 lbs SO2
08/01/2023 23:00	8630.6	744.5	382.6	4.91	5.13	1239.9	1241.2	156.7	2202	0.04	196.6	343.2	4.54	152.12	114.59		4.27	8.45	2.72	153.94	108.26	Acid Gas to SRU Rx Furnace 23:26 (12&24 hr limits applicable again)
08/02/2023 00:00	4115.9	1085.9	553.1	5.47	5.08	1234.6	1238.4	76.5	2289	0.02	255.9	416.1	4.65	71.84			4.28	14.32	2.79	73.70		Feed to TGTU 00:16
08/02/2023 01:00	156.4	1097.3	558.6	5.46	5.28	1235.4	1236.6	2.5	2216	0.00	235.6	415.5	3.93	-1.47			4.15	14.07	2.36	0.10		Instantaneous SO2 Corrected < 150ppm at 01:26
08/02/2023 02:00	86.7	1102.8	561.2	5.39	5.44	1233.4	1234.5	1.4	2235	0.00	80.3	411.5	4.01	-2.62			4.20	14.34	2.40	-1.01		
08/02/2023 03:00	68.5	1106.8	563.2	5.51	5.46	1235.5	1234.8	1.1	2216	0.00	4.9	409.8	3.94	-2.86			4.14	14.18	2.36	-1.28		
08/02/2023 04:00	63.4	1110.4	564.9	5.55	5.49	1238.0	1235.6	1.0	2188	0.00	3.5	408.8	3.90	-2.91			4.07	14.02	2.34	-1.35		
08/02/2023 05:00	60.2	1113.4	566.5	5.51	5.53	1238.0	1237.2	0.9	2210	0.00	3.0	407.0	3.95	-3.00			4.13	14.25	2.37	-1.42		
08/02/2023 06:00	60.2	1116.4	568.1	5.40	5.49	1237.3	1237.8	1.0	2232	0.00	2.9	404.9	4.03	-3.06			4.20	14.54	2.42	-1.45		
08/02/2023 07:00	53.7	1118.8	569.5	5.27	5.39	1237.0	1237.4	0.9	2241	0.00	2.8	402.0	4.10	-3.22			4.25	14.76	2.46	-1.58		
08/02/2023 08:00	52.3	1121.1	571.0	5.08	5.25	1237.5	1237.3	0.9	2246	0.00	2.7	398.7	4.16	-3.29			4.31	15.02	2.50	-1.63		Start Sour Water Stripper off-gas to flare: 08:13
08/02/2023 09:00	85.0	1121.9	573.8	4.73	5.02	1236.4	1237.0	1.5	2292	0.00	3.2	395.7	4.26	-2.81			4.50	15.68	2.56	-1.11		
08/02/2023 10:00	80.4	1126.1	576.5	4.75	4.85	1237.3	1237.1	1.4	2265	0.00	3.7	392.4	4.23	-2.87			4.44	15.55	2.54	-1.18		End Sour Water Stripper off-gas to flare: 10:13
08/02/2023 11:00	110.4	416.1	580.3	4.64	4.70	1236.9	1236.9	1.9	2298	0.00	4.7	389.6	4.35	-2.43	41.31		4.53	3.01	2.61	-0.69		
08/02/2023 12:00	204.6	90.2	588.0	4.42	4.60	1236.3	1236.8	3.7	2336	0.00	7.0	387.0	4.53	-0.82					2.72	0.99		
08/02/2023 13:00	107.7	86.1	591.7	4.25	4.44	1235.8	1236.3	2.0	2360	0.00	7.6	381.3	4.67	-2.66					2.80	-0.79		
08/02/2023 14:00	204.7	95.9	599.4	4.22	4.30	1234.1	1235.4	3.8	2336	0.00	9.5	377.1	4.60	-0.83					2.76	1.01		
08/02/2023 15:00	68.6	95.9	601.4	4.28	4.25	1238.5	1236.1	1.2	2301	0.00	7.0	369.3	4.45	-3.23					2.67	-1.45		
08/02/2023 16:00	37.9	93.8	602.1	4.30	4.27	1238.7	1237.1	0.7	2320	0.00	5.7	359.4	4.49	-3.81					2.69	-2.01		
08/02/2023 17:00	38.0	92.0	602.7	4.27	4.28	1235.3	1237.5	0.7	2330	0.00	2.6	347.6	4.47	-3.79					2.68	-2.00		
08/02/2023 18:00	24.4	89.0	602.7	4.29	4.29	1235.4	1236.5	0.4	2316	0.00	1.8	334.0	4.51	-4.07					2.70	-2.26		
08/02/2023 19:00	26.2	86.7	602.7	4.32	4.30	1238.5	1236.4	0.5	2311	0.00	1.6	318.2	4.48	-4.01					2.69	-2.22		
08/02/2023 20:00	25.1	84.4	602.8	4.32	4.31	1238.5	1237.4	0.4	2299	0.00	1.3	300.8	4.38	-3.94					2.63	-2.19		
08/02/2023 21:00	17.7	78.8	600.4	4.35	4.33	1238.2	1238.4	0.3	2327	0.00	1.2	284.0	4.52	-4.20					2.71	-2.39		
08/02/2023 22:00	10.8	73.0	599.6	4.49	4.39	1238.5	1238.4	0.2	2307	0.00	1.0	261.5	5.56	-5.32					3.33	-3.09		
08/02/2023 23:00	14.7	65.0	240.6	4.51	4.45	1237.8	1238.2	0.3	2306	0.00	0.8	105.0	4.42	-4.16					2.65	-2.39	42.30	
08/03/2023 00:00	10.7	48.9	69.5	4.53	4.51	1238.1	1238.1	0.2	2315	0.00	0.7	28.8	4.44	-4.25					2.66	-2.47		
08/03/2023 01:00	7.0	40.5	63.3	4.54	4.53	1237.4	1237.8	0.2	2306	0.00	0.6	26.4	5.36	-5.21					3.21	-3.06		

	H_2S	SO2 3-hr	SO2 24-hr	Title V / Ja 12-hr	EPCRA	GCD	Title V / GCD 24-hr
Total Excess Emissions (lbs)	**0.06**	**-**	–	**155.9**	**1734.8**	**172.2**	**150.6**

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 (0.169×10^{-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.

Superior Refining Company LLC
Superior, WI Refinery
7/25/2023 SRU Shutdown
Refinery Wide Excess SO_2 and H_2S Emissions By Source
EPCRA and CERCLA Reporting Threshold

48hr Period from 08:00 on 7/25/2023 to 08:00 on 7/272023

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
07/25/2023	SRU Shutdown	Waste Heat Boiler Leak/Repair	1734.8				0.1			0.1
		Subtotals	1734.8				0.1			0.1

Note: The FCCU was in standby 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)
1734.8

TOTAL FACILITY WIDE H_2S (lbs)
(EPCRA Facility Wide Reportable Quantity ≥ 100 lbs H_2S total)
0.1

HIGHEST SOURCE H_2S (lbs)
(CERCLA Source Reportable Quantity ≥ 100 lbs H2S source)
0.1

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.

7/25/2023 Flare Gas Caustic Scrubber Exceedance - Flare H_2S, SO_2, and Flow Data

		Refinery PI or DAHS Data			Limit: >162 ppmd H_2S 3 hr RA	98% Destruction Efficiency — Title V Permit / Construction Permit, 162 ppm H_2S 3 hr Rolling Average						99% Destruction Efficiency — NSPS Subpart Ja, 162 ppm H_2S 3 hr Rolling Average						100% Destruction Efficiency — GCD, 162 ppm H_2S 3 hr Rolling Average				98% Destruction Efficiency — Limit: 39.3 lbs SO_2 / hr 12 hr RA	Title V Permit, 39.3 lbs SO_2 / hr 12hr RA				Title V / Construction Permit, 98% Destruction Efficiency	SO_2 EPCRA > 500 lbs		H_2S EPCRA / CERCLA > 100 lbs	40 CFR 60 Subpart Ja, 99% Destruction Efficiency	Limit: Requires Root Cause if Equal to or Greater than 500 lbs total SO_2	2010 GCD, 100% Destruction Efficiency	Limit: Requires Root Cause if Equal to or Greater than 500 lbs total SO_2	40 CFR 60 Subpart Ja, Flow	Limit: Requires Root Cause if 500,000 scf above Baseline (86,780scf)	
Date	Start Time	Flare Flow 1-hr Avg SCFM	Flare H_2S 1-hr Avg ppmd	Flare TRS 1-hr Avg ppmd	Flare H_2S 3-hr RA ppmd	Hourly Actual Emissions lbs SO_2	Hourly Allowable Emissions lbs SO_2	Hourly Excess Emissions lbs SO_2	Hourly Emissions lbs H_2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO_2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H_2S	Hourly Actual Emissions lbs SO_2	Hourly Allowable Emissions lbs SO_2	Hourly Excess Emissions lbs SO_2	Hourly Emissions lbs H_2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO_2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H_2S	Hourly Actual Emissions lbs SO_2	Hourly Allowable Emissions lbs SO_2	Hourly Excess Emissions lbs SO_2	162 ppm 3hr RA Excess Emissions 3-hr Sum lbs SO_2	lbs SO_2 / hr 12 hr RA lbs SO_2 / hr	Actual Title V lbs SO_2 / hr	Allowable Title V lbs SO_2 / hr	Excess Title V lbs SO_2 / hr	Excess Title V 12 hr rolling sum (98% Dest Eff) lbs SO_2	Excess SO_2 Emissions (>162 ppm 98%) lbs SO_2	Excess Emissions (>162 ppm 98%) Previous 24hr Rolling Sum lbs SO_2	lbs H_2S	Emissions Previous 24hr Rolling Sum lbs H_2S	Ja lbs SO_2 / hr	Ja 24 hr rolling sum total lbs SO_2 (99% Dest Eff) lbs SO_2	GCD lbs SO_2 / hr lbs SO_2 / hr	GCD 24 hr rolling sum total lbs SO_2 (100% Dest Eff) lbs SO_2	Ja total flow scf / hr	Ja 24 hr rolling sum excess flow scf	Comments
07/25/2023	0:00	412	0	57	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.3	0.2	39.3	-39.1	-468.3	-0.7	-16.8	0.0	-0.3	0.2	6.4	0.2	6.4	24720	428580	
	1:00	410	0	58	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.3	0.2	39.3	-39.1	-468.4	-0.7	-16.9	0.0	-0.3	0.2	6.4	0.2	6.5	24600	431700	
	2:00	391	0	58	0	0.0	0.6	-0.6	0.0			0.0	0.6	-0.6	0.0			0.0	0.6	-0.6		0.3	0.2	39.3	-39.1	-468.4	-0.6	-16.8	0.0	-0.3	0.2	6.4	0.2	6.4	23460	429960	
	3:00	419	0	56	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.3	0.2	39.3	-39.1	-468.5	-0.7	-16.9	0.0	-0.3	0.2	6.4	0.2	6.5	25140	434280	
	4:00	416	0	56	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.3	0.2	39.3	-39.1	-468.5	-0.7	-16.9	0.0	-0.3	0.2	6.4	0.2	6.4	24960	433440	
	5:00	417	0	55	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.3	0.2	39.3	-39.1	-468.6	-0.7	-16.9	0.0	-0.3	0.2	6.3	0.2	6.4	25020	431940	
	6:00	442	0	84	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.3	0.4	39.3	-38.9	-468.5	-0.7	-17.0	0.0	-0.3	0.4	6.5	0.4	6.6	26520	435900	
	7:00	455	0	100	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.3	0.5	39.3	-38.8	-468.4	-0.7	-17.1	0.0	-0.3	0.5	6.7	0.5	6.8	27300	440100	
	8:00	478	28	105	9	0.1	0.8	-0.6	0.0			0.1	0.8	-0.6	0.0			0.1	0.8	-0.6		0.3	0.5	39.3	-38.8	-468.1	-0.6	-17.0	0.0	-0.3	0.5	7.0	0.5	7.1	28680	443400	
	9:00	493	4	115	11	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.3	0.6	39.3	-38.7	-467.8	-0.8	-17.1	0.0	-0.3	0.6	7.3	0.6	7.4	29580	445680	Acid Gas to Flare / SRU Shutdown / No Feed to SRU 09:55
	10:00	753	1	129	11	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.4	1.0	39.3	-38.3	-467.1	-1.2	-17.6	0.0	-0.4	1.0	8.0	1.0	8.1	45180	463140	
	11:00	756	2	148	2	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.4	1.1	39.3	-38.2	-466.3	-1.2	-18.1	0.0	-0.4	1.1	8.8	1.1	8.9	45360	480600	
	12:00	729	5	218	3	0.0	1.2	-1.1	0.0			0.0	1.2	-1.1	0.0			0.0	1.2	-1.2		0.6	1.6	39.3	-37.7	-464.9	-1.1	-18.4	0.0	-0.4	1.6	10.1	1.6	10.2	43740	495720	
	13:00	744	80	886	29	0.6	1.2	-0.6	0.0			0.6	1.2	-0.6	0.0			0.6	1.2	-0.6		1.1	6.5	39.3	-32.8	-458.6	-0.6	-18.3	0.0	-0.4	6.6	16.4	6.7	16.5	44640	513360	
	14:00	756	28	167	37	0.2	1.2	-1.0	0.0			0.2	1.2	-1.0	0.0			0.2	1.2	-1.0		1.2	1.3	39.3	-38.0	-457.6	-1.0	-18.5	0.0	-0.4	1.3	17.4	1.3	17.5	45360	530580	
	15:00	876	0	95	36	0.0	1.4	-1.4	0.0			0.0	1.4	-1.4	0.0			0.0	1.4	-1.4		1.2	0.8	39.3	-38.5	-457.0	-1.4	-19.2	0.0	-0.4	0.8	17.9	0.8	18.1	52560	557160	
	16:00	983	0	85	9	0.0	1.6	-1.6	0.0			0.0	1.6	-1.6	0.0			0.0	1.6	-1.6		1.3	0.8	39.3	-38.5	-456.4	-1.6	-20.1	0.0	-0.4	0.8	18.5	0.8	18.7	58980	589500	
	17:00	1047	0	86	0	0.0	1.7	-1.7	0.0			0.0	1.7	-1.7	0.0			0.0	1.7	-1.7		1.3	0.9	39.3	-38.4	-455.7	-1.7	-21.1	0.0	-0.4	0.9	19.1	0.9	19.3	62820	625380	
	18:00	1021	0	85	0	0.0	1.6	-1.6	0.0			0.0	1.7	-1.7	0.0			0.0	1.7	-1.7		1.4	0.9	39.3	-38.4	-455.2	-1.6	-21.9	0.0	-0.4	0.9	19.7	0.9	19.9	61260	656820	
	19:00	1029	0	84	0	0.0	1.7	-1.7	0.0			0.0	1.7	-1.7	0.0			0.0	1.7	-1.7		1.4	0.9	39.3	-38.4	-454.8	-1.7	-22.8	0.0	-0.5	0.9	20.2	0.9	20.4	61740	689940	
	20:00	1009	3	85	1	0.0	1.6	-1.6	0.0			0.0	1.6	-1.6	0.0			0.0	1.7	-1.6		1.4	0.9	39.3	-38.4	-454.5	-1.6	-23.7	0.0	-0.5	0.9	20.8	0.9	21.0	60540	724560	
	21:00	916	8	158	4	0.1	1.5	-1.4	0.0			0.1	1.5	-1.4	0.0			0.1	1.5	-1.4		1.5	1.4	39.3	-37.9	-453.6	-1.4	-24.4	0.0	-0.5	1.5	22.0	1.5	22.2	54960	754560	
	22:00	944	2130	10649	714	20.0	1.5	18.4	0.2	15.4	0.2	20.2	1.5	18.6	0.1	15.6	0.1	20.4	1.5	18.8	15.8	9.7	99.8	39.3	60.5	-354.7	18.4	-5.3	0.4	-0.1	100.8	122.6	101.9	123.8	56640	784800	H_2S above span of instrument; conservatively assumed that H_2S=20% of TRS;
	23:00	968	530	2652	890	5.1	1.6	3.5	0.1			5.1	1.6	3.6	0.0			5.2	1.6	3.6		11.8	25.5	39.3	-13.8	-330.4	3.5	-1.1	0.1	0.0	25.7	148.1	26.0	149.6	58080	817440	H_2S above span of instrument; conservatively assumed that H_2S=20% of TRS;
07/26/2023	0:00	1012	6	73	889	0.1	1.6	-1.6	0.0			0.1	1.6	-1.6	0.0			0.1	1.7	-1.6		11.7	0.7	39.3	-38.6	-331.2	-1.6	-2.0	0.0	0.0	0.7	148.6	0.7	150.1	60720	853440	
	1:00	1025	1	66	179	0.0	1.6	-1.6	0.0	0.3	0.0	0.0	1.7	-1.7	0.0	0.3	0.0	0.0	1.7	-1.7	0.3	11.2	0.7	39.3	-38.6	-337.1	-1.6	-2.9	0.0	-0.1	0.7	149.0	0.7	150.5	61500	890340	
	2:00	1032	1	63	3	0.0	1.7	-1.7	0.0			0.0	1.7	-1.7	0.0			0.0	1.7	-1.7		11.2	0.6	39.3	-38.7	-337.7	-1.7	-4.0	0.0	-0.1	0.7	149.5	0.7	151.0	61920	928800	
	3:00	1002	1	62	1	0.0	1.6	-1.6	0.0			0.0	1.6	-1.6	0.0			0.0	1.6	-1.6		11.1	0.6	39.3	-38.7	-337.9	-1.6	-4.9	0.0	-0.1	0.6	149.8	0.6	151.4	60120	963780	
	4:00	1011	2	63	1	0.0	1.6	-1.6	0.0			0.0	1.6	-1.6	0.0			0.0	1.7	-1.6		11.1	0.6	39.3	-38.7	-338.1	-1.6	-5.8	0.0	-0.1	0.6	150.2	0.6	151.8	60660	999480	
	5:00	1054	3	65	2	0.0	1.7	-1.7	0.0			0.0	1.7	-1.7	0.0			0.0	1.7	-1.7		11.1	0.7	39.3	-38.6	-338.3	-1.7	-6.8	0.0	-0.1	0.7	150.7	0.7	152.2	63240	1037700	
	6:00	1058	6	68	4	0.1	1.7	-1.6	0.0			0.1	1.7	-1.7	0.0			0.1	1.7	-1.7		11.1	0.7	39.3	-38.6	-338.5	-1.6	-7.7	0.0	-0.2	0.7	151.0	0.7	152.6	63480	1074660	
	7:00	982	52	201	20	0.5	1.6	-1.1	0.0			0.5	1.6	-1.1	0.0			0.5	1.6	-1.1		11.2	2.0	39.3	-37.3	-337.4	-1.1	-8.1	0.0	-0.2	2.0	152.6	2.0	154.1	58920	1106280	
	8:00	984	21	82	26	0.2	1.6	-1.4	0.0			0.2	1.6	-1.4	0.0			0.2	1.6	-1.4		11.2	0.8	39.3	-38.5	-337.4	-1.4	-8.9	0.0	-0.2	0.8	152.9	0.8	154.4	59040	1136640	
	9:00	974	0	64	25	0.0	1.6	-1.6	0.0			0.0	1.6	-1.6	0.0			0.0	1.6	-1.6		11.1	0.6	39.3	-38.7	-338.2	-1.6	-9.7	0.0	-0.2	0.6	152.9	0.6	154.5	58440	1165500	
	10:00	920	9	65	10	0.1	1.5	-1.4	0.0			0.1	1.5	-1.4	0.0			0.1	1.5	-1.4		2.8	0.6	39.3	-38.7	-437.4	-1.4	-9.9	0.0	-0.2	0.6	152.6	0.6	154.1	55200	1175520	
	11:00	902	3	74	4	0.0	1.5	-1.4	0.0			0.0	1.5	-1.4	0.0			0.0	1.5	-1.5		0.8	0.7	39.3	-38.6	-462.3	-1.4	-10.1	0.0	-0.2	0.7	152.1	0.7	153.6	54120	1184280	
	12:00	951	0	72	4	0.0	1.5	-1.5	0.0			0.0	1.5	-1.5	0.0			0.0	1.6	-1.6		0.8	0.7	39.3	-38.6	-462.3	-1.5	-10.5	0.0	-0.2	0.7	151.2	0.7	152.7	57060	1197600	
	13:00	875	1	77	2	0.0	1.4	-1.4	0.0			0.0	1.4	-1.4	0.0			0.0	1.4	-1.4		0.8	0.7	39.3	-38.6	-462.3	-1.4	-11.3	0.0	-0.2	0.7	145.3	0.7	146.7	52500	1205460	
	14:00	873	8	92	3	0.1	1.4	-1.3	0.0			0.1	1.4	-1.3	0.0			0.1	1.4	-1.4		0.8	0.8	39.3	-38.5	-462.2	-1.3	-11.6	0.0	-0.2	0.8	144.8	0.8	146.3	52380	1212480	
	15:00	833	8	96	6	0.1	1.3	-1.3	0.0			0.1	1.4	-1.3	0.0			0.1	1.4	-1.3		0.8	0.8	39.3	-38.5	-462.0	-1.3	-11.5	0.0	-0.2	0.8	144.8	0.8	146.2	49980	1209900	
	16:00	843	33	213	16	0.3	1.4	-1.1	0.0			0.3	1.4	-1.1	0.0			0.3	1.4	-1.1		0.9	1.8	39.3	-37.5	-460.8	-1.1	-11.0	0.0	-0.2	1.8	145.7	1.8	147.2	50580	1201500	
	17:00	843	100	501	47	0.8	1.4	-0.5	0.0			0.8	1.4	-0.5	0.0			0.9	1.4	-0.5		1.2	4.2	39.3	-35.1	-457.3	-0.5	-9.8	0.0	-0.2	4.2	149.1	4.3	150.6	50580	1189260	H_2S above span of instrument; conservatively assumed that H_2S=20% of TRS;
	18:00	832	2	76	45	0.0	1.3	-1.3	0.0			0.0	1.4	-1.3	0.0			0.0	1.4	-1.4		1.2	0.6	39.3	-38.7	-457.4	-1.3	-9.5	0.0	-0.2	0.6	148.8	0.6	150.3	49920	1177920	
	19:00	827	0	71	34	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.4	-1.4		1.1	0.6	39.3	-38.7	-458.8	-1.3	-9.1	0.0	-0.2	0.6	148.6	0.6	150.1	49620	1165800	
	20:00	799	0	65	1	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.0	0.5	39.3	-38.8	-459.1	-1.3	-8.8	0.0	-0.2	0.5	148.2	0.5	149.7	47940	1153200	
	21:00	748	0	62	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		1.0	0.5	39.3	-38.8	-459.2	-1.2	-8.6	0.0	-0.2	0.5	147.2	0.5	148.7	44880	1143120	
	22:00	730	0	63	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		1.0	0.5	39.3	-38.8	-459.4	-1.2	-28.2	0.0	-0.6	0.5	46.9	0.5	47.3	43800	1130280	
	23:00	743	1	64	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		1.0	0.5	39.3	-38.8	-459.6	-1.2	-32.9	0.0	-0.7	0.5	21.6	0.5	21.8	44580	1116780	
07/27/2023	0:00	740	1	67	1	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		1.0	0.5	39.3	-38.8	-459.8	-1.2	-32.5	0.0	-0.7	0.5	21.3	0.5	21.6	44400	1100460	
	1:00	734	5	73	2	0.0	1.2	-1.1	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		1.0	0.5	39.3	-38.8	-459.9	-1.1	-32.0	0.0	-0.7	0.5	21.2	0.5	21.4	44040	1083000	
	2:00	732	41	317	16	0.3	1.2	-0.9	0.0			0.3	1.2	-0.9	0.0			0.3	1.2	-0.9		1.1	2.3	39.3	-37.0	-458.4	-0.9	-31.2	0.0	-0.6	2.3	22.9	2.4	23.1	43920	1065000	
	3:00	740	925	4624	323	6.8	1.2	5.6	0.1	3.6	0.0	6.9	1.2	5.7	0.0	3.6	0.0	6.9	1.2	5.7	3.6	3.9	34.0	39.3	-5.3	-425.2	5.6	-24.0	0.1	-0.5	34.3	56.6	34.7	57.1	44400	1049280	H_2S above span of instrument; conservatively assumed that H_2S=20% of TRS;
	4:00	735	70	348	345	0.5	1.2	-0.7	0.0			0.5	1.2	-0.7	0.0			0.5	1.2	-0.7		3.9	2.5	39.3	-36.8	-424.4	-0.7	-23.1	0.0	-0.5	2.6	58.5	2.6	59.1	44100	1032720	H_2S above span of instrument; conservatively assumed that H_2S=20% of TRS;
	5:00	754	4	64	333	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		3.6	0.5	39.3	-38.8	-428.2	-1.2	-22.6	0.0	-0.5	0.5	58.3	0.5	58.9	45240	1014720	
	6:00	773	0	60	25	0.0	1.2	-1.2	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		3.6	0.5	39.3	-38.8	-428.3	-1.2	-22.2	0.0	-0.5	0.5	58.0	0.5	58.6	46380	997620	
	7:00	784	1	60	2	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		3.6	0.5	39.3	-38.8	-428.4	-1.3	-22.4	0.0	-0.5	0.5	56.5	0.5	57.1	47040	985740	
	8:00	802	1	63	1	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		3.6	0.5	39.3	-38.8	-428.5	-1.3	-22.3	0.0	-0.5	0.5	56.2	0.5	56.8	48120	974820	
	9:00	819	41	333	14	0.3	1.3	-1.0	0.0			0.3	1.3	-1.0	0.0			0.3	1.3	-1.0		3.8	2.7	39.3	-36.6	-426.2	-1.0	-21.7	0.0	-0.4	2.7	58.3	2.8	58.9	49140	965520	
	10:00	857	54	764	32	0.5	1.4	-0.9	0.0			0.5	1.4	-0.9	0.0			0.5	1.4	-0.9		4.3	6.5	39.3	-32.8	-420.2	-0.9	-21.2	0.0	-0.4	6.6	64.3	6.6	65.0	51420	961740	
	11:00	869	4	77	33	0.0	1.4	-1.4	0.0			0.0	1.4	-1.4	0.0			0.0	1.4	-1.4		4.3	0.7	39.3	-38.6	-420.0	-1.4	-21.2	0.0	-0.4	0.7	64.3	0.7	65.0	52140	959760	
	12:00	856	4	82	21	0.0	1.4	-1.3	0.0			0.0	1.4	-1.4	0.0			0.0	1.4	-1.4		4.3	0.7	39.3	-38.6	-419.8	-1.3	-21.0	0.0	-0.4	0.7	64.3	0.7	65.0	51360	954060	
	13:00	838	1	74	3	0.0	1.3	-1.3	0.0			0.0	1.4	-1.4	0.0			0.0	1.4	-1.4		4.3	0.6	39.3	-38.7	-419.7	-1.3	-20.9	0.0	-0.4	0.6	64.3	0.6	64.9	50280	951840	
	14:00	818	0	73	2	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		4.2	0.6	39.3	-38.7	-421.4	-1.3	-20.9	0.0	-0.4	0.6	64.1	0.6	64.7	49080	948540	
	15:00	759	0	65	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		1.4	0.5	39.3	-38.8	-454.9	-1.2	-20.8	0.0	-0.4	0.5	63.8	0.5	64.4	45540	944100	
	16:00	745	0	65	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		1.2	0.5	39.3	-38.8	-456.9	-1.2	-20.9	0.0	-0.4	0.5	62.4	0.5	63.1	44700	938220	
	17:00	733	0	64	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		1.2	0.5	39.3	-38.8	-457.0	-1.2	-21.6	0.0	-0.4	0.5	58.7	0.5	59.3	43980	931620	
	18:00	737	0	63	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		1.2	0.5	39.3	-38.8	-457.0	-1.2	-21.5	0.0	-0.4	0.5	58.5	0.5	59.1	44220	925920	
	19:00	795	0	67	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.2	0.5	39.3	-38.8	-456.9	-1.3	-21.5	0.0	-0.4	0.5	58.5	0.5	59.0	47700	924000	
	20:00	804	0	68	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.2	0.5	39.3	-38.8	-456.9	-1.3	-21.5	0.0	-0.4	0.5	58.5	0.6	59.1	48240	924300	
	21:00	742	1	70	1	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		1.0	0.5	39.3	-38.8	-459.0	-1.2	-21.5	0.0	-0.4	0.5	58.5	0.5	59.1	44520	923940	
	22:00	731	2	71	1	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.5	39.3	-38.8	-465.0	-1.2	-21.5	0.0	-0.4	0.5	58.6	0.5	59.2	43860	924000	
	23:00	731	4	75	2	0.0	1.2	-1.1	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.5	39.3	-38.8	-465.1	-1.1	-21.4	0.0	-0.4	0.5	58.7	0.6	59.3	43860	923280	
07/28/2023	0:00	729	6	81	4	0.0	1.2	-1.1	0.0			0.0	1.2	-1.1	0.0			0.0	1.2	-1.2		0.5	0.6	39.3	-38.7	-465.3	-1.1	-21.3	0.0	-0.4	0.6	58.8	0.6	59.4	43740	922620	
	1:00	727	10	91	7	0.1	1.2	-1.1	0.0			0.1	1.2	-1.1	0.0			0.1	1.2	-1.1		0.5	0.7	39.3	-38.6	-465.2	-1.1	-21.3	0.0	-0.4	0.7	58.9	0.7	59.5	43620	922200	
	2:00	727	28	111	15	0.2	1.2	-1.0	0.0			0.2	1.2	-1.0	0.0			0.2	1.2	-1.0		0.5	0.8	39.3	-38.5	-465.0	-1.0	-21.4	0.0	-0.4	0.8	57.4	0.8	58.0	43620	921900	
	3:00	724	1	60	13	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.4	39.3	-38.9	-465.1	-1.2	-28.2	0.0	-0.6	0.4	23.5	0.4	23.7	43440	920940	
	4:00	724	0	58	10	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.4	39.3	-38.9	-465.1	-1.2	-28.7	0.0	-0.6	0.4	21.3	0.4	21.6	43440	920280	
	5:00	726	0	58	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.4	39.3	-38.9	-465.2	-1.2	-28.7	0.0	-0.6	0.4	21.3	0.4	21.5	43560	918600	
	6:00	731	0	59	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.4	39.3	-38.9	-465.2	-1.2	-28.7	0.0	-0.6	0.4	21.2	0.4	21.5	43860	916080	
	7:00	742	0	60	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.4	39.3	-38.9	-465.3	-1.2	-28.6	0.0	-0.6	0.4	21.2	0.5	21.4	44520	913560	
	8:00	795	0	63	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		0.5	0.5	39.3	-38.8	-465.3	-1.3	-28.6	0.0	-0.6	0.5	21.2	0.5	21.4	47700	913140	
	9:00	792	1	64	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		0.5	0.5	39.3	-38.8	-465.4	-1.3	-28.9	0.0	-0.6	0.5	19.0	0.5	19.2	47520	911520	
	10:00	754	5	73	2	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.5	39.3	-38.8	-465.3	-1.2	-29.2	0.0	-0.6	0.6	13.0	0.6	13.1	45240	905340	
	11:00	796	4	68	3	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		0.5	0.5	39.3	-38.8	-465.3	-1.3	-29.1	0.0	-0.6	0.5	12.8	0.5	13.0	47760	900960	
	12:00	804	4	72	4	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		0.5	0.6	39.3	-38.7	-465.3	-1.3	-29.1	0.0	-0.6	0.6	12.7	0.6	12.9	48240	897840	
	13:00	807	6	79	5	0.1	1.3	-1.2	0.0			0.1	1.3	-1.3	0.0			0.1	1.3	-1.3		0.5	0.6	39.3	-38.7	-465.4	-1.2	-29.0	0.0	-0.6	0.6	12.7	0.6	12.9	48420	895980	
	14:00	783	6	75	5	0.0	1.3	-1.2	0.0			0.0	1.3	-1.2	0.0			0.0	1.3	-1.2		0.5	0.6	39.3	-38.7	-465.6	-1.2	-28.9	0.0	-0.6	0.6	12.7	0.6	12.9	46980	893880	
	15:00	759	0	62	4	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.5	39.3	-38.8	-465.6	-1.2	-28.9	0.0	-0.6	0.5	12.7	0.5	12.8	45540	893880	
	16:00	748	0	58	2	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.4	39.3	-38.9	-465.5	-1.2	-28.9	0.0	-0.6	0.4	12.7	0.4	12.8	44880	894060	
	17:00	704	0	60	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.2	-1.2		0.5	0.4	39.3	-38.9	-465.5	-1.1	-28.8	0.0	-0.6	0.4	12.6	0.4	12.7	42240	892320	
	18:00	766	0	57	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.3	-1.3		0.5	0.4	39.3	-38.9	-465.5	-1.2	-28.8	0.0	-0.6	0.4	12.6	0.4	12.7	45960	894060	
	19:00	801	0	55	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		0.5	0.4	39.3	-38.9	-465.5	-1.3	-28.8	0.0	-0.6	0.4	12.5	0.4	12.6	48060	894420	
	20:00	762	0	55	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.3	-1.3		0.5	0.4	39.3	-38.9	-465.6	-1.2	-28.7	0.0	-0.6	0.4	12.4	0.4	12.5	45720	891900	
	21:00	719	0	58	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.4	39.3	-38.9	-465.7	-1.2	-28.7	0.0	-0.6	0.4	12.3	0.4	12.4	43140	890520	
	22:00	719	0	59	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.4	39.3	-38.9	-465.8	-1.2	-28.7	0.0	-0.6	0.4	12.2	0.4	12.3	43140	889800	
	23:00	716	1	62	1	0.0	1.2	-1.1	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.4	39.3	-38.9	-465.9	-1.1	-28.7	0.0	-0.6	0.4	12.1	0.4	12.2	42960	888900	
07/29/2023	0:00	709	2	62	1	0.0	1.1	-1.1	0.0			0.0	1.2	-1.1	0.0			0.0	1.2	-1.1		0.5	0.4	39.3	-38.9	-466.1	-1.1	-28.7	0.0	-0.6	0.4	11.9	0.4	12.0	42540	887700	

7/25/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2, and Flow Data

		Refinery PI or DAHS Data			Limit: >162 ppmd H2S 3 hr RA	98% Destruction Efficiency — Title V Permit / Construction Permit (162 ppm H2S 3 hr Rolling Average)						99% Destruction Efficiency — NSPS Subpart Ja (162 ppm H2S 3 hr Rolling Average)						100% Destruction Efficiency — GCD (162 ppm H2S 3 hr Rolling Average)				98% Destruction Efficiency — Limit: 39.3 lbs SO2 / hr 12 hr RA	Title V Permit (39.3 lbs SO2 / hr 12hr RA)				Title V / Construction Permit — 98% Destruction Efficiency	SO2 EPCRA > 500 lbs		H2S EPCRA / CERCLA > 100 lbs	40 CFR 60 Subpart Ja — 99% Destruction Efficiency	Limit: Requires Root Cause if Equal to or Greater than 500 lbs total SO2	2010 GCD — 100% Destruction Efficiency	Limit: Requires Root Cause if Equal to or Greater than 500 lbs total SO2	40 CFR 60 Subpart Ja — Flow	Limit: Requires Root Cause if 500,000 scf above Baseline (86,780scf)	
Date	Start Time	Flare Flow 1-hr Avg SCFM	Flare H2S 1-hr Avg ppmd	Flare TRS 1-hr Avg ppmd	Flare H2S 3-hr RA ppmd	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	Hourly Emissions lbs H2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H2S	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	Hourly Emissions lbs H2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H2S	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	162 ppm 3hr RA Excess Emissions 3-hr Sum lbs SO2	lbs SO2 / hr 12 hr RA lbs SO2 / hr	Actual Title V lbs SO2 / hr	Allowable Title V lbs SO2 / hr	Excess Title V lbs SO2 / hr	Excess Title V 12 hr rolling sum (98% Dest Eff) lbs SO2	Excess SO2 Emissions (>162 ppm 98%) lbs SO2	Excess Emissions (>162 ppm 98%) Previous 24hr Rolling Sum lbs SO2	lbs H2S	Emissions Previous 24hr Rolling Sum lbs H2S	Ja lbs SO2 / hr	Ja 24 hr rolling sum total lbs SO2 (99% Dest Eff) lbs SO2	GCD lbs SO2 / hr lbs SO2 / hr	GCD 24 hr rolling sum total lbs SO2 (100% Dest Eff) lbs SO2	Ja total flow scf / hr	Ja 24 hr rolling sum excess flow scf	Comments
	1:00	711	4	66	2	0.0	1.1	-1.1	0.0			0.0	1.2	-1.1	0.0			0.0	1.2	-1.1		0.4	0.5	39.3	-38.8	-466.2	-1.1	-28.7	0.0	-0.6	0.5	11.7	0.5	11.8	42660	886740	
	2:00	717	6	73	4	0.0	1.2	-1.1	0.0			0.0	1.2	-1.1	0.0			0.0	1.2	-1.1		0.4	0.5	39.3	-38.8	-466.3	-1.1	-28.8	0.0	-0.6	0.5	11.4	0.5	11.5	43020	886140	
	3:00	712	9	81	6	0.1	1.1	-1.1	0.0			0.1	1.2	-1.1	0.0			0.1	1.2	-1.1		0.5	0.6	39.3	-38.7	-466.2	-1.1	-28.7	0.0	-0.6	0.6	11.6	0.6	11.7	42720	885420	
	4:00	718	270	1350	95	1.9	1.2	0.8	0.0			1.9	1.2	0.8	0.0			2.0	1.2	0.8		1.2	9.6	39.3	-29.7	-457.0	0.8	-26.7	0.0	-0.5	9.7	20.9	9.8	21.1	43080	885060	H2S above span of instrument; conservatively assumed that H2S=20% of TRS;
	5:00	716	201	1007	160	1.4	1.2	0.3	0.0			1.4	1.2	0.3	0.0			1.5	1.2	0.3		1.8	7.2	39.3	-32.1	-450.3	0.3	-25.2	0.0	-0.5	7.2	27.7	7.3	28.0	42960	884460	H2S above span of instrument; conservatively assumed that H2S=20% of TRS;
	6:00	724	10	70	161	0.1	1.2	-1.1	0.0			0.1	1.2	-1.1	0.0			0.1	1.2	-1.1		1.8	0.5	39.3	-38.8	-450.2	-1.1	-25.1	0.0	-0.5	0.5	27.8	0.5	28.0	43440	884040	
	7:00	733	0	62	71	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		1.8	0.5	39.3	-38.8	-450.2	-1.2	-25.1	0.0	-0.5	0.5	27.8	0.5	28.0	43980	883500	
	8:00	785	0	66	4	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.8	0.5	39.3	-38.8	-450.1	-1.3	-25.1	0.0	-0.5	0.5	27.8	0.5	28.1	47100	882900	
	9:00	809	0	67	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.8	0.5	39.3	-38.8	-450.0	-1.3	-25.1	0.0	-0.5	0.5	27.8	0.5	28.1	48540	883920	
	10:00	822	2	82	1	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.8	0.7	39.3	-38.6	-449.7	-1.3	-25.2	0.0	-0.5	0.7	27.9	0.7	28.2	49320	888000	
	11:00	799	1	74	1	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.8	0.6	39.3	-38.7	-449.6	-1.3	-25.2	0.0	-0.5	0.6	28.0	0.6	28.3	47940	888180	
	12:00	795	1	75	1	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.8	0.6	39.3	-38.7	-449.4	-1.3	-25.2	0.0	-0.5	0.6	28.0	0.6	28.3	47700	887640	
	13:00	791	2	80	1	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.9	0.6	39.3	-38.7	-449.2	-1.3	-25.3	0.0	-0.5	0.6	28.0	0.6	28.3	47460	886680	
	14:00	790	6	85	3	0.0	1.3	-1.2	0.0			0.0	1.3	-1.2	0.0			0.1	1.3	-1.2		1.9	0.7	39.3	-38.6	-449.1	-1.2	-25.3	0.0	-0.5	0.7	28.1	0.7	28.4	47400	887100	
	15:00	762	6	88	5	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.3	-1.2		1.9	0.7	39.3	-38.6	-449.0	-1.2	-25.3	0.0	-0.5	0.7	28.3	0.7	28.6	45720	887280	
	16:00	781	10	103	7	0.1	1.3	-1.2	0.0			0.1	1.3	-1.2	0.0			0.1	1.3	-1.2		1.1	0.8	39.3	-38.5	-457.8	-1.2	-25.3	0.0	-0.5	0.8	28.7	0.8	29.0	46860	889260	
	17:00	810	10	96	8	0.1	1.3	-1.2	0.0			0.1	1.3	-1.2	0.0			0.1	1.3	-1.2		0.6	0.8	39.3	-38.5	-464.2	-1.2	-25.4	0.0	-0.5	0.8	29.0	0.8	29.3	48600	895620	
	18:00	789	0	70	7	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		0.6	0.5	39.3	-38.8	-464.2	-1.3	-25.5	0.0	-0.5	0.6	29.1	0.6	29.4	47340	897000	
	19:00	789	0	68	3	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		0.6	0.5	39.3	-38.8	-464.1	-1.3	-25.5	0.0	-0.5	0.5	29.2	0.5	29.5	47340	896280	
	20:00	738	0	67	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.6	0.5	39.3	-38.8	-464.1	-1.2	-25.5	0.0	-0.5	0.5	29.3	0.5	29.6	44280	894840	
	21:00	676	0	62	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.6	0.4	39.3	-38.9	-464.2	-1.1	-25.4	0.0	-0.5	0.4	29.3	0.4	29.6	40560	892260	
	22:00	691	0	58	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.6	0.4	39.3	-38.9	-464.5	-1.1	-25.3	0.0	-0.5	0.4	29.3	0.4	29.6	41460	890580	
	23:00	645	0	58	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.1	-1.1		0.6	0.4	39.3	-38.9	-464.7	-1.0	-25.2	0.0	-0.5	0.4	29.2	0.4	29.5	38700	886320	
07/30/2023	0:00	664	0	65	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.6	0.4	39.3	-38.9	-464.9	-1.1	-25.2	0.0	-0.5	0.4	29.2	0.4	29.5	39840	883620	
	1:00	642	1	65	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.1	-1.0		0.5	0.4	39.3	-38.9	-465.1	-1.0	-25.1	0.0	-0.5	0.4	29.2	0.4	29.5	38520	879480	
	2:00	650	3	71	1	0.0	1.0	-1.0	0.0			0.0	1.1	-1.0	0.0			0.0	1.1	-1.0		0.5	0.5	39.3	-38.8	-465.3	-1.0	-25.0	0.0	-0.5	0.5	29.1	0.5	29.4	39000	875460	
	3:00	640	4	76	3	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.1	-1.0		0.5	0.5	39.3	-38.8	-465.5	-1.0	-24.9	0.0	-0.5	0.5	29.0	0.5	29.3	38400	871140	
	4:00	652	0	64	3	0.0	1.0	-1.0	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.5	0.4	39.3	-38.9	-465.9	-1.0	-26.7	0.0	-0.5	0.4	19.7	0.4	19.9	39120	867180	
	5:00	653	0	62	2	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.4	0.4	39.3	-38.9	-466.2	-1.1	-28.1	0.0	-0.6	0.4	12.9	0.4	13.0	39180	863400	
	6:00	653	0	61	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.4	0.4	39.3	-38.9	-466.4	-1.1	-28.1	0.0	-0.6	0.4	12.8	0.4	12.9	39180	859140	
	7:00	672	0	62	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.4	0.4	39.3	-38.9	-466.5	-1.1	-28.0	0.0	-0.6	0.4	12.7	0.4	12.9	40320	855480	
	8:00	704	0	65	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.2	-1.2		0.4	0.5	39.3	-38.8	-466.6	-1.1	-27.8	0.0	-0.6	0.5	12.7	0.5	12.8	42240	850620	
	9:00	743	0	71	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.4	0.5	39.3	-38.8	-466.4	-1.2	-27.7	0.0	-0.6	0.5	12.7	0.5	12.8	44580	846660	
	10:00	745	0	74	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.4	0.5	39.3	-38.8	-466.3	-1.2	-27.6	0.0	-0.6	0.6	12.5	0.6	12.7	44700	842040	
	11:00	759	6	77	2	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.6	39.3	-38.7	-466.1	-1.2	-27.5	0.0	-0.6	0.6	12.5	0.6	12.6	45540	839640	
	12:00	752	2	76	3	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.6	39.3	-38.7	-465.9	-1.2	-27.4	0.0	-0.6	0.6	12.5	0.6	12.6	45120	837060	
	13:00	741	2	82	3	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.6	39.3	-38.7	-465.8	-1.2	-27.3	0.0	-0.6	0.6	12.5	0.6	12.6	44460	834060	
	14:00	733	4	87	3	0.0	1.2	-1.1	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.6	39.3	-38.7	-465.6	-1.1	-27.2	0.0	-0.6	0.6	12.4	0.6	12.6	43980	830640	
	15:00	715	8	101	5	0.1	1.2	-1.1	0.0			0.1	1.2	-1.1	0.0			0.1	1.2	-1.1		0.5	0.7	39.3	-38.6	-465.3	-1.1	-27.1	0.0	-0.6	0.7	12.5	0.7	12.6	42900	827820	
	16:00	737	2	80	5	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.5	0.6	39.3	-38.7	-465.2	-1.2	-27.1	0.0	-0.6	0.6	12.3	0.6	12.4	44220	825180	
	17:00	754	0	79	3	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.6	0.6	39.3	-38.7	-465.0	-1.2	-27.1	0.0	-0.6	0.6	12.1	0.6	12.2	45240	821820	
	18:00	757	0	87	1	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.6	0.7	39.3	-38.6	-464.7	-1.2	-27.0	0.0	-0.6	0.7	12.2	0.7	12.3	45420	819900	
	19:00	752	0	97	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.6	0.7	39.3	-38.6	-464.4	-1.2	-26.9	0.0	-0.5	0.7	12.4	0.7	12.5	45120	817680	
	20:00	690	0	109	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.6	0.7	39.3	-38.6	-464.1	-1.1	-26.8	0.0	-0.5	0.8	12.7	0.8	12.8	41400	814800	
	21:00	651	0	109	0	0.0	1.0	-1.0	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.6	0.7	39.3	-38.6	-463.9	-1.0	-26.7	0.0	-0.5	0.7	12.9	0.7	13.1	39060	813300	
	22:00	645	0	109	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.1	-1.1		0.7	0.7	39.3	-38.6	-463.8	-1.0	-26.6	0.0	-0.5	0.7	13.2	0.7	13.4	38700	810540	
	23:00	648	0	104	0	0.0	1.0	-1.0	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.7	0.7	39.3	-38.6	-463.7	-1.0	-26.6	0.0	-0.5	0.7	13.5	0.7	13.7	38880	810720	
07/31/2023	0:00	643	0	107	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.1	-1.1		0.7	0.7	39.3	-38.6	-463.6	-1.0	-26.5	0.0	-0.5	0.7	13.8	0.7	13.9	38580	809460	
	1:00	745	1	102	0	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.7	0.8	39.3	-38.5	-463.4	-1.2	-26.7	0.0	-0.5	0.8	14.1	0.8	14.3	44700	815640	
	2:00	554	1	128	0	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.7	0.7	39.3	-38.6	-463.4	-0.9	-26.6	0.0	-0.5	0.7	14.4	0.7	14.5	33240	809880	
	3:00	647	2	121	1	0.0	1.0	-1.0	0.0			0.0	1.1	-1.0	0.0			0.0	1.1	-1.0		0.7	0.8	39.3	-38.5	-463.3	-1.0	-26.6	0.0	-0.5	0.8	14.7	0.8	14.8	38820	810300	
	4:00	637	3	123	2	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.7	0.8	39.3	-38.5	-463.1	-1.0	-26.6	0.0	-0.5	0.8	15.1	0.8	15.2	38220	809400	
	5:00	626	0	103	2	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.7	0.6	39.3	-38.7	-463.1	-1.0	-26.5	0.0	-0.5	0.6	15.3	0.7	15.5	37560	807780	
	6:00	628	0	102	1	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.7	0.6	39.3	-38.7	-463.1	-1.0	-26.4	0.0	-0.5	0.6	15.5	0.6	15.7	37680	806280	
	7:00	626	0	102	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.7	0.6	39.3	-38.7	-463.2	-1.0	-26.3	0.0	-0.5	0.6	15.8	0.6	15.9	37560	803520	
	8:00	661	0	106	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.7	0.7	39.3	-38.6	-463.2	-1.1	-26.3	0.0	-0.5	0.7	16.0	0.7	16.2	39660	800940	
	9:00	703	0	116	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.2	-1.2		0.7	0.8	39.3	-38.5	-463.1	-1.1	-26.2	0.0	-0.5	0.8	16.3	0.8	16.5	42180	798540	
	10:00	725	1	117	1	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.7	0.8	39.3	-38.5	-463.0	-1.2	-26.2	0.0	-0.5	0.9	16.6	0.9	16.8	43500	797340	
	11:00	711	7	121	3	0.0	1.1	-1.1	0.0			0.0	1.2	-1.1	0.0			0.0	1.2	-1.1		0.7	0.9	39.3	-38.4	-462.8	-1.1	-26.1	0.0	-0.5	0.9	16.9	0.9	17.0	42660	794460	
	12:00	739	2	116	3	0.0	1.2	-1.2	0.0			0.0	1.2	-1.2	0.0			0.0	1.2	-1.2		0.7	0.9	39.3	-38.4	-462.6	-1.2	-26.1	0.0	-0.5	0.9	17.2	0.9	17.3	44340	793680	
	13:00	689	2	126	4	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.8	0.9	39.3	-38.4	-462.5	-1.1	-26.0	0.0	-0.5	0.9	17.4	0.9	17.6	41369	790589	PI data used for Flare Flow 13:00
	14:00	704	4	127	3	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.2	-1.1		0.8	0.9	39.3	-38.4	-462.3	-1.1	-26.0	0.0	-0.5	0.9	17.7	0.9	17.9	42240	788849	
	15:00	679	6	138	4	0.0	1.1	-1.0	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.8	0.9	39.3	-38.4	-462.2	-1.0	-25.9	0.0	-0.5	0.9	17.9	0.9	18.1	40740	786689	
	16:00	697	8	147	6	0.1	1.1	-1.1	0.0			0.1	1.1	-1.1	0.0			0.1	1.1	-1.1		0.8	1.0	39.3	-38.3	-461.9	-1.1	-25.8	0.0	-0.5	1.0	18.3	1.0	18.5	41820	784289	
	17:00	709	1	111	5	0.0	1.1	-1.1	0.0			0.0	1.2	-1.1	0.0			0.0	1.2	-1.2		0.8	0.8	39.3	-38.5	-461.8	-1.1	-25.7	0.0	-0.5	0.8	18.5	0.8	18.7	42540	781589	
	18:00	699	0	101	3	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.8	0.7	39.3	-38.6	-461.7	-1.1	-25.6	0.0	-0.5	0.7	18.6	0.7	18.8	41940	778109	
	19:00	692	0	95	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.8	0.7	39.3	-38.6	-461.7	-1.1	-25.5	0.0	-0.5	0.7	18.5	0.7	18.7	41520	774509	
	20:00	633	0	93	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.8	0.6	39.3	-38.7	-461.8	-1.0	-25.4	0.0	-0.5	0.6	18.3	0.6	18.5	37980	771089	
	21:00	617	0	90	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.8	0.6	39.3	-38.7	-462.1	-1.0	-25.4	0.0	-0.5	0.6	18.2	0.6	18.4	37020	769049	
	22:00	618	0	90	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.8	0.6	39.3	-38.7	-462.4	-1.0	-25.4	0.0	-0.5	0.6	18.0	0.6	18.2	37080	767429	
	23:00	609	0	88	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.7	0.5	39.3	-38.8	-462.7	-1.0	-25.4	0.0	-0.5	0.5	17.9	0.5	18.1	36540	765089	
08/01/2023	0:00	619	0	88	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.7	0.5	39.3	-38.8	-463.0	-1.0	-25.4	0.0	-0.5	0.5	17.8	0.6	17.9	37140	763649	
	1:00	612	1	92	1	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.7	0.6	39.3	-38.7	-463.3	-1.0	-25.2	0.0	-0.5	0.6	17.6	0.6	17.7	36720	755669	
	2:00	626	5	99	2	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.7	0.6	39.3	-38.7	-463.6	-1.0	-25.3	0.0	-0.5	0.6	17.5	0.6	17.6	37560	759989	
	3:00	628	8	101	4	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.6	0.6	39.3	-38.7	-463.9	-1.0	-25.3	0.0	-0.5	0.6	17.3	0.6	17.5	37680	758849	
	4:00	633	0	81	4	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.6	0.5	39.3	-38.8	-464.4	-1.0	-25.3	0.0	-0.5	0.5	17.0	0.5	17.2	37980	758609	
	5:00	620	0	80	3	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.6	0.5	39.3	-38.8	-464.7	-1.0	-25.3	0.0	-0.5	0.5	16.9	0.5	17.1	37200	758249	
	6:00	629	0	79	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.6	0.5	39.3	-38.8	-464.9	-1.0	-25.3	0.0	-0.5	0.5	16.7	0.5	16.9	37740	758309	
	7:00	641	0	81	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.1	-1.1		0.5	0.5	39.3	-38.8	-465.0	-1.0	-25.3	0.0	-0.5	0.5	16.6	0.5	16.8	38460	759209	
	8:00	690	0	86	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.5	0.6	39.3	-38.7	-465.0	-1.1	-25.3	0.0	-0.5	0.6	16.5	0.6	16.7	41400	760949	
	9:00	707	0	87	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.2	-1.2		0.6	0.6	39.3	-38.7	-465.0	-1.1	-25.3	0.0	-0.5	0.6	16.3	0.6	16.5	42420	761189	
	10:00	727	6	102	2	0.0	1.2	-1.1	0.0			0.0	1.2	-1.1	0.0			0.0	1.2	-1.2		0.6	0.7	39.3	-38.6	-464.8	-1.1	-25.2	0.0	-0.5	0.7	16.2	0.8	16.4	43620	761309	
	11:00	706	1	106	3	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.2	-1.1		0.6	0.7	39.3	-38.6	-464.6	-1.1	-25.2	0.0	-0.5	0.8	16.1	0.8	16.3	42360	761009	
	12:00	713	2	111	3	0.0	1.1	-1.1	0.0			0.0	1.2	-1.1	0.0			0.0	1.2	-1.2		0.6	0.8	39.3	-38.5	-464.3	-1.1	-25.1	0.0	-0.5	0.8	16.0	0.8	16.2	42780	759449	
	13:00	677	4	120	2	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.6	0.8	39.3	-38.5	-464.1	-1.1	-25.1	0.0	-0.5	0.8	16.0	0.8	16.1	40620	758700	
	14:00	658	6	130	4	0.0	1.1	-1.0	0.0			0.0	1.1	-1.0	0.0			0.0	1.1	-1.0		0.6	0.8	39.3	-38.5	-463.8	-1.0	-25.0	0.0	-0.5	0.9	15.9	0.9	16.1	39480	755940	
	15:00	669	10	131	7	0.1	1.1	-1.0	0.0			0.1	1.1	-1.0	0.0			0.1	1.1	-1.0		0.7	0.9	39.3	-38.4	-463.6	-1.0	-25.0	0.0	-0.5	0.9	15.9	0.9	16.0	40140	755340	
	16:00	672	0	98	5	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.7	0.7	39.3	-38.6	-463.5	-1.1	-25.0	0.0	-0.5	0.7	15.5	0.7	15.7	40320	753840	
	17:00	645	0	97	3	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.1	-1.1		0.7	0.6	39.3	-38.7	-463.3	-1.0	-24.9	0.0	-0.5	0.6	15.4	0.6	15.5	38700	750000	
	18:00	695	0	98	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.7	0.7	39.3	-38.6	-463.1	-1.1	-24.9	0.0	-0.5	0.7	15.3	0.7	15.5	41700	749760	
	19:00	659	0	97	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.7	0.6	39.3	-38.7	-463.0	-1.1	-24.9	0.0	-0.5	0.6	15.3	0.6	15.5	39540	747780	
	20:00	654	0	95	0	0.0	1.1	-1.1	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.7	0.6	39.3	-38.7	-463.0	-1.1	-25.0	0.0	-0.5	0.6	15.3	0.6	15.5	39240	749040	
	21:00	646	0	99	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.1	-1.1		0.7	0.6	39.3	-38.7	-463.0	-1.0	-25.0	0.0	-0.5	0.6	15.4	0.6	15.6	38760	750780	
	22:00	648	0	101	0	0.0	1.0	-1.0	0.0			0.0	1.1	-1.1	0.0			0.0	1.1	-1.1		0.7	0.6	39.3	-38.7	-463.1	-1.0	-25.0	0.0	-0.5	0.7	15.5	0.7	15.7	38880	752580	
	23:00	578	0	96	0	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.7	0.6	39.3	-38.7	-463.2	-0.9	-24.9	0.0	-0.5	0.6	15.5	0.6	15.7	34680	750720	Acid gas to SRU Reaction Furnace 23:26
08/02/2023	0:00	495	0	91	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.7	0.4	39.3	-38.9	-463.6	-0.8	-24.7	0.0	-0.5	0.5	15.4	0.5	15.6	29700	743280	
	1:00	494	0	92	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.6	0.5	39.3	-38.8	-463.9	-0.8	-24.5	0.0	-0.5	0.5	15.3	0.5	15.5	29640	736200	
	2:00	490	0	91	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.6	0.4	39.3	-38.9	-464.3	-0.8	-24.3	0.0	-0.5	0.4	15.2	0.5	15.3	29400	728040	

7/25/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2, and Flow Data

						98% Destruction Efficiency						99% Destruction Efficiency						100% Destruction Efficiency				98% Destruction Efficiency					Title V / Construction Permit				40 CFR 60 Subpart Ja	2010 GCD		40 CFR 60 Subpart Ja		
					Limit																	Limit					98% Destruction Efficiency				99% Destruction Efficiency	100% Destruction Efficiency		Flow		
		Refinery PI or DAHS Data			>162 ppmd H2S 3 hr RA	Title V Permit / Construction Permit 162 ppm H2S 3 hr Rolling Average						NSPS Subpart Ja 162 ppm H2S 3 hr Rolling Average						GCD 162 ppm H2S 3 hr Rolling Average				39.3 lbs SO2 / hr 12 hr RA	Title V Permit 39.3 lbs SO2 / hr 12hr RA					SO2 EPCRA > 500 lbs		H2S EPCRA / CERCLA > 100 lbs		Limit	Limit		Limit		
Date	Start Time	Flare Flow 1-hr Avg SCFM	Flare H2S 1-hr Avg ppmd	Flare TRS 1-hr Avg ppmd	Flare H2S 3-hr RA ppmd	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	Hourly Emissions lbs H2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H2S	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	Hourly Emissions lbs H2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H2S	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	162 ppm 3hr RA Excess Emissions 3-hr Sum lbs SO2	lbs SO2 / hr 12 hr RA lbs SO2 / hr	Actual Title V lbs SO2 / hr	Allowable Title V lbs SO2 / hr	Excess Title V lbs SO2 / hr	Excess Title V 12 hr rolling sum (98% Dest Eff) lbs SO2	Excess SO2 Emissions (>162 ppm 98%) lbs SO2	Excess Emissions (>162 ppm 98%) Previous 24hr Rolling Sum lbs SO2	lbs H2S	Emissions Previous 24hr Rolling Sum lbs H2S	Ja lbs SO2 / hr	Ja 24 hr rolling sum total lbs SO2 (99% Dest Eff) lbs SO2	GCD lbs SO2 / hr	GCD 24 hr rolling sum total lbs SO2 (100% Dest Eff) lbs SO2	Ja total flow scf / hr	Ja 24 hr rolling sum excess flow scf	Comments
	3:00	487	0	90	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.6	0.4	39.3	-38.9	-464.8	-0.8	-24.1	0.0	-0.5	0.4	15.0	0.4	15.1	29220	719580	
	4:00	475	0	90	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.5	0.4	39.3	-38.9	-465.0	-0.8	-23.9	0.0	-0.5	0.4	14.9	0.4	15.0	28500	710100	
	5:00	487	0	93	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.5	0.4	39.3	-38.9	-465.2	-0.8	-23.7	0.0	-0.5	0.5	14.8	0.5	15.0	29220	702120	
	6:00	476	0	91	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.5	0.4	39.3	-38.9	-465.4	-0.8	-23.5	0.0	-0.5	0.4	14.8	0.4	14.9	28560	692940	
	7:00	495	0	87	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.5	0.4	39.3	-38.9	-465.6	-0.8	-23.3	0.0	-0.5	0.4	14.7	0.4	14.8	29700	684180	
	8:00	525	0	92	0	0.0	0.8	-0.8	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.5	0.5	39.3	-38.8	-465.8	-0.8	-23.0	0.0	-0.5	0.5	14.6	0.5	14.7	31500	674280	
	9:00	590	0	97	0	0.0	0.9	-0.9	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.5	0.6	39.3	-38.7	-465.8	-0.9	-22.8	0.0	-0.5	0.6	14.5	0.6	14.7	35400	667260	
	10:00	556	4	106	2	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.5	0.6	39.3	-38.7	-465.9	-0.9	-22.6	0.0	-0.5	0.6	14.4	0.6	14.5	33360	657000	
	11:00	544	0	102	2	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.5	0.6	39.3	-38.7	-465.9	-0.9	-22.4	0.0	-0.5	0.6	14.2	0.6	14.3	32640	647280	
	12:00	556	0	108	2	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.5	0.6	39.3	-38.7	-465.8	-0.9	-22.2	0.0	-0.5	0.6	14.0	0.6	14.1	33360	637860	
	13:00	630	0	107	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.5	0.7	39.3	-38.6	-465.5	-1.0	-22.1	0.0	-0.5	0.7	13.9	0.7	14.0	37800	635040	
	14:00	628	0	104	0	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.5	0.6	39.3	-38.7	-465.3	-1.0	-22.1	0.0	-0.5	0.7	13.7	0.7	13.8	37680	633240	
	15:00	543	0	116	0	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.5	0.6	39.3	-38.7	-465.1	-0.9	-22.0	0.0	-0.4	0.6	13.4	0.6	13.5	32580	625680	
	16:00	527	0	117	0	0.0	0.8	-0.8	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.6	0.6	39.3	-38.7	-465.0	-0.8	-21.7	0.0	-0.4	0.6	13.4	0.6	13.5	31620	616980	
	17:00	516	0	120	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.6	0.6	39.3	-38.7	-464.8	-0.8	-21.5	0.0	-0.4	0.6	13.4	0.6	13.5	30960	609240	
	18:00	520	0	116	0	0.0	0.8	-0.8	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.6	0.6	39.3	-38.7	-464.6	-0.8	-21.2	0.0	-0.4	0.6	13.3	0.6	13.4	31200	598740	
	19:00	513	0	133	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.6	0.7	39.3	-38.6	-464.4	-0.8	-20.9	0.0	-0.4	0.7	13.3	0.7	13.5	30780	589980	
	20:00	486	0	136	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.6	0.7	39.3	-38.6	-464.2	-0.8	-20.6	0.0	-0.4	0.7	13.4	0.7	13.5	29160	579900	
	21:00	448	0	137	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.6	0.6	39.3	-38.7	-464.2	-0.7	-20.3	0.0	-0.4	0.6	13.3	0.6	13.5	26880	568020	
	22:00	447	0	147	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.6	0.7	39.3	-38.6	-464.1	-0.7	-20.0	0.0	-0.4	0.7	13.3	0.7	13.5	26820	559960	
	23:00	464	0	162	0	0.0	0.7	-0.7	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.6	0.7	39.3	-38.6	-463.9	-0.7	-19.8	0.0	-0.4	0.8	13.5	0.8	13.7	27840	549120	
08/03/2023	0:00	454	0	156	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.7	0.7	39.3	-38.6	-463.8	-0.7	-19.7	0.0	-0.4	0.7	13.8	0.7	13.9	27240	546660	
	1:00	455	0	147	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.7	0.7	39.3	-38.6	-463.8	-0.7	-19.6	0.0	-0.4	0.7	14.0	0.7	14.2	27300	544320	
	2:00	455	0	132	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.6	0.6	39.3	-38.7	-463.8	-0.7	-19.5	0.0	-0.4	0.6	14.2	0.6	14.3	27300	542220	
	3:00	461	0	128	0	0.0	0.7	-0.7	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.6	0.6	39.3	-38.7	-463.9	-0.7	-19.4	0.0	-0.4	0.6	14.3	0.6	14.5	27660	540660	
	4:00	478	0	129	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.6	0.6	39.3	-38.7	-463.9	-0.8	-19.4	0.0	-0.4	0.6	14.5	0.6	14.7	28680	540840	
	5:00	451	0	141	0	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.6	0.6	39.3	-38.7	-463.9	-0.7	-19.3	0.0	-0.4	0.6	14.7	0.6	14.8	27060	538680	
	6:00	482	0	140	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.7	0.7	39.3	-38.6	-463.8	-0.8	-19.3	0.0	-0.4	0.7	14.9	0.7	15.1	28920	539040	
	7:00	480	0	148	0	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.7	0.7	39.3	-38.6	-463.8	-0.8	-19.3	0.0	-0.4	0.7	15.2	0.7	15.4	28800	538140	
	8:00	542	1	149	1	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.7	0.8	39.3	-38.5	-463.6	-0.9	-19.4	0.0	-0.4	0.8	15.5	0.8	15.7	32520	539160	SWS Off-gas to Flare 08:13 to 10:13
	9:00	627	2	145	1	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.7	0.9	39.3	-38.4	-463.3	-1.0	-19.5	0.0	-0.4	0.9	15.9	0.9	16.0	37620	541380	SWS Off-gas to Flare 08:13 to 10:13
	10:00	539	2	158	2	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.7	0.8	39.3	-38.5	-463.1	-0.9	-19.5	0.0	-0.4	0.9	16.1	0.9	16.3	32340	540360	SWS Off-gas to Flare 08:13 to 10:13
	11:00	613	4	163	3	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.7	1.0	39.3	-38.3	-462.9	-1.0	-19.6	0.0	-0.4	1.0	16.6	1.0	16.8	36780	544500	
	12:00	623	5	171	4	0.0	1.0	-1.0	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.8	1.1	39.3	-38.2	-462.5	-1.0	-19.7	0.0	-0.4	1.1	17.1	1.1	17.2	37380	548520	
	13:00	552	4	175	4	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.8	1.0	39.3	-38.3	-462.2	-0.9	-19.6	0.0	-0.4	1.0	17.3	1.0	17.5	33120	543840	
	14:00	538	2	176	4	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.8	0.9	39.3	-38.4	-461.9	-0.9	-19.5	0.0	-0.4	0.9	17.6	1.0	17.8	32280	538440	
	15:00	537	1	166	2	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.8	0.9	39.3	-38.4	-461.6	-0.9	-19.5	0.0	-0.4	0.9	17.9	0.9	18.1	32220	538080	
	16:00	532	2	168	2	0.0	0.9	-0.8	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9		0.9	0.9	39.3	-38.4	-461.3	-0.8	-19.5	0.0	-0.4	0.9	18.2	0.9	18.4	31920	538380	
	17:00	523	3	176	2	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.9	-0.8		0.9	0.9	39.3	-38.4	-461.0	-0.8	-19.5	0.0	-0.4	0.9	18.5	0.9	18.7	31380	538800	
	18:00	501	3	175	3	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.9	0.9	39.3	-38.4	-460.8	-0.8	-19.5	0.0	-0.4	0.9	18.8	0.9	18.9	30060	537660	
	19:00	527	3	169	3	0.0	0.8	-0.8	0.0			0.0	0.9	-0.8	0.0			0.0	0.9	-0.8		0.9	0.9	39.3	-38.4	-460.7	-0.8	-19.5	0.0	-0.4	0.9	19.0	0.9	19.2	31620	538500	
	20:00	478	3	165	3	0.0	0.8	-0.8	0.0			0.0	0.8	-0.8	0.0			0.0	0.8	-0.8		0.9	0.8	39.3	-38.5	-460.7	-0.8	-19.5	0.0	-0.4	0.8	19.1	0.8	19.3	28680	538020	
	21:00	456	3	160	3	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.9	0.7	39.3	-38.6	-460.9	-0.7	-19.5	0.0	-0.4	0.7	19.2	0.7	19.4	27360	538500	
	22:00	455	3	158	3	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.7	-0.7		0.9	0.7	39.3	-38.6	-461.0	-0.7	-19.5	0.0	-0.4	0.7	19.3	0.7	19.5	27300	538980	
	23:00	459	3	149	3	0.0	0.7	-0.7	0.0			0.0	0.7	-0.7	0.0			0.0	0.8	-0.7		0.9	0.7	39.3	-38.6	-461.3	-0.7	-19.5	0.0	-0.4	0.7	19.2	0.7	19.4	27540	538680	
						Total Excess Emissions - Title V Permit / Construction Permit			lbs SO2	lbs H2S		Total Excess Emissions - NSPS Subpart Ja			lbs SO2	lbs H2S		Total Excess Emissions - GCD			lbs SO2	Total Excess Emissions - Title V			lbs SO2		SO2			H2S						
									19.3	0.2					19.5	0.1				19.7				N/A		N/A			N/A						

Emissions from flare during the hours in which Acid Gas flaring occurred	42.2 lbs SO2		0.5 lbs H2S

$$Title\ V\ lbs\ SO2\ =\ Duratioin(mins) x\ flow(scfm) x\ \frac{(ppm) scf\ H2S}{1{,}000{,}000\ scf\ FG}\ x\ \frac{1\ lb\ mole}{379\ scf}\ x\ \frac{64\ lb\ SO2}{lb\ mole\ H2S} \times 0.98\ Flare\ Destruction\ Efficiency$$

$$NSPS\ Ja\ lbs\ SO2\ =\ Duratioin(mins) x\ flow(scfm) x\ \frac{(ppm) scf\ H2S}{1{,}000{,}000\ scf\ FG}\ x\ \frac{1\ lb\ mole}{379\ scf}\ x\ \frac{64\ lb\ SO2}{lb\ mole\ H2S} \times 0.99\ Flare\ Destruction\ Efficiency$$

cenovus ENERGY | Superior Refinery

August 25, 2023

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611, Ben Franklin Station
Washington, DC 20044-7611

Director, Air Enforcement Division
Office of Civil Enforcement
U.S. Environmental Protection Agency
Mail Code 2242-A
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460-0001

Re: **United States of America, the Louisiana Department of Environmental Quality and the State of Wisconsin v. Murphy Oil USA, Inc., Civil Action No. 3:10-cv-563 (W.D. Wis., entered February 16, 2011 and as subsequently amended).**

Superior Refining Company LLC - Superior, Wisconsin Refinery

Subject: **7/27/2023 Sulfur Pit Event Report**

To Whom It May Concern:

As required by Paragraph 45 of the above-referenced Global Consent Decree, we are submitting the enclosed "GCD 45.b. Report and Emission Estimates from the Sulfur Pit Incident Occurring On: 07/27/2023". Based on observation and engineering judgment, it seems as if there were no actual emissions from the sulfur pit, but we are filing this report out of an abundance of caution

On 7/25/2023 Superior Refining Company LLC (SRC) began a shutdown of the SRU, which was necessary to repair a leak in the Waste Heat Boiler. Between 7/27/2023 (11:30) and 8/1/2023 (22:30), no visible emissions were observed from the sulfur pit. Nonetheless, the vent from the sulfur pit to atmosphere was necessarily open while the Reaction Furnace was shut down and, therefore, venting from the sulfur pit to atmosphere was possible. During this sulfur pit event, there was zero sulfur make, which is the typical basis for sulfur pit emissions estimates. To estimate emissions, SRC calculated the vapor space in the sulfur pit during the period when the atmospheric vent remained open and assumed that the entire vapor space dissipated to atmosphere, which is suitably conservative, resulting in total estimated emissions of 0.07 lbs of H_2S.

If you have any questions, please feel free to contact me at 715-718-8568.

Sincerely,

Ross Lovely
Senior Environmental Advisor

enc: GCD 45.b. Report and Emission Estimates from the Sulfur Pit Incident Occurring On: 7/27/2023.

cc: Chief, Civil Division
U.S. Attorney's Office
222 West Washington Avenue, Suite 700
Madison, WI 53703

Air and Radiation Division
U.S. EPA, Region 5
77 West Jackson Blvd. (AE-17J)
Chicago, IL 60604
Attn: Compliance Tracker

Office of Regional Counsel
U.S. EPA, Region 5
77 West Jackson Blvd. (C-14J)
Chicago, IL 60604

Wisconsin Department of Natural Resources
Attn: Michalee Leuthard
3911 Fish Hatchery Rd
Fitchburg, WI 53711

Submitted electronically to:

- Patrick Foley, EPA (foley.patrick@epa.gov)
- Constantinos Loukeris, EPA (Loukeris.Constantinos@epa.gov)
- Matrix New World Eng. Inc. (csullivan@matrixneworld.com, jmack@matrixneworld.com)
- Randy Matty, WDNR (Randall.Matty@Wisconsin.gov)
- Michalee Leuthard, WDNR (Michalee.Leuthard@Wisconsin.gov)
- John Obery, Cenovus Energy (John.Obery@cenovus.com)

Superior Refining Company LLC

GCD 45.b. Report and Emission Estimates from Sulfur Pit Incident Occurring On: 07/27/2023

GCD 45.a. By no later than the Date of Entry (2/16/11), each of the 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 C.F.R. § 60.102a(f)(2)

GCD 45.b. Beginning no later than the Date of Entry (2/16/11), within 30 days of any violation of condition I.E.2.b.(17) of WDNR Air Pollution Operation Permit No. 816009590-P01 (or its successor permit) and/or 40 C.F.R. § 60.104(a)(2) at the Superior Refinery sulfur pit, the Refinery shall submit a report to WDNR and EPA containing the following: information:

i.

Start Date (m/dd/yyyy):	07/27/2023
Start Time (24 Hour Time):	11:30
End Date (m/dd/yyyy):	08/01/2023
End Time (24 Hour Time):	22:30
Total Duration (hours):	131.00
Total Estimated Quantity of H2S Emitted:	0.07 pounds

i. Steps taken by the Refinery to minimize the quantity of H2S emitted:

After acid gas flow was routed to the flare, while the SulTraps were still blocked in, and the Rxn Furnace was at temperature, natural gas was used for two days to push as much residual H2S through the Rxn Furnace as possible.

ii. Analysis of the cause(s) of the exceedance:

A leak was discovered in the SRU Waste Heat Boiler, which required an SRU shutdown in order to investigate and repair.

ii. Description of the remedial measure(s) taken to correct the cause(s) of the exceedance:

After acid gas flow was routed to the flare, while the SulTraps were still blocked in, and the Rxn Furnace was at temperature, natural gas was used for two days to push as much residual H2S through the Rxn Furnace as possible.

ii. Steps taken to prevent a recurrence of the cause of the exceedance in the future:

No visible emissions were observed during the time period when the sulfur pit vent to atmosphere was open. Best practices were followed to ensure a satisfactory repair of the Waste Heater Boiler.

iii. Other relevant information detailing the Refinery's compliance with 40 C.F.R. § 60.11(d):

SRC typically calculates H2S from sulfur pit emissions using sulfur make, which was zero during the shutdown. Moreover, there was no pressure on the sulfur pit and no visible emissions were observed. Pounds of H2S were conservatively estimated by calculating the vapor space in the pit based on the height of molten sulfur in the pit at the time and assuming that the entire volume of vapor dissipated to atmosphere. H2S concentration of 300ppm in the vapor is assumed, as usual for SRC sulfur pit calculations.

Superior Refining Company LLC

GCD 45.b. Report and Emission Estimates from Sulfur Pit Incident Occurring On: 07/27/2023

Start Date (m/dd/yyyy):	07/27/2023
Start Time (24 Hour Time):	11:30
End Date (m/dd/yyyy):	08/01/2023
End Time (24 Hour Time):	22:30
Duration (hours)	131.00
Average Sulfur Make During Event (LTD):	0
Estimated Quantity of H2S Emitted	0.07 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.

Volume of Pit and Degassing Section		Volume of Molten Sulfur		Assumed Concentration of H_2S in Vapor Space		Density of H_2S (lbs/ft^3)		Emissions
$(4547.5\ ft^3$	-	$2{,}054.2\ ft^3)$	*	$\frac{300\ ppm\ H_2S}{1{,}000{,}000\ ppm\ total}$	*	$\frac{0.09\ lbs}{ft^3}$	=	0.07 lbs H2S

From: DNRAMCOMPLIANCEEXTERNALSUBMISSION@Wisconsin.gov
To: Lovely, Ross
Cc: michalee.leuthard@wisconsin.gov; Perkins, Dean S.
Subject: Deviation Notification Received. Superior Refining Company LLC
Date: Wednesday, July 26, 2023 4:03:08 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_I10_P20_07262023_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 **

Clear Data | Print... | Save...

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

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), (1)(e)(i), (1)(f), (5)(a), (6)(a) Permit No. Construction Permit 12-DCF-256 I.A.1.a.(1) Deviations may be added/updated in the final report	**Permit Process No./Unit Description:** Process No. P20 - Sulfur Recovery Unit (SRU), Tail Gas Treatment Unit (TGTU), and Tail Gas Combustor (TGC)/Incinerator Process No. I10 – Refinery Flare

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

SRU Shutdown: 7/25/2023 @ 09:55 – ongoing, which resulted in several exceedances of the 12 and 24-hr rolling average limits for SO2 as well as Acid Gas flaring and Sulfur Pit emissions.
Flare H2S 3hr RA > 162ppm: 07/25/2023 @ 20:00 – 07/26/2023@ 02:00
Additional detail will be added to the times referenced above in the final report

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

A leak was discovered in the Waste Heat Boiler of the SRU. In order to investigate the leak and fix the Waste Heat Boiler, the SRU needed to be shutdown. During the controlled but unplanned shutdown, several deviations from permitted limits and/or conditions occurred.

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):

The refinery entered abatement conditions prior to the controlled shutdown of the SRU. The TGTU was able to continue operating for a short period time to help reduce emissions. Caustic at the refinery flare was replaced as soon as safely practical when TRS and H2S readings indicated that a change was necessary.

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):

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: SRC Environmental Department

Signature of Responsible Official	Title	Date
	GM Refining	

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.

Appendix H -

Sulfur Plan Malfunction Prevention and Abatement Plan

Sulfur Plant
Malfunction Prevention and Abatement Plan (MPAP)

Superior Refinery

Prepared for
Superior Refining Company LLC

Cenovus ENERGY | Superior Refinery

February 2023

325 South Lake Avenue, Suite 700
Duluth, MN 55802
218.529.8200
www.barr.com

Sulfur Plant
Malfunction Prevention and Abatement Plan (MPAP)
Superior Refinery

February 2023

Contents

List of Appendices

Revision Tracking

Revision Number	Date	Revision Summary
0	April 2010	Five-year general update
1	February 7, 2011	1. Changed Joe Amato's title to Operations Area Superintendent to better encapsulate his job. 2. In sections II.B. and II.C., changed the "every two hours" to provide flexibility in case of emergency or occasional missed reading. 3. In sections III.A.1.d.2, III.A.2.c.2, and III.A.4.b.2, added a specific 0.60% by weight sulfur content requirement. 4. In section III.B.2, changed "every 8th quarter" language to reflect the updated regulatory requirement. 5. Fixed typos throughout
2	October 2011	Updated plan to reflect change of ownership
3	March 23, 2015	General plan update, including formatting. Added Sections 5.0 and 6.0. Added Appendix A. Submitted to Wisconsin Department of Natural Resources (WDNR).
4	December 2018	Update for name change from Calumet Superior LLC to Superior Refining Company LLC. Updated Section 2.1. Incorporate requirements from construction permit 16-RAB-184. Not officially finalized.
5	March 2020	Five-year general plan update. Incorporate requirements from construction permit 19-RAB-057.
6	February 2023	General plan update, including responsible individual information.

1.0 Purpose and Overview

Superior Refining Company LLC (SRC) operates a petroleum refinery in Superior, Wisconsin. As part of refinery operations, SRC operates and maintains a Claus sulfur recovery unit (SRU) and Tail Gas Treatment Unit (TGTU) followed by incineration to comply with the requirements of NR 417.07 and refinery permit conditions.

NR 439 requires that the owner or operator of any direct or portable source which may emit hazardous substances or emits more than 15 pounds in any day or 3 pounds in any hour of any air contaminant for which emission limits have been adopted shall prepare a malfunction prevention and abatement plan (MPAP). This MPAP is prepared in accordance with NR 439 and contains the requirements of NR 417.07. The purpose of this plan is to prevent, detect, and correct malfunctions or equipment failures that may cause any applicable emission limitation to be violated or that may cause air pollution. The plan is required to be updated at least every five years.

NR 439.11 details the required content of MPAPs. An outline of these requirements as addressed in this plan is as follows:

1. Malfunction Prevention (Section 2.0)
    a. NR 439.11(1)(a) - Identification of the individual responsible for inspecting, maintaining, and repairing the air pollution control equipment.
    b. NR 439.11(1)(b) - The maximum intervals for inspection and routine maintenance of the air pollution control equipment.
    c. NR 439.11(1)(c) - A description of the items or conditions that will be checked.
    d. NR 439.11(1)(d) - A listing of materials and spare parts that will be maintained in inventory.
2. Abatement Plans (Section 3.0)
    a. NR 439.11(1)(e) - A description of the corrective procedures that will be taken in the event of a malfunction or failure which results in the exceedance of the applicable emission limitation. These corrective procedures shall achieve and maintain compliance with the applicable emission limitations as expeditiously as possible, but not longer than the time necessary to discontinue operation of the source consistent with safe operating procedures.
    b. NR 439.11(1)(f) - A description of the activities and maximum intervals for routine maintenance and inspection of instrumentation installed and operated to monitor the operation of air pollution control equipment as required under NR 439.055(1). The maximum interval for inspection and routine maintenance may not exceed that recommended by the manufacturer of the instrumentation unless otherwise specified in this plan.
    c. NR 439.11(1)(g) - The calibration schedule for any device that monitors either a source or air pollution control equipment operational variable. The time between calibrations may not exceed one year or as specified in this plan, whichever is shorter.
    d. NR 439.11(h) – Such other information as the WDNR may deem pertinent.

e. The WDNR may order submittal of this plan for review and approval. The WDNR may amend the plan if deemed necessary for malfunction prevention or the reduction of excess emissions during malfunctions.
f. No owner or operator may fail to carry out this plan.
g. NR 439.11(4) – All air pollution control equipment shall be operated and maintained in conformance with good engineering practices to minimize the possibility for the exceedance of any emission limitations.

3. Recordkeeping (Section 4.0)
   a. NR 439.04(1)(b) - Records detailing all malfunctions which cause any applicable emission limitation to be exceeded, including logs to document the implementation of the plan required by s. NR 439.11.

The plan has been formatted to follow the requirements NR 439.11. Additional sections not required by NR 439.11 have been added for completeness and informational purposes. Information regarding reporting can be found in Section 5.0, and instructions for revising this MPAP can be found in Section 6.0.

2.0 Malfunction Prevention

This section outlines the steps taken by SRC to prevent malfunctions. These steps include identifying an individual responsible for maintaining and repairing the air pollution control equipment, conducting routine inspections and maintenance, and keeping spare parts on site.

2.1 Individual Responsible

NR 439.11(1)(a) requires the appointment of a Responsible Individual.

The individual responsible for inspecting, maintaining and repairing the sulfur plant is:

Mr. Aaron Laszewski
Operations Area Superintendent
(715) 398-8439

The alternate responsible individuals are:

Mr. Tim Thom
Operations Manager
(715) 398-8225

2.2 Routine Maintenance

NR 439.11(1)(b) requires identification of intervals for inspection and routine maintenance. The unit Operator conducts routine inspections visually several times per shift. The Operator either repairs problems noted during the shift or writes and submits a work order using the Superior Refinery work order system. The Shift Foreman or Area Superintendent receives and approves the work order and submits the work order to the maintenance department. The maintenance department takes action to carry out the work order based on the priority provided by the Shift Foreman and/or the Area Superintendent.

The refinery conducts major unit shutdowns at regular intervals. The anticipated interval for a SRU/TGTU shutdown for inspection and maintenance (turn-around) is approximately every five years. Prior to turn-around, a plan is developed which indicates the equipment to be inspected based on good engineering practices and standards and as established by operational history.

2.3 Description of Items/Conditions Checked

NR 439.11(1)(c) requires a description of items/conditions checked during inspection and routine maintenance. Operating data are logged several times per shift on the boiler-house/sulfur plant log sheet. During a significant unit shutdown, vessels and exchangers are opened for inspection, cleaning, and repair as required by the turn-around plan and as established by operational history.

2.4 Materials and Spare Parts Inventory List

NR439.11 (1)(d) requires a listing of materials and spare parts maintained in inventory. SRC maintains an inventory of normal, consumable items necessary to ensure the operation of the control device(s) is/are in conformance with the manufacturer's specifications and recommendations. Additional spare parts that have been identified through the root cause analysis procedures are also stocked onsite. An inventory of materials and spare parts maintained in the Superior Refinery Warehouse can be viewed through the inventory system. Continuous emission monitoring system (CEMS) spare parts are tracked separately by both the warehouse and CEMS Technicians and can be viewed through the inventory system.

3.0 Abatement Plans

This section outlines the steps taken by SRC to abate malfunctions. These steps include identifying corrective actions taken in the event of malfunctions, conducting routine maintenance and inspections, and calibrating monitors on a regular schedule.

3.1 Corrective Procedures

NR439.11(1)(e) requires a description of the corrective procedures taken in the event of a malfunction or failure that results in the exceedance of the applicable emission limitation. Corrective procedures will achieve and maintain compliance with the applicable emission limitations as expeditiously as possible but not longer than the time necessary to discontinue operation of the source consistent with safe operating procedures.

During a malfunction or failure, the source may remain operational if it is determined that the emissions from the shutdown and subsequent startup will be more than the emissions from the unit if it were allowed to run during an upset. Corrective action procedures are described below, and a table detailing the sources and applicable emission limitations can be found in Appendix A.

Several scenarios encompass the typical causes of permit excursions for the fuel gas or SRU/TGTU Incinerator limits. This abatement plan requires that the refinery implement, at a minimum, the following plan whenever the SRU and/or TGTU is reasonably anticipated to be non-operational for three hours or longer. It must be noted, however, that deviations may be required if, due to specific refinery conditions, it is necessary to provide sufficient feed to the SRU to allow for reliable operation (approximately four LT/D of feed to the SRU).

3.1.1 Abatement Plan / Sulfur Shedding Procedure

The following sulfur shedding procedure must be implemented whenever the SRU and/or TGTU is reasonably anticipated to be non-operational for three hours or longer, unless SRC elects to route the off-gases from the Sour Water Stripper (SWS) and amine acid gas to the flare and flare gas caustic scrubber, provided that the flare gas caustic scrubbing unit is operating and the average concentration of H_2S in the flare gas does not exceed 162 ppmv on a 3-hour rolling average.

a. Maximum throughput to the refinery Crude Unit shall be limited to 24,000 barrels per day. Target feed rates should be achieved as fast as safely and reasonably possible.
b. The crude oil processed in the refinery shall be the lowest in sulfur content available in inventory.
c. The #2 distillate desulfurizer unit shall use the lowest sulfur content feedstock available onsite.
d. The feed to the Fluid Catalytic Cracking Unit (FCCU) shall be reduced to no more than 5,000 barrels per day. Target feed rates should be achieved as fast as safely and reasonably possible. Reduced crude (feed coming from the bottom of the Crude Vacuum Distillation Tower) may not be used in the FCCU during sulfur shedding.

e. The SWS will be shut down.

3.1.2 Malfunction Scenarios and Emission Minimization Procedures

The malfunction scenarios and procedures for emission minimization are as follows:

1. Sulfur Plant Malfunction – results in a sulfur plant and TGTU shutdown. When the SRU and/or TGTU are non-operational for three hours or longer:
   a. Abatement Plan in Section 3.1.1 above must be followed.
   b. All Hydrogen Sulfide (H_2S) laden gas (acid gas) will be diverted to the flare, which is equipped with a Flare Gas Caustic Scrubber.
   c. The amine unit will continue to produce on-specification plant fuel gas.
   d. The sulfur plant will be returned to normal operation as soon as possible.
2. Sour Water Stripper Malfunction
   a. Shut down the SWS.
   b. Tank 79 will be used to receive all water that would otherwise have been routed to the SWS.
   c. The SWS will be returned to normal operation as soon as possible.
   d. When the SWS returns to normal operation, the water held in Tank 79 will be processed in the SWS to alleviate any backlog.
3. Amine Unit Shutdown – If the Amine Unit is shut down, the SRU will likely consequently shut down, which results in the shutdown of the SWS and TGTU. If the SRU and/or TGTU are non-operational for three hours or longer:
   a. Abatement Plan in Section 3.1.1 above must be followed.
   b. Acid gas is sent to the flare.
   c. Amine sour gas is diverted to the flare.
   d. All plant combustion devices are fueled from the Fuel Gas Balance Drum using natural gas make-up.
   e. Sulfur recovery plant is purged of residual sulfur.
   f. The amine unit will be returned to normal operation as soon as possible. Typical causes for malfunction might be piping failure or unstable operation due to contaminant buildup in amine absorber or stripper.
4. If the hydrogen sulfide concentration in the fuel gas exceeds the 162 ppmv limit for three hours, the following operational schedule shall be implemented consistent with safe operating practices:
   a. Abatement Plan in Section 3.1.1 above must be followed.
   b. Shut down of the SRU may be required.
5. TGTU Malfunction – results in a shutdown of the TGTU. Whenever the TGTU is reasonably anticipated to be non-operational for three hours or longer:
   a. Abatement Plan in Section 3.1.1 above must be followed.
   b. The amine unit will continue to produce on-specification plant fuel gas.
   c. All plant combustion devices are fueled from the Fuel Gas Balance Drum with natural gas make-up.

6. Routine maintenance – complete sulfur plant, TGTU, and/or amine unit shutdown at approximately five-year intervals for inspection and repair. Typical inspection/repairs require two to three weeks.
    a. Abatement Plan in Section 3.1.1 above must be followed.
    b. All plant fuel gas continues to fuel fired equipment.
    c. During this period, the following actions will be taken when circumstances permit:
        i. The SWS can remain operational if it is determined that the emissions from the shutdown and subsequent startup will be more than the emissions from the unit if it were allowed to run during an upset (i.e., of short duration).
        ii. To the extent possible, any additional sulfur loadings that can be minimized will be assessed.
        iii. As feasible, maintenance activities will be scheduled such that H_2S producing units are shut down prior to the SRU/TGTU and amine unit.

3.2 Calibration Schedule

NR 439.11(1)(f) requires a description of the activities and maximum intervals of routine maintenance and inspection of instrumentation installed and operated to monitor the operation of air control equipment. Inspection and maintenance procedures are carried out as required by regulation. Refer to the SRU SO_2 and O_2 CEMS Quality Assurance/Quality Control (QA/QC) Plans for additional details. Completed work orders are maintained in the work order system.

NR 439.11 (1)(g) requires a calibration schedule for any device that monitors either a source or air pollution control equipment's operational variables. The SRU stack is monitored by two CEMS, each of which are inspected, maintained, and calibrated according to the SRU SO_2 and O_2 CEMS QA/QC Plans maintained by the refinery Environmental Department. Calibration procedures for the CEMS typically include daily calibration drift checks, quarterly cylinder gas audits (CGAs) during three quarters, and an annual relative accuracy test audit (RATA). Other instruments used for measuring source or air pollution control equipment operational variables shall be calibrated yearly or at a frequency based on good engineering practice as established by operational history, whichever is more frequent.

NR 439.11(1)(h) requires any other information the department may deem pertinent. As of this update, the WDNR has not requested any additional pertinent information to be included in this plan.

4.0 Recordkeeping

NR 439.04(1)(b) outlines the requirements for recordkeeping. The owner or operator of an air contaminant source to which chapter NR 400 to 499 apply shall maintain the following records:

a. "Records detailing all malfunctions which cause any applicable emission limitation to be exceeded, including logs to document the implementation of the plan required by s. NR 439.11."

If an emission limitation is exceeded, General Duty Compliance Plan (GDCP) Forms (if applicable) are used to document the type of malfunction, description of the event, cause of the malfunction, and the steps taken to minimize emissions. Initial and formal reports documenting the events are submitted to the WDNR (see Section 5.0 for details).

All applicable reports and records must be kept for at least five years and maintained so that they can be readily accessed within 24 hours. Records are kept with the environmental department.

5.0 Reporting

Reports shall be submitted to the WDNR compliance engineer for the Refinery by electronic mail or uploaded through the WDNR Web Access Management System (WAMS). NR 439.03(10) requires each report to be certified by a responsible official as to its truth, accuracy and completeness.

A follow up report may also be submitted. Information regarding emission limit exceedances, malfunctions or permit deviations are also included in applicable quarterly, semi-annual, and annual reports.

5.1 Malfunction Reporting

NR 439.03(4)(a) requires a report to the WDNR the next business day following the onset, any malfunction or other unscheduled event at the source, not reported in advance to the department, which causes or may cause any emission limitation, including the visible emission limit, to be exceeded. The report to the WDNR shall include:

a. the cause and duration of the exceedance, and
b. the period of time considered necessary for correction, and measures taken to minimize emissions during the period.

If a CEMS or monitoring device is required to be operated, NR 439.03(5) requires a report to the WDNR by the next business day following the onset of any shutdown, breakdown, or malfunction of the CEMS or monitoring device which is anticipated to continue in excess of one week.

5.2 Permit Deviation Reporting

NR 439.03(4)(c) requires a report to the WDNR by the next business day for any deviation from permit requirements. The report to the Department shall include:

a. the probable cause of the deviation, and
b. any corrective actions or preventive measures taken or which will be taken to prevent future deviations.

5.3 Air Pollution Control Equipment Downtime Reporting

NR 439.03(6) requires advance reporting to the WDNR of schedules for planned shutdown and startup of air pollution control equipment and the measures to be taken to minimize the downtime of the control equipment while the source is operating. Scheduled maintenance or other scheduled events approved by the WDNR which cause an emission limitation to be exceeded shall also be reported in advance to the WDNR. Advance reporting does not relieve SRC from the duty to comply with any applicable emission limitation.

6.0 Changes to the MPAP

This MPAP must be updated at least once every five years or as necessary to satisfy the regulation and to reflect changes in equipment or procedures. NR 439 requires preparation of MPAPs but provides discretion to the WDNR regarding submittal by the source and review and approval by the WDNR. WDNR compliance staff should verify that sources prepare and update MPAPs as required under NR 439.11(1) as part of full compliance evaluations or inspections.

SRC will submit the revised plan as required by an applicable permit(s) or at the request of the WDNR. WDNR approval is not required before implementation of the changes. The WDNR may order SRC to submit the plan for review and approval at any time. The WDNR may amend the plan if deemed necessary for malfunction prevention or reducing excess emissions during malfunctions. Submittal of an MPAP for WDNR review and approval is always required when an update of the MPAP is part of the resolution of a Letter of Noncompliance (LON) or Notice of Violation (NOV).

Appendix A

Sulfur Plant Emission Limits

Sulfur Plant Emission Limits

Source ID	Pollutant	Limit	Regulatory Reference	Averaging Period	Monitoring Parameter	Method of Compliance	Permit #
S14/P20 – SRU, TGTU and Tail Gas Combustor (i.e., the Incinerator) (NSPS Ja)	Sulfur Dioxide	250 ppmvd @ 0% O_2 (at all sulfur input levels and all emission points, excluding periods of startup)	NR 405.08(3), 407.09(2)(d), 440.26, Wis. Adm. Code	12-hour rolling	SO_2	CEMS, General permit requirements[1]	816009590-P01
		150 ppmvd @ 0% O_2 (when sulfur input to the SRU is equal to or exceeds 0.250 long tons in any hour, excluding any hours in which the feed rate to the SRU is zero)		24-hour rolling			
		Whenever sulfur input to the SRU is less than 0.250 long tons of sulfur averaged in any hour, whichever is lower: 318 ppmvd @ 0% O_2 OR The value calculated using the following equation: $E_{BACT} = [k_1 \times (-0.038 \times (\%O_2)^2 + 11.53 \times \%O_2 + 25.6)]$ Where E_{BACT} = Emission limit in ppmvd and corrected to 0% O_2, averaged over any 24-hour period $K_1 = 1.0$ $\%O_2 = O_2$ 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 $\%O_2$. (when sulfur input to the SRU is less than 0.250 long tons of sulfur in any hour, excluding periods of planned startup and any hours in which the feed rate to the SRU is zero)	405.08, Wis. Adm. Code	12-hour rolling			16-RAB-184
		When sulfur input to the SRU is equal to or exceeds 0.250 long tons of sulfur averaged in any hour, whichever is lower: 218 ppmvd @ 0% O_2 OR The value calculated using the following equation: $E_{BACT} = [k_1 \times (-0.038 \times (\%O_2)^2 + 11.53 \times \%O_2 + 25.6)] - 100$ Where E_{BACT} = Emission limit in ppmvd and corrected to 0% O_2, averaged over any 24-hour period $K_1 = 1.0$ $\%O_2 = O_2$ 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 $\%O_2$. (when sulfur input to the SRU is equal to or exceeds 0.250 long tons of sulfur in any hour, excluding periods of planned startup and any hours in which the feed rate to the SRU is zero)		24-hour rolling			
		2,664 lbs per "meltout" during planned shutdown		N/A	SO_2		
		2,628 lbs per "burnout" during planned shutdown					
		1,659 lbs during a planned startup					
		6,743 lbs from Claus SRU	417.07(2)(g), Wis. Adm. Code	24-hour rolling			
		843 lbs from Claus SRU		3-hour rolling			
		$E_{LS} = k_1 \times (-0.038 \times (\%O_2)^2 + 11.53 \times \%O_2 + 25.6)$ Where: E_{LS} = Emission limit for large sulfur recovery plant, ppmv (as SO_2, dry basis at zero percent excess air) $K_1 = 1.0$ $\%O_2 = O_2$ 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 O_2 concentration of the air/oxygen mixture used in the Claus burner or for non-Claus sulfur recovery plants, use 20.9% for $\%O_2$.	285.65(7) & (13), Wis. Stats.; 40 CFR §60.102a(f)(1)(i) and §63.1568(a)	N/A			
		40 long tons per day sulfur input	405.08, Wis. Adm. Code	Calendar day	Acid gas feed and other sources of sulfur		
		240 hours per year allowed for sulfur pit maintenance	405.08, Wis. Adm. Code; s. 285.65(2) and (3), Wis. Stats.	Calendar Year	Hours of sulfur pit maintenance		

Source ID	Pollutant	Limit	Regulatory Reference	Averaging Period	Monitoring Parameter	Method of Compliance	Permit #
S14/P20 – SRU, TGTU and Tail Gas Combustor (i.e., the Incinerator) (NSPS Ja)	Temperature and Oxygen	Whenever gases are vented to the TGTU, the tail gas combustion device must be operated at a minimum temperature of 1180°F with a minimum of 2.0% oxygen in the exhaust stream.	405.08, Wis. Adm. Code	3-hour period	Temperature and Oxygen	CMS, CEMS, General permit requirements[1]	16-RAB-184
		At no time may the temperature be less than 1100°F or contain less than 0.5% oxygen.		15-minute period			
	Visible Emissions	10% opacity	405.08, Wis. Adm. Code	6-minute	Opacity	General permit requirements[1]	16-RAB-184
		20% opacity (or number 1 on the Ringlemann chart)	NR 431.05, 407.09(2)(d), Wis. Adm. Code	N/A			816009590-P01
	Nitrogen Oxide	0.05 lbs/MMBTU heat input	405.08 Wis. Adm. Code	N/A	NO_X	General permit requirements[1]	16-RAB-184
	Carbon Monoxide	2.75 lbs/hr[2]	405.08 Wis. Adm. Code	1-hour rolling	CO	General permit requirements[1]	16-RAB-184
		0.6 lbs/hr	405.08, 407.09(2)(d), Wis. Adm. Code				816009590-P01
	Particulate Matter	1.06 lbs/hr[2] (total PM, PM_{10} or $PM_{2.5}$ emissions, filterable and condensable combined)	405.08 Wis. Adm. Code	1-hour rolling	PM	General permit requirements[1]	16-RAB-184
		0.15 lbs/MMBTU heat input	415.06(2)(a), Wis. Adm. Code	N/A			
		0.5 lbs/hr	405.08(2), 407.09(2)(d), Wis. Adm. Code	1-hour rolling			816009590-P01
	Hydrogen Sulfide	10 ppm @ 3% O_2	405.08, Wis. Adm. Code	N/A	H_2S	General permit requirements[1]	16-RAB-184
	Volatile Organic Compounds	BACT is to comply with the CO BACT	405.08, Wis. Adm. Code	N/A	CO	CEMS; General permit requirements**Error! Bookmark not defined.**	16-RAB-184
	Greenhouse Gases	BACT is to comply with the SO_2 BACT	405.08, Wis. Adm. Code	N/A	SO_2	CEMS; General permit requirements[1]	16-RAB-184

[1] General permit requirements may include stack testing, stack/burner requirements, or fuel restrictions when required or as applicable.
[2] Prior to the determination of final BACT as described in construction permit 16-RAB-184.

Appendix I -

Inlet Cyclone Velocity Data

	Start Time	Regen Cylone Inlet Velocity ft/s
08/03/2023	7:00	57.1
	8:00	72.1
	9:00	79.7
	10:00	84.4
	11:00	82.5
	12:00	82.9
	13:00	83.9
	14:00	66.2
	15:00	65.8
	16:00	58.6
	17:00	61.7
	18:00	61.0
	19:00	60.7
	20:00	60.2
	21:00	61.7
	22:00	64.2
	23:00	58.6
08/04/2023	0:00	60.3
	1:00	58.4
	2:00	58.0
	3:00	62.6
	4:00	62.3
	5:00	64.5
	6:00	57.5
	7:00	59.6
	8:00	63.3
	9:00	63.5
	10:00	59.4
	11:00	64.9
	12:00	64.9
	13:00	66.0
	14:00	67.5
	15:00	66.1
	16:00	71.8
	17:00	66.6
	18:00	59.8
	19:00	63.3
	20:00	61.7
	21:00	59.6
	22:00	61.6
	23:00	62.1
08/05/2023	0:00	63.4

	1:00	63.6
	2:00	62.5
	3:00	62.4
	4:00	60.2
	5:00	61.0
	6:00	59.4
	7:00	60.4
	8:00	62.1
	9:00	62.2
	10:00	65.5
	11:00	63.6
	12:00	63.2
	13:00	62.2
	14:00	61.4
	15:00	58.9
	16:00	59.6
	17:00	60.9
	18:00	60.9
	19:00	60.7
	20:00	60.7
	21:00	62.8
	22:00	62.9
	23:00	61.6
08/06/2023	0:00	62.0
	1:00	62.0
	2:00	61.7
	3:00	63.2
	4:00	64.0
	5:00	60.4
	6:00	59.1
	7:00	55.7
	8:00	52.8
	9:00	55.5
	10:00	59.8
	11:00	61.9
	12:00	65.2
	13:00	68.0
	14:00	62.4
	15:00	60.3
	16:00	60.0
	17:00	59.8
	18:00	59.6
	19:00	60.2
	20:00	60.1
	21:00	60.2
	22:00	59.5
	23:00	60.1

08/07/2023	0:00	56.6
	1:00	56.3
	2:00	58.4
	3:00	58.2
	4:00	57.2
	5:00	58.4
	6:00	56.8
	7:00	55.8
	8:00	56.2
	9:00	55.9
	10:00	57.1
	11:00	56.8
	12:00	57.9
	13:00	57.0
	14:00	57.4
	15:00	56.7
	16:00	54.5
	17:00	54.7
	18:00	55.4
	19:00	56.0
	20:00	56.0
	21:00	55.6
	22:00	56.2
	23:00	55.2
08/08/2023	0:00	54.8
	1:00	55.9
	2:00	55.0
	3:00	53.8
	4:00	55.3
	5:00	54.2
	6:00	52.8
	7:00	51.7
	8:00	49.4
	9:00	47.0
	10:00	49.9
	11:00	53.3
	12:00	55.2
	13:00	56.7
	14:00	56.1
	15:00	58.5
	16:00	58.8
	17:00	60.6
	18:00	62.9
	19:00	63.6
	20:00	63.5
	21:00	64.0
	22:00	64.9

	23:00	64.1
08/09/2023	0:00	64.1
	1:00	65.7
	2:00	64.5
	3:00	65.2
	4:00	66.5
	5:00	65.2
	6:00	61.3
	7:00	60.4
	8:00	60.1
	9:00	60.4
	10:00	60.9
	11:00	61.1
	12:00	62.9
	13:00	64.1
	14:00	63.6
	15:00	61.2
	16:00	59.4
	17:00	59.5
	18:00	60.6
	19:00	60.5
	20:00	56.1
	21:00	58.8
	22:00	64.0
	23:00	64.3
08/10/2023	0:00	63.3
	1:00	65.0
	2:00	65.4
	3:00	64.7
	4:00	63.8
	5:00	65.1
	6:00	65.0
	7:00	64.0
	8:00	63.5
	9:00	63.6
	10:00	64.2
	11:00	68.4
	12:00	68.9
	13:00	69.0
	14:00	66.8
	15:00	64.2
	16:00	63.0
	17:00	64.3
	18:00	62.8
	19:00	63.7
	20:00	61.6
	21:00	62.9

	22:00	64.6
	23:00	65.0
08/11/2023	0:00	62.8
	1:00	59.8
	2:00	60.5
	3:00	55.5
	4:00	52.5
	5:00	55.9
	6:00	56.3
	7:00	57.0
	8:00	57.5
	9:00	57.9
	10:00	59.1
	11:00	58.6
	12:00	56.9
	13:00	58.7
	14:00	59.0
	15:00	58.2
	16:00	57.6
	17:00	56.2
	18:00	55.3
	19:00	54.6
	20:00	54.5
	21:00	55.0
	22:00	55.7
	23:00	56.2
08/12/2023	0:00	56.6
	1:00	57.6
	2:00	57.3
	3:00	58.0
	4:00	58.3
	5:00	57.0
	6:00	56.7
	7:00	56.9
	8:00	57.0
	9:00	57.4
	10:00	57.4
	11:00	57.2
	12:00	56.8
	13:00	56.6
	14:00	58.8
	15:00	56.9
	16:00	56.9
	17:00	56.8
	18:00	57.0
	19:00	56.3
	20:00	55.4

	21:00	55.7
	22:00	55.8
	23:00	55.5
08/13/2023	0:00	55.6
	1:00	55.5
	2:00	55.4
	3:00	55.4
	4:00	55.5
	5:00	55.5
	6:00	55.5
	7:00	55.6
	8:00	55.7
	9:00	55.5
	10:00	55.5
	11:00	55.4
	12:00	55.7
	13:00	55.9
	14:00	56.1
	15:00	56.0
	16:00	56.5
	17:00	56.8
	18:00	56.9
	19:00	56.8
	20:00	57.0
	21:00	56.7
	22:00	56.8
	23:00	56.8
08/14/2023	0:00	56.6
	1:00	56.5
	2:00	56.5
	3:00	56.4
	4:00	56.4
	5:00	56.4
	6:00	56.3
	7:00	56.3
	8:00	56.4
	9:00	56.4
	10:00	56.4
	11:00	56.1
	12:00	56.0
	13:00	56.0
	14:00	55.9
	15:00	55.7
	16:00	55.3
	17:00	55.0
	18:00	54.8
	19:00	54.7

	20:00	54.5
	21:00	54.4
	22:00	54.7
	23:00	54.2
08/15/2023	0:00	53.9
	1:00	53.5
	2:00	53.2
	3:00	53.2
	4:00	53.1
	5:00	53.0
	6:00	53.0
	7:00	53.2
	8:00	53.3
	9:00	53.2
	10:00	53.4
	11:00	53.5
	12:00	53.5
	13:00	53.6
	14:00	53.7
	15:00	53.7
	16:00	53.8
	17:00	53.8
	18:00	53.8
	19:00	53.7
	20:00	53.7
	21:00	53.7
	22:00	53.6
	23:00	53.5
08/16/2023	0:00	53.5
	1:00	53.5
	2:00	53.6
	3:00	53.5
	4:00	53.5
	5:00	53.5
	6:00	53.4
	7:00	53.6
	8:00	53.6
	9:00	53.5
	10:00	53.5
	11:00	53.4
	12:00	53.3
	13:00	53.4
	14:00	53.4
	15:00	53.6
	16:00	53.7
	17:00	53.5
	18:00	53.1

	19:00	52.8
	20:00	52.9
	21:00	53.2
	22:00	53.3
	23:00	53.3
08/17/2023	0:00	53.4
	1:00	53.0
	2:00	52.7
	3:00	52.8
	4:00	52.5
	5:00	52.3
	6:00	52.2
	7:00	52.0
	8:00	51.9
	9:00	52.3
	10:00	52.2
	11:00	51.1
	12:00	54.7
	13:00	49.6
	14:00	48.5
	15:00	42.5
	16:00	47.7
	17:00	48.1
	18:00	48.2
	19:00	53.6
	20:00	54.8
	21:00	55.2
	22:00	55.5
	23:00	55.0
08/18/2023	0:00	55.3
	1:00	55.6
	2:00	55.5
	3:00	55.7
	4:00	55.6
	5:00	55.6
	6:00	55.7
	7:00	55.6
	8:00	55.6
	9:00	55.6
	10:00	56.1
	11:00	59.7
	12:00	60.1
	13:00	59.3
	14:00	57.5
	15:00	56.7
	16:00	56.5
	17:00	56.8

	18:00	56.8
	19:00	56.6
	20:00	56.5
	21:00	56.1
	22:00	56.0
	23:00	56.1
08/19/2023	0:00	56.1
	1:00	56.3
	2:00	56.4
	3:00	56.1
	4:00	55.5
	5:00	55.2
	6:00	55.1
	7:00	55.1
	8:00	55.0
	9:00	54.9
	10:00	55.6
	11:00	55.8
	12:00	56.0
	13:00	56.5
	14:00	57.3
	15:00	56.8
	16:00	57.6
	17:00	57.6
	18:00	59.1
	19:00	60.3
	20:00	58.2
	21:00	51.8
	22:00	52.6
	23:00	54.3
08/20/2023	0:00	55.2
	1:00	56.6
	2:00	58.4
	3:00	57.4
	4:00	57.0
	5:00	55.5
	6:00	57.1
	7:00	57.5
	8:00	58.3
	9:00	58.8
	10:00	59.5
	11:00	59.5
	12:00	59.3
	13:00	59.2
	14:00	60.6
	15:00	61.8
	16:00	64.0

	17:00	65.6
	18:00	62.4
	19:00	59.6
	20:00	64.6
	21:00	68.8
	22:00	64.1
	23:00	61.3

Appendix J -

8/7/2023 Next Business Day Notification FCCU Startup Event

Clear Data | Print... | Save...

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.: 19-RAB-057: I.M.3.a.1.a, I.M.3.a.2.a.: 20% opacity 19-RAB-057: I.M.4.a.1.b., I.M.4.a.2.b., I.M.4.a.3.a. – 500ppmdv CO	Permit Process No./Unit Description: Process No. P31 - FLUID CATALYTIC CRACKING UNIT (FCCU)

Start/Stop Time(s) of Deviation/Malfunction/Unscheduled Event:
Start Time: 00:00 August 5, 2023
Stop Time: Ongoing

Cause(s) of Deviation/Malfunction/Unscheduled Event: Initial startup of the FCCU.
Startup of the FCCU began at 07:00 on 8/3/2023 when torch oil was introduced to the FCCU Regenerator to start heating up the structure. By definition, startup of the FCCU ended at 23:00 on 8/4/2023, forty hours after the introduction of torch oil. Nonetheless, startup efforts have continued in order for the FCCU to achieve catalyst circulation, introduction of raw oil charge, and stable operation as quickly as safely possible, which have resulted in many 6-minute periods of greater than 20% opacity and a few one-hour periods of greater than 500ppmdv CO emissions. The refinery has implemented good air pollution control practices to minimize visible emissions and CO emissions by maintaining inlet velocity to the primary internal cyclones of the catalyst regenerator at or above 20 ft/s on an hourly average basis and maintaining an oxygen (O2) content in the exhaust gas from the catalyst regenerator of at least 1 volume percent, which are permitted alternative compliance methods for visible emissions and CO emissions during startup.

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):
The refinery continues to maintained inlet velocity to the primary internal cyclones of the catalyst regenerator at or above 20 ft/s on an hourly average basis and oxygen (O2) content in the exhaust gas from the catalyst regenerator of at least 1 volume percent. Subject matter experts are at site to help ensure the FCCU safely achieves stable operation.

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):
Startup efforts continue to achieve catalyst circulation and introduction of raw oil charge. Opacity greater than 20% will continue at times through startup until the ESP can be safely turned on. Additional CO exceedances could be possible as well while the startup process continues.

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: SRC Environmental Department

Signature of Responsible Official	GM Refining	Date

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.

Appendix K -

Exhaust Gas O2 Data

		Stack O2
	Start Time	% O2
08/03/2023	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/04/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/05/2023	0:00	10.6

Instrument high span is 10% Stack O2; when out of range, 10.6% Stack O2 used as a conservative assumption.

	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/06/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6

08/07/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/08/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6

	23:00	10.6
08/09/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/10/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6

	22:00	10.6
	23:00	10.6
08/11/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/12/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6

	21:00	10.6
	22:00	10.6
	23:00	10.6
08/13/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/14/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6

	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/15/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.5
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/16/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6

	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/17/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/18/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6

	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/19/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.6
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6
	17:00	10.6
	18:00	10.6
	19:00	10.6
	20:00	10.6
	21:00	10.6
	22:00	10.6
	23:00	10.6
08/20/2023	0:00	10.6
	1:00	10.6
	2:00	10.6
	3:00	10.6
	4:00	10.6
	5:00	10.6
	6:00	10.6
	7:00	10.6
	8:00	10.0
	9:00	10.6
	10:00	10.6
	11:00	10.6
	12:00	10.6
	13:00	10.6
	14:00	10.6
	15:00	10.6
	16:00	10.6

	17:00	10.6
	18:00	10.6
	19:00	9.1
	20:00	9.2
	21:00	10.6
	22:00	10.6
	23:00	10.6

Appendix L -

4/1/2023 Flare Caustic Scrubber H_2S Deviation Report

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:	3Z679
Document Description:	Deviation Notification
File Name:	DEVIATION-MALFUNCTION_NOTIFICATION_I10_04032023_816009590.pdf
File Size [KB]:	61
Wisconsin User ID (WAMS):	Mgunn42
User Name:	Matthew B Gunn
User Verified Status:	
Temporary PIN Sent To:	matt.gunn@cenovus.com
Signature ID:	3Z64H
Signature Date/Time:	5/19/2023 2:44:29 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:	96FAFCA0DAB124C1CCD2E97DA67FD36463E0B9CC126031B5541533A2C670D6AD911A630F10AE08A344C8379F48C1CA6B53F5F4DC02F7940EA287F8C9E8DFD33D		
Public Key Value:	0602000000A400005253413100080000010001000C95ED49A8B3E5D02FB40B6164E8F77E9C303A9F1517611DE30A763C7DB044A3DC4197DF24FEC1B97DB67AA706301F11DCB530BC41123554E9912E947D534C247977109D74D9B08B5E2C38FFB42FE9AE0E87682A0064C1F81338948295AA5CF06B162E65A2BA05FBE8627D617871663722616E9AC84D7235E8186AE0FC4FBCDC3313DF862CCE1ACBE52F9CC0845EEFF4B37121D44029712133290439BAB03820C9F769801A4B18F2388AA5B7A0B26D12C782D7EA6DCBA991F0F177A79DFCEA9F55F5454758761269D3F80F9AFD26318E4420C99531D0DE2207B70747A7A24E2D8238F08BCE9A39D13DC4EEAE4AA2916EBBFFD3942491C6DA0008B91BA0ED98EAE		
Document Hash Value:	0A2DE90FB30A1D46B07C4F4A95D4BC762B1A9168E4F14D00BFD6E1E55B20CA96186EB70C0DF96BAF1CF86BFA8822C915193C06DE325FA870FDB673F06A824858		
Document Signature Value:	3B10982B12B1B9D28EF0CB38D8ADA97EA9C610DD1C97BAB92635DCDB27005A91B6F75EB37AC74ACB2012F912C79762FB74230CCCCED2BC6408F58E66571A6EAE4BCE34AF514D8924A46659960E0BDAA6ED40F14A5544247BC3BB1747B6452BE6522828D58E93AB0DF124D871C5C9CB5A9F171FD12C9ED36F8E8D65BC4DC5BB20DDF2651A492F7AD8C51DBEADDB45C0049D8212C3574A7FAA4F7BCD3C0BD5E58682CE22C44B03197DE2BBE677AB096C292B83B57422926817264A1E89D00C8C655ECA1DDBC0D53ED83A0AFD9B85ED3AEFA9B10C395632435B3E33744BB490B2895A2506924CBECF9EF1AC42953F3336B625498E8DA159B390D3D18622C7684D2C		

Beattie, David

From: Beattie, David
Sent: Thursday, April 6, 2023 2:43 PM
To: Michalee Leuthard (michalee.leuthard@wisconsin.gov)
Cc: Lovely, Ross
Subject: 4/1/2023 Flare H2S Exceedance
Attachments: 2023.04.01 Flare Gas H2S Exceedance Event Report.pdf

Michalee-

Attached is the follow-up report for the flare H2S exceedance that occurred on 4/1/2023.
This was initially reported to the WDNR on 4/3/2023 (next business day) through the WAMS system.

Lots of parts and pieces on the emission spreadsheet so happy to discuss if you'd like.

Thanks,
Dave

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

Superior Refining Company LLC

Event Information for:

Start Date:	4/1/2023
Start Time (24-hr time):	2:20
End Date:	4/1/2023
End Time (24-hr time):	9:05
Duration(hours):	6.75
Description:	Flare Caustic Scrubber Exit Gas Exceedance
Cause:	Caustic for the Flare Gas Scrubber became spent.
Action(s):	Operators switched to the fresh caustic tank which increased the ability to scrub H2S from the flare gas and brought the H2S readings back into compliance.
Comments:	Added indication of the H2S readings to additional screens in the distributed control system to make it easier for operators to monitor the value. Discussed the limitation, monitoring, and corrective actions with operators to increase awareness and what can be done to limit an exceedance.

Reporting Information:

Date	Time	Agency	Agency Contact	Caller
4/3/2023	16:19	Wisconsin Department of Natural Resources (WDNR)	WAMS Submittal	Matthew Turner

Source ID: Facility-wide, Total Facility Applicable Requirements

Date: 4/1/2023 **Duration (hr): 9.00** **Excess Emissions (lbs): 0.7**

Air Pollutant	Applicable Document	Description
Hydrogen sulfide	2010 Consent Decree [V.I.49.c.]	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)

Source ID: I10, Blowdown (Refinery) Primary Flare

Date: 4/1/2023 **Duration (hr): 9.00** **Excess Emissions (lbs): 0.7**

Air Pollutant	Applicable Document	Description
Sulfur Dioxide	12-DCF-256 [I.A.1.a.(1)]	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)
Hydrogen Sulfide	12-DCF-256 [I.Aa.1.a.(1)]	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)

Source ID: I10, Blowdown (Refinery) Primary Flare

Date: 4/1/2023 **Duration (hr): 9.00** **Excess Emissions (lbs): 0.7**

Air Pollutant	Applicable Document	Description
Hydrogen sulfide	40 CFR Part 60 - Subpart Ja [60.103a(h)]	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)

Superior Refining Company LLC

Facility-wide

Date: 4/1/2023 **Excess emissions associated with the following conditions (lbs): 0.7**

Pollutant	Limitation	Applicable Conditions	Comment
Hydrogen sulfide	2010 Consent Decree V.I.49.c.	If prior to the termination of this Consent Decree, a Flaring Device becomes subject to NSPS Subpart Ja for a particular pollutant due to a “modification” (as that term is defined in the final Subpart Ja rule), the modified affected facility shall be subject to and comply with NSPS Subpart Ja, in lieu of NSPS Subpart J, for that regulated pollutant to which a standard applies as a result of the modification.	The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for three(3) 3-hr RA periods during the timeframe of 01:00 to 10:00 on 4/1/2023 (H2S exceeded 162ppmd from 02:20 to 09:05). Total excess emissions from the GCD deviation were 0.7 lbs of SO2 (100% destruction efficiency). See attached "4/1/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

Superior Refining Company LLC

I10

Date: 4/1/2023 **Excess emissions associated with the following conditions (lbs): 0.7**

Pollutant	Limitation	Applicable Conditions	Comment
Hydrogen Sulfide	12-DCF-256 I.Aa.1.a.(1)	The hydrogen sulfide content of the gas exiting the caustic scrubber may not exceed 162 ppmv, based on a 3 hour rolling average basis. See I.A.1.a.(2).	The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for three(3) 3-hr RA periods during the timeframe of 01:00 to 10:00 on 4/1/2023 (H2S exceeded 162ppmd from 02:20 to 09:05). Total excess emissions from the Title V/Construction Permit deviation were 0.7 lbs of SO2 and 0.0 lbs of H2S (98% destruction efficiency). See attached "4/1/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.
Sulfur Dioxide	12-DCF-256 I.A.1.a.(1)	Each owner or operator shall not burn in any affected flare any fuel gas that contains H2S in excess of 162 ppmv determined hourly on a 3-hour rolling average basis. The combustion in a flare of process upset gases or fuel gas that is released to the flare as a result of relief valve leakage or other emergency malfunctions is exempt from this limit.	The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for three(3) 3-hr RA periods during the timeframe of 01:00 to 10:00 on 4/1/2023 (H2S exceeded 162ppmd from 02:20 to 09:05). Total excess emissions from the Title V/Construction Permit deviation were 0.7 lbs of SO2 and 0.0 lbs of H2S (98% destruction efficiency). See attached "4/1/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

I10

Date: 4/1/2023 **Excess emissions associated with the following conditions (lbs): 0.7**

Pollutant	Limitation	Applicable Conditions	Comment
Hydrogen sulfide	40 CFR Part 60 - Subpart Ja 60.103a(h)	Each owner or operator shall not burn in any affected flare any fuel gas that contains H2S in excess of 162 ppmv determined hourly on a 3-hour rolling average basis. The combustion in a flare of process upset gases or fuel gas that is released to the	The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for three(3) 3-hr RA periods during the timeframe of 01:00 to 10:00 on 4/1/2023 (H2S exceeded 162ppmd from 02:20 to 09:05). Total excess emissions from the NSPS Subpart Ja deviation were 0.7 lbs of SO2 and 0.0 lbs of H2S (99% destruction efficiency). See attached "4/1/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

4/1/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2, and Flow Data

					98% Destruction Efficiency						99% Destruction Efficiency						100% Destruction Efficiency					98% Destruction Efficiency					Title V / Construction Permit				40 CFR 60 Subpart Ja		2010 GCD		40 CFR 60 Subpart Ja		
				Limit																		Limit					98% Destruction Efficiency				99% Destruction Efficiency		100% Destruction Efficiency		Flow		
		Refinery PI or DAHS Data		>162 ppmd H2S 3 hr RA	Title V Permit / Construction Permit 162 ppm H2S 3 hr Rolling Average						NSPS Subpart Ja 162 ppm H2S 3 hr Rolling Average						GCD 162 ppm H2S 3 hr Rolling Average					39.3 lbs SO2 / hr 12 hr RA	Title V Permit 39.3 lbs SO2 / hr 12hr RA				SO2 EPCRA > 500 lbs		H2S EPCRA / CERCLA > 100 lbs		Requires Root Cause if Equal to or Greater than 500 lbs total SO2		Requires Root Cause if Equal to or Greater than 500 lbs total SO2		Requires Root Cause if 500,000 scf above Baseline (86,760scf)		
Date	Start Time	Flare Flow 1-hr Avg SCFM	Flare H2S 1-hr Avg ppmd	Flare TRS 1-hr Avg ppmd	Flare H2S 3-hr RA ppmd	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	Hourly Emissions lbs H2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H2S	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	Hourly Emissions lbs H2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H2S	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	162 ppm 3hr RA Excess Emissions 3-hr Sum lbs SO2	lbs SO2 / hr 12 hr RA lbs SO2 / hr	Actual Title V lbs SO2 / hr	Allowable Title V lbs SO2 / hr	Excess Title V lbs SO2 / hr	Excess Title V 12 hr rolling sum (98% Dest Eff) lbs SO2	Excess SO2 Emissions (>162 ppm 98%) lbs SO2	Excess Emissions (>162 ppm 98%) Previous 24hr Rolling Sum lbs SO2	lbs H2S	Emissions Previous 24hr Rolling Sum lbs H2S	Ja lbs SO2 / hr	Ja 24 hr rolling sum total lbs SO2 (99% Dest Eff) lbs SO2	GCD lbs SO2 / hr	GCD 24 hr rolling sum total lbs SO2 (100% Dest Eff) lbs SO2	Ja total flow scf / hr	Ja 24 hr rolling sum excess flow scf	Comments
3/31/2023	19:00	112	23	1137	17	0.0	0.2	-0.2	0.0			0.0	0.2	-0.2	0.0			0.0	0.2	-0.2		0.9	1.3	39.3	-38.0	-461.0	-0.2	-8.4	0.0	0.2	1.3	16.8	1.3	16.9	6720	108420	
	20:00	109	31	1277	24	0.0	0.2	-0.1	0.0			0.0	0.2	-0.1	0.0			0.0	0.2	-0.1		0.9	1.4	39.3	-37.9	-460.3	-0.1	-8.1	0.0	0.2	1.4	17.7	1.4	17.9	6540	100200	
	21:00	96	40	1378	31	0.0	0.2	-0.1	0.0			0.0	0.2	-0.1	0.0			0.0	0.2	-0.1		1.0	1.3	39.3	-38.0	-459.7	-0.1	-7.8	0.0	0.2	1.3	18.6	1.3	18.8	5760	91080	
	22:00	122	58	1462	43	0.1	0.2	-0.1	0.0			0.1	0.2	-0.1	0.0			0.1	0.2	-0.1		1.1	1.8	39.3	-37.5	-458.7	-0.1	-7.5	0.0	0.2	1.8	20.0	1.8	20.2	7320	83520	
	23:00	125	55	1229	51	0.1	0.2	-0.1	0.0			0.1	0.2	-0.1	0.0			0.1	0.2	-0.1		1.1	1.5	39.3	-37.8	-458.6	-0.1	-7.2	0.0	0.2	1.5	21.0	1.6	21.2	7500	76560	
4/1/2023	0:00	119	103	1499	72	0.1	0.2	-0.1	0.0			0.1	0.2	-0.1	0.0			0.1	0.2	-0.1		1.2	1.8	39.3	-37.5	-457.3	-0.1	-6.9	0.0	0.2	1.8	22.3	1.8	22.6	7140	69480	
	1:00	114	134	1536	97	0.2	0.2	0.0	0.0			0.2	0.2	0.0	0.0			0.2	0.2	0.0		1.2	1.7	39.3	-37.6	-456.6	0.0	-6.5	0.0	0.3	1.8	23.6	1.8	23.9	6840	62100	
	2:00	109	168	1528	135	0.2	0.2	0.0	0.0			0.2	0.2	0.0	0.0			0.2	0.2	0.0		1.3	1.7	39.3	-37.6	-455.7	1.5	-4.6	0.0	0.3	1.7	24.8	1.7	25.0	6540	54180	Flare H2S > 162ppmd at 02:20
	3:00	107	201	1537	168	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	1.4	1.6	39.3	-37.7	-454.8	1.5	-2.7	0.0	0.3	1.6	25.9	1.7	26.2	6420	46080	
	4:00	105	240	1540	203	0.2	0.2	0.1	0.0			0.3	0.2	0.1	0.0			0.3	0.2	0.1		1.5	1.6	39.3	-37.7	-454.0	1.4	-0.9	0.0	0.3	1.6	27.0	1.8	27.3	6300	37980	
	5:00	101	289	1546	243	0.3	0.2	0.1	0.0			0.3	0.2	0.1	0.0			0.3	0.2	0.1		1.5	1.6	39.3	-37.7	-453.3	1.4	0.9	0.0	0.3	1.6	28.0	1.6	28.3	6060	29820	
	6:00	99	385	1541	305	0.4	0.2	0.2	0.0	0.4	0.0	0.4	0.2	0.2	0.0	0.4	0.0	0.4	0.2	0.2	0.4	1.6	1.5	39.3	-37.8	-452.9	1.4	2.7	0.0	0.3	1.5	28.9	1.5	29.2	5940	21660	
	7:00	92	388	1551	354	0.4	0.1	0.2	0.0			0.4	0.1	0.2	0.0			0.4	0.2	0.2		1.6	1.4	39.3	-37.9	-452.7	1.3	4.4	0.0	0.3	1.4	29.7	1.4	30.0	5520	12900	H2S above analyzer range. Used 25% of each hour's TRS value as an estimate based on trend of previous hours.
	8:00	105	332	1328	368	0.3	0.2	0.2	0.0			0.3	0.2	0.2	0.0			0.4	0.2	0.2		1.6	1.4	39.3	-37.9	-452.7	1.2	6.0	0.0	0.3	1.4	30.5	1.4	30.8	6300	4680	H2S above analyzer range. Used 25% of each hour's TRS value as an estimate based on trend of previous hours
	9:00	124	96	484	272	0.1	0.2	-0.1	0.0			0.1	0.2	-0.1	0.0			0.1	0.2	-0.1	0.3	1.5	0.6	39.3	-38.7	-453.4	-0.1	6.3	0.0	0.3	0.6	30.3	0.8	30.6	7440	-2040	Flare caustic changed out ~09:50. Flare H2S < 162ppmd at 09:05
	10:00	139	67	425	165	0.1	0.2	-0.1	0.0			0.1	0.2	-0.1	0.0			0.1	0.2	-0.1		1.4	0.6	39.3	-38.7	-454.6	-0.1	6.6	0.0	0.3	0.6	30.2	0.6	30.5	8340	-7680	
	11:00	131	11	140	58	0.0	0.2	-0.2	0.0			0.0	0.2	-0.2	0.0			0.0	0.2	-0.2	58	1.3	0.2	39.3	-39.1	-456.0	-0.2	6.8	0.0	0.3	0.2	29.5	0.2	29.8	7860	-13980	
	12:00	121	1	72	26	0.0	0.2	-0.2	0.0			0.0	0.2	-0.2	0.0			0.0	0.2	-0.2		1.2	0.1	39.3	-39.2	-457.7	-0.2	7.0	0.0	0.3	0.1	28.5	0.1	28.8	7260	-21420	
	13:00	125	0	58	4	0.0	0.2	-0.2	0.0			0.0	0.2	-0.2	0.0			0.0	0.2	-0.2		1.0	0.1	39.3	-39.2	-459.3	-0.2	7.2	0.0	0.3	0.1	27.6	0.1	27.8	7500	-28380	
	14:00	101	0	53	0	0.0	0.2	-0.2	0.0			0.0	0.2	-0.2	0.0			0.0	0.2	-0.2		0.9	0.1	39.3	-39.2	-460.9	-0.2	7.2	0.0	0.3	0.1	26.8	0.1	27.1	6060	-31620	
	15:00	124	1	51	0	0.0	0.2	-0.2	0.0			0.0	0.2	-0.2	0.0			0.0	0.2	-0.2		0.8	0.1	39.3	-39.2	-462.5	-0.2	7.2	0.0	0.3	0.1	26.2	0.1	26.5	7440	-31380	
	16:00	121	0	49	0	0.0	0.2	-0.2	0.0			0.0	0.2	-0.2	0.0			0.0	0.2	-0.2		0.6	0.1	39.3	-39.2	-464.0	-0.2	7.2	0.0	0.3	0.1	25.5	0.1	25.7	7260	-30900	
	17:00	116	0	47	0	0.0	0.2	-0.2	0.0			0.0	0.2	-0.2	0.0			0.0	0.2	-0.2		0.5	0.1	39.3	-39.2	-465.5	-0.2	7.2	0.0	0.3	0.1	24.6	0.1	24.9	6960	-30660	
	18:00	103	0	42	0	0.0	0.2	-0.2	0.0			0.0	0.2	-0.2	0.0			0.0	0.2	-0.2		0.4	0.0	39.3	-39.3	-467.0	-0.2	7.2	0.0	0.3	0.0	23.6	0.0	23.8	6180	-31200	
	19:00	110	0	44	0	0.0	0.2	-0.2	0.0			0.0	0.2	-0.2	0.0			0.0	0.2	-0.2		0.3	0.0	39.3	-39.3	-468.4	-0.2	7.2	0.0	0.2	0.0	22.3	0.0	22.6	6600	-31320	
						Total Excess Emissions - Title V Permit / Construction Permit				lbs SO2 0.7	lbs H2S 0.0	Total Excess Emissions - NSPS Subpart Ja				lbs SO2 0.7	lbs H2S 0.0	Total Excess Emissions - GCD			lbs SO2 0.7		Total Excess Emissions - Title V				lbs SO2 N/A				SO2 N/A			H2S N/A				

Emissions from flare during the hours in which Acid Gas flaring occurred	N/A lbs SO2		N/A lbs H2S

$$Title\ V\ lbs\ SO2 = Duration(mins) x\ flow(scfm) x \frac{(ppm) scf\ H2S}{1{,}000{,}000\ scf\ FG} x \frac{1\ lb\ mole}{379\ scf} x \frac{64\ lb\ SO2}{lb\ mole\ H2S} \times 0.98\ Flare\ Destruction\ Efficiency$$

$$NSPS\ Ja\ lbs\ SO2 = Duration(mins) x\ flow(scfm) x \frac{(ppm) scf\ H2S}{1{,}000{,}000\ scf\ FG} x \frac{1\ lb\ mole}{379\ scf} x \frac{64\ lb\ SO2}{lb\ mole\ H2S} \times 0.99\ Flare\ Destruction\ Efficiency$$

From: DNRAMCOMPLIANCEEXTERNALSUBMISSION@Wisconsin.gov
To: Turner, Matthew
Cc: michalee.leuthard@wisconsin.gov; Perkins, Dean S.
Subject: Deviation Notification Received. Superior Refining Company LLC
Date: Monday, April 3, 2023 4:19:01 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_I10_04032023_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 **

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

Air Permit Next Business Day Reporting

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 Process No./Unit Description:**
Permit No. 12-DCF-256 I.A.1.a.(1) & I.Aa.1.a.(1) 162ppm H2S 3hr Rolling Average	Process No. I10 Refinery Flare

Start/Stop Time(s) of Deviation/Malfunction/Unscheduled Event:
Start: 1am on April 1, 2023
Stop: 10am on April 1, 2023

Cause(s) of Deviation/Malfunction/Unscheduled Event:
Caustic at the flare gas scrubber became spent prior to SRC flare operators being able to switch to a fresh caustic tank.

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):
SRC flare operators changed the spent caustic for fresh caustic.

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 estimates of excess emissions are:
0.7lbs SO2
0.0lbs H2S

A follow-up event report will be provided upon completion of a deviation investigation. SRC's responsible corporate official (Dean Perkins) was not available to sign this form on the required submittal date. SRC is submitting this form unsigned to meet the reporting deadline. SRC will have this form signed by Dean Perkins when he becomes available.

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: SRC Environmental Department - 2023.04.03

Signature of Responsible Official	Title	Date

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.

Appendix M -

8/18/2023 Flare H_2S Exceedance Report

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:	44WYX
Document Description:	Deviation Notification
File Name:	DEVIATION-MALFUNCTION_NOTIFICATION_I10_08212023_816009590.pdf
File Size [KB]:	135
Wisconsin User ID (WAMS):	Mgunn42
User Name:	Matthew B Gunn
User Verified Status:	
Temporary PIN Sent To:	matt.gunn@cenovus.com
Signature ID:	44WW5
Signature Date/Time:	9/13/2023 4:26:47 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:	47.225.237.11	Public Key Type: RSA-2048	Hash Type: SHA-512
Temporary PIN Hash Value:	FA882053FEE2C33C6083BBD6FCAF7AB0BB1FA916EB1AE7785676188626AD7DCCAC39D03ED88F2804A25F803822B01ED2187DA8166713E9BB721326E5A31E4448		
Public Key Value:	0602000000A400005253413100080000010001005D4B9A07AA91FD7E56917AEB554467F47B350D66F54802F8FCD390763987A195D446E82F6EAD1732A85085AF408C79E0275CD68F8690F1AF05E56DB880080D7F44E9F71375F6E1AE6E4A597115AF5FCB4F0E659CF3D238D0C04F1B0C9E8863959823D8A47AF0F328CA2C59910A5E8C3BD8D725EC3CDA14C674364DDC2EA3C0C1F53C88E3E8A8AF8DC9DD5EAAF1C73F24DC40DFE407E0D66A091FB4C6E92E960DB6279D189F77027A330069B6C202159B01B41FC2444B58383E3780EBAA1734D262952E4AA76A7DCC731245EE6DC1488A3424207DF669EBDA1FFD633CA8FC0DCD38449C4D09EA2C039D2DA81E085909A83291962B98191C43C7DD0B2880BB85F4		
Document Hash Value:	A55F300E22C6359E9C0D6DE893C4FD9C93D337DEAEC3E17FEFBA3B1987400A97D36404CD810C3F89EE573F1B9BA0BAB9FD7494D334D0D52B3E49E6E9610DE629		
Document Signature Value:	7059BA96FB3104F2CFA35CE5255C249E2329D0D6702CFA867C3F96615E6CB3B70A2CDD7CB4A9E7D14F3BF0FFD6216EE7E143ABFCF533C36515C72BB53CE227E3A96678D4605ACEE62C68B39FD47F9E73DE66CEBB79CD81909D5F9A818405DEABF3A4A8D57FD10CF37CB8D9615CD63F4532497B8DFC9AC1AF61C90396026C7C2A842D2D4905CEAA3A275A93A4FCB5B45088A3B3E956CBF6A1A09AE9A4AEE97BD335DDCD52E3E74C2EAC3A4268178033D09D3480FA36A7BA72616143B10F3AD2683B9A28A8B2C81DF43F4C18F49E5435C83E58722C7B0A93D044F558D5A513D40738B0124B14D81F650564D5AA8328A4FC2898AA25CE6DE7DFE552174CE361F2B1		

Superior Refining Company LLC

1. Event Information:

Start Date:	08/18/2023
Start Time (24-hr time):	4:05
End Date:	08/18/2023
End Time (24-hr time):	5:06
Duration(hours)	1.02
Description:	Flare H2S Exceedance
Cause:	Flare gas caustic scrubber operated with lower than normal causitc flow causing less than optimal treatment of flare gas and elevated H2S readings.
Action(s):	Operators worked as quickly as possible to restore designed caustic flow, including flushing pumps, demisters, and bypassing the air cooler.
Comments:	Alhtough caustic flow fell below design rates, flow was present at all times during the event.

2. Reporting Information:

Date	Time	Agency	Agency Contact	Caller
08/21/2023	13:43	Wisconsin Department of Natural Resources (WDNR)	WAMS	Ross Lovely

3. Applicable Requirements Summary Information:

Source ID: Facility-wide, Total Facility Applicable Requirements

Date: 08/18/2023 **Duration (hr): 3** **Excess Emissions (lbs): 40.4**

Air Pollutant	Applicable Requirement	Description
Hydrogen sulfide	2010 Consent Decree, V.I.49.c.	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)

3. Applicable Requirements Summary Information:

Source ID: I10, Blowdown (Refinery) Primary Flare

Date: 08/18/2023 **Duration (hr): 3** **Excess Emissions (lbs): 39.6**

Air Pollutant	Applicable Requirement	Description
Sulfur Dioxide	12-DCF-256, I.A.1.a.(1)	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)
Hydrogen Sulfide	12-DCF-256, I.Aa.1.a.(1)	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)

Source ID: I10, Blowdown (Refinery) Primary Flare

Date: 08/18/2023 **Duration (hr): 3** **Excess Emissions (lbs): 40.0**

Air Pollutant	Applicable Requirement	Description
Hydrogen sulfide	40 CFR Part 60, Subpart Ja, 60.103a(h)	NSPS Flare Gas H2S > 162 (3-hr rolling average) (Excess emissions reported as SO2)

4. Applicable Requirements Detailed Information:

Source ID: Facility-wide, Total Facility Applicable Requirements

Date: 08/18/2023 **Excess emissions associated with the following conditions (lbs): 40.4**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Hydrogen sulfide	2010 Consent Decree	V.I.	49.c.	If prior to the termination of this Consent Decree, a Flaring Device becomes subject to NSPS Subpart Ja for a particular pollutant due to a “modification” (as that term is defined in the final Subpart Ja rule), the modified affected facility shall be subject to and comply with NSPS Subpart Ja, in lieu of NSPS Subpart J, for that regulated pollutant to which a standard applies as a result of the modification.

Comment:

The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for (1) 3-hr RA periods: 02:00 on 8/18/2023 to 05:00 on 8/18/2023. Total excess emissions from the GCD deviation were 40.4 lbs of SO2 (100% destruction efficiency). See attached "8/18/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

4. Applicable Requirements Detailed Information:

Source ID: I10, Blowdown (Refinery) Primary Flare

Date: 08/18/2023 **Excess emissions associated with the following conditions (lbs): 39.6**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Hydrogen Sulfide	12-DCF-256	I.Aa.1.a.	(1)	The hydrogen sulfide content of the gas exiting the caustic scrubber may not exceed 162 ppmv, based on a 3 hour rolling average basis. See I.A.1.a.(2).

Comment:

The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for one (1) 3-hr RA period: 02:00 on 8/18/2023 to 05:00 on 8/18/2023. Total excess emissions from the Title V/Construction Permit deviation were 39.6 lbs of SO2 and 0.4 lbs of H2S (98% destruction efficiency). See attached "8/18/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

Sulfur Dioxide	12-DCF-256	I.A.1.a.	(1)	Each owner or operator shall not burn in any affected flare any fuel gas that contains H2S in excess of 162 ppmv determined hourly on a 3-hour rolling average basis. The combustion in a flare of process upset gases or fuel gas that is released to the flare as a result of relief valve leakage or other emergency malfunctions is exempt from this limit.

Comment:

The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for one (1) 3-hr RA period: 02:00 on 8/18/2023 to 05:00 on 8/18/2023. Total excess emissions from the Title V/Construction Permit deviation were 39.6 lbs of SO2 and 0.4 lbs of H2S (98% destruction efficiency). See attached "8/18/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

4. Applicable Requirements Detailed Information:

Source ID: I10, Blowdown (Refinery) Primary Flare

Date: 08/18/2023 **Excess emissions associated with the following conditions (lbs): 40.0**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Hydrogen sulfide	40 CFR Part 60, Subpart Ja	60.103a	(h)	Each owner or operator shall not burn in any affected flare any fuel gas that contains H2S in excess of 162 ppmv determined hourly on a 3-hour rolling average basis. The combustion in a flare of process upset gases or fuel gas that is released to the flare as a result of relief valve leakage or other emergency malfunctions is exempt from this limit.

Comment:

The Flare Caustic Scrubber Exit Gas exceeded the 162 ppm H2S 3-hr RA for one (1) 3-hr RA periods: 02:00 on 8/18/2023 to 05:00 on 8/18/2023. Total excess emissions from the NSPS Subpart Ja deviation were 40.0 lbs of SO2 and 0.2 lbs of H2S (99% destruction efficiency). See attached "8/18/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2 and Flow Data" for more details.

8/18/2023 Flare Gas Caustic Scrubber Exceedance - Flare H2S, SO2, and Flow Data

						98% Destruction Efficiency						99% Destruction Efficiency						100% Destruction Efficiency					98% Destruction Efficiency					Title V / Construction Permit				40 CFR 60 Subpart Ja		2010 GCD		40 CFR 60 Subpart Ja		
				Limit																			Limit					98% Destruction Efficiency				99% Destruction Efficiency		100% Destruction Efficiency		Flow		
		Refinery PI or DAHS Data		>162 ppmd H2S 3 hr RA	Title V Permit / Construction Permit 162 ppm H2S 3 hr Rolling Average						NSPS Subpart Ja 162 ppm H2S 3 hr Rolling Average						GCD 162 ppm H2S 3 hr Rolling Average					39.3 lbs SO2 / hr 12 hr RA	Title V Permit 39.3 lbs SO2 / hr 12hr RA					SO2 EPCRA > 500 lbs		H2S EPCRA / CERCLA > 100 lbs		Requires Root Cause if Equal to or Greater than 500 lbs total SO2		Requires Root Cause if Equal to or Greater than 500 lbs total SO2		Requires Root Cause if 500,000 scf above Baseline (86,760scf)		
Date	Start Time	Flare Flow 1-hr Avg SCFM	Flare H2S 1-hr Avg ppmd	Flare TRS 1-hr Avg ppmd	Flare H2S 3-hr RA ppmd	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	Hourly Emissions lbs H2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H2S	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	Hourly Emissions lbs H2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H2S	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	162 ppm 3hr RA Excess Emissions 3-hr Sum lbs SO2	lbs SO2 / hr 12 hr RA lbs SO2 / hr	Actual Title V lbs SO2 / hr	Allowable Title V lbs SO2 / hr	Excess Title V lbs SO2 / hr	Excess Title V 12 hr rolling sum (98% Dest Eff) lbs SO2	Excess SO2 Emissions (>162 ppm 98%) lbs SO2	Excess Emissions (>162 ppm 98%) Previous 24hr Rolling Sum lbs SO2	lbs H2S	Emissions Previous 24hr Rolling Sum lbs H2S	Ja lbs SO2 / hr	Ja 24 hr rolling sum total lbs SO2 (99% Dest Eff) lbs SO2	GCD lbs SO2 / hr	GCD 24 hr rolling sum total lbs SO2 (100% Dest Eff) lbs SO2	Ja total flow scf / hr	Ja 24 hr rolling sum excess flow scf	Comments
08/17/2023	19:00	888	0	78	0	0.0	1.4	-1.4	0.0			0.0	1.4	-1.4	0.0			0.0	1.5	-1.5		0.9	1.3	39.3	-38.0	-461.0	-0.2	-8.4	0.0	0.2	1.3	16.8	1.3	16.9	6720	108420	
	20:00	822	0	76	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		0.9	1.4	39.3	-37.9	-460.3	-0.1	-8.1	0.0	0.2	1.4	17.7	1.4	17.9	6540	100200	
	21:00	818	0	73	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.0	1.3	39.3	-38.0	-459.7	-0.1	-7.8	0.0	0.2	1.3	18.6	1.3	18.8	5760	91080	
	22:00	816	0	69	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.1	1.8	39.3	-37.5	-458.7	-0.1	-7.5	0.0	0.2	1.8	20.0	1.8	20.2	7320	83520	
	23:00	819	1	65	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.1	1.5	39.3	-37.8	-458.0	-0.1	-7.2	0.0	0.2	1.5	21.0	1.6	21.2	7500	76560	
08/18/2023	0:00	804	2	63	1	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.2	1.8	39.3	-37.5	-457.3	-0.1	-6.9	0.0	0.2	1.8	22.3	1.8	22.6	7140	69480	
	1:00	792	3	63	2	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.2	1.7	39.3	-37.6	-456.6	0.0	-6.5	0.0	0.3	1.8	23.6	1.8	23.9	6840	62100	
	2:00	809	3	63	2	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.3	1.7	39.3	-37.6	-455.7	1.5	-4.6	0.0	0.3	1.7	24.8	1.7	25.0	6540	54180	
	3:00	790	2	8	2	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.4	1.6	39.3	-37.7	-454.8	1.5	-2.7	0.0	0.3	1.6	25.9	1.7	26.2	6420	46080	**H2S** above required span limit of 300ppm on ppm GC data (~04:05-06:05); H2S data estimated using % GC data (used for BTU) tracked with data logger; **TRS** data unavailable due to hardware fault on SOLA analyzer; TRS data calculated assuming conservative estimate that H2S is 20% of TRS
	4:00	788	5552	27758	1852	43.4	1.3	42.2	0.5	39.6	0.4	43.9	1.3	42.6	0.2	40.0	0.2	44.3	1.3	43.0	40.4	1.5	1.6	39.3	-37.7	-454.0	1.4	-0.9	0.0	0.3	1.6	27.0	1.6	27.3	6300	37980	
	5:00	785	0	34	1851	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.5	1.6	39.3	-37.7	-453.3	1.4	0.9	0.0	0.3	1.6	28.0	1.6	28.3	6060	29820	
	6:00	789	0	32	1851	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.6	1.5	39.3	-37.8	-452.9	1.4	2.7	0.0	0.3	1.5	28.9	1.5	29.2	5940	21660	
	7:00	801	0	32	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.6	1.4	39.3	-37.9	-452.7	1.3	4.4	0.0	0.3	1.4	29.7	1.4	30.0	5520	12900	
	8:00	840	0	35	0	0.0	1.4	-1.4	0.0			0.0	1.4	-1.4	0.0			0.0	1.4	-1.4		1.6	1.4	39.3	-37.9	-452.7	1.2	6.0	0.0	0.3	1.4	30.5	1.4	30.8	6300	4680	
	9:00	864	0	36	0	0.0	1.4	-1.4	0.0			0.0	1.4	-1.4	0.0			0.0	1.4	-1.4		1.5	0.6	39.3	-38.7	-453.4	-0.1	6.3	0.0	0.3	0.6	30.3	0.6	30.6	7440	-2040	
	10:00	876	0	37	0	0.0	1.4	-1.4	0.0			0.0	1.4	-1.4	0.0			0.0	1.4	-1.4		1.4	0.6	39.3	-38.7	-454.6	-0.1	6.6	0.0	0.3	0.6	30.2	0.6	30.5	8340	-7680	
	11:00	967	0	39	0	0.0	1.5	-1.5	0.0			0.0	1.6	-1.6	0.0			0.0	1.6	-1.6		1.3	0.2	39.3	-39.1	-456.0	-0.2	6.8	0.0	0.3	0.2	29.5	0.2	29.8	7860	-13980	
	12:00	788	0	42	0	0.0	1.3	-1.3	0.0			0.0	1.3	-1.3	0.0			0.0	1.3	-1.3		1.2	0.1	39.3	-39.2	-457.7	-0.2	7.0	0.0	0.3	0.1	28.5	0.1	28.8	7260	-21420	
	13:00	920	0	37	0	0.0	1.5	-1.5	0.0			0.0	1.5	-1.5	0.0			0.0	1.5	-1.5		1.0	0.1	39.3	-39.2	-459.3	-0.2	7.2	0.0	0.3	0.1	27.6	0.1	27.8	7500	-28380	
	14:00	915	0	83	0	0.0	1.5	-1.5	0.0			0.0	1.5	-1.5	0.0			0.0	1.5	-1.5		0.9	0.1	39.3	-39.2	-460.8	-0.2	7.2	0.0	0.3	0.1	26.8	0.1	27.1	6060	-31520	
	15:00	921	2	112	1	0.0	1.5	-1.5	0.0			0.0	1.5	-1.5	0.0			0.0	1.5	-1.5		0.8	0.1	39.3	-39.2	-462.5	-0.2	7.2	0.0	0.3	0.1	26.2	0.1	26.5	7440	-31380	
	16:00	944	2	128	1	0.0	1.5	-1.5	0.0			0.0	1.5	-1.5	0.0			0.0	1.5	-1.5		0.6	0.1	39.3	-39.2	-464.0	-0.2	7.2	0.0	0.3	0.1	25.5	0.1	25.7	7260	-30900	
	17:00	927	3	142	2	0.0	1.5	-1.5	0.0			0.0	1.5	-1.5	0.0			0.0	1.5	-1.5		0.5	0.1	39.3	-39.2	-465.5	-0.2	7.2	0.0	0.3	0.1	24.8	0.1	24.9	6960	-30660	
	18:00	922	4	156	3	0.0	1.5	-1.4	0.0			0.0	1.5	-1.5	0.0			0.0	1.5	-1.5		0.4	0.0	39.3	-39.3	-467.0	-0.2	7.2	0.0	0.3	0.0	23.6	0.0	23.8	6180	-31200	
	19:00	912	4	166	4	0.0	1.5	-1.4	0.0			0.0	1.5	-1.4	0.0			0.0	1.5	-1.5		0.3	0.0	39.3	-39.3	-468.4	-0.2	7.2	0.0	0.2	0.0	22.3	0.0	22.6	6600	-31320	
						Total Excess Emissions - Title V Permit / Construction Permit				lbs SO2 39.6	lbs H2S 0.4	Total Excess Emissions - NSPS Subpart Ja				lbs SO2 40.0	lbs H2S 0.2	Total Excess Emissions - GCD			lbs SO2 40.4		Total Excess Emissions - Title V				lbs SO2 N/A		SO2 N/A		H2S N/A							

$$Title\ V\ lbs\ SO2 = Duration(mins) x\ flow(scfm) x \frac{(ppm) scf\ H2S}{1{,}000{,}000\ scf\ FG} x \frac{1\ lb\ mole}{379\ scf} x \frac{64\ lb\ SO2}{lb\ mole\ H2S} \times 0.98\ Flare\ Destruction\ Efficiency$$

$$NSPS\ Ja\ lbs\ SO2 = Duration(mins) x\ flow(scfm) x \frac{(ppm) scf\ H2S}{1{,}000{,}000\ scf\ FG} x \frac{1\ lb\ mole}{379\ scf} x \frac{64\ lb\ SO2}{lb\ mole\ H2S} \times 0.99\ Flare\ Destruction\ Efficiency$$

From: DNRAMCOMPLIANCEEXTERNALSUBMISSION@Wisconsin.gov
To: Lovely, Ross
Cc: michalee.leuthard@wisconsin.gov; Perkins, Dean S.; Gunn, Matt
Subject: Deviation Notification Received. Superior Refining Company LLC
Date: Monday, August 21, 2023 1:43:31 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_I10_08212023_816009590.pdf and has been filed for: FID: 816009590 Superior Refining Company LLC.

LINK TO DOCUMENT

To complete this submittal, it is necessary to either:
Mail a hard copy of the signature page with the Responsible Corporate Official's ink signature to the department,
OR ~ have the Responsible Official complete the e-signature process.

If completing the process by hard copy, note that only the page with the ink signature is required (not entire attachment). Mail the signature page to the compliance inspector assigned to the facility.

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

Clear Data | Print... | Save...

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 Process No./Unit Description:**
Permit No. 12-DCF-256 I.A.1.a.(1) & I.Aa.1.a.(1)	Process No. I10

Start/Stop Time(s) of Deviation/Malfunction/Unscheduled Event:
Start Time: 8/18/2023 at 02:00
Stop Time: 8/18/2023 at 05:00

Cause(s) of Deviation/Malfunction/Unscheduled Event:
Operations noticed that the flow of caustic diminished below design standard around 03:35 on 8/18. SRC immediately sought to restore caustic flow and ultimately was able to do so around 04:35. While the caustic system operated on low flow, it could not treat the flow of gas as effectively as it normally would, resulting in a deviation for one three-hour period of time. When caustic flow was re-established, H2S and TRS again returned to normal levels.

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):
The refinery briefly initiated abatement procedures until caustic flow was re-established. Operators worked as quickly as possible to restore caustic flow, including flushing the pumps, demisters, and bypassing the air cooler.

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):
Caustic flow was present at all times during the event but was diminished below the design standard of the caustic system.

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: SRC Environmental Department

Signature of Responsible Official	Title	Date
	GM Refining	

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.

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
3911 Fish Hatchery Road
Fitchburg, WI 53711

Tony Evers, Governor
Adam N. Payne, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

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

From:	Beattie, David
To:	Johnson, Melissa - DMA; Douglas County - DMA; david.radisewitz@widma.gove
Cc:	Paddock, Jeffrey J - DNR; Leuthard, Michalee J - DNR; Lovely, Ross
Subject:	RE: 8/24/2023 Superior Refinery Vapor Release EPCRA Follow-up Report
Date:	Friday, September 22, 2023 8:19:57 PM
Attachments:	image001.png 2023.08.24 Superior Refinery Vapor Release EPCRA Followup Report (revised).pdf

Apologies, attached is a revised report. I had inadvertently include water vapor, nitrogen, and hydrogen sulfide in the total hydrocarbon estimate.
The correct estimate for hydrocarbons was approximately 1,550 lbs.

Thanks,
Dave

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

From: Beattie, David
Sent: Friday, September 22, 2023 8:08 PM
To: Johnson, Melissa - DMA <Melissa.Johnson@widma.gov>; (slettend@ci.superior.wi.us) <slettend@ci.superior.wi.us>; david.radisewitz@widma.gove
Cc: Jeffrey Paddock (Jeffrey.paddock@wisconsin.gov) <Jeffrey.paddock@wisconsin.gov>; Michalee Leuthard (michalee.leuthard@wisconsin.gov) <michalee.leuthard@wisconsin.gov>; Lovely, Ross <Ross.Lovely@cenovus.com>
Subject: 8/24/2023 Superior Refinery Vapor Release EPCRA Follow-up Report

Good Evening –

Attached is the follow-up report for the 8/24/2023 EPCRA Notification the Superior Refinery made to the State of Wisconsin for a vapor release.

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

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:	44X7G
Document Description:	Deviation Notification
File Name:	DEVIATION-MALFUNCTION_NOTIFICATION_P20_08292023_816009590.pdf
File Size [KB]:	166
Wisconsin User ID (WAMS):	Mgunn42
User Name:	Matthew B Gunn
User Verified Status:	
Temporary PIN Sent To:	matt.gunn@cenovus.com
Signature ID:	44X4O
Signature Date/Time:	9/13/2023 4:27:17 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:	47.225.237.11	Public Key Type: RSA-2048	Hash Type: SHA-512
Temporary PIN Hash Value:	09DC616DE49DC72D5E6B922479E070D70235A0D20D9B4B62027456161D7674560E1763D17DBCC162FBC2CD1BDC7F62588C0FD12389B5DE0326BC9D95CC936501		
Public Key Value:	0602000000A400005253413100080000010001001912A7C621E4861A492800FE4B0D59B985A5810412F0835340149A7DCC04B7F946EFB807971CFBB7F7E8965328438C403A5AB472F26B9D8CE401BEDEC446A5B752BE391B4C83805DC456A59589A143590D6F59C0783BA735421D13DD82F1849C6519C20D08CBADBE9CE2194707B56263A3361E2077D1258944CF4679D27D60699FE49B5704F7D8BE2F8A9384998B42CF9BAA432B471BEF57E41330246CE3EE2F80CFAA7940AEEFFC6260DBA2B453CD4A2D652D459C44171684C2708F3C1D8CB48E3C008DEFBC05EBCCC7B1FB3210023ACD55D72456E524DD9F26D099FDA5724EBB62397DFC757BD269B9594C26F210CE6FDC9F80472931CF69369065B5DC64B2		
Document Hash Value:	ED0E4F02F9AA2B8BE78C85422D3B26C2BC0BBC0C0D38A67D67C6619B0CA06CF4E3EB8F40DECA8B0582FB81CB1264ACED8279EA5C479BFB43AC2C4418ED9A3E55		
Document Signature Value:	65535E97A0F57CB0C0AF0E85A05B7051A078FBC1C536DF98E716221940A6081B6A838A197C19F1588F9F31258C357729AEA56669919AC62EC0FE656C52BA353DCFCC9D68958E3607FB32ACB7B6E03EDADB15D52D645551B379CC2EBA0A5D9C72AA54A7D00545BBC51652F951646FCBB8964A5F671D1F480D4258382F78A65102B417F2E1E13FC5F1B52FF9475D6944CF7BABE22859D04AB57C9B05B4D742D6D572258FC235132F4D7CB66A97AF4DF5611668701B12A2CD91471C157EE2377AAD75AFD4AFA4B02704987E51A7A30955A89516729112A121D60981E645AD977B53E2A70D98DF661E47691419AC4B121815DE0C8376007ECE9CDCD369B0E1B026A1		

Superior Refining Company LLC

1. Event Information:

Start Date:	08/28/2023
Start Time (24-hr time):	12:26
End Date:	08/28/2023
End Time (24-hr time):	12:31
Duration(hours)	0.08
Description:	Sour Water Stripper Off-gas Flaring
Cause:	A brief change in the composition of water to the Sour Water Stripper resulted in a pressure upset that could have negatively impacted the operation of the SRU Reaction Furnace. Instead of allowing the upset to impact the Reaction Furnace, the off-gas from the Sour Water Stripper was briefly routed to the flare.
Action(s):	Operators reduced charge to the Sour Water Stripper temporarily until equilibrium could be regained. Routing the Sour Water Stripper off-gas to the flare gas caustic scrubber was a corrective action in itself and reduced potential emissions by ensuring stability of the SRU Reaction Furnace.
Comments:	The next-business-day notification identified "Process No I10, Refinery Flare" as the affected Permit Process. The correct Permit Process No. is P20, S14, which is correctly identified in the associated WAMS entry.

2. Reporting Information:

Date	Time	Agency	Agency Contact	Caller
08/29/2023	16:11	Wisconsin Department of Natural Resources (WDNR)	WAMS	Ross Lovely

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: 08/28/2023 **Duration (hr): 0.08** **Excess Emissions (lbs): 0.0**

Air Pollutant	Applicable Requirement	Description
Sulfur dioxide	16-RAB-184, I.E.1.a.(1)(f)	Acid Gas not routed to SRU

Superior Refining Company LLC

4. Applicable Requirements Detailed Information:

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

Date: 08/28/2023 **Excess emissions associated with the following conditions (lbs): 0.0**

Air Pollutant	Applicable Document	Section ID	Paragraph ID	Paragraph Text
Sulfur dioxide	16-RAB-184	I.E.1.a.	(1)(f)	Except during periods of planned startup or planned shutdown as defined in I.E.1.a.(1)(h), the permittee shall at all times route the off-gases from the sour water stripper and amine acid gas from the amine unit, i.e. acid gas, to the SRU.

Comment:

For five one-minute periods between 12:26-12:31 on 8/28/2023, the valve from the Sour Water Stripper to the flare was opened, routing the off-gas from the Sour Water Stripper to the flare, resulting in 0.0 lbs of excess SO2 emissions. The flare caustic scrubber system was operable for the duration of the event. See the attached spreadsheet, "8/28/2023 Sour Water Stripper Off-Gas to the Flare - Flare H2S, SO2, and Flow Data" for additional details.

8/28/2023 Sour Water Stripper Off-Gas to the Flare - Flare H2S, SO2, and Flow Data

						98% Destruction Efficiency						99% Destruction Efficiency						100% Destruction Efficiency					98% Destruction Efficiency					Title V / Construction Permit				40 CFR 60 Subpart Ja		2010 GCD		40 CFR 60 Subpart Ja		
				Limit																			Limit					98% Destruction Efficiency				99% Destruction Efficiency	Limit	100% Destruction Efficiency	Limit	Flow	Limit	
		Refinery PI or DAHS Data		>162 ppmd H2S 3 hr RA	Title V Permit / Construction Permit 162 ppm H2S 3 hr Rolling Average						NSPS Subpart Ja 162 ppm H2S 3 hr Rolling Average						GCD 162 ppm H2S 3 hr Rolling Average					39.3 lbs SO2 / hr 12 hr RA	Title V Permit 39.3 lbs SO2 / hr 12hr RA					SO2 EPCRA > 500 lbs		H2S EPCRA / CERCLA > 100 lbs		Requires Root Cause if Equal to or Greater than 500 lbs total SO2		Requires Root Cause if Equal to or Greater than 500 lbs total SO2		Requires Root Cause if 500,000 scf above Baseline (86,760scf)		
Date	Start Time	Flare Flow 1-hr Avg SCFM	Flare H2S 1-hr Avg ppmd	Flare TRS 1-hr Avg ppmd	Flare H2S 3-hr RA ppmd	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	Hourly Emissions lbs H2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H2S	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	Hourly Emissions lbs H2S	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs SO2	162 ppm 3hr RA Excess Flare Emissions 3-hr Sum lbs H2S	Hourly Actual Emissions lbs SO2	Hourly Allowable Emissions lbs SO2	Hourly Excess Emissions lbs SO2	162 ppm 3hr RA Excess Emissions 3-hr Sum lbs SO2	lbs SO2 / hr 12 hr RA lbs SO2 / hr	Actual Title V lbs SO2 / hr	Allowable Title V lbs SO2 / hr	Excess Title V lbs SO2 / hr	Excess Title V 12 hr rolling sum (99% Dest Eff) lbs SO2	Excess SO2 Emissions (>162 ppm 98%) lbs SO2	Excess Emissions (>162 ppm 98%) Previous 24hr Rolling Sum lbs SO2	lbs H2S	Emissions Previous 24hr Rolling Sum lbs H2S	Ja lbs SO2 / hr	Ja 24 hr rolling sum total lbs SO2 (99% Dest Eff) lbs SO2	GCD lbs SO2 / hr lbs SO2 / hr	GCD 24 hr rolling sum total lbs SO2 (100% Dest Eff) lbs SO2	Ja total flow scf / hr	Ja 24 hr rolling sum excess flow scf	Comments
8/28/23	0:00	244	0.0	50	0	0.0	0.4	-0.4	0.0			0.0	0.4	-0.4	0.0			0.0	0.4	-0.4			0.1	39.3	-39.2		-0.4		0.0		0.1		0.1		14640		
	1:00	206	0.0	51	0	0.0	0.3	-0.3	0.0			0.0	0.3	-0.3	0.0			0.0	0.3	-0.3			0.1	39.3	-39.2		-0.3		0.0		0.1		0.1		12360		
	2:00	235	0.0	54	0	0.0	0.4	-0.4	0.0			0.0	0.4	-0.4	0.0			0.0	0.4	-0.4			0.1	39.3	-39.2		-0.4		0.0		0.1		0.1		14100		
	3:00	233	0.0	53	0	0.0	0.4	-0.4	0.0			0.0	0.4	-0.4	0.0			0.0	0.4	-0.4			0.1	39.3	-39.2		-0.4		0.0		0.1		0.1		13980		
	4:00	239	0.0	52	0	0.0	0.4	-0.4	0.0			0.0	0.4	-0.4	0.0			0.0	0.4	-0.4			0.1	39.3	-39.2		-0.4		0.0		0.1		0.1		14340		
	5:00	229	0.0	52	0	0.0	0.4	-0.4	0.0			0.0	0.4	-0.4	0.0			0.0	0.4	-0.4			0.1	39.3	-39.2		-0.4		0.0		0.1		0.1		13740		
	6:00	260	0.0	53	0	0.0	0.4	-0.4	0.0			0.0	0.4	-0.4	0.0			0.0	0.4	-0.4			0.1	39.3	-39.2		-0.4		0.0		0.1		0.1		15600		
	7:00	249	0.0	54	0	0.0	0.4	-0.4	0.0			0.0	0.4	-0.4	0.0			0.0	0.4	-0.4			0.1	39.3	-39.2		-0.4		0.0		0.1		0.1		14940		
	8:00	568	0.0	77	0	0.0	0.9	-0.9	0.0			0.0	0.9	-0.9	0.0			0.0	0.9	-0.9			0.4	39.3	-38.9		-0.9		0.0		0.4		0.4		34080		
	9:00	1372	0.1	118	0	0.0	2.2	-2.2	0.0			0.0	2.2	-2.2	0.0			0.0	2.3	-2.3			1.6	39.3	-37.7		-2.2		0.0		1.6		1.6		82320		
	10:00	1319	0.0	112	0	0.0	2.1	-2.1	0.0			0.0	2.1	-2.1	0.0			0.0	2.2	-2.2			1.5	39.3	-37.8		-2.1		0.0		1.5		1.5		79140		
	11:00	1111	3.1	144	1	0.0	1.8	-1.8	0.0			0.0	1.8	-1.8	0.0			0.0	1.8	-1.8		0.5	1.6	39.3	-37.7	-465.5	-1.8		0.0		1.6		1.6		66660		
	12:00	925	0.1	161	1	0.0	1.5	-1.5	0.0			0.0	1.5	-1.5	0.0			0.0	1.5	-1.5		0.6	1.5	39.3	-37.8	-464.2	-1.5		0.0		1.5		1.5		55500		Sour Water Stripper Off-gas valve to flare opened slightly 12:26-12:31
	13:00	588	0.0	158	1	0.0	0.9	-0.9	0.0			0.0	1.0	-1.0	0.0			0.0	1.0	-1.0		0.7	0.9	39.3	-38.4	-463.3	-0.9		0.0		0.9		0.9		35280		
	14:00	335	0.0	158	0	0.0	0.5	-0.5	0.0			0.0	0.5	-0.5	0.0			0.0	0.5	-0.5		0.7	0.5	39.3	-38.8	-462.9	-0.5		0.0		0.5		0.5		20100		
	15:00	238	0.1	146	0	0.0	0.4	-0.4	0.0			0.0	0.4	-0.4	0.0			0.0	0.4	-0.4		0.7	0.3	39.3	-39.0	-462.7	-0.4		0.0		0.3		0.4		14280		
	16:00	219	0.0	132	0	0.0	0.4	-0.4	0.0			0.0	0.4	-0.4	0.0			0.0	0.4	-0.4		0.8	0.3	39.3	-39.0	-462.6	-0.4		0.0		0.3		0.3		13140		
	17:00	277	0.0	118	0	0.0	0.4	-0.4	0.0			0.0	0.5	-0.5	0.0			0.0	0.5	-0.5		0.8	0.3	39.3	-39.0	-462.3	-0.4		0.0		0.3		0.3		16620		
	18:00	320	0.0	106	0	0.0	0.5	-0.5	0.0			0.0	0.5	-0.5	0.0			0.0	0.5	-0.5		0.8	0.3	39.3	-39.0	-462.1	-0.5		0.0		0.3		0.3		19200		
	19:00	279	0.0	95	0	0.0	0.4	-0.4	0.0			0.0	0.5	-0.5	0.0			0.0	0.5	-0.5		0.8	0.3	39.3	-39.0	-462.0	-0.4		0.0		0.3		0.3		16740		
	20:00	258	0.0	89	0	0.0	0.4	-0.4	0.0			0.0	0.4	-0.4	0.0			0.0	0.4	-0.4		0.8	0.2	39.3	-39.1	-462.2	-0.4		0.0		0.2		0.2		15480		
	21:00	294	0.0	88	0	0.0	0.5	-0.5	0.0			0.0	0.5	-0.5	0.0			0.0	0.5	-0.5		0.7	0.3	39.3	-39.0	-463.6	-0.5		0.0		0.3		0.3		17640		
	22:00	300	0.0	91	0	0.0	0.5	-0.5	0.0			0.0	0.5	-0.5	0.0			0.0	0.5	-0.5		0.6	0.3	39.3	-39.0	-464.8	-0.5		0.0		0.3		0.3		18000		
	23:00	325	0.0	88	0	0.0	0.5	-0.5	0.0			0.0	0.5	-0.5	0.0			0.0	0.5	-0.5		0.5	0.3	39.3	-39.0	-466.1	-0.5		0.0		0.3		0.3		19500		
						Total Excess Emissions - Title V Permit / Construction Permit				lbs SO2	lbs H2S	Total Excess Emissions - NSPS Subpart Ja				lbs SO2	lbs H2S	Total Excess Emissions - GCD			lbs SO2		Total Excess Emissions - Title V				lbs SO2		SO2			H2S						
										N/A	N/A					N/A	N/A				N/A					N/A		N/A			N/A						

Emissions from flare during the hours in which Acid Gas flaring occurred	0.0 lbs SO2		0.0 lbs H2S

$$Title\ V\ lbs\ SO2 = Duration(mins) x\ flow(scfm) x \frac{(ppm) scf\ H2S}{1{,}000{,}000\ scf\ FG} x \frac{1\ lb\ mole}{379\ scf} x \frac{64\ lb\ SO2}{lb\ mole\ H2S} \times 0.98\ Flare\ Destruction\ Efficiency$$

$$NSPS\ Ja\ lbs\ SO2 = Duration(mins) x\ flow(scfm) x \frac{(ppm) scf\ H2S}{1{,}000{,}000\ scf\ FG} x \frac{1\ lb\ mole}{379\ scf} x \frac{64\ lb\ SO2}{lb\ mole\ H2S} \times 0.99\ Flare\ Destruction\ Efficiency$$

	Sour Water Stripper Off-Gas to Flare Valve
	% Open
	25-PY-0230-B/BG1/OUT.CV
28-Aug-23 11:00:00	0
28-Aug-23 11:01:00	0
28-Aug-23 11:02:00	0
28-Aug-23 11:03:00	0
28-Aug-23 11:04:00	0
28-Aug-23 11:05:00	0
28-Aug-23 11:06:00	0
28-Aug-23 11:07:00	0
28-Aug-23 11:08:00	0
28-Aug-23 11:09:00	0
28-Aug-23 11:10:00	0
28-Aug-23 11:11:00	0
28-Aug-23 11:12:00	0
28-Aug-23 11:13:00	0
28-Aug-23 11:14:00	0
28-Aug-23 11:15:00	0
28-Aug-23 11:16:00	0
28-Aug-23 11:17:00	0
28-Aug-23 11:18:00	0
28-Aug-23 11:19:00	0
28-Aug-23 11:20:00	0
28-Aug-23 11:21:00	0
28-Aug-23 11:22:00	0
28-Aug-23 11:23:00	0
28-Aug-23 11:24:00	0
28-Aug-23 11:25:00	0
28-Aug-23 11:26:00	0
28-Aug-23 11:27:00	0
28-Aug-23 11:28:00	0
28-Aug-23 11:29:00	0
28-Aug-23 11:30:00	0
28-Aug-23 11:31:00	0
28-Aug-23 11:32:00	0
28-Aug-23 11:33:00	0
28-Aug-23 11:34:00	0
28-Aug-23 11:35:00	0
28-Aug-23 11:36:00	0
28-Aug-23 11:37:00	0
28-Aug-23 11:38:00	0
28-Aug-23 11:39:00	0

28-Aug-23 11:40:00	0
28-Aug-23 11:41:00	0
28-Aug-23 11:42:00	0
28-Aug-23 11:43:00	0
28-Aug-23 11:44:00	0
28-Aug-23 11:45:00	0
28-Aug-23 11:46:00	0
28-Aug-23 11:47:00	0
28-Aug-23 11:48:00	0
28-Aug-23 11:49:00	0
28-Aug-23 11:50:00	0
28-Aug-23 11:51:00	0
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28-Aug-23 11:58:00	0
28-Aug-23 11:59:00	0
28-Aug-23 12:00:00	0
28-Aug-23 12:01:00	0
28-Aug-23 12:02:00	0
28-Aug-23 12:03:00	0
28-Aug-23 12:04:00	0
28-Aug-23 12:05:00	0
28-Aug-23 12:06:00	0
28-Aug-23 12:07:00	0
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28-Aug-23 12:09:00	0
28-Aug-23 12:10:00	0
28-Aug-23 12:11:00	0
28-Aug-23 12:12:00	0
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28-Aug-23 12:21:00	0
28-Aug-23 12:22:00	0
28-Aug-23 12:23:00	0
28-Aug-23 12:24:00	0
28-Aug-23 12:25:00	0
28-Aug-23 12:26:00	0.001

28-Aug-23 12:27:00	0.016
28-Aug-23 12:28:00	0.034
28-Aug-23 12:29:00	0.202
28-Aug-23 12:30:00	0.987
28-Aug-23 12:31:00	0
28-Aug-23 12:32:00	0
28-Aug-23 12:33:00	0
28-Aug-23 12:34:00	0
28-Aug-23 12:35:00	0
28-Aug-23 12:36:00	0
28-Aug-23 12:37:00	0
28-Aug-23 12:38:00	0
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28-Aug-23 12:42:00	0
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28-Aug-23 12:45:00	0
28-Aug-23 12:46:00	0
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28-Aug-23 13:01:00	0
28-Aug-23 13:02:00	0
28-Aug-23 13:03:00	0
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28-Aug-23 13:06:00	0
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28-Aug-23 13:08:00	0
28-Aug-23 13:09:00	0
28-Aug-23 13:10:00	0
28-Aug-23 13:11:00	0
28-Aug-23 13:12:00	0
28-Aug-23 13:13:00	0

28-Aug-23 13:14:00	0
28-Aug-23 13:15:00	0
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28-Aug-23 13:17:00	0
28-Aug-23 13:18:00	0
28-Aug-23 13:19:00	0
28-Aug-23 13:20:00	0
28-Aug-23 13:21:00	0
28-Aug-23 13:22:00	0
28-Aug-23 13:23:00	0
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28-Aug-23 13:25:00	0
28-Aug-23 13:26:00	0
28-Aug-23 13:27:00	0
28-Aug-23 13:28:00	0
28-Aug-23 13:29:00	0
28-Aug-23 13:30:00	0
28-Aug-23 13:31:00	0
28-Aug-23 13:32:00	0
28-Aug-23 13:33:00	0
28-Aug-23 13:34:00	0
28-Aug-23 13:35:00	0
28-Aug-23 13:36:00	0
28-Aug-23 13:37:00	0
28-Aug-23 13:38:00	0
28-Aug-23 13:39:00	0
28-Aug-23 13:40:00	0
28-Aug-23 13:41:00	0
28-Aug-23 13:42:00	0
28-Aug-23 13:43:00	0
28-Aug-23 13:44:00	0
28-Aug-23 13:45:00	0
28-Aug-23 13:46:00	0
28-Aug-23 13:47:00	0
28-Aug-23 13:48:00	0
28-Aug-23 13:49:00	0
28-Aug-23 13:50:00	0
28-Aug-23 13:51:00	0
28-Aug-23 13:52:00	0
28-Aug-23 13:53:00	0
28-Aug-23 13:54:00	0
28-Aug-23 13:55:00	0
28-Aug-23 13:56:00	0
28-Aug-23 13:57:00	0
28-Aug-23 13:58:00	0
28-Aug-23 13:59:00	0

From:	DNRAMCOMPLIANCEEXTERNALSUBMISSION@Wisconsin.gov
To:	Lovely, Ross
Cc:	michalee.leuthard@wisconsin.gov; Perkins, Dean S.; Gunn, Matt
Subject:	Deviation Notification Received. Superior Refining Company LLC
Date:	Tuesday, August 29, 2023 4:11:06 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_08292023_816009590.pdf and has been filed for: FID: 816009590 Superior Refining Company LLC.

LINK TO DOCUMENT

To complete this submittal, it is necessary to either:
Mail a hard copy of the signature page with the Responsible Corporate Official's ink signature to the department,
OR ~ have the Responsible Official complete the e-signature process.

If completing the process by hard copy, note that only the page with the ink signature is required (not entire attachment). Mail the signature page to the compliance inspector assigned to the facility.

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

Clear Data | Print... | Save...

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. 816009590-P01 16-RAB-184 I.E.1.a.(1)(f) Sour water stripper off-gas to the Flare	**Permit Process No./Unit Description:** Process No. I10 Refinery Flare

Start/Stop Time(s) of Deviation/Malfunction/Unscheduled Event:
12:26 pm August 28, 2023 – 12:30 pm
August 28, 2023

Cause(s) of Deviation/Malfunction/Unscheduled Event:
On August 28, 2023, water quality issues resulted in an upset in the sour water stripper. Off-gas from the sour water stripper appears to have been directed to the flare for approximately four minutes as a result of the upset.

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):

All plans and procedures were followed to recover from the upset in the sour water stripper and the sour water stripper off-gas valve to the flare was quickly closed.

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):

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: SRC Environmental Department

Signature of Responsible Official	Title	Date

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.

From: Beattie, David
To: Paddock, Jeffrey J - DNR; Leuthard, Michalee J - DNR
Cc: Lovely, Ross
Subject: 8/24/2023 FCCU Main Column Leak
Date: Thursday, August 24, 2023 2:40:42 PM
Attachments: image001.png

Jeff/Michalee – Our FCCU operators discovered smoke coming from a flange on the FCCU Main Column Tower around 1pm today and our onsite ERT responded to help control and minimize the chance of it becoming a bigger issue.
The material in the tower is a heavier hydrocarbon and is at elevated temperature (not related to the issue we had yesterday).
They are using a water fog to suppress any smoke/vapors which will be contained at site.

As a precaution, we evacuated the on-site contractors, similar to what we did yesterday when we had the propane/butane leak.
Superior Fire Department was called out to assist if needed, but has remained on standby to this point.

They are in the process of shutting down the FCCU and isolating the tower.

Michalee – There will likely be some opacity exceedances for the FCCU from the shutdown.
Our plan is to include them in the overall startup event for the FCCU. Anything related to the restart when we get to that point would be included as well.

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
cenovus ENERGY

From: Antonuk, Connie J - DNR
To: Antonuk, Connie J - DNR; Balk Ludwig, Michelle M - DNR; Binzley, Ronald A - DNR; DeVenecia, Eric R - DNR; Grant, Katie L - DNR; Jacobson, Matthew J - DNR; Leuthard, Michalee J - DNR; Matty, Randall S - DNR; Nobile, Trevor W - DNR; Paddock, Jeffrey J - DNR; Pauli, Mark D - DNR; Perk, Beth A - DNR; Saari, Christopher A - DNR; Sager, John E - DNR; Sieger, Christine T - DNR; Sponseller, Bart A - DNR; Yach, James A - DNR
Subject: FW: Additional media coverage on last week"s incidents at the refinery
Date: Tuesday, August 29, 2023 9:08:48 AM
Attachments: image001.png

The Superior Refinery continues to garner media attention because of two incidences that occurred at the refinery this past week – propane/butane release and smoke coming from a flange on the fluid catalytic cracking unit main tower. Michalee Leuthard, Air Management Program, did an interview with Danielle Kaeding at Wisconsin Public Radio regarding these incidents.

Subject: Additional media coverage on last week's incidents at the refinery

Dear Superior CAP members,
We received additional media coverage on the incidents from last week at the refinery tonight. You can find the link to that story here: 'Those are not the calls I wanted to take': Superior mayor addresses Cenovus incidents (northernnewsnow.com).

Myself and other members of our team continue to be in close communication with the City and Douglas County emergency response partners. We respect and understand the city's role in assuring the safety of our community. We in turn are connecting with stakeholders, and continue our focus on safe and reliable operations.

While both incidents are under investigation, I will talk more about the incidents and our follow-up with local officials at our next meeting on September 12. We have an excellent lineup for that meeting, and I hope to see you all there.

While I have reached out to some of you already, I will continue reaching out to more of you before our next meeting to check-in. If you have questions, I am always a phone call, email, or a cup of coffee away. Please reach out if you have any questions or feedback that you would like to share. Thanks to those of you who have reached out or taken my calls to date. I very much appreciate your roles within our community and the unique perspectives that you all bring to our CAP.

I wanted to mention one more thing as I know many of you live by the refinery. On Wednesday morning, we are hosting an emergency response training at the request of the Superior Fire Department. There will be emergency response vehicles on site including one or more ambulances. I want to assure all of you that this is a training and no real emergency is taking place. We will have a post on our local Facebook page Cenovus Superior Refinery tomorrow, and are also letting the media know in the case that passerby's call in the scene or

inquire about what is happening. This is just one more way that we are training side by side with our local emergency response partners.

Have a great rest of the week and a wonderful holiday weekend. I look forward to seeing all of you soon!

Kate

Kate Van Daele
Senior Advisor, Regional Communications
Superior Refinery
Downstream
Kate.VanDaele@cenovus.com
715-817-5733

On January 1, 2021, Husky and Cenovus combined to form a resilient integrated energy leader. Husky is now part of the Cenovus group of companies.

From: Paddock, Jeffrey J - DNR
To: DNR DL NOR SIGNIFICANT SPILL
Subject: Superior Refinery Hydrocarbon Release Significant Spill Notification - 8/24/2023
Date: Thursday, August 24, 2023 3:09:00 PM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png

- ***FOR SITUATIONAL AWARENESS - GOVERNMENTAL COMMUNICATIONS***
- ***INVESTIGATION ONGOING - COMMUNICATION FOR SITUATIONAL AWARENESS***
- ****Not for media release.** If you receive any media inquiries, please contact Jeff Paddock at 715-828-8544 or Jeffrey.paddock@wisconsin.gov**

All,

This e-mail is being sent due to potential media involvement and inquiries. This latest release and evacuation were at the same facility (Superior Refinery), but are likely not associated with the evacuation yesterday caused by a propane butane/release described in the previous e-mail:

- Operators noted smoke coming from a flange on the Fluid Catalytic Cracking Unit Main Tower at approximately 13:00 today. The material in that tower is a heavier hydrocarbon and is at a elevated temperature.
- The Superior Refinery Emergency Response Team responded to the flare and are misting the area to suppress smoke/vapors. The City of Superior Fire Department was notified and are on standby.
- As a precaution, onsite contractors were evacuated.
- Superior Refinery also notified Michalee Leuthard, DNR Air Emissions Engineer. As with yesterdays release, a spill response will likely not be required at this point.

Thank you and please let me know if you have any questions.

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Visit our survey at http://dnr.wi.gov/customersurvey to evaluate how I did.

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

From: Paddock, Jeffrey J - DNR
Sent: Wednesday, August 23, 2023 2:01 PM
To: DNR DL NOR SIGNIFICANT SPILL <DNRDLNORSIGNIFICANTSPILL@wisconsin.gov>
Subject: Superior Refinery Propane Release Significant Spill Notification

FOR SITUATIONAL AWARENESS - GOVERNMENTAL COMMUNICATIONS

- ***INVESTIGATION ONGOING - COMMUNICATION FOR SITUATIONAL AWARENESS***
- ****Not for media release.** If you receive any media inquiries, please contact Jeff Paddock at 715-828-8544 or Jeffrey.paddock@wisconsin.gov**

All,

I'm e-mailing this significant spill notification due to media reports regarding this release:

- At approximately 7:50 am this morning a propane/butane release occurred at the Superior Refinery when a leak occurred downstream of the Fluid Catalytic Cracker. Operations were shut down, which caused flaring. The Superior Fire Department responded and used water to dissipate the propane. The refinery evacuated non-essential personnel as a precaution and they have returned to work. The leak was reportedly stopped at 9:25.
- The refinery is still depressurizing the converter/line to determine the cause of the release.
- The propane reportedly was released into the air so it is unlikely that a spill response will be required. The refinery is in contact with Michalee Leuthard, who is a DNR Air Management Engineer.

Here is a link to the news report regarding the release.

https://www.northernnewsnow.com/2023/08/23/several-employees-evacuated-after-propane-leak-superiors-cenovus-refinery/

Barring any unforeseen events, this will be the last update.

Thank you

We are committed to service excellence.

Visit our survey at http://dnr.wi.gov/customersurvey to evaluate how I did.

Jeff Paddock, P.G.
Northern Region Spill Coordinator – Remediation and Redevelopment Program
Wisconsin Department of Natural Resources
107 Sutliff Avenue
Rhinelander, WI 54501
Phone: (715) 828-8544
Jeffrey.Paddock@Wisconsin.gov

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From:	Meister, Molly R - DNR
To:	Leuthard, Michalee J - DNR; Reif, Maizie L - DNR; Saari, Christopher A - DNR; Ross, Issac A - DNR
Cc:	Paddock, Jeffrey J - DNR
Subject:	RE: WPR interview/comment request
Date:	Thursday, August 24, 2023 3:46:24 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png

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Thank you!

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Molly Meister
Public Information Officer | Office of Communications
Wisconsin Department of Natural Resources
Phone: 608-235-7105
Email: molly.meister@wisconsin.gov

dnr.wi.gov

From: Leuthard, Michalee J - DNR <michalee.leuthard@wisconsin.gov>
Sent: Thursday, August 24, 2023 3:46 PM
To: Reif, Maizie L - DNR <Maizie.Reif@wisconsin.gov>; Meister, Molly R - DNR <molly.meister@wisconsin.gov>; Saari, Christopher A - DNR <Christopher.Saari@wisconsin.gov>; Ross, Issac A - DNR <Issac.Ross@wisconsin.gov>
Cc: Paddock, Jeffrey J - DNR <jeffrey.paddock@wisconsin.gov>
Subject: RE: WPR interview/comment request

I will respond and work with Danielle – thanks!

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

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From: Reif, Maizie L - DNR <Maizie.Reif@wisconsin.gov>

Sent: Thursday, August 24, 2023 3:19 PM
To: Meister, Molly R - DNR <molly.meister@wisconsin.gov>; Saari, Christopher A - DNR <Christopher.Saari@wisconsin.gov>; Ross, Issac A - DNR <Issac.Ross@wisconsin.gov>; Leuthard, Michalee J - DNR <michalee.leuthard@wisconsin.gov>
Cc: Paddock, Jeffrey J - DNR <jeffrey.paddock@wisconsin.gov>
Subject: RE: WPR interview/comment request

Hi Molly,

I spoke with Jeff and it sounds like Michalee Leuthard might be the best person to answer these questions as they are both air releases and she has been working with the facility.

Michalee are you able to help with this request?

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Maizie Reif
Phone:920-360-4291
Maizie.reif@wisconsin.gov

From: Meister, Molly R - DNR <molly.meister@wisconsin.gov>
Sent: Thursday, August 24, 2023 3:02 PM
To: Reif, Maizie L - DNR <Maizie.Reif@wisconsin.gov>; Saari, Christopher A - DNR <Christopher.Saari@wisconsin.gov>; Ross, Issac A - DNR <Issac.Ross@wisconsin.gov>
Subject: FW: WPR interview/comment request
Importance: High

Hi all, see below. Can you assist? Thanks,

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

Molly Meister
Public Information Officer | Office of Communications
Wisconsin Department of Natural Resources
Phone: 608-235-7105
Email: molly.meister@wisconsin.gov


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From: Danielle C Kaeding <danielle.kaeding@wpr.org>
Sent: Thursday, August 24, 2023 2:57 PM
To: DNR DL Press <DNRDLPress@wisconsin.gov>

Cc: Grant, Katie L - DNR <Katie.Grant@wisconsin.gov>; Porter, Dana N - DNR <dana.porter@wisconsin.gov>; Meister, Molly R - DNR <molly.meister@wisconsin.gov>
Subject: WPR interview/comment request

Good afternoon all,

Danielle here with Wisconsin Public Radio. I hope you're doing well.

I'm reaching out to you because I understand that there's been another fuel leak today at the Cenovus refinery in Superior, marking the second spill in a week.

I'm wondering if anyone at the DNR could talk over the phone today about the amount of the release, what product was involved, and whether this had anything to do with yesterday's propane release.

I'm also interested in any information you can provide on how the refinery is addressing these releases and aims to prevent additional leaks.

I appreciate any time or comments you may be willing to provide yet today!

Very best,

Danielle
Wisconsin Public Radio
(715) 828-6392