



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6  
1445 ROSS AVENUE, SUITE 1200  
DALLAS, TX 75202-2733

October 25, 2017

CERTIFIED MAIL – RETURN RECEIPT REQUESTED: 7007 3020 0000 1522 8588

Jennifer Keane  
Baker Botts LLP  
98 San Jacinto Blvd, Ste 1500  
Austin, TX 78701

RE: In the Matter of Dixie Chemical Company, Inc., CAA-06-2017-3344

Dear Ms. Keane,

Please find enclosed a copy of the fully-executed Consent Agreement and Final Order (“CAFO”) that was filed today with the Regional Hearing Clerk in EPA, Region 6. Dixie Chemical Company, Inc. (“Dixie”) will have thirty (30) days from the effective date of the CAFO to pay the civil penalty of seventeen thousand dollars (\$17,000.00). Dixie is required to comply with the conditions of settlement within the deadlines described in the CAFO.

If you have any questions regarding this matter, please feel free to contact me at 214-665-8130 or via email at [lannen.justin@epa.gov](mailto:lannen.justin@epa.gov).

Sincerely,

A handwritten signature in blue ink that reads "Justin Lannen".

Justin Lannen  
Assistant Regional Counsel  
U.S. EPA, Region 6

Enclosure

cc: Michael Gromacki, President  
Dixie Chemical Company, Inc.  
10701 Bay Area Blvd  
Pasadena, Texas 77507-1707



4. As described more fully herein, Complainant alleges that Respondent violated 40 C.F.R §§ 60.11(d), 60.18(c), 63.11(b), and 63.11495(d) at its Flare X-201 (the “Flare”) located at Respondent’s chemical manufacturing facility, 10601 Bay Area Boulevard, Pasadena, TX 77507 (the “Facility”).

5. 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 the “CAFO”, without adjudication of any issues of law or fact herein, and Respondent agrees to comply with the terms of this CAFO.

6. Beginning in the fall of 2014, Respondent implemented the TCEQ / UT Austin Supplemental Flare Operations Training Program to provide training to all operators and supervisors responsible for operating and controlling the flare system. As of 2016, all operators and supervisors have completed the flare training course, which covered the proper operation of steam-assisted flares, and the effect of steam on flare combustion efficiency and how to recognize when steam-assisted flares are over- or under-assisted.

7. In 2015 and 2016, Respondent installed, and thereafter operated, the following improvements at the Flare:

- a. Installed and began operating minimum steam flow controllers and steam flow meters for the Flare;
- b. Implemented Net Heating Value (NHV) in Combustion Zone Control for the Flare, including:
  - i. Adjustable natural gas flow to meet the combustion zone NHV set point,
  - ii. Calculation of combustion zone NHV based on the analyzed Flare header Btu, measured Flare flow, and measured steam flow; and an
  - iii. Automated system to link the addition of steam and natural gas to real-

time vent gas NHV and flow rate data.

**B. JURISDICTION**

8. This CAFO is entered into under Section 113(d) of the Act, as amended, 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).

9. The 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.

10. 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).

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

**C. DEFINITIONS**

12. "Ambient Air" shall mean that portion of the atmosphere, external to buildings, to which persons have access.

13. "Assist Air" shall mean all air that intentionally is introduced prior to or at the flare tip through nozzles or other hardware conveyances for the purposes of, including, but not limited to, protecting the design of the flare tip and promoting turbulence for mixing or inducing air into the flame. Assist Air includes Premix Assist Air and Perimeter Assist Air. Assist Air does not include Ambient Air.

14. "Assist Steam" shall mean all steam that intentionally is introduced prior to or at the flare tip through nozzles or other hardware conveyance for the purposes of, including, but not limited to, protecting the design of the flare tip and 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.

15. "Center Steam" shall mean the portion of Assist Steam introduced into the stack of the flare to reduce burnback.

16. "Combustion Zone Gas" shall mean all gases and vapors found after the flare tip. This gas includes all Vent Gas, Pilot Gas, and Total Steam.

17. "In Operation" or "Being In Operation" or "Operating", 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 closed valves and/or blinds.

18. "Instantaneous" shall mean a current snapshot in time subject to the refresh rate of the instrumentation being utilized. The refresh rate of the instrumentation being utilized shall not exceed 15 minutes.

19. "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.

20. "Lower Steam" shall mean the portion of Assist Steam piped to an exterior annular ring near the lower part of the flare tip, which then flows through tubes to the flare tip, and ultimately exits the tubes at the flare tip.

21. "Malfunction" shall mean, as specified in 40 C.F.R. Part 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.

22. "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 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 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.

23. "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 flares. The  $NHV_{cz}$  shall be calculated in accordance with Step 3 of the Appendix of this CAFO.

24. "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 flares.  $NHV_{vg}$  shall be calculated in accordance with Step 1 of the Appendix of this CAFO.

25. "Perimeter Assist Air" shall mean the portion of Assist Air introduced at the perimeter of the flare tip or above the flare tip. Perimeter Assist Air includes air intentionally entrained in Lower and Upper Steam. Perimeter Assist Air includes all Assist Air except Premix Assist Air.

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

27. "Premix Assist Air" shall mean the portion of Assist air that is introduced to the Vent Gas, whether injected or induced, prior to the flare tip. Premix Assist Air also includes any air intentionally entrained in the Center Steam.

28. "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.

29. "Supplemental Gas" shall mean all gas introduced to a flare in order to improve the combustible characteristics of the Combustion Zone Gas.



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

31. "Total Steam" shall mean the total of all steam that is supplied to the flares and includes, but is not limited to, Lower Steam, Center Steam, and Upper Steam.

32. "Upper Steam" shall mean the portion of Assist Steam introduced via nozzles located on the exterior perimeter of the upper end of the flare tip.

33. "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, Total Steam or Assist Air.

34. "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, Assist Air, 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 enforceable permit requirements regarding the combustible characteristics of Combustion Zone Gas; therefore "Waste Gas" does not include Supplemental Gas.

**D. GOVERNING LAW**

35. The Clean Air Act is designed to protect and enhance the quality of the nation's air so as to promote the public health and welfare and the productive capacity of its population. Section 101(b)(1) of the Act, 42 U.S.C. § 7401(b).

**New Source Performance Standards**

36. 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.

37. 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 a New Source Performance Standard ("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.

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

39. 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").

40. 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(a).

41. 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)

42. 40 C.F.R. § 60.18(c)(3)(ii) provides that “[f]lares shall be used only with the net heating value of the gas being combusted at 11.2 MJ/scm (300 Btu/scf) or greater if the flare is steam-assisted . . . .”

#### **National Emission Standards for Hazardous Air Pollutants**

43. Section 112 of the CAA, 42 U.S.C. § 7412, sets forth a national program for the control of hazardous air pollutants (“HAPs”). Under Section 112(b), Congress listed 188 HAPs believed to cause adverse health or environmental effects. 42 U.S.C. § 7412(b)(1).

44. Congress directed EPA to publish a list of all categories and subcategories of, *inter alia*, major sources of HAPs. CAA § 112(c); 42 U.S.C. § 7412(c).

45. Congress directed EPA to promulgate regulations establishing emission standards for each category or subcategory of, *inter alia*, major sources of HAPs. CAA § 112(d)(1); 42 U.S.C. § 7412(d)(1). These emission standards must require the maximum degree of reduction in emissions of HAPs that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable for the new or existing sources in the

category or subcategory to which the emission standard applies. CAA § 112(d)(2); 42 U.S.C. § 7412(d)(2).

46. To the extent that it is not feasible to prescribe or enforce an emission standard for the control of a HAP, Congress authorized EPA to promulgate “design, equipment, work practice, or operational” standards, which are to be treated as emission standards. CAA § 112(h); 42 U.S.C. § 7412(h).

47. The emission standards promulgated under Section 112 of the 1990 Amendments of the CAA, 42 U.S.C. § 7412, are known as the National Emission Standards for Hazardous Air Pollutants (“NESHAPs”) for Source Categories or “MACT” (“maximum achievable control technology”) standards. These emission standards are found in Part 63 of Title 40 of the Code of Federal Regulations.

48. After the effective date of any emission standard, limitation, or regulation promulgated pursuant to Section 112 of the CAA, no person may operate a source in violation of such standard, limitation, or regulation. 42 U.S.C. § 7412(i)(3).

49. Pursuant to Section 112 of the CAA, 42 U.S.C. § 7412, EPA has promulgated a NESHAP applicable to Chemical Manufacturing Area Sources (“CMPU”), located at 40 C.F.R. Part 63, Subpart VVVVVV (“NESHAP Subpart 6V”).

50. NESHAP Subpart 6V requires that “[a]t all times, [owners and operators] must operate and maintain any CMPU, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions.” 40 C.F.R. § 63.11495(d).

51. Pursuant to Section 112 of the CAA, 42 U.S.C. § 7412, EPA has promulgated regulations that contain general provisions applicable to sources that are subject to the MACT standards. 40 C.F.R. Part 63, Subpart A, §§ 63.1–63.16 (“NESHAP Subpart A”).

52. NESHAP Subpart A requires that “[f]lares shall be used only with the net heating value of the gas being combusted at 11.2 MJ/scm (300 Btu/scf) or greater if the flare is steam-assisted . . .” 40 C.F.R. § 63.11(b)(6)(ii).

**E. FINDINGS OF FACT AND CONCLUSIONS OF LAW**

53. At all times relevant to this proceeding, Respondent has owned and/or operated the Facility.

54. Respondent is the owner and/or operator of the Facility within the meaning of Sections 111(a)(5) and 112(a)(9), 42 U.S.C. §§ 7411(a)(5) and 7412(a)(9), of the Act and 40 C.F.R. §§ 60.2 and 63.2.

55. At all times relevant to this proceeding, Respondent owned and/or operated units that emit 1,3 butadiene at the Facility.

56. The Facility is a “stationary source” as that term is defined in Sections 111(a)(3) and 112(a)(3) of the Act, 42 U.S.C. §§ 7411(a)(3) and 7412(a)(3), and 40 C.F.R. §§ 60.2 and 63.2.

57. At the Facility, Respondent utilizes a steam-assisted flare, Flare X-201 (the “Flare”), to control the emission of waste gases from Respondent’s chemical manufacturing operation.

58. At all times relevant to this proceeding, the Facility was located within the Houston/Galveston/Brazoria ozone nonattainment area.

59. On October 9, 2014, EPA issued a Clean Air Act Section 114 Information Request to Respondent, to which Respondent responded on December 15, 2014. As part of its responses, Respondent provided information regarding the Facility's flaring operations, including, but not limited to, vent gas and assist steam flow rates, and vent gas net heating values.

60. Based on its review of the above information, EPA identified alleged violations of the CAA at the Flare, as described in Section F of this CAFO.

## **F. ALLEGED VIOLATIONS**

### **Good Air Pollution Control Practices**

61. The Flare is subject to 40 C.F.R. §§ 60.11(d) and 63.11495(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 Flare in a manner consistent with good air pollution control practice for minimizing emissions.

62. On information and belief, at various times from May 20, 2013, to October 14, 2014, as reflected in the data Respondent produced to EPA described in Section E, above, the Flare was operated with an excessively high steam-to-Vent Gas ratio. Upon information and belief, this excessively high steam-to-Vent Gas ratio increased the likelihood of flame quenching and reduced combustion efficiency.

63. On information and belief, at various times from May 20, 2013, to October 14, 2014, as reflected in the data Respondent produced to EPA described in Section E, above, the Flare was operated without a sufficient  $NHV_{cz}$ . Upon information and belief, this insufficient  $NHV_{cz}$  reduced flare combustion efficiency.

64. As referenced above, operation of the Flare by Respondent with a high steam-to-Vent Gas ratio and with an insufficient  $NHV_{cz}$  violated the requirement to operate the Flare in a manner consistent with good air pollution control practices for minimizing emissions, as required by 40 C.F.R. §§ 60.11(d) and 63.11495(d).

**Combusting Gas with a Net Heating Value of Less than 300 Btu/scf**

65. The Flare is subject to 40 C.F.R. §§ 60.18(c)(3)(ii) and 63.11(b)(6)(ii), under which Respondent was and is required to operate the Flare, which is steam-assisted, with the NHV of the gas being combusted at 11.2 MJ/scm (300 Btu/scf) or greater.

66. On information and belief, at various times from July 1, 2011, to October 14, 2014, as reflected in the data Respondent produced to EPA described in Section E, above, Respondent operated the Flare with the gas being combusted having a NHV of less than 300 BTU/scf.

67. Operation of the Flare with the gas being combusted having a NHV of less than 300 Btu/scf violated 40 C.F.R. §§ 60.18(c)(3)(ii) and 63.11(b)(6)(ii)

**G. CIVIL PENALTY AND CONDITIONS OF SETTLEMENT**

**General**

68. 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;<sup>1</sup>
- e. consents to the conditions specified in this CAFO;
- f. consents to any stated Permit Action;<sup>2</sup>
- 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.

69. 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 actions;
- 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 Clean Air Act, 42 U.S.C. § 7607(b)(1);
- d. consents to personal jurisdiction in any action to enforce this CAFO in the United States District Court for the Southern District of Texas;
- e. waives any right it may possess at law or in equity to challenge the authority of the EPA to bring a civil action in the United States District

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<sup>1</sup> 40 C.F.R. § 22.18(b)(2) requires that all of the items in section 68 be included in a CAFO. However, sub-bullets d and f are not applicable to this case.

<sup>2</sup> See previous footnote.



Court for the Southern District of Texas 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**

70. 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, including Respondent's agreement to perform the additional conditions of settlement and Supplemental Environmental Project ("SEP") set forth below, EPA has assessed a civil penalty in the amount of **Seventeen Thousand Dollars** (\$17,000) ("EPA Penalty"). The

EPA Penalty has been determined in accordance with Section 113 of the Act, 42 U.S.C. § 7413, and at no time exceeded EPA's statutory authority.

71. 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 U.S. currency; or (5) On Line 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), 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

Re: Dixie Chemical Company, Inc.  
Docket No. CAA-06-2017-3344

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 On Line 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-06-2017-3341 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-06-2017-3341. Respondent's adherence to this request will ensure proper credit is given when penalties are received for the Region. Respondent shall also send a simultaneous notice of such payment, including a copy of the money order, or check, and the transmittal letter to the following addresses:

Margaret Osbourne  
Chief, Air Toxics Section (6EN-AT)  
Compliance Assurance and Enforcement Division  
U.S. EPA, Region 6  
1445 Ross Avenue Suite 1200  
Dallas, TX 75202-2733

and

Region 6 Hearing Clerk (6RC-D)  
U.S. EPA Region 6

1445 Ross Avenue, Suite 1200  
Dallas, TX 75202-2733

72. Respondent shall 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 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.

73. 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.

74. If Respondent fails to timely pay any portion of the penalty assessed under this CAFO, the 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 the EPA or engaging in programs the EPA sponsors or funds, 40 C.F.R. § 13.17.

#### **Conditions of Settlement**

75. Respondent agrees that, no later than one hundred twenty (120) days after the Effective Date of this CAFO, Respondent shall comply with the following requirements at the Flare:

- a. Net Heating Value of Combustion Zone Gas ( $NHV_{cz}$ ). Respondent shall operate the Flare to maintain the  $NHV_{cz}$  at or above 270 Btu/scf determined on an instantaneous basis at all times when waste gas is vented to the Flare. Respondent shall utilize the equations and directives set forth in the Appendix to meet the requirements of this Subparagraph 75.a.
- b. 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.

- c. 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 TCEQ requesting to incorporate the limits and standards in Paragraph 75.a into a non-Title V, federally enforceable permit.

### **Certification of Completion**

76. At such time as the Respondent believes that it has complied with the requirements of Paragraph 71 (payment of EPA Penalty), that it has achieved initial compliance with the requirements of Paragraph 75 and the Appendix (Conditions of Settlement), and that it has satisfactorily completed the Supplemental Environmental Project in Section H, 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:

Margaret Osbourne  
Chief, Air Toxics Enforcement Section (6EN-AT)  
Compliance Assurance and Enforcement Division

U.S. EPA, Region 6  
1445 Ross Avenue Suite 1200  
Dallas, TX 75202-2733

EPA has 90 days to respond in writing with questions or disagreement that the conditions of the CAFO have been satisfied.

77. Respondent agrees that the time period from the Effective Date of this CAFO until initial compliance with the conditions specified in Paragraph 75 and the Supplemental Environmental Project in Section H is 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.

78. The provisions of this CAFO shall apply to and be binding upon Respondent and its officers, directors, employees, agents, authorized representatives, successors and assigns. From the Effective Date of this CAFO until the end of the Tolling Period, as set out in Paragraph 77, 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 the 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 the EPA has provided written approval.

79. 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.

80. 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 execute and enter into the terms and conditions of this CAFO and has legal capacity to bind the party he or she represents to this CAFO.

81. By signing this CAFO, Respondent certifies based on information and belief that the information it has supplied concerning this matter was at the time of submission, and is at the time of signing, true, accurate, and complete for each submission, response, and statement. Respondent acknowledges that there are significant penalties for submitting false or misleading information, including the possibility of fines and imprisonment for knowing submission of such information, under 18 U.S.C. § 1001.

82. Respondent specifically waives its right to seek reimbursement of its costs and attorneys' fees under 5 U.S.C. § 504 and 40 C.F.R. Part 17. Except as qualified by Paragraph 73, each party shall bear its own attorney's fees, costs, and disbursements incurred in this proceeding.

#### **H. SUPPLEMENTAL ENVIRONMENTAL PROJECT**

83. Respondent shall undertake the following SEP, which the parties agree is intended to secure significant environmental or public health protection and improvements.

84. By no later than 120 days of the effective date of this CAFO, Respondent shall complete mechanical upgrades of each of the Respondent's five (5) pumps that are in light liquid service at the Facility. The upgrades will consist of adding a separate pressurized barrier



fluid seal pot on each pump. Respondent estimates that this project will result in fugitive emission reductions of approximately 200 pounds per year.

85. Respondent's total expenditure for the SEP shall be no less than Fifty Thousand Dollars (\$50,000).

86. Respondent hereby certifies based on information and belief formed after reasonable inquiry that:

- a. All cost information provided to the EPA in connection with EPA's approval of the SEP is complete and accurate and that Respondent in good faith estimates that its cost to implement the SEP is Fifty Thousand Dollars (\$50,000).
- b. As of the Effective Date of this CAFO, Respondent is not required to perform or develop the SEP by any federal, state, or local law or regulation and is not required to perform or develop the SEP by agreement, grant, or as injunctive relief awarded in any other action in any forum;
- c. The SEP is not a project that Respondent was planning or intending to construct, perform, or implement other than in settlement of the claims resolved in this CAFO;
- d. Respondent has not received and will not receive credit for the SEP in any other enforcement action;
- e. Respondent will not receive reimbursement for its portion of the SEP from another person or entity;

- f. For federal income tax purposes, Respondent agrees that it will neither capitalize into inventory or basis nor deduct any costs or expenditures incurred in performing the SEP;
- g. Respondent is not a party to any open federal financial assistance transaction that is funding or could fund the same activity as the SEP; and
- h. Respondent has inquired of the SEP recipient and/or SEP implementer (if applicable) whether either is a party to an open federal financial assistance transaction that is funding or could fund the same activity as the SEP and has been informed by the recipient and/or the implementer (if applicable) that neither is a party to such a transaction.

87. No later than sixty (60) days after it has completed the SEP as described in Paragraph 84 above of this CAFO, Respondent shall submit a Final SEP Completion Report. The Final SEP Completion Report shall contain the following information: (i) a detailed description of the SEP as implemented, (ii) a certification that the SEP has been fully implemented pursuant to the provisions of this CAFO with itemized final costs and copies of receipts for all expenditures, (iii) a certification upon completion of the SEP that the Respondent has not deducted the SEP from its income taxes, and (iv) a description of the environmental, emergency preparedness, and/or public health benefits resulting from implementation of the SEP.

88. In itemizing its costs in the Final SEP Completion Report, Respondent shall clearly identify and provide acceptable documentation for all eligible costs. For purposes of this Paragraph, "acceptable documentation" includes invoices, purchase orders, or other documentation that specifically identifies and itemizes the individual costs of the goods and/or

services for which payment is being made. Canceled drafts do not constitute acceptable documentation unless such drafts specifically identify and itemize the individual costs of the goods and/or services for which payment is being made.

89. Respondent shall, by its representative who is fully authorized by Respondent to legally commit and bind Respondent, sign and certify under penalty of law that the information contained in the Final SEP Completion Report is true, accurate, and complete, by signing the following statement:

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

The Final SEP Completion Report shall be sent to:

Margaret Osbourne  
Chief, Air Toxics Enforcement Section (6EN-AT)  
Compliance Assurance and Enforcement Division  
U.S. EPA, Region 6  
1445 Ross Avenue Suite 1200  
Dallas, TX 75202-2733

90. After receipt of the Final SEP Completion Report described above, EPA will notify Respondent, in writing within ninety (90) days, regarding: (a) any deficiencies in the SEP Completion Report itself along with a grant of an additional thirty (30) days, from receipt of that notification, for Respondent to correct any deficiencies in the SEP Completion Report; or (b) indicate that EPA concludes that the project has been completed satisfactorily; or (c) determine that the project has not been completed satisfactorily.

91. If Respondent fails to comply with any of the terms or provisions of this CAFO relating to performance of the SEP and/or to the extent Respondent's actual expenditures for

the SEP do not equal or exceed its estimated cost for the SEP, Respondent shall be liable for stipulated penalties according to the provisions set forth below:

- a. Except as provided in Subparagraphs (b)-(e) below, for a SEP which has not been completed satisfactorily pursuant to this CAFO, Respondent shall pay a stipulated penalty to the United States in the amount of Sixty Thousand Dollars (\$60,000).
- b. If the SEP is not completed in accordance with Paragraph 84, but the Complainant determines that the Respondent: a) made good faith and timely efforts to complete the project; and b) certifies, with supporting documentation, that at least 90 percent of the amount of money which was required to be spent was expended on the SEP, Respondent shall not be liable for any stipulated penalty.
- c. If the SEP is completed in accordance with Paragraph 84, but the Respondent spent less than 90 percent of the amount of money required to be spent for the project, Respondent shall pay a stipulated penalty to the United States in the amount of the difference between Forty-Five Thousand Dollars (\$45,000) (i.e. 90% of \$50,000) and the amount spent on the SEP.
- d. If the SEP is completed in accordance with Paragraph 84, and the Respondent spent at least 90 percent of the amount of money required to be spent for the project, Respondent shall not be liable for any stipulated penalty.

- e. If the Respondent fails to timely complete the SEP for any reason, the respondent shall pay the stipulated penalties shown below. Respondent's stipulated penalties for failure to timely complete the SEP shall not exceed Sixty Thousand Dollars (\$60,000).

<u>Penalty Per Day</u>	<u>Period of Noncompliance</u>
\$250	1st through 14th day
\$500	15th through 30th day
\$750	31st day and beyond

- f. For failure to timely submit the SEP Final Completion Report required by Paragraphs 87-89 above, Respondent shall pay stipulated penalties as follows:

<u>Penalty Per Day</u>	<u>Period of Noncompliance</u>
\$100	1st through 14th day
\$250	15th through 30th day
\$500	31st day and beyond

92. The determination of whether the SEP has been satisfactorily completed and whether Respondent has made a good faith, timely effort to implement the SEP shall be at the sole, reasonable discretion of EPA.

93. Nothing herein shall obligate Respondent to publicize its involvement in the SEP; however, any public statement, oral or written, made by Respondent to publicize its participation in SEP activities shall include the following language: "This project was undertaken in connection with the settlement of an enforcement action taken by the U.S. Environmental Protection Agency for violations of the Clean Air Act and the regulations

promulgated thereunder.”

**I. EFFECT OF CONSENT AGREEMENT AND FINAL ORDER**

94. In accordance with 40 C.F.R. § 22.18(c), this CAFO resolves only Respondent’s liability for federal civil penalties for the violations alleged in Section F and the facts that form the basis for those alleged violations.

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

96. 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.

97. The material 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. The correction of errors and other non-substantive changes are not material terms and may be modified by written agreement of the parties.

98. Any violation of the included Final Order may result in a civil judicial action for an injunction or civil penalties of up to \$37,500 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). The EPA may use any information submitted under this CAFO in an administrative, civil judicial, or criminal action.

99. 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.

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

**J. EFFECTIVE DATE**

101. 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 Dixie Chemical Company, Inc., Docket No. CAA-06-2017-3341, is Hereby Stipulated, Agreed, and Approved for Entry.

FOR RESPONDENT:

Date: OCTOBER 9, 2017



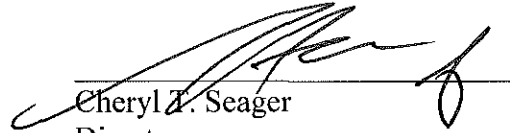
\_\_\_\_\_  
Michael Gromacki, President  
Dixie Chemical Company, Inc.  
10601 Bay Area Blvd  
Pasadena, Texas 77507-1707

Re: Dixie Chemical Company, Inc.  
Docket No. CAA-06-2017-3344

FOR COMPLAINANT:

23 OCT 2017

Date: \_\_\_\_\_



Cheryl T. Seager  
Director  
Compliance Assurance and  
Enforcement Division  
U.S. EPA, Region 6  
1445 Ross Avenue  
Dallas, Texas 75202





CERTIFICATE OF SERVICE

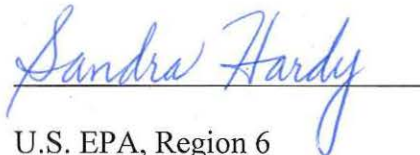
I hereby certify that on the 25<sup>th</sup> day of October, 2017, the original and one copy of the foregoing Consent Agreement and Final Order was hand delivered to the Regional Hearing Clerk, U.S. EPA - Region 6, 1445 Ross Avenue, Suite 1200, Dallas, Texas 75202-2733, and a true and correct copy was delivered to the following individual(s) by the method indicated below:

CERTIFIED MAIL - RETURN RECEIPT REQUESTED 70073020000015228595

Michael Gromacki, President  
Dixie Chemical Company, Inc.  
10701 Bay Area Blvd  
Pasadena, Texas 77507-1707

CERTIFIED MAIL - RETURN RECEIPT REQUESTED 70073020000015228588

Jennifer Keane  
Baker Botts LLP  
98 San Jacinto, Suite 1500  
Austin, Texas 78701



U.S. EPA, Region 6  
Dallas, Texas

## APPENDIX

### Calculating Net Heating Value of the Combustion Zone Gas

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

#### Step 1: Determine the Net Heating Value of the Vent Gas (NHV<sub>vg</sub>)

Respondent shall determine the Net Heating Value of the Vent Gas (NHV<sub>vg</sub>) based on composition monitoring data on an instantaneous basis according to the following requirements. If Respondent monitors separate gas streams that combine to comprise the total vent gas flow to the Flare, the instantaneous 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 instantaneous Net Heating Value of the cumulative Vent Gas. The NHV<sub>vg</sub> shall be calculated on an instantaneous basis and archived on one minute intervals.

#### **Equation or Output to be Used to Determine NHV<sub>vg</sub> at a Measurement Location**

**For any gas stream for which Respondent operates 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:** Equation 1 shall be used to determine the NHV<sub>vg</sub> 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 Respondent operates a calorimeter capable of continuously measuring, calculating, and recording the NHV<sub>vg</sub> at standard conditions 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<sub>vg</sub> for the sample.

**For any gas stream for which Respondent operates a calorimeter capable of continuously measuring, calculating, and recording the NHV<sub>vg</sub> at standard conditions and for which a Hydrogen Concentration Monitor is also used:** Equation 2 shall be used to determine the NHV<sub>vg</sub> 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 2: Determine Volumetric Flow Rates of Gas Streams**

Respondent 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, on an instantaneous basis.

**For any gas streams for which Respondent uses 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).

**For Vent Gas, assist steam, or premix assist air gas streams for which Respondent uses 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 Respondent elects to use a mass flow monitor to determine volumetric flow rate of Vent Gas, Respondent must collect compositional analysis data for such Vent Gas. 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.

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

**For gas streams for which the molecular weight of the gas is known and for which Respondent uses a continuous pressure/temperature monitoring system(s):** Use appropriate engineering calculations to determine the instantaneous volumetric flow rate of that gas stream. 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.

## **Step 3: Calculate the Net Heating Value of the Combustion Zone Gas (NHV<sub>cz</sub>)**

Respondent shall determine the net heating value of the combustion zone gas (NHV<sub>cz</sub>) by direct calculation methodology. Equation 4 shall be used to determine the instantaneous NHV<sub>cz</sub> based on the instantaneous Vent gas and assist gas flow rates. For periods when there is no Assist Steam flow or Premix Assist Air flow, NHV<sub>cz</sub> = NHV<sub>vg</sub>.

$$NHV_{cz} = \frac{Q_{vg} * NHV_{vg}}{Q_{vg} + Q_s + Q_{a,premix}} \quad \text{Equation 4}$$

**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 on an instantaneous basis when Waste Gas is routed to the Flare. In the event that an instantaneous  $NHV_{cz}$  based on the compositional analysis and the flow rates is below 270 BTU/scf, Respondent is required to make operational adjustments based on that information within the next 8 minutes to achieve, at a minimum, the net heating value limit. If Respondent's operational adjustments achieve the minimum  $NHV_{cz}$  within that 8 minutes, then the original instantaneous  $NHV_{cz}$  reading that was below 270 BTU/scf will not be considered a deviation of the operating limit. Equation 5 shows this relationship.

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

*Equation 5*

## 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 (BTU/scf)

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

$Q_{a,premix}$  = cumulative vol flow of pre-mix assist air (scf)

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

$Q_{NG1}$  = cumulative vol flow of Supplemental Gas (measured as total natural gas flow to the flare) to flare

$Q_{NG2}$  = cumulative vol flow of Supplemental Gas (measured as total natural gas flow to the flare) to flare

$Q_s$  = cumulative vol flow of Total Steam (scf)

$Q_{vg}$  = cumulative vol flow of Vent Gas (scf)

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

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

$x_{H2}$  = concentration of H<sub>2</sub> in Vent Gas at time sample was input into NHV monitoring system (vol fraction)

**Table 1**  
**Individual Component Properties**

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

<sup>A</sup> The theoretical Net Heating Value for hydrogen is 274 BTU/scf, but for the purposes of this Consent Agreement, 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 vent gas 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.