

FILED

Equistar Chemicals, LP
Docket No. 06-2021-3357

21 OCT 14 AM 9:39

REGIONAL HEARING CLERK
EPA REGION VI

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 6
DALLAS, TEXAS

IN THE MATTER OF:

EQUISTAR CHEMICALS, LP
4101 LOUISIANA HIGHWAY 108
WESTLAKE, LA 70669

RESPONDENT

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DOCKET NO. CAA 06-2021-3357

CONSENT AGREEMENT

A. PRELIMINARY STATEMENT

1. This is an administrative penalty assessment proceeding brought under Section 113(d) of the Clean Air Act, (the "CAA" or "Act"), 42 U.S.C. § 7413(d), and Sections 22.13, 22.18, and 22.34 of the Consolidated Rules of Practice Governing the Administrative Assessment of Civil Penalties and the Revocation/Termination or Suspension of Permit ("Consolidated Rules"), as codified at 40 C.F.R. Part 22.

2. Complainant is the United States Environmental Protection Agency, Region 6 (the "EPA"). On EPA's behalf, the Director of the Enforcement and Compliance Assurance Enforcement Division, EPA Region 6, has been delegated the authority to settle civil administrative penalty proceedings under Section 113(d) of the Act, 42 U.S.C. § 7413(d).

3. Respondent Equistar Chemicals, LP (“Respondent”) is a limited partnership doing business in the state of Louisiana. Respondent is a “person” as defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

4. Complainant and Respondent, having agreed that settlement of this action is in the public interest, consent to the entry of this Consent Agreement along with the corresponding Final Order hereinafter known together as “CAFO” without adjudication of any issues of law or fact herein, and Respondent agrees to comply with the terms of this CAFO.

B. JURISDICTION

5. This CAFO is entered into under Section 113(d) of the Act, 42 U.S.C. § 7413(d), and the Consolidated Rules, 40 C.F.R. Part 22. The alleged violations in this CAFO are pursuant to Section 113(a)(3)(A) of the Act, 42 U.S.C. § 7413(a)(3)(A).

6. EPA and the United States Department of Justice jointly determined that this matter, although it involves alleged violations that occurred more than a year before the initiation of this proceeding, is appropriate for an administrative penalty assessment. 42 U.S.C. § 7413(d); 40 C.F.R. § 19.4.

7. The Regional Judicial Officer is authorized to ratify this CAFO which memorializes a settlement between Complainant and Respondent. 40 C.F.R. §§ 22.4(b) and 22.18(b).

8. The issuance of this CAFO simultaneously commences and concludes this proceeding. 40 C.F.R. § 22.13(b).

C. DEFINITIONS

9. “Assist Steam” means all steam that is intentionally introduced before or at a Flare tip through nozzles or other hardware conveyance for the purposes of, including, but not limited

to, protecting the design of the Flare tip, promoting turbulence for mixing, or inducing air into the flame. Assist Steam includes, but is not necessarily limited to, center steam, lower steam, and upper steam. Assist Steam does not include water vapor that exists in the header prior to the flare and is accounted for in the measurement of the Net Heating Value of the Vent Gas.

10. "Combustion Zone" means the area of the Flare flame where the Combustion Zone Gas combines for combustion.

11. "Combustion Zone Gas" means all gases and vapors found after the Flare tip. This gas includes all Vent Gas, Pilot Gas, and Total Steam.

12. "Flare" means a combustion device lacking an enclosed combustion chamber that uses an uncontrolled volume of ambient air to burn gases.

13. "Flare Tip Velocity" or "Vtip" means the velocity of gases exiting the Flare tip as defined in 40 C.F.R. § 60.18(c)(4).

14. "In Operation" with respect to a Flare shall mean any and all times that Sweep, Supplemental, and/or Waste Gas is or may be vented to a Flare. A Flare that is In Operation is capable of receiving Sweep, Supplemental, and/or Waste Gas unless all Sweep, Supplemental, and Waste Gas flow is prevented by means of an isolation device such as closed valves, blinds, and/or stopples.

15. "Lower Heating Value" or "*LHV*" shall mean the theoretical total quantity of heat liberated by the complete combustion of a unit volume or weight of a fuel initially at 25 degrees Centigrade and 760 mmHg, assuming that the produced water is vaporized and all combustion products remain at, or are returned to, 25 degrees Centigrade; however, the standard for determining the volume corresponding to one mole is 20 degrees Centigrade.

16. "Malfunction" shall mean, as specified in 40 C.F.R. § 60.2, "any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not Malfunctions." In any dispute under this CAFO involving this definition, Respondent shall have the burden of proving all of the following:

- a. The excess emissions were caused by a sudden, unavoidable breakdown of technology, beyond the control of the owner or operator;
- b. The excess emissions (1) did not stem from any activity or event that could have been foreseen and avoided, or planned for, and (2) could not have been avoided by better operation and maintenance practices;
- c. To the maximum extent practicable the air pollution control equipment or processes were maintained and operated in a manner consistent with good practice for minimizing emissions;
- d. Repairs were made in an expeditious fashion when the operator knew or should have known that applicable emission limitations were being exceeded. Off-shift labor and overtime must have been utilized, to the extent practicable, to ensure that such repairs were made as expeditiously as practicable;
- e. The amount and duration of the excess emissions (including any bypass) were minimized to the maximum extent practicable during periods of such emissions;
- f. All possible steps were taken to minimize the impact of the excess emissions on ambient air quality;

- g. All emission monitoring systems were kept in operation if at all possible;
- h. The owner or operator's actions during the period of excess emissions were documented by properly signed, contemporaneous operating logs, or other relevant evidence;
- i. The excess emissions were not part of a recurring pattern indicative of inadequate design, operation, or maintenance; and
- j. The owner or operator properly and promptly notified the appropriate regulatory authority if required.

17. "Monitoring System Malfunction" shall mean any sudden, infrequent, and not reasonably preventable failure of instrumentation or a monitoring system to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not Monitoring System Malfunctions. In any dispute under this CAFO involving this definition, respondent shall have the burden of proving all of the following:

- a. The instrument or monitoring system downtime was caused by a sudden, unavoidable breakdown of technology, beyond the control of the owner or operator;
- b. The instrument or monitoring system downtime (a) did not stem from any activity or event that could have been foreseen and avoided, or planned for, and (b) could not have been avoided by better operation and maintenance practices;
- c. To the maximum extent practicable the instrument or monitoring system was maintained and operated in a manner consistent with good practice for minimizing emissions;

- d. Repairs were made in an expeditious fashion when the operator knew or should have known that applicable emission limitations were being exceeded. Off-shift labor and overtime must have been utilized, to the extent practicable, to ensure that such repairs were made as expeditiously as practicable;
- e. The amount and duration of the instrument or monitoring system downtime was minimized to the maximum extent practicable;
- f. The owner or operator's actions during the period of instrument or monitoring system downtime were documented by properly signed, contemporaneous operating logs, or other relevant evidence; and
- g. The instrument or monitoring system downtime was not part of a recurring pattern indicative of inadequate design, operation, or maintenance.

18. "Net Heating Value" means Lower Heating Value.

19. "Net Heating Value of Combustion Zone Gas" or " NHV_{CZ} " shall mean the Lower Heating Value, in BTU/scf, of the Combustion Zone Gas in the flare. The NHV_{CZ} shall be calculated in accordance with Step 3 of Appendix B of this CAFO.

20. "Net Heating Value of Vent Gas" or " NHV_{Vg} " shall mean the Lower Heating Value, in BTU/scf, of the Vent Gas directed to the flare. NHV_{Vg} shall be calculated in accordance with Step 1 of Appendix B of this CAFO.

21. "Pilot Gas" shall mean gas introduced into the flare tip that provides a flame to ignite the Vent Gas.

22. "Purge Gas" shall mean the gas introduced between a Flare header's water seal and the Flare tip to prevent oxygen infiltration (backflow) into the Flare tip. For a Flare with no

water seal, the function of Purge Gas is performed by Sweep Gas, and therefore, by definition, such a Flare has no Purge Gas.

23. "SCFD" or "scfd" means standard cubic feet per day.

24. "SCFH" or "scfh" means standard cubic feet per hour.

25. "SCFM" or scfm means standard cubic feet per minute.

26. "Smoke Emissions" has the meaning set forth in Section 3.5 of Method 22 of 40 C.F.R. Part 60, Appendix A.

27. "Steam Assisted Flare" means a Flare that uses Assist Steam piped to a Flare tip to assist in combustion.

28. "Supplemental Gas" shall mean all gas introduced to the flare to comply with the net heating value requirements of 40 C.F.R. § 63.670(e).

29. "Sweep Gas" shall mean the minimum amount of gas introduced into the flare header to (a) prevent oxygen buildup, corrosion, and/or freezing in the flare header; (b) maintain a safe flow of gas through the flare header; including a higher flow during hot taps; and (c) prevent oxygen infiltration (backflow) into the flare tip.

30. "Total Steam" shall mean the total of all steam that is supplied to the flare and includes, but is not limited to, lower steam, center steam, and upper steam.

31. "Vent Gas" shall mean all gas found just prior to the flare tip. This gas includes all Waste Gas, that portion of Sweep Gas that is not recovered, Purge Gas, and Supplemental Gas, but does not include Pilot Gas, or Total Steam.

32. "Visible Emissions" means five minutes or more of Smoke Emissions during any two consecutive hours.

33. "Waste Gas" shall mean the mixture of all gases from the facility operations that is directed to the flare for the purpose of disposing of the gas. "Waste Gas" does not include gas introduced to the flare exclusively to make it operate safely and as intended; therefore "Waste Gas" does not include Pilot Gas, Total Steam, or the minimum amount of Sweep Gas and Purge Gas that is necessary to perform the functions of Sweep Gas and Purge Gas. "Waste Gas" also does not include the minimum amount of gas introduced to the flare to comply with regulatory and/or permit requirements regarding the combustible characteristics of Combustion Zone Gas; therefore "Waste Gas" does not include Supplemental Gas.

D. GOVERNING LAW

New Source Performance Standards

34. Section 111(b)(1)(A) of the CAA, 42 U.S.C. § 7411(b)(1)(A), requires EPA to publish and periodically revise a list of categories of stationary sources, including those categories that, in EPA's judgment, cause or contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare.

35. Once a category is included on the list, Section 111(b)(1)(B) of the CAA, 42 U.S.C. § 7411(b)(1)(B), requires EPA to promulgate a federal standard of performance for new sources within the category, also known as New Source Performance Standards ("NSPS"). Section 111(e) of the CAA, 42 U.S.C. §7411(e), prohibits an owner or operator of a new source from operating that source in violation of an NSPS after the effective date of the NSPS applicable to such source.

36. The NSPS are located in Part 60 of Title 40 of the Code of Federal Regulations.

37. Pursuant to Section 111(b)(1)(B) of the CAA, 42 U.S.C. § 7411(b)(1)(B), EPA has promulgated regulations that contain general provisions applicable to all NSPS sources. 40 C.F.R. Part 60, Subpart A, §§ 60.1-60.19 (“NSPS Subpart A”).

38. Under NSPS Subpart A, the provisions of 40 C.F.R. Part 60 “apply to the owner or operator of any stationary source which contains an affected facility, the construction or modification of which is commenced after publication [in Part 60] of any standard (or, if earlier, the date of publication of any proposed standard) applicable to that facility.” 40 C.F.R. § 60.1.

39. NSPS Subpart A requires that “[a]t all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions.” 40 C.F.R. § 60.11(d).

E. FINDINGS OF FACT AND CONCLUSIONS OF LAW

40. At all times relevant to this proceeding, Respondent has owned and/or operated a chemical manufacturing facility located at 4101 Louisiana Highway 108, Westlake, Louisiana 70669 (the “Facility”).

41. Respondent is the owner and/or operator of the Facility within the meaning of Section 111(a)(5) of the Act, 42 U.S.C. § 7411(a)(5), 40 C.F.R. § 60.2.

42. At all times relevant to this proceeding, Respondent owned and/or operated units that emit Volatile Organic Compounds (“VOCs”) at the Facility.

43. The Facility produces polypropylene and other specialty products.

44. The Facility is a “stationary source” as that term is defined in Section 111(a)(3) of the Act, 42 U.S.C. § 7411(a)(3), and 40 C.F.R. § 60.2.

45. At all times relevant to this proceeding, the Facility was a “major source” within the meaning of the Act’s Title V program, Section 501(2) of the Act, 42 U.S.C. § 7661(2), and 40 C.F.R. § 70.2.

46. The Facility is subject to the CAA Title V Federal Operating Permit (“FOP”) program.

47. On or about July 12, 2016, the Louisiana Department of Environmental Quality (“LDEQ”) issued Respondent Permit No. 0520-00006-V5 (the “Title V permit”), an air permit issued under LDEQ’s Part 70 Operating Permits Program, approved by EPA at 60 Fed. Reg. 47,296 (September 12, 1995). The Title V permit consolidated three separate Title V permits at the Facility (Permit No. 2109-V7 for the M-Line Production Area, issued on or about October 6, 2014, Permit No. 0520-00006-V4AA for the Plant 5 Process Unit, issued on or about July 18, 2014, and Permit No. 2868-V2AA for the Cogeneration Plant, issued on or about July 18, 2014). These Title V permits covered various emissions units at the Facility, including the M-Line Production Area Flare and the Plant 5 Process Unit Flare (collectively, “the Flares”). LDEQ modified the Title V permit on several occasions since July 12, 2016, with the most recent modification on or about March 4, 2021.

48. At the Facility, Respondent utilizes the M-Line Production Area Flare to control the emissions of routine process waste gas streams from the M-Line Production Area. The Title V permit requires, inter alia, that Respondent operate the M-Line Production Area Flare in compliance with certain provisions of NSPS Subpart A (40 C.F.R. Part 60, Subpart A).

49. At the Facility, Respondent utilizes the Plant 5 Process Unit Flare to control the emissions of routine process waste gas streams from the Plant 5 Process Unit. The Title V

permit requires, inter alia, that Respondent operate the Plant 5 Process Unit Flare in compliance with certain provisions of NSPS Subpart A (40 C.F.R. Part 60, Subpart A).

50. The Flares are steam-assisted flares.

51. On April 29, 2018, EPA conducted a flyover to assess the Facility's emissions using Optical Gas Imaging ("OGI") technology.

52. Based on information EPA obtained during the flyover, EPA issued an Information Request on July 9, 2018 regarding the Facility under Section 114 of the Act, 42 U.S.C. § 7414 ("Section 114 Request"). On July 30, 2018, EPA sent Respondent OGI video capture of its flaring operations. EPA received Respondent's response on August 20, 2018. As part of its response, Respondent provided various information regarding the Facility's flaring operations, including but not limited to assist steam flow rates and steam-to-vent gas ratios at the Flares from July 17, 2015 through July 17, 2018 ("Section 114 Request Period").

53. EPA identified alleged violations of the CAA at the Flares during the Section 114 Request Period based on its review of the above information. On September 24, 2020, EPA and Respondent entered into an Administrative Compliance Order on Consent ("Consent Order") pursuant to EPA's authority under Section 113(a)(3) of the Act, 42 U.S.C. § 7413(a)(3), to address violations of 40 C.F.R. § 60.18(d) to ensure the Flares are operated and maintained in conformance with their designs.

54. Respondent has complied with all terms of the Consent Order and submitted its Certification of Compliance on May 27, 2020. The Consent Order expired on September 24, 2020, one year after its Effective Date and in accordance with Paragraph 36 of the Consent Order. Respondent continued in good faith to meet the schedule of commitments dated May 30, 2019 to implement flare efficiency control equipment. Respondent has made commitments

estimated at \$7 (seven) Million dollars for purposes of complying with the Consent Order and this CAFO.

55. Section F of this CAFO describes the alleged violations at the Flares for the period between March 1, 2016 and July 17, 2018 that are addressed in this CAFO.

F. ALLEGED VIOLATIONS

56. The Flares are subject to 40 C.F.R. § 60.11(d). Under these regulations, Respondent was and is, required, at all times, including periods of startup, shutdown, and malfunction, to the extent practicable, to maintain and operate the Flares in a manner consistent with safety and good air pollution control practices for minimizing emissions.

57. On information and belief, at various times during the period between March 1, 2016 and July 17, 2018, as reflected in the data Respondent produced to EPA described in Section E of the CAFO, Respondent operated the Flares with high steam to vent gas ratios. Upon information and belief, the high steam to vent gas ratios increased the likelihood of reduced combustion efficiency.

58. Respondent's operation of the Flares with high steam to vent gas ratios violated 40 C.F.R. § 60.11(d) by failing to operate the Flares in a manner consistent with good air pollution control practices for minimizing emissions.

G. CIVIL PENALTY AND CONDITIONS OF SETTLEMENT

General

59. For the purpose of this proceeding, as required by 40 C.F.R. § 22.18(b)(2),

Respondent:

- a. admits that the EPA has jurisdiction over the subject matter alleged in this CAFO;

- b. neither admits nor denies the specific factual allegations contained in the CAFO;
 - c. consents to the assessment of a civil penalty as stated below;
 - d. consents to the issuance of any specified compliance or corrective action order;¹
 - e. consents to the conditions specified in this CAFO;
 - f. consents to any stated permit action;
 - g. waives any right to contest the alleged violations set forth in Section F of this CAFO; and
 - h. waives its rights to appeal the Final Order included in this CAFO.
60. For the purpose of this proceeding, Respondent:
- a. agrees that this CAFO states a claim upon which relief may be granted against Respondent;
 - b. acknowledges that this CAFO constitutes an enforcement action for purposes of considering Respondent's compliance history in any subsequent enforcement action;
 - c. waives any and all remedies, claims for relief and otherwise available rights to judicial or administrative review that Respondent may have with respect to any issue of fact or law set forth in this CAFO, including any right of judicial review under Section 307(b)(1) of the Act, 42 U.S.C. § 7607(b)(1);

¹ Although 40 C.F.R. § 22.18(b)(2) requires each item in this list to be stated in this CAFO, Subparagraphs "d." and "f." are not applicable to this particular case.

- d. consents to personal jurisdiction in any action to enforce this CAFO in the United States District Court for the Western District of Louisiana;
- e. waives any right it may possess at law or in equity to challenge the authority of EPA to bring a civil action in a United States District Court to compel compliance with this CAFO and to seek an additional penalty for such noncompliance, and agrees that federal law shall govern in any such civil action; and
- f. agrees that in any subsequent administrative or judicial proceeding initiated by the Complainant or the United States for injunctive relief, civil penalties, or other relief relating to this Facility, Respondent shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim preclusion, claim splitting, or other defenses based on any contention that the claims raised by the Complainant or the United States were or should have been brought in the instant case, except with respect to claims that have been specifically resolved pursuant to this CAFO.

Penalty Assessment and Collection

61. Upon consideration of the entire record herein, including the Findings of Fact and Conclusions of Law, which are hereby adopted and made a part hereof, and upon consideration of the size of the business, the economic impact of the penalty on the business, the Respondent's full compliance history and good faith efforts to comply, the duration of the violation, payment by the Respondent of penalties previously assessed for the same violation, the economic benefit of noncompliance, the seriousness of the violation, and other factors as

justice may require, EPA has assessed a civil penalty in the amount of \$275,000 (the “EPA Penalty”). The EPA Penalty has been determined in accordance with the Section 113 of the Act, 42 U.S.C. § 7413, and at no time exceeded EPA’s statutory authority.

62. Respondent agrees to:

- a. pay the EPA Penalty within 30 calendar days of the Effective Date of this CAFO, and
- b. pay the EPA Penalty by cashier’s check, certified check, or wire transfer made payable to “Treasurer, United States of America, EPA – Region 6.” Payment shall be remitted in one of five (5) ways: (1) regular U.S. Postal Service mail including certified mail; (2) overnight mail; (3) wire transfer; (4) Automated Clearinghouse for receiving US currency; or (5) Online Payment.

For regular U.S. Postal Service mail, U.S. Postal Service certified mail, or U.S. Postal Service express mail, payment should be remitted to:

U.S. Environmental Protection Agency
Fines and Penalties
Cincinnati Finance Center
P.O. Box 979077
St. Louis, MO 63197-9000

For overnight mail (non-U.S. Postal Service, *e.g.* FedEx), payment should be remitted to:

U.S. Bank
Government Lockbox 979077
U.S. EPA Fines & Penalties
1005 Convention Plaza
SL-MO-C2-GL
St. Louis, MO 63101

Contact: Natalie Pearson
(314) 418-4087

For wire transfer, payment should be remitted to:

Federal Reserve Bank of New York
ABA: 021030004
Account Number: 68010727
SWIFT address: FRNYUS33
33 Liberty Street
New York, NY 10045

Field Tag 4200 of the Fedwire message should read:
"D 68010727 Environmental Protection Agency"

For Automated Clearinghouse (also known as REX or remittance express):

U.S. Treasury REX / Cashlink ACH Receiver
ABA: 051036706
Account Number: 310006, Environmental Protection Agency
CTX Format Transaction Code 22 – checking
Physical location of U.S. Treasury facility:
5700 Rivertech Court
Riverdale, MD 20737

Contact – Jesse White (301) 887-6548

For Online Payment:

<https://www.pay.gov/paygov/>
Enter sfo 1.1 in search field
Open form and complete required fields.

PLEASE NOTE: The docket number CAA-06-2021-3357 should be clearly typed on the check to ensure proper credit. The payment shall also be accompanied by a transmittal letter that shall reference Respondent's name and address, the case name, and docket number CAA-06-2021-3357. Respondent's adherence to this request will ensure proper credit is given when penalties are received for the Region. Respondent shall also email a simultaneous notice of such payment, including a copy of the money order, or check, and the transmittal letter to the following email addresses:

Justin Chen (ECDAT)
U.S. EPA Region 6
1201 Elm Street, Suite 500
Dallas, Texas 75270
Chen.Justin@epa.gov

And

Lorena Vaughn (6RC)
U.S. EPA Region 6
1201 Elm Street, Suite 500
Dallas, Texas 75270
Vaughn.Lorena@epa.gov

63. Respondent agrees to pay the following on any overdue EPA Penalty:

- a. Interest. Pursuant to Section 113(d)(5) of the Act, 42 U.S.C. § 7413(d)(5), any unpaid portion of a civil penalty must bear interest at the rates established pursuant to 26 U.S.C. § 6621(a)(2).
- b. Nonpayment Penalty. On any portion of a civil penalty more than ninety (90) calendar days delinquent, Respondent must pay a nonpayment penalty, pursuant to Section 113(d)(5) of the Act, 42 U.S.C. § 7413(d)(5), which shall accrue from the date the penalty payment became delinquent, and which shall be in addition to the interest which accrues under Subparagraph “a.” of this Paragraph.

64. Respondent shall pay a charge to cover the cost of processing and handling any delinquent penalty claim, pursuant to 42 U.S.C. § 7413(d)(5), including but not limited to attorneys’ fees incurred by the United States for collection proceedings.

65. If Respondent fails to timely pay any portion of the penalty assessed under this CAFO, EPA may:

- a. refer the debt to a credit reporting agency, a collection agency, or to the Department of Justice for filing of a collection action in the appropriate United States District Court (in which the validity, amount, and appropriateness of the assessed penalty and of this CAFO shall not be subject to review) to secure payment of the debt, which may include the original

- penalty, enforcement and collection expenses, nonpayment penalty and interest, 42 U.S.C. § 7413(d)(5) and 40 C.F.R. §§ 13.13, 13.14, and 13.33;
- b. collect the above-referenced debt by administrative offset (*i.e.*, the withholding of money payable by the United States to, or held by the United States for, a person to satisfy the debt the person owes the Government), which includes, but is not limited to, referral to the Internal Revenue Service for offset against income tax refunds, 40 C.F.R. Part 13, Subparts C and H; and
 - c. suspend or revoke Respondent's licenses or other privileges, or suspend or disqualify Respondent from doing business with EPA or engaging in programs the EPA sponsors or funds, 40 C.F.R. § 13.17.

Conditions of Settlement

66. As a Condition of Settlement, Respondent agrees that, within 365 calendar days of the Effective Date of this CAFO, Respondent shall have completed the Flare Data and Monitoring Systems and Protocol Report for the Flares and shall have completed the installation and commenced the operation of the instrumentation, controls, and monitoring systems set forth in Appendix A for the Flares and operate the Flares as required in Appendix A.

67. Permits Needed to Meet Compliance Obligations. If any compliance obligation under this CAFO requires Respondent to obtain federal, state, or local permit or approval, Respondent shall submit timely and complete applications and take all other actions necessary to obtain all such permit or approvals.

68. Permits to Ensure Survival of CAFO Limits and Standards. By no later than ninety (90) days after the Effective Date of this CAFO, Respondent shall submit a complete application to the Louisiana Department of Environmental Quality requesting to incorporate the limits and standards in Appendix A into the federally enforceable operating permit.

69. At such time as the Respondent believes that it has complied with all terms and conditions of Paragraphs 61-63 (payment of EPA penalty), that it has achieved compliance with the requirements of Paragraph 66 and Appendix A (Conditions of Settlement), Respondent shall certify to EPA completion of these items and provide any necessary documentation.

Respondent represents that the signing representative will be fully authorized by Respondent to certify that the terms and conditions of this CAFO have been met. The certification should include the following statement:

I certify under penalty of law that I have examined and am familiar with the information submitted in this document and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is, to the best of my knowledge, true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fines and imprisonment.

The certification required above shall be sent to the following email address:

Justin Chen (ECDAT)
U.S. EPA, Region 6
1201 Elm Street, Suite 500
Dallas, Texas 75270
Chen.Justin@epa.gov

Respondent may also request that EPA issue a close-out letter when Respondent certifies completion of the terms and conditions of the CAFO. EPA has 90 days to respond with questions

or disagreement that the conditions of the CAFO have been satisfied, or to issue a close-out letter if requested by Respondent.

70. Respondent agrees that the time period from the Effective Date of this CAFO until compliance with the conditions specified in Paragraph 66 and Appendix A are completed (the "Tolling Period") shall not be included in computing the running of any statute of limitations potentially applicable to any action brought by Complainant on any claims set forth in Section F of this CAFO (the "Tolled Claims"). Respondent shall not assert, plead, or raise in any fashion, whether by answer, motion or otherwise, any defense of laches, estoppel, or waiver, or other similar equitable defense based on the running of any statute of limitations or the passage of time during the Tolling Period in any action brought on the Tolled Claims.

71. The provisions of this CAFO shall apply to and be binding upon Respondent and its officers, directors, employees, agents, trustees, servants, authorized representatives, successors and assigns. From the Effective Date of this Agreement until the end of the Tolling Period, as set out in Paragraph 70, Respondent must give written notice and a copy of this CAFO to any successors in interest prior to transfer of ownership or control of any portion or interest in the Facility. Simultaneously with such notice, Respondent shall provide written notice of such transfer, assignment, or delegation to EPA. In the event of any such transfer, assignment or delegation, Respondent shall continue to be bound by the obligations or liabilities of this CAFO until EPA has provided written approval.

72. By signing this CAFO, Respondent acknowledges that this CAFO will be available to the public and agrees that this CAFO does not contain any confidential business information.

73. By signing this CAFO, the undersigned representative of Complainant and the undersigned representative of Respondent each certify that he or she is fully authorized to

that accrue from the Effective Date of this CAFO until compliance is achieved, and seek other relief in a civil judicial action pursuant to the Clean Air Act, pursuant to contract law, or both.

79. Penalties paid pursuant to this CAFO shall not be deductible for purposes of federal taxes.

80. This CAFO constitutes the entire agreement and understanding of the parties and supersedes any prior agreements or understandings, whether written or oral, among the parties with respect to the subject matter hereof, with the exception of the Consent Order issued on September 24, 2019.

81. The terms, conditions, and compliance requirements of this CAFO may not be modified or amended except upon the written agreement of both parties, and approval of the Regional Judicial Officer.

82. Any violation of the included Final Order may result in a civil judicial action for an injunction or civil penalties of up to \$102,638 per day of violation, or both, as provided in Section 113(b)(2) of the Act, 42 U.S.C. § 7413(b)(2), as well as criminal sanctions as provided in Section 113(c) of the Act, 42 U.S.C. § 7413(c). EPA may use any information submitted under this CAFO in an administrative, civil judicial, or criminal action.

83. Nothing in this CAFO shall relieve Respondent of the duty to comply with all applicable provisions of the Act and other federal, state, or local laws or statutes, nor shall it restrict the EPA's authority to seek compliance with any applicable laws or regulations, nor shall it be construed to be a ruling on, or a determination of, any issue related to any federal, state, or local permit.

84. Nothing herein shall be construed to limit the power of EPA to undertake any action against Respondent or any person in response to conditions that may present an imminent and substantial endangerment to the public health, welfare, or the environment.

85. For purposes of the identification requirement in Section 162(f)(2)(A)(ii) of the Internal Revenue Code, 26 U.S.C. § 162(f)(2)(A)(ii), and 26 C.F.R. § 1.162-21(b)(2), performance of Paragraphs 66-68 and Appendix A is restitution, remediation, or required to come into compliance with the law.

I. EFFECTIVE DATE

86. Respondent and Complainant agree to the issuance of the included Final Order. Upon filing the EPA will transmit a copy of the filed CAFO to the Respondent. This CAFO shall become effective after execution of the Final Order by the Regional Judicial Officer on the date of filing with the Hearing Clerk.

The foregoing Consent Agreement In the Matter of Equistar Chemicals, LP, Docket No. 06-2021-3357, is Hereby Stipulated, Agreed, and Approved for Entry.

FOR RESPONDENT:

Date: 10/12/21



Julie Solmer Stine, Esq.
Associate General Counsel – Operations and HSE
LyondellBasell
1221 McKinney Street, Suite 300
Houston, Texas 77010

FOR COMPLAINANT:

STEPHEN
GILREIN

Digitally signed by STEPHEN GILREIN
DN: cn=US, o=U.S. Government,
ou=Environmental Protection Agency,
cn=STEPHEN GILREIN,
o=U.S. 2342, 19200300, 100.1.1+680010036517M
Date: 2021.10.13.16.40.42 -0500

Cheryl T. Seager
Director
Enforcement and
Compliance Assurance Division
U.S. EPA, Region 6

CERTIFICATE OF SERVICE

I hereby certify that on the date in the electronic signature below, an electronic copy of the foregoing Consent Agreement and Final Order was electronically delivered to the Regional Hearing Clerk, U.S. EPA - Region 6, 1201 Elm Street, Suite 500, Dallas, Texas 75270-2102, and a true and correct copy was delivered to the following individual(s) by the method indicated below:

EMAIL - READ RECEIPT REQUESTED

Julie Solmer Stine, Esq.
Associate General Counsel – Operations and HSE
LyondellBasell
1221 McKinney Street, Suite 300
Houston, Texas 77010
Julie.SolmerStine@lyondellbasell.com

U.S. EPA, Region 6
Dallas, Texas

APPENDIX A
Instrumentation and Monitoring Systems

A1. Flare Data and Monitoring Systems and Protocol Report. For the Flares, by no later than 365 calendar days from the Effective Date of the CAFO, Equistar shall submit a report, to EPA that includes the following:

A1.a. Facility-Wide

A1.a.1 Facility plot plan showing the location of each Flare in relation to the general plant layout

A1.b. General Description of Each Flare

A1.b.1 Ground or elevated

A1.b.2 Type of assist system

A1.b.3 Simple or integrated (*e.g.*, sequential, staged)

A1.b.4 Date first installed

A1.b.5 History of any physical changes to the Flare

A1.b.6 Whether the Flare is a temporary-use Flare, and if so, the duration and time periods of use

A1.c. Flare Components: Complete description of each major component of each Flare including but not limited to:

A1.c.1 Flare stack (for elevated flares)

A1.c.2 Flare tip

A1.c.2.1 Date installed

A1.c.2.2 Manufacturer

A1.c.2.3 Tip size

A1.c.2.4 Tip drawing

A1.c.3 Knockout or surge drum(s) or pot(s), including dimensions and design capacities

A1.c.4 Water seal(s), including dimensions and design parameters

A1.c.5 Flare header(s)

A1.c.6 Sweep Gas system

A1.c.7 Purge Gas system

A1.c.8 Pilot Gas system

A1.c.9 Supplemental Gas system

- A1.c.10 Assist system
- A1.c.11 Ignition system
- A1.d. Simplified process diagram(s) showing the configuration of the components listed in Paragraph A1.c
- A1.e. Flare Design Parameters
 - A1.e.1 Maximum Vent Gas flow rate and/or mass rate
 - A1.e.2 Maximum Sweep Gas flow rate and/or mass rate
 - A1.e.3 Maximum Purge Gas flow rate and/or mass rate, if applicable
 - A1.e.4 Maximum Pilot Gas flow rate and/or mass rate
 - A1.e.5 Maximum Supplemental Gas flow rate and/or mass rate
 - A1.e.6 If steam-assisted, minimum total steam rate, including all available information on how that rate was derived
- A1.f. Gases Venting to Each Flare
 - A1.f.1 Sweep Gas
 - A1.f.1.1 Type of gas used
 - A1.f.1.2 Actual set operating flow rate (in scfm)
 - A1.f.1.3 Average lower heating value expected for each type of gas used
 - A1.f.2 Purge Gas, if applicable
 - A1.f.2.1 Type of gas used
 - A1.f.2.2 Actual set operating flow rate (in scfm)
 - A1.f.2.3 Average lower heating value expected for each type of gas used
 - A1.f.3 Pilot Gas
 - A1.f.3.1 Type of gas used
 - A1.f.3.2 Actual set operating flow rate (in scfm)
 - A1.f.3.3 Average lower heating value expected for each type of gas used
 - A1.f.4 Supplemental Gas
 - A1.f.4.1 Type of gas used
 - A1.f.4.2 Average lower heating value expected for each type of gas used
 - A1.f.5 Steam (if applicable)
 - A1.f.5.1 Drawing showing points of introduction of Lower Steam, Center Steam, Upper Steam, and any other steam

A1.f.6 Simplified flow diagram that depicts the points of introduction of all gases, including Waste Gases, at the Flare (in this diagram, the detailed drawings of A1.f.5.1 may be simplified; in addition, detailed Waste Gas mapping is not required; a simple identification of the header(s) that carries(y) the Waste Gas to the Flare and show(s) its(their) location in relation to the location of the introduction of the other gases is all that is required)

A1.g. Existing Monitoring Systems at Each Flare

A1.g.1 A brief narrative description, including manufacturer and date of installation, of all existing monitoring systems, including but not limited to:

A1.g.1.1 Waste Gas and/or Vent Gas flow monitoring

A1.g.1.2 Waste Gas and/or Vent Gas heat content analyzer

A1.g.1.3 Sweep Gas flow monitoring

A1.g.1.4 Purge Gas flow monitoring

A1.g.1.5 Supplemental Gas flow monitoring

A1.g.1.6 Steam flow monitoring

A1.g.1.7 Waste Gas or Vent Gas molecular weight analyzer

A1.g.1.8 Gas chromatograph

A1.g.1.9 Sulfur analyzer(s)

A1.g.1.10 Video camera

A1.g.1.11 Thermocouple

A1.g.2 Drawing(s) showing locations of all existing monitoring systems

A1.h. Monitoring equipment to be installed to comply with this CAFO

A1.i. Narrative description of the monitoring methods and calculations that will be used to comply with the NHV_{CZ} requirements in the CAFO

A2. Installation and Operation of Monitoring Systems. Within 365 calendar days from the Effective Date of this CAFO, Equistar shall have completed the installation and commenced the operation of the instrumentation, controls, and monitoring systems set forth in Paragraphs A3-A5 for the Flares.

A3. Vent Gas and Assist Steam Monitoring Systems.

a. Equistar shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of Vent Gas (which includes Waste, Sweep, Purge, and any Supplemental Gas used) in the header or headers that feed the Flares. Different flow monitoring methods may be used to measure different gaseous streams that make up the Vent Gas provided that the flow rates of all gas streams that contribute to the Vent Gas are determined.

- b. Equistar shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of Assist Steam used with each Flare.
- c. Each flow rate monitoring system must be able to correct for the temperature and pressure of the system and output parameters in standard conditions (*i.e.*, a temperature of 20 °C (68 °F) and a pressure of 1 atmosphere).
- d. In lieu of a monitoring system that directly measures volumetric flow rate, Equistar may choose from the following additional options for monitoring any gas stream:
- (i) Mass flow monitors may be used for determining the volumetric flow rate of steam provided that Equistar converts the mass flow rates to volumetric flow rates pursuant to the methodology in Step 2 of Appendix B;
 - (ii) Mass flow monitors may be used for determining the volumetric flow rate of Vent Gas, provided Equistar determines the molecular weight of such Vent Gas using compositional analysis data collected pursuant to the monitoring method specified in Paragraph A5.a or A5.b and provided that Equistar converts the mass flow rates to volumetric flow rates pursuant to the methodology in Step 2 of Appendix B; and
 - (iii) Continuous pressure/temperature monitoring system(s) and appropriate engineering calculations may be used in lieu of a continuous volumetric flow monitoring system provided the molecular weight of the gas is known and provided Equistar complies with the methodology in Step 2 of Appendix B for calculating volumetric flow rates. For Vent Gas, Equistar must determine molecular weight using compositional analysis data collected pursuant to the monitoring method specified in Paragraph A5.a or A5.b.

A4. Equipment Controls.

- a. Equistar shall install, operate, calibrate (if necessary), and maintain equipment, including main and trim control valves and piping, that enables Equistar to control Assist Steam flow in a manner sufficient to ensure compliance with this CAFO.
- b. Install and operate automated controls to automatically adjust the steam flow rates with changes to the Vent Gas flow rates to ensure compliance with the NHVcz standard.
- c. Install and operate automated controls of the Supplemental Gas rate in relation to the Vent Gas flow rate to ensure compliance with the NHVcz standard.

A5. Vent Gas Compositional Monitoring or Direct Monitoring of Net Heating Value of Vent Gas. For each Flare, Equistar shall determine the concentration of individual components in the Vent Gas or shall directly monitor the Net Heating Value of the Vent Gas (NHV_{vg}) in compliance with one of the methods specified in Subparagraphs A5.a–A5.c. Equistar may elect to use different monitoring methods (of the methods provided in Subparagraphs A5.a–A5.c) for different gaseous streams that make up the

Vent Gas, provided the composition or Net Heating Value of all gas streams that contribute to the Vent Gas are determined.

- a. Install, operate, calibrate, and maintain a monitoring system capable of continuously measuring (*i.e.*, at least once every 15 minutes), calculating, and recording the individual component concentrations present in the Vent Gas; or
- b. Install, operate, calibrate, and maintain a calorimeter capable of continuously measuring (*i.e.*, at least once every 15 minutes), calculating, and recording the NHV_{vg} at standard conditions. If Equistar elects this method, Equistar may, at its discretion, install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the hydrogen concentration in the Vent Gas; or
- c. Direct compositional or Net Heating Value monitoring is not required for purchased ("pipeline quality") natural gas streams. The Net Heating Value of purchased natural gas streams may be determined using annual or more frequent grab sampling at any one representative location. Alternatively, the Net Heating Value of any purchased natural gas stream can be assumed to be 920 BTU/scf.

A6. Instrumentation and Monitoring Systems: Specifications, Calibration, Quality Control, and Maintenance.

- a. The instrumentation and monitoring systems identified in Paragraphs A3 and A5 shall:
 - (i) Meet or exceed all applicable minimum accuracy, calibration and quality control requirements specified in Table 13 of 40 C.F.R. Part 63, Subpart CC;
 - (ii) Have an associated readout (*i.e.*, a visual display or record) or other indication of the monitored operating parameter that is readily accessible onsite for operational control or inspection by Equistar;
 - (iii) Be capable of measuring the appropriate parameter over the range of values expected for that measurement location; and
 - (iv) The associated data recording system must have a resolution that is equal to or better than the required instrumentation/system accuracy.
- b. Equistar shall operate, maintain, and calibrate each instrumentation and monitoring system identified in Paragraphs A3 and A5 according to a continuous parametric monitoring system (CPMS) monitoring plan that contains the information listed in 40 C.F.R. §§ 63.671(b)(1) through (5).
- c. All monitoring systems that fall under the monitoring method in Paragraph A5.a must also meet the requirements of 40 C.F.R. §§ 63.671(e)(1) through (3) (Additional Requirements for Gas Chromatographs).

d. For each instrumentation and monitoring system identified in Paragraphs A3 and A5, Equistar shall comply with the out-of-control procedures described in 40 C.F.R. §§ 63.671(c)(1) and (2), and with the data reduction requirements specified in 40 C.F.R. §§ 63.671(d)(1) through (3).

A7. Instrumentation and Monitoring Systems: Recording and Averaging Times. The instrumentation and monitoring systems identified in Paragraphs A3 and A5 shall be able to produce and record data measurements and calculations for each parameter at the following time intervals.

<u>Instrumentation and Monitoring System</u>	<u>Recording and Averaging Times</u>
Vent Gas (including Waste, Sweep, Purge, and Supplemental) and Assist Steam Flow Monitoring Systems	Measure continuously and record 15-minute block averages
Vent Gas Compositional Monitoring (if using the methodology in Paragraph A5.a)	Measure no less than once every 15 minutes and record that value
Vent Gas Net Heating Value Analyzer (if using the methodology in Paragraph A5.b)	Measure continuously and record 15-minute block averages

The term “continuously” in this Paragraph means to make a measurement as often as the manufacturer’s stated design capabilities of the flow monitors (for Vent Gas, Assist Steam, Assist Air, and if installed, Pilot Gas) and the Vent Gas Net Heating Value analyzers during each fifteen (15) minute block period, but in no case shall the flow monitors or the Vent Gas Net Heating Value analyzers make less than one measurement in each fifteen (15) minute block period. The measurement results are then averaged and recorded to represent each fifteen (15) minute block period.

Nothing in this Paragraph is intended to prohibit Equistar from setting up process control logic that uses different averaging times from those in this table provided that the recording and averaging times in this table are available and used for determining compliance with this CAFO.

A8. Instrumentation and Monitoring Systems: Operation. Except for periods of Monitoring System Malfunctions, repairs associated with Monitoring System Malfunctions, and required monitoring system quality assurance or quality control activities (including, as applicable, calibration checks and required zero and span adjustments), Equistar shall operate each of the instruments and monitoring systems required in Paragraphs A3 and A5 and collect data on a continuous basis at all times the Flares are capable of receiving Sweep, Supplemental, and/or Waste Gas.

Flare Combustion Efficiency

A9. General Emission Standards Applicable to Flares. By the Effective Date of the CAFO, Equistar shall comply with the requirements set forth in this Paragraph at all times when the Flares are In Operation.

a. Operation during Vent Gas Venting. Equistar shall operate each Flare at all times when Vent Gas may be vented to it.

- b. Pilot Flame Presence. Equistar shall comply with the requirements of the Facility's Title V permit and 40 C.F.R. § 60.18(f)(2).
- c. No Visible Emissions. Equistar shall comply with the requirements of the Facility's Title V permit and 40 C.F.R. § 60.18(c)(1).
- d. Flare Tip Velocity. Equistar shall comply with the requirements of the Facility's Title V permit and 40 C.F.R. § 60.18(c)(4).
- e. Monitoring According to Applicable Provisions. Equistar shall comply with all applicable Subparts of 40 C.F.R. Parts 60, 61, and 63 which state how a particular flare must be monitored.
- f. Good Air Pollution Control Practices. At all times, including during periods of Startup, Shutdown, and/or Malfunction, Equistar shall implement good air pollution control practices to minimize emissions from each Flare.

A10. Combustion Zone Net Heating Value Standard. Within 365 calendar days from the Effective Date of this CAFO, at any time that Supplemental, Sweep, and/or Waste Gas is routed to a Flare for at least 15 minutes, Equistar shall operate the Flare(s) to maintain the NHV_{cz} at or above 270 BTU/scf determined on a 15-minute block period basis. Equistar shall monitor and calculate NHV_{cz} in accordance with Appendix B.

A11. Recordkeeping: Timing and Substance. At the time paragraph A10 applies, Equistar shall comply with recordkeeping requirements to calculate and record each of the following parameters:

- a. Volumetric flow rates of all gas streams that contribute to the Vent Gas volumetric flow rate (in scfm) (in 15-minute block averages and in accordance with any calculation requirements of Paragraph A5 and Step 2 of Appendix B);
- b. Assist Steam volumetric flow rate (in scfm) (in 15-minute block averages and in accordance with any calculation requirements of Paragraph A5 and Step 2 of Appendix B);
- c. NHV_{vg} (in BTU/scf) (in 15-minute block averages in accordance with Step 1 of Appendix B);
- d. NHV_{cz} (in BTU/scf) (in 15-minute block averages in accordance with Step 3 of Appendix B).

APPENDIX B
CALCULATING NET HEATING VALUE OF THE COMBUSTION ZONE GAS (NHV_{cz})

All abbreviations, constants, and variables are defined in the Key on Page B-5 of this Appendix.

Step 1: Determine the Net Heating Value of the Vent Gas (NHV_{vg})

Equistar shall determine the Net Heating Value of the Vent Gas (NHV_{vg}) based on composition monitoring data on a 15-minute block average basis according to the following requirements. If Equistar monitors separate gas streams that combine to comprise the total vent gas flow to a flare, the 15-minute block average Net Heating Value shall be determined separately for each measurement location according to the following requirements and a flow-weighted average of the gas stream Net Heating Values shall be used to determine the 15-minute block average Net Heating Value of the cumulative Vent Gas. The NHV_{vg} 15-minute block averages shall be calculated for set 15-minute time periods starting at 12 midnight to 12:15 AM, 12:15 AM to 12:30 AM and so on, concluding at 11:45 PM to midnight.

Step 1a: Equation or Output to be Used to Determine NHV_{vg} at a Measurement Location

For any gas stream for which Equistar complies with Paragraph A5 by collecting compositional analysis data in accordance with the method set forth in A5.a: Equation 1 shall be used to determine the NHV_{vg} of a specific sample by summing the Net Heating Value for each individual component by individual component volume fractions. Individual component Net Heating Values are listed in Table 1 of this Appendix.

$$NHV_{vg} = \sum_{i=1}^n (x_i \cdot NHV_i) \quad \text{Equation 1}$$

For any gas stream for which Equistar complies with Paragraph A5 by collecting direct Net Heating Value monitoring data in accordance with the method set forth in A5.b but for which a Hydrogen Concentration Monitor is not used: Use the direct output (measured value) of the monitoring system(s) (in BTU/scf) to determine the NHV_{vg} for the sample.

For any gas stream for which Equistar complies with Paragraph A5 by collecting direct Net Heating Value monitoring data in accordance with the method set forth in A5.b and for which a Hydrogen Concentration Monitor is also used: Equation 2 shall be used to determine the NHV_{vg} for each sample measured via the Net Heating Value monitoring system. Where hydrogen concentration data is collected, Equation 2 performs a net correction for the measured heating value of hydrogen since the theoretical Net Heating Value for hydrogen is 274 Btu/scf, but for the purposes of this CAFO, a Net Heating Value of 1,212 Btu/scf may be used (1,212 – 274 = 938 BTU/scf).

$$NHV_{vg} = NHV_{measured} + 938x_{H2} \quad \text{Equation 2}$$

Step 1b: Calculation Method to be Used in Applying Equation/Output to Determine NHV_{vg}

For any flare for which Equistar complies with Paragraph A5 by using a continuous monitoring system in accordance with the method set forth in A5.a or A5.b: Equistar may elect to determine the 15-minute block average NHV_{vg} using either the Feed-Forward Calculation Method or the Direct Calculation Method (both described below). Equistar need not elect to use the same methodology at all flares with a continuous monitoring system; however, for each such flare, Equistar must elect one

calculation method that will apply at all times, and use that method for all continuously monitored flare vent streams associated with that flare. If Equistar intends to change the calculation method that applies to a flare, Equistar must notify the EPA 30 days in advance of such a change.

Feed-Forward Calculation Method. When calculating NHV_{vg} for a specific 15-minute block:

1. Use the results from the first sample collected during an event (for periodic Vent Gas flow events) for the first 15-minute block associated with that event.
2. If the results from the first sample collected during an event (for periodic Vent Gas flow events) are not available until after the second 15-minute block starts, use the results from the first sample collected during an event for the second 15-minute block associated with that event.
3. For all other cases, use the results that are available from the most recent sample prior to the 15-minute block period for that 15-minute block period for all Vent Gas streams. For the purpose of this requirement, use the time that the results become available rather than the time the sample was collected. For example, if a sample is collected at 12:25 AM and the analysis is completed at 12:38 AM, the results are available at 12:38 AM and these results would be used to determine compliance during the 15-minute block period from 12:45 AM to 1:00 AM.

Direct Calculation Method. When calculating NHV_{vg} for a specific 15-minute block:

1. If the results from the first sample collected during an event (for periodic Vent Gas flow events) are not available until after the second 15-minute block starts, use the results from the first sample collected during an event for the first 15-minute block associated with that event.
2. For all other cases, use the arithmetic average of all NHV_{vg} measurement data results that become available during a 15-minute block to calculate the 15-minute block average for that period. For the purpose of this requirement, use the time that the results become available rather than the time the sample was collected. For example, if a sample is collected at 12:25 AM and the analysis is completed at 12:38 AM, the results are available at 12:38 AM and these results would be used to determine compliance during the 15-minute block period from 12:30 AM to 12:45 AM.

Step 2: Determine Volumetric Flow Rates of Gas Streams

Equistar shall determine the volumetric flow rate in standard cubic feet (scf) of vent gas, along with the volumetric flow rates (in scf) of any Supplemental Gas, assist steam, and premix assist air, over a 15-minute block average basis. The 15-minute block average volumetric flow rates shall be calculated for set 15-minute time periods starting at 12 midnight to 12:15 AM, 12:15 AM to 12:30 AM and so on, concluding at 11:45 PM to midnight.

For any gas streams for which Equistar complies with Paragraph A3 by using a monitoring system that directly records volumetric flow rate: Use the direct output (measured value) of the monitoring system(s) (in scf), as corrected for the temperature and pressure of the system to standard conditions (*i.e.*, a temperature of 20 °C (68 °F) and a pressure of 1 atmosphere) to then calculate the average volumetric flow rate of that gas stream for the 15-minute block period.

For Vent Gas, assist steam, or premix assist air gas streams for which Equistar complies with Paragraph A3 by using a mass flow monitor to determine volumetric flow rate: Equation 3 shall be used to determine the volumetric flow rate of Vent Gas, premix assist air, or assist steam by converting mass flow rate to volumetric flow at standard conditions (*i.e.*, a temperature of 20 °C (68 °F) and a pressure of 1 atmosphere). Equation 3 uses the molecular weight of the gas stream as an input to the

equation; therefore, if Equistar elects to use a mass flow monitor to determine volumetric flow rate of Vent Gas, Equistar must collect compositional analysis data for such Vent Gas in accordance with the method set forth in A5.a/E5.a. For assist steam, use a molecular weight of 18 pounds per pound-mole. For assist air, use a molecular weight of 29 pounds per pound-mole. The converted volumetric flow rates at standard conditions from Equation 3 shall then be used to calculate the average volumetric flow rate of that gas stream for the 15-minute block period.

$$Q_{vol} = \frac{Q_{mass} * 385.3}{MWt} \quad \text{Equation 3}$$

For gas streams for which the molecular weight of the gas is known and for which Equistar complies with Paragraph A3 by using continuous pressure/temperature monitoring system(s): Use appropriate engineering calculations to determine the average volumetric flow rate of that gas stream for the 15-minute block period. For assist steam, use a molecular weight of 18 pounds per pound-mole. For assist air, use a molecular weight of 29 pounds per pound-mole. For Vent Gas, molecular weight must be determined by collecting compositional analysis data for such Vent Gas in accordance with the method set forth in A5.a/E5.a.

Step 3: Calculate the Net Heating Value of the Combustion Zone Gas (NHV_{cz})

For any flare at which: 1) the Feed-Forward Calculation Method is used; 2) gas composition or Net Heating Value monitoring is performed in a location representative of the cumulative vent gas stream; and 3) Supplemental Gas flow additions to the flare are directly monitored: Equation 4 shall be used to determine the 15-minute block average NHV_{cz} based on the 15-minute block average vent gas, supplemental gas, and assist gas flow rates.

$$NHV_{cz} = \frac{(Q_{vg} - Q_{NG2} + Q_{NG1}) * NHV_{vg} + (Q_{NG2} - Q_{NG1}) * NHV_{NG}}{Q_{vg} + Q_s + Q_{a,premix}} \quad \text{Equation 4}$$

For the first 15-minute block period of an event, Q_{NG1} shall use the volumetric flow value for the current 15-minute block period (*i.e.*, $Q_{NG1} = Q_{NG2}$). NHV_{NG} shall be determined using one of the following methods: 1) direct compositional or Net Heating Value monitoring of the natural gas stream in accordance with Step 1; or 2) for purchased (“pipeline quality”) natural gas streams, Equistar may elect to either: a) use annual or more frequent grab sampling at any one representative location; or b) assume a Net Heating Value of 920 BTU/scf.

For all other flares: Equation 5 shall be used to determine the 15-minute block average NHV_{cz} based on the 15-minute block average vent gas and assist gas flow rates. For periods when there is no Assist Steam flow or Premix Assist Air flow, $NHV_{cz} = NHV_{vg}$.

$$NHV_{cz} = \frac{Q_{vg} * NHV_{vg}}{Q_{vg} + Q_s + Q_{a,premix}} \quad \text{Equation 5}$$

Step 4: Ensure that during flare operation, $NHV_{cz} \geq 270$ BTU/scf

The flare must be operated to ensure that NHV_{cz} is equal to or above 270 BTU/scf, as determined for each 15-minute block period when Supplemental, Sweep, and/or Waste Gas is routed to a flare for at least 15-minutes. Equation 6 shows this relationship.

$$NHV_{cz} \geq 270 \text{ BTU/scf}$$

Equation 6

Key to the Abbreviations:

385.3 = conversion factor (scf/lb-mol)

i = individual component in Vent Gas (unitless)

MW_t = molecular weight of the gas at the flow monitoring location (lb/lb-mol)

n = number of components in Vent Gas (unitless)

NHV_{cz} = Net Heating Value of Combustion Zone Gas (BTU/scf)

NHV_i = Net Heating Value of component i according to Table 1 of this Appendix (BTU/scf)

$NHV_{measured}$

= Net Heating Value of Vent Gas stream as measured by monitoring system (BTU/scf)

NHV_{NG} = Net Heating Value of Supplemental Gas to flare during the 15

– minute block period (BTU/scf)

NHV_{vg} = Net Heating Value of Vent Gas (BTU/scf)

$Q_{a,premix}$ = cumulative vol flow of premix assist air during the 15 –

minute block period (scf)

Q_{mass} = massflow rate (pounds per second)

Q_{NG1} = cumulative vol flow of Supplemental Gas to flare during previous 15 –

minute block period (scf)

Q_{NG2} = cumulative vol flow of Supplemental Gas to flare during the 15 –

minute block period (scf)

Q_s = cumulative vol flow of Total Steam during the 15 – minute block period (scf)

Q_{vg} = cumulative vol flow of Vent Gas during the 15 – minute block period (scf)

Q_{vol} = volumetric flow rate (scf per second)

x_i = concentration of component i in Vent Gas (vol fraction)

x_{H2}

= concentration of H2 in Vent Gas at time sample was input into NHV monitoring system (vol fraction)

Table 1
Individual Component Properties

Component	Molecular Formula	MW _i (pounds per pound-mole)	CMN _i (mole per mole)	NHV _i (British thermal units per standard cubic foot)	LFL _i (volume %)
Acetylene	C ₂ H ₂	26.04	2	1,404	2.5
Benzene	C ₆ H ₆	78.11	6	3,591	1.3
1,2-Butadiene	C ₄ H ₆	54.09	4	2,794	2.0
1,3-Butadiene	C ₄ H ₆	54.09	4	2,690	2.0
iso-Butane	C ₄ H ₁₀	58.12	4	2,957	1.8
n-Butane	C ₄ H ₁₀	58.12	4	2,968	1.8
cis-Butene	C ₄ H ₈	56.11	4	2,830	1.6
iso-Butene	C ₄ H ₈	56.11	4	2,928	1.8
trans-Butene	C ₄ H ₈	56.11	4	2,826	1.7
Carbon Dioxide	CO ₂	44.01	1	0	∞
Carbon Monoxide	CO	28.01	1	316	12.5
Cyclopropane	C ₃ H ₆	42.08	3	2,185	2.4
Ethane	C ₂ H ₆	30.07	2	1,595	3.0
Ethylene	C ₂ H ₄	28.05	2	1,477	2.7
Hydrogen	H ₂	2.02	0	1,212 ^A	4.0
Hydrogen Sulfide	H ₂ S	34.08	0	587	4.0
Methane	CH ₄	16.04	1	896	5.0
Methyl-Acetylene	C ₃ H ₄	40.06	3	2,088	1.7
Nitrogen	N ₂	28.01	0	0	∞
Oxygen	O ₂	32.00	0	0	∞
Pentane+ (C5+)	C ₅ H ₁₂	72.15	5	3,655	1.4
Propadiene	C ₃ H ₄	40.06	3	2,066	2.16
Propane	C ₃ H ₈	44.10	3	2,281	2.1
Propylene	C ₃ H ₆	42.08	3	2,150	2.4
Water	H ₂ O	18.02	0	0	∞

^A The theoretical Net Heating Value for hydrogen is 274 Btu/scf, but for the purposes of this CAFO, a Net Heating Value of 1,212 Btu/scf shall be used.

Note: If a component is not specified in this Table 1, the heats of combustion may be determined using any published values where the net enthalpy per mole of offgas is based on combustion at 25 °C and 1 atmosphere (or constant pressure) with offgas water in the gaseous state, but the standard temperature for determining the volume corresponding to one mole of vent gas is 20 °C.