IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

UNITED STATES OF AMERICA, Plaintiff, v. CITGO PETROLEUM CORPORATION and PDV MIDWEST REFINING, LLC, Defendants,	)	Civil Action No. 16 C 10484 Judge Alonzo

CONSENT DECREE

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CONSENT DECREE

WHEREAS Plaintiff the United States of America ("United States"), on behalf of the United States Environmental Protection Agency ("EPA"), has filed a complaint ("Complaint") against Defendants CITGO Petroleum Corporation and PDV Midwest Refining, LLC (collectively "CITGO" or "Defendants"), concurrently with the lodging of this Consent Decree, for alleged environmental violations at CITGO's petroleum refinery located in Lemont, Illinois ("Refinery" or "Lemont Refinery");

WHEREAS the United States, the State of Illinois, and CITGO are among the parties to a Consent Decree entered by the United States District Court for the Southern District of Texas in Civ. No. 4:04-cv-3883 on January 27, 2005 (the "2005 Consent Decree"), which covers six refineries, that at the time, all were owned and operated by CITGO, including the Lemont Refinery;

WHEREAS, on February 26, 2009, and on September 30, 2011, EPA issued Notices and Findings of Violation to CITGO asserting the Lemont Refinery's non-compliance with various requirements of the following: (i) the 2005 Consent Decree; (ii) the Clean Air Act ("CAA"), 42 U.S.C. § 7401 *et seq.*, and corresponding federal regulations; (iii) the federally enforceable Illinois State Implementation Plan ("Illinois SIP") provisions that incorporate, adopt, and/or implement federal requirements; and (iv) Lemont Refinery construction and Title V permits;

WHEREAS CITGO denies that it has violated and/or continues to violate the 2005 Consent Decree or any statutory, regulatory, or permit requirements, and maintains that it has been and remains in compliance with the 2005 Consent Decree and all applicable statutes, regulations, and permits and is not liable for civil penalties and injunctive relief as alleged in the Complaint or for stipulated penalties under the 2005 Consent Decree;

WHEREAS, pursuant to Paragraph 276 of the 2005 Consent Decree, CITGO complied with and completed the 2005 Consent Decree with respect to Lemont Refinery obligations except for certain limited obligations that were not yet completed but are being incorporated herein;

WHEREAS EPA reviewed extensive information and data submitted by CITGO regarding its compliance with the Lemont Refinery obligations in the 2005 Consent Decree and determined that, except for the limited obligations that are incorporated herein, CITGO has satisfactorily completed the requirements for termination set forth in Paragraph 274 of the 2005 Consent Decree;

WHEREAS, because this Consent Decree incorporates all remaining obligations of the 2005 Consent Decree that pertain to the Lemont Refinery (in addition to a resolution of the matters alleged in the Complaint), the United States, Illinois, and CITGO have lodged on this day in the Southern District of Texas a First Amendment to the 2005 Consent Decree that will terminate all obligations of the 2005 Consent Decree that apply to the Lemont Refinery and will otherwise amend the 2005 Consent Decree as needed to reflect the termination of the provisions applicable to the Lemont Refinery;

WHEREAS, pursuant to the First Amendment of the 2005 Consent Decree filed in the Southern District of Texas, CITGO will pay $323,500 in stipulated penalties for past violations of certain Lemont Refinery obligations of which $161,750 will be paid to the United States and $161,750 will be paid to Illinois;

WHEREAS, under this Consent Decree, CITGO will pay a civil penalty of $1,955,000 to the United States for resolution of alleged violations of the Clean Air Act at the Lemont Refinery set forth in the Complaint and in the February 26, 2009 and September 30, 2011 Notices and

Findings of Violation, as well as perform two Supplemental Environmental Projects at a cost of no less than $1 million and a mitigation project at an estimated cost of $1.14 million;

WHEREAS CITGO has indicated that it remains committed to proactively addressing environmental issues relating to its operations;

WHEREAS CITGO estimates that, including expenditures it already has made, it will spend a total of approximately $42 million to comply with the injunctive relief requirements of this Consent Decree;

WHEREAS the United States anticipates that the affirmative relief in Section V of this Consent Decree (Compliance Requirements) will reduce emissions of the following pollutants by the following amounts, in tons per year ("tpy"):

Nitrogen Oxides ("NO_x")	90
Sulfur Dioxide ("SO_2")	170
Volatile Organic Compounds ("VOCs")	170
Particulate Matter ("PM")	40
Carbon Dioxide Equivalents ("CO_2e")	10,850

The United States also anticipates reductions of carbon monoxide and hazardous air pollutants ("HAPs");

WHEREAS discussions between the United States and CITGO ("the Parties") have resulted in the settlement embodied in the Consent Decree;

WHEREAS CITGO has waived any applicable federal or state requirements of statutory notice of the alleged violations;

WHEREAS the Parties recognize, and this Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties at arms length and in good faith and will avoid litigation between the Parties, and that this Consent Decree is fair, reasonable, and in the public interest;

NOW, THEREFORE, before the taking of any testimony, without the adjudication or admission of any issue of fact or law except as provided in Section I, and with the consent of the Parties, it is hereby ORDERED, ADJUDGED, AND DECREED as follows:

I. JURISDICTION AND VENUE

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331, 1345, and 1355; Sections 113(b) and 167 of the CAA, 42 U.S.C. §§ 7413(b) and 7477; and over the Parties. Venue lies in this District pursuant to Section 113(b) of the CAA, 42 U.S.C. § 7413(b); and 28 U.S.C. §§ 1391(b) and (c) and 1395(a), because CITGO is located in this judicial district and the violations alleged in the Complaint are alleged to have occurred in this judicial district. For purposes of this Decree, or any action to enforce this Decree, CITGO consents to this Court's jurisdiction over this Decree, over any action to enforce this Decree, and over CITGO. CITGO also consents to venue in this judicial district.

2. For purposes of this Consent Decree, CITGO does not contest that the Complaint states claims upon which relief may be granted.

3. The State of Illinois has actual notice of the commencement of this action in accordance with the requirements of CAA Sections 113(a)(1) and 113(b)(3), 42 U.S.C. §§ 7413(a)(1) and 7413(b)(3).

II. APPLICABILITY AND BINDING EFFECT

4. The obligations of this Consent Decree apply to and are binding upon the United States and upon CITGO and any successors, assigns, and other entities or persons otherwise bound by law. The obligations of this Consent Decree relating to CITGO apply at the Lemont Refinery and no other refinery owned or operated by CITGO.

5. Effective from the Date of Lodging of this Consent Decree, CITGO shall give written notice, and shall provide a copy of, this Consent Decree to any successors in interest at least sixty days prior to the transfer of ownership or operation of any portion of the Lemont Refinery. CITGO shall notify the United States in accordance with the notice provisions set forth in Section XVII (Notices), of any successor in interest at least thirty days prior to any such transfer.

6. If CITGO intends to request that the United States agree to a transferee's assumption of any obligations of the Consent Decree, CITGO shall condition any transfer, in whole or in part, of ownership of, operation of, or other interest in (exclusive of any non-controlling, non-operational shareholder interest) the Lemont Refinery upon the transferee's written agreement to execute a modification to the Consent Decree that shall make the terms and conditions of the Consent Decree applicable to the transferee.

7. As soon as possible prior to the transfer: (i) CITGO shall notify the United States of the proposed transfer and of the specific Consent Decree provisions that CITGO proposes the transferee assume; (ii) CITGO shall certify that the transferee is contractually bound to assume the obligations and liabilities of this Consent Decree; and (iii) the transferee shall submit to the United States a certification that the transferee has the financial and technical ability to assume

the obligations and liabilities of this Consent Decree and a certification that the transferee is contractually bound to assume the obligations and liabilities of this Consent Decree.

8. After the submission to the United States of the notice and certification required by the previous Paragraph, either: (i) the United States shall notify CITGO that the United States does not agree to modify the Consent Decree to make the transferee responsible for complying with the terms and conditions of the Consent Decree; or (ii) the United States, CITGO, and the transferee shall file with the Court a joint motion requesting the Court approve a modification substituting the transferee for CITGO as the Defendant responsible for complying with the terms and conditions of the Consent Decree.

9. If CITGO does not secure the agreement of the United States to a joint motion within a reasonable period of time, then CITGO and the transferee may file, without the agreement of the United States, a motion requesting the Court to approve a modification substituting the transferee for CITGO as the Defendant responsible for complying with some or all of the terms and conditions of the Consent Decree. The United States may file an opposition to the motion.

10. Except as provided in Paragraphs 5–9 and Section XII (Force Majeure), CITGO shall be solely responsible for ensuring that performance of the work required under this Consent Decree is undertaken in accordance with the deadlines and requirements contained in this Consent Decree (including Appendices). CITGO shall provide an electronic or hard copy of this Consent Decree to its officers, the Lemont Refinery plant manager, the Lemont Refinery Manager of Health, Safety, Security, and Environmental Protection, and all personnel in the Lemont Refinery Environmental Department. In addition, CITGO shall ensure that its employees, agents, and contractors whose duties might reasonably include compliance with any

provision of this Decree are made aware of this Consent Decree and aware of the specific requirements of this Consent Decree that fall within such person's duties. CITGO shall place an electronic version of the Consent Decree on its internal environmental website. CITGO shall condition any contract for work required under this Consent Decree upon performance of the work in conformity with the terms of this Consent Decree. Copies of the applicable portions of this Consent Decree do not need to be supplied to firms who are retained solely to supply materials or equipment to satisfy requirements of this Consent Decree.

11. In any action to enforce this Consent Decree, CITGO shall not raise as a defense the failure by any of its officers, directors, employees, agents, or contractors to take any actions necessary to comply with the provisions of this Consent Decree.

III. OBJECTIVES

12. It is the purpose of the Parties to this Consent Decree to further the objectives of the Clean Air Act, the Illinois SIP promulgated pursuant to Section 110 of the Clean Air Act, 42 U.S.C. § 7410, and the rules and regulations promulgated under the Clean Air Act.

IV. DEFINITIONS

13. Unless otherwise defined herein, terms used in this Consent Decree shall have the meaning given to those terms in the Clean Air Act and the implementing regulations promulgated thereunder. The following terms used in this Consent Decree shall be defined for purposes of this Consent Decree and the reports and documents submitted pursuant thereto as follows:

a. "2005 Consent Decree" shall mean the civil consent decree entered in *United States, et al. v. CITGO Petroleum Corporation, et al.*, Civil No. 4:04-cv-3883 (S.D. Texas) on January 27, 2005.

b. "30-day rolling average" shall mean the average daily emission rate or concentration during the preceding 30 days. For purposes of clarity, the first day used in a 30-day rolling average compliance period is the first day on which the emission limit is effective, and the first complete 30-day average compliance period is 30 days later (*e.g.*, for a limit effective on January 1, the first day in the period is January 1 and the first complete 30-day period is January 1 through January 30).

c. "365-day rolling average" shall mean the average daily emission rate or concentration during the preceding 365 days. For purposes of clarity, the first day used in a 365-day rolling average compliance period is the first day on which the emission limit is effective, and the first complete 365-day average compliance period is 365 days later (*e.g.*, for a limit effective on January 1, the first day in the period is January 1 and the first complete 365-day period is January 1 through December 31).

d. "Calendar Quarter" shall mean any one of the three month periods ending on March 31st, June 30th, September 30th, and December 31st.

e. "CEMS" or "Continuous Emissions Monitoring System" shall mean, consistent with the definition of "Continuous Monitoring System" in 40 C.F.R. § 60.2, the total equipment, required under this Consent Decree or an applicable regulation or permit, used to sample and condition (if applicable), to analyze, and to provide a permanent record of emissions or process parameters.

f. "CEMS Downtime Root Cause Analysis" shall mean an assessment conducted through a process of investigation to determine the primary cause and any contributing cause(s) of CEMS downtime.

g. "CITGO" shall mean CITGO Petroleum Corporation and PDV Midwest Refining, L.L.C., and their successors and assigns.

h. "CO" shall mean carbon monoxide.

i. "Consent Decree" or "Decree" shall mean this Consent Decree, including any and all appendices attached to this Consent Decree, and any amendments thereto.

j. "Date of Entry" or "DOE" shall mean the Effective Date of this Consent Decree.

k. "Date of Lodging" shall mean the date this Consent Decree is filed for lodging with the Clerk of the Court for the United States District Court for the Northern District of Illinois.

l. "Day" or "day" (that is, without an initial capitalization) shall mean a calendar day unless expressly stated to be a business day. In computing any period of time under this Consent Decree for the submission of material(s), where the last day would fall on a Saturday, Sunday, or federal or state holiday, the period shall run until the close of business of the next business day. In computing any period of time under this Consent Decree for the payment of a penalty, where the last day would fall on a Saturday, Sunday, or federal holiday, the period shall run until the close of business of the next federal business day.

m. "Effective Date" shall have the definition set forth in Section XVIII (Effective Date) of this Consent Decree.

n. "EPA" or "U.S. EPA" shall mean the United States Environmental Protection Agency and any of its successor departments or agencies.

o. "Existing CEMS" shall mean the following CEMS which exist at the Lemont Refinery as of the Date of Lodging:

Source	Constituents
FCCU	CO O_2 H_2O NO_x SO_2
119A-train of SRP 119B-train of SRP	SO_2 O_2
121C-train of SRP 121D-train of SRP	SO_2 O_2
111B-1A Heater	NO_x CO O_2
111B-1B Heater	NO_x CO O_2
111B-2 Heater	NO_x CO O_2
430B-1 Aux Boiler	NO_x CO O_2
844 C-1 Flare	Total Sulfur
844 C-2 Flare	Total Sulfur
844 C-3 Flare	Total Sulfur
109B-62 Heater	NO_x CO O_2
590 H-1 Heater 590 H-2 Heater	O_2
SP FG 114-116 FG (Dual Service A) 115-125 FG (Dual Service A) NC FG (Dual Service B) PSA Gas (Dual Service B) 118-122 FG System 123 FG (Dual Service C) NP Bir FG (Dual Service C)	H_2S

To the extent that, after the Date of Lodging of this Consent Decree, it is determined that additional CEMS existed as of the Date of Lodging but were not set forth on this list, then those additional CEMS shall be included in the definition of "Existing CEMS" for purposes of this Consent Decree.

p. "FCCU" shall mean the fluidized catalytic cracking unit, its regenerator, and its associated CO boiler that CITGO owns and/or operates at the Lemont Refinery.

q. "Fuel Oil" shall mean any liquid fossil fuel with sulfur content of greater than 0.05% by weight.

r. "Illinois" shall mean the State of Illinois, on behalf of the Illinois Environmental Protection Agency.

s. "Illinois EPA" shall mean the Illinois Environmental Protection Agency and any of its successor departments or agencies.

t. "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."

u. "MMBtu" shall mean million British thermal units.

v. "Natural Gas Curtailment" shall mean a restriction imposed by a natural gas supplier, which limits CITGO's ability to obtain natural gas.

w. "NO_x" shall mean nitrogen oxides.

x. "Paragraph" shall mean a portion of this Consent Decree identified by an Arabic numeral.

y. "Parties" shall mean the United States and CITGO.

z. "PEMS" or "Parametric Emission Monitoring System" shall mean the monitoring system that CITGO may elect to install on the 123B-2 heater at the Lemont Refinery pursuant to the requirements of Subparagraph 16.a and Appendix E.

aa. "PM" shall mean particulate matter as measured by 40 C.F.R. Part 60, Appendix A, Method 5B or 5F.

bb. "$PM_{2.5}$" shall mean all filterable and condensable particulate matter 2.5 microns or less in diameter, as measured by 40 C.F.R. Part 51, Appendix M, Methods 201A and 202.

cc. "PM_{10}" shall mean all filterable and condensable particulate matter ten microns or less in diameter, as measured by 40 C.F.R. Part 51, Appendix M, Methods 201A and 202.

dd. "Project Dollars" shall mean CITGO's expenditures and payments incurred or made in carrying out the Supplemental Environmental Projects identified in Section VII and Appendices C and D to the extent that such expenditures or payments both: (i) comply with the requirements set forth in that Section and Appendices C and D; and (ii) constitute CITGO's direct payments for such projects or CITGO's external costs for contractors, vendors, and equipment.

ee. "Refinery" or "Lemont Refinery" shall mean the refinery owned and operated by CITGO in Lemont, Illinois, which is subject to the requirements of this Consent Decree.

ff. "Section" shall mean a portion of this Consent Decree that has a heading identified by an upper case Roman numeral.

gg. "Shutdown" shall mean the cessation of operation for any purpose.

hh. "SO_2" shall mean sulfur dioxide.

ii. "SRP" or "Claus Sulfur Recovery Plant" shall mean a process unit that recovers sulfur from hydrogen sulfide by a vapor phase catalytic reaction of sulfur dioxide with hydrogen sulfide.

jj. "Startup" shall mean the setting in operation for any purpose.

kk. "VOC" or "Volatile Organic Compounds" shall have the definition set forth in 40 C.F.R. § 51.100(s).

ll. "WESP" shall mean a wet electrostatic precipitator.

mm. "WESP Root Cause Analysis" shall mean an assessment conducted through a process of investigation to determine the primary cause and any contributing cause(s) of "triggering events," as defined in Subparagraph 25.a, at the WESP.

nn. "WGS" shall mean a wet gas scrubber.

V. COMPLIANCE REQUIREMENTS

A. NO_x Emissions Reductions from Heaters and Boilers

14. 590H-1 and 590H-2 Heaters.

a. NO_x Emissions Monitoring. By no later than December 31, 2016, CITGO shall install, certify, calibrate, maintain, and operate NO_x CEMS on the 590H-1 and 590H-2 heaters in accordance with the provisions of 40 C.F.R. § 60.13 that are applicable to CEMS (excluding those provisions applicable only to Continuous Opacity Monitoring Systems) and 40 C.F.R. Part 60, Appendices A and F, and the applicable performance specification test of 40 C.F.R. Part 60, Appendix B. However, unless a federal or state regulation or a permit condition otherwise requires compliance with 40 C.F.R. Part 60, Appendix F §§ 5.1.1, 5.1.3, and 5.1.4, for these CEMS, CITGO may conduct: (1) either a Relative Accuracy Audit ("RAA") or a Relative Accuracy Test Audit ("RATA") once every three (3) years; and (2) a Cylinder Gas Audit ("CGA") each calendar quarter in which a RAA or RATA is not performed.

b. NO_x Emissions Limits. By no later than March 31, 2017, CITGO shall comply with a NO_x emission limit of 0.020 pounds NO_x per MMBtu at 3% stack oxygen ("O_2")

on a 30-day rolling average basis at the 590H-1 heater and at the 590H-2 heater. Compliance shall be demonstrated using the NO_x CEMS and calculated using 40 C.F.R. Part 60, Appendix A, Method 19.

15. 125B-1 and 125B-2 Heaters.

a. NO_x Emissions Monitoring. No later than December 31, 2017, CITGO shall install, certify, calibrate, maintain, and operate a NO_x CEMS on the 125B-1 and 125B-2 heater stack in accordance with the provisions of 40 C.F.R. § 60.13 that are applicable to CEMS (excluding those provisions applicable only to Continuous Opacity Monitoring Systems) and 40 C.F.R. Part 60, Appendices A and F, and the applicable performance specification test of 40 C.F.R. Part 60, Appendix B. However, unless a federal or state regulation or a permit condition otherwise requires compliance with 40 C.F.R. Part 60, Appendix F §§ 5.1.1, 5.1.3, and 5.1.4, for these CEMS, CITGO may conduct: (1) either a Relative Accuracy Audit ("RAA") or a Relative Accuracy Test Audit ("RATA") once every three (3) years; and (2) a Cylinder Gas Audit ("CGA") each calendar quarter in which a RAA or RATA is not performed.

b. NO_x Emissions Limits. By no later than December 31, 2017, CITGO shall install on the 125B-1 heater and on the 125B-2 heater low NO_x burners that are designed to achieve a NO_x emission rate of less than or equal to 0.030 pounds of NO_x per MMBtu high heating value ("HHV") when firing natural gas at 3% stack O_2 at full design load without air preheat, even if upon installation actual emissions exceed 0.030 pounds of NO_x per MMBtu HHV, on a 30-day rolling average basis. By no later than March 31, 2018, CITGO shall comply with a NO_x emission limit of 0.030 pounds NO_x per MMBtu at 3% stack O_2 on a 30-day rolling average basis at the 125B-1 heater and at the 125B-2 heater. Compliance shall be demonstrated using the NO_x CEMS and calculated using 40 C.F.R. Part 60, Appendix A, Method 19.

16. 123B-2 Heater.

a. NO_x Emissions Monitoring. By no later than December 31, 2019, CITGO shall either: (1) install, certify, calibrate, maintain, and operate NO_x CEMS on the 123B-2 heater, consistent with the requirements set forth in Subparagraph 15.a for NO_x CEMS installation at the 125B-1 and 125B-2 heaters; or (2) develop, certify, calibrate, maintain, and operate a parametric emission monitoring system ("PEMS") for NO_x on the 123B-2 heater in accordance with the requirements set forth in Appendix E.

b. NO_x Emissions Limit. By no later than December 31, 2019, CITGO shall install on the 123B-2 heater low NO_x burners that are designed to achieve a NO_x emission rate of less than or equal to 0.030 pounds of NO_x per MMBtu HHV when firing natural gas at 3% stack O_2 at full design load without air preheat, even if upon installation actual emissions exceed 0.030 lb/MMBtu HHV, on a 30-day rolling average basis. By no later than March 31, 2020, CITGO shall comply with a NO_x emission limit at the 123B-2 heater of 0.030 pounds of NO_x per MMBtu at 3% stack O_2 on a 30-day rolling average basis. Compliance shall be demonstrated using the NO_x CEMS or PEMS, as applicable, and calculated using 40 C.F.R. Part 60, Appendix A, Method 19.

17. Opportunity to Request Modification of a NO_x Emissions Limit.

a. First Three Years. If during the first three years of monitoring NO_x emissions with CEMS or PEMS pursuant to Paragraphs 14–16, CITGO believes that, despite best efforts at design, installation, operation, and maintenance of controls, it is technically infeasible to comply with the NO_x emissions limit applicable to one or more heaters, CITGO may submit to EPA a demonstration supporting this conclusion and may request an increase, not to exceed 0.010 pounds NO_x per MMBtu over the original limit, of the NO_x emission limit prescribed for each such heater in Paragraphs 14–16. EPA may grant or deny CITGO's request in whole or in part, subject to dispute resolution under Section XIII of this Decree; however, the Parties agree that "best efforts," as used in this Subparagraph, shall not include decreasing production.

b. After First Three Years. At any time after the first three years of monitoring, CITGO may submit a demonstration, as described in Subparagraph 17.a, but any decision by EPA to deny CITGO's request in whole or in part shall not be subject to dispute resolution.

c. Effect of EPA Approval of CITGO's Demonstration. If EPA approves CITGO's demonstration and request for one or more increased NO_x emissions limits, the approved increased limit(s) shall be deemed to have been effective under Paragraphs 14–16, as applicable, and in place of the previous limit(s) during all of the following time periods: (i) the time during which achievement of the previous limit(s) was infeasible (including any period of time that occurred prior to submittal of the demonstration), (ii) the pendency of EPA's review of CITGO's demonstration, and (iii) the pendency of any proceeding undertaken pursuant to Section XIII (Dispute Resolution).

d. Stipulated Penalties for NO_x Emissions up to and including 0.010 lb/MMBtu Above Applicable Limits. During any of the three periods of time set forth in Subparagraph 17.c, EPA may demand stipulated penalties for NO_x emissions that are up to and including 0.010 lb/MMBtu above the applicable limits set forth in Paragraphs 14–16. However, CITGO shall not be obligated to pay any such demand until: (i) after all three time periods identified in Subparagraph 17.c are over; and (ii) CITGO's demonstration has been finally denied by either EPA or the Court (if the dispute is resolved by the Court). Stipulated penalties under this Subparagraph shall not accrue: (i) during the period, if any, beginning on the 31st day after EPA's receipt of CITGO's demonstration under Subparagraph 17.a or 17.b until the date that EPA notifies CITGO of its decision; and (ii) with respect to a decision that CITGO disputes under the dispute resolution provisions of this Decree, during the period, if any, beginning on the 21st day after the date that CITGO serves its written Statement of Position on the United States until the United States issues its final decision on this dispute; and (iii) with respect to judicial review by this Court of any dispute under the dispute resolution provisions of this Decree, during the period, if any, beginning on the 31st day after the Court's receipt of the final submission regarding the dispute until the date that the Court issues a final decision regarding such dispute.

e. Stipulated Penalties for NO_x Emissions Greater Than 0.010 lb/MMBtu Above the Applicable Limit. Nothing in this Paragraph 17 shall alter or modify the provisions in this Consent Decree related to stipulated penalties for violating NO_x emission limits at Heaters 590H-1, 590H-2, 125B-1, 125B-2, and 123B-2 when the NO_x emissions are greater 0.010 lb/MMBtu above the applicable limit.

18. Shutdown of 106B-1, 107B-21, 108B-41, and 108B-42 Heaters. By no later than the Date of Entry, CITGO shall permanently shut down and submit applications to

surrender all operating permits for the 106B-1, 107B-21, 108B-41, and 108B-42 heaters. These operating permits shall be surrendered prior to termination of this Consent Decree pursuant to Section XXI (Termination). CITGO may seek to recommence operation of one or more of these heaters only if:

a. CITGO accepts the applicability of 40 C.F.R. Part 60, Subpart Ja, as to the heater in question;

b. CITGO undertakes the following:

i. For Heaters 106B-1, 107B-21, and 108B-42, CITGO installs, at a minimum, ultra-low NO_x burners that are designed to achieve a NO_x emission rate of less than or equal to 0.030 pounds of NOx per MMBtu high heating value when firing natural gas at 3% stack O_2 at full design load without air preheat;

ii. For Heater 108B-41, CITGO installs, at a minimum, ultra-low NO_x burners that are designed to achieve a NO_x emission rate of less than or equal to 0.060 pounds of NO_x per MMBtu high heating value when firing natural gas at 3% stack O_2 at full design load with air preheat;

and

c. CITGO complies with all applicable new source permitting requirements prior to restarting the heater in question.

Regardless of whether CITGO recommences the operation of any of these heaters as a new source, CITGO is forever subject to the prohibition in Paragraph 48 of this Consent Decree on the use of the emission reductions resulting from the shutdown of these heaters.

B. PM Emissions Reductions from Heaters

19. PM, PM_{10}, and $PM_{2.5}$ Emissions Limits at Certain Heaters. By no later than the Date of Entry, CITGO shall comply with PM, PM_{10}, and $PM_{2.5}$ emission limits of 0.0075 pounds per MMBtu on a 3-hour average basis, as demonstrated by a performance test, at each of the following heater stacks: the 590H-1 heater stack, the 590H-2 heater stack, the 115B-1/115B-2

heater stack, and the 125B-1/125B-2 heater stack. All of the performance tests shall be completed by no later than 90 days of the Date of Entry. Each performance test shall consist of a 3-run average with each run being at least 1 hour in duration.

C. PM Emissions Reductions from FCCU

20. By no later than the Date of Lodging, CITGO shall control and reduce PM emissions from the FCCU by continuous operation of a Wet Gas Scrubber ("WGS") and a Wet Electrostatic Precipitator ("WESP").

21. FCCU PM Emission Limits. By September 30, 2015, CITGO shall comply with an FCCU emission limit of 0.5 pounds of PM per 1000 pounds of coke burned on a 3-hour average basis.

22. Opportunity to Request Modification of the FCCU PM Limit.

a. Prior to September 30, 2018. If, prior to September 30, 2018, CITGO believes that, despite best efforts at design, installation, operation, and maintenance of controls, it is technically infeasible to comply with a limit of 0.5 pounds of PM per 1000 pounds of coke burned on a 3-hour average basis at the FCCU, CITGO may submit to EPA a demonstration supporting this conclusion and may request an increase in the limit. CITGO shall not seek a limit greater than 1.0 pounds of PM per 1000 pounds of coke burned on a 3-hour average basis. EPA may grant or deny CITGO's request in whole or in part, subject to dispute resolution in Section XIII of this Decree; however, the Parties agree that "best efforts," as used in this Subparagraph, shall not include decreasing production.

b. After September 30, 2018. At any time after September 30, 2018, CITGO may submit a demonstration, as described in Subparagraph 22.a, but any decision by EPA to deny CITGO's request in whole or in part shall not be subject to dispute resolution.

c. Effect of EPA Approval of CITGO's Demonstration. If EPA approves CITGO's demonstration and request for an increased limit for PM at the FCCU, the approved increased limit shall be deemed to have been effective and in place of the previous limit during all of the following time periods: (i) the time during which achievement of the previous limit was infeasible (including any period of time that occurred prior to submittal of the demonstration), (ii) the pendency of EPA's review of CITGO's demonstration, and (iii) the pendency of any proceeding undertaken pursuant to Section XIII (Dispute Resolution).

d. Stipulated Penalties for PM Emissions Greater than 0.5 lb/1000 lb Coke but Less than or Equal to 1.0 lb/1000 lb Coke. During any of the three periods of time set forth in Subparagraph 22.c, EPA may demand stipulated penalties for FCCU PM emissions that are greater than 0.5 lb/1000 lb coke but less than or equal to 1.0 lb/1000 lb coke on a 3-hour average basis. However, CITGO shall not be obligated to pay any such demand until: (i) after all three time periods identified in Subparagraph 22.c are over; and (ii) CITGO's demonstration has been finally denied by either EPA or the Court (if the dispute is resolved by the Court). Stipulated penalties under this Subparagraph shall not accrue: (i) during the period, if any, beginning on the 31st day after EPA's receipt of CITGO's demonstration under Subparagraph 22.a or 22.b until the date that EPA notifies CITGO of its decision; and (ii) with respect to a decision that CITGO disputes under the dispute resolution provisions of this Decree, during the period, if any, beginning on the 21st day after the date CITGO serves its written Statement of Position on the United States until the United States issues its final decision on this dispute; and (iii) with respect to judicial review by this Court of any dispute under the dispute resolution provisions of this Decree, during the period, if any, beginning on the 31st day after the Court's receipt of the final

submission regarding the dispute until the date that the Court issues a final decision regarding such dispute.

e. Stipulated Penalties for FCCU PM Emissions Greater than 1.0 lb/1000 lb Coke. Nothing in this Paragraph 22 shall alter or modify the provisions in this Consent Decree related to stipulated penalties for violating the FCCU PM emission limit when the PM emissions are greater than 1.0 lb/1000 lb coke on a 3-hour average basis.

23. Demonstrating Compliance with FCCU PM Emission Limit. Each calendar year commencing in 2016, CITGO shall conduct a PM stack test at the FCCU using EPA Reference Method 5B in accordance with 40 C.F.R. § 60.106(b)(2). By no later than 90 days prior to the first test, CITGO shall submit a stack test protocol to EPA for review and approval. Upon demonstrating through at least three (3) annual tests that the limit established under Paragraph 21, reflecting any adjustments made pursuant to Paragraph 22, is not being exceeded, CITGO may request EPA approval to conduct tests less frequently than annually. Such approval will not be unreasonably withheld.

24. Additional Requirements for PM Controls at the FCCU: Fallen Electrodes within the FCCU WESP. Beginning no later than the Date of Entry, upon becoming aware of a fallen electrode within the FCCU WESP, CITGO shall, as soon as practicable but in no case later than 48 hours from such knowledge, reduce the coke burn rate at the FCCU to a maximum of 55,000 pounds per hour until repairs are made and the WESP is operational. This requirement shall be in addition to the requirement to maintain compliance with all applicable PM emission limits.

25. Additional Requirements for PM Controls at the FCCU: WESP Root Cause Analysis and Corrective Action.

a. WESP Triggering Events. Beginning no later than 30 days after the Date of Entry unless a force majeure causes the event, CITGO shall conduct a WESP Root Cause Analysis and develop a corrective action plan to address the findings of the WESP Root Cause Analysis when any of the following occurs:

i. A PM limit exceedance; or

ii. During FCCU operation:

(1) The voltage at the WESP falls below 40,000 Volts on a three-hour rolling average, rolled hourly; or

(2) The amperage at the WESP falls below 90 milliAmps on a three-hour rolling average, rolled hourly.

Provided, however, that CITGO shall not be required to conduct a WESP Root Cause Analysis even if one or both of the triggers under Subparagraph 25.a.(ii) are satisfied if the trigger results from a routine WESP flush.

b. WESP Root Cause Analysis and Corrective Action Report: Full Report. By no later than 45 days after an event triggers a WESP Root Cause Analysis, CITGO shall prepare a WESP Root Cause Analysis and Corrective Action Report that shall, at a minimum, include the following elements:

i. An identification and detailed analysis setting forth the root cause and any contributing cause(s) of the triggering event;

ii. The steps, if any, taken to limit the duration of the incident;

iii. An analysis of the measures reasonably available to prevent the root cause and any contributing cause(s) of the triggering event from recurring. This analysis shall include an evaluation of possible design, operational, and maintenance measures; and

iv. The corrective actions taken or to be taken consistent with the requirements of Subparagraph 25.d.

c. WESP Root Cause Analysis and Corrective Action Report: Abbreviated Report. If a triggering event resulting from the same underlying cause(s) occurs while CITGO is investigating and/or implementing corrective action for a prior incident with the same underlying cause(s), within 45 days after the triggering event occurs, CITGO shall prepare a report that: (i) briefly identifies the root cause and any contributing causes of the new incident; (ii) sets forth the steps, if any, taken to limit the duration of the new incident; and (iii) identifies the date of the original incident for which a full report was generated or is being generated.

d. WESP Corrective Action. CITGO shall undertake as expeditiously as reasonably possible all reasonably available corrective actions that are necessary to correct the cause of the triggering event and to prevent a recurrence of the root cause and any contributing cause(s) identified in the WESP Root Cause Analysis. In all reports required under Subparagraph 25.b or 25.e, CITGO shall include a description of any corrective actions already completed or, for corrective actions that are not yet completed, a schedule for their implementation including proposed commencement and completion dates.

e. WESP Third Party Evaluation.

i. If triggering events with the same root cause and/or contributing cause(s) recur two times within a rolling twelve-month period, CITGO shall document each event and retain an independent third party to evaluate CITGO's assessment of the events' cause(s). By no later than 120 days after the second incident in the rolling twelve-month period occurs, the independent third party shall prepare a written report ("Third Party Report"), which may include recommendations for additional corrective actions. CITGO shall implement all recommended corrective action(s) or implement other actions that address the root cause and any

contributing causes identified by the third party. CITGO shall document its basis for not implementing any element of the third party's recommended corrective action(s). Dispute resolution under Section XIII may be invoked for disputes arising under this Subparagraph.

ii. The requirements of Subparagraph 25.e shall not apply if triggering events with the same root cause and/or contributing cause(s) are already the subject of a third party evaluation and the corrective actions identified from that evaluation have not been completed. CITGO shall not be required to retain a third party more than once every rolling twenty-four-months for incidents that are caused by fallen electrodes.

f. WESP Root Cause Analyses and Corrective Action Reports (Full and Abbreviated) and WESP Third Party Evaluations: Reports to EPA. CITGO shall include a copy of each report required by Subparagraphs 25.b, 25.c, and/or 25.e in the first semi-annual report due under Section IX of the Consent Decree (Reporting and Recordkeeping) that CITGO submits after the Subparagraph 25.b, 25.c, and/or 25.e report(s) is (are) required to be completed. In any semi-annual report that includes a report under Subparagraph 25.e, CITGO also shall include, if applicable, documentation of its basis for not implementing any element of the third party's recommended corrective action.

g. EPA Review and Comment on Corrective Actions; CITGO Response; Dispute Resolution.

i. EPA Review. After a review of a WESP Root Cause Analysis and Corrective Action Report or Third Party Report, EPA may notify CITGO in writing of: *(1)* any deficiencies in the corrective actions identified; and/or *(2)* any objections to the schedules for implementation of the corrective actions. In the notification, EPA will provide an explanation of the basis for its objections.

ii. CITGO Response.

(1) If CITGO has not yet commenced implementation of the corrective action, CITGO will implement an alternative or revised corrective action or implementation schedule based on EPA's comments.

(2) If a corrective action that EPA has identified as deficient has already commenced or is already completed, then CITGO is not obligated to implement any alternative or additional corrective action identified by EPA. However, CITGO shall be on notice that EPA considers such corrective action deficient and not acceptable for remedying any subsequent, similar root cause(s) of any future triggering event.

iii. If EPA and CITGO cannot agree on the appropriate corrective action(s) or implementation schedule(s), if any, to be taken in response to a WESP Root Cause Analysis and Corrective Action Report, either party may invoke the dispute resolution provisions of Section XIII of this Consent Decree.

D. Sulfur Pit Emissions, Operation, and Maintenance

26. NSPS Subpart A and J Applicability. As of the Date of Lodging, the Sulfur Recovery Plant ("SRP") shall continue to be an "affected facility" within the meaning of Subparts A and J of 40 C.F.R. Part 60. CITGO shall continue to route or re-route all sulfur pit emissions at the Lemont Refinery so that they are eliminated, controlled, or included and monitored as part of the SRP emissions subject to NSPS Subpart A and the NSPS Subpart J limit for SO_2, 40 C.F.R. § 60.104(a)(2).

27. Requirement for Good Air Pollution Control Practices. By no later than the Date of Entry, CITGO shall operate and maintain the following control and monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions: 1) the sulfur pit air sweep system for sulfur pits on SRP Trains A, B, C, and D; and

2) the sulfur pit air sweep flow meters located at each eductor inlet. CITGO shall route all sweep air and emissions into the combustion zone of the tail gas incinerator.

28. Sulfur Pit Operation and Maintenance Plan.

a. Requirements of Sulfur Pit Operation and Maintenance Plan. By no later than 90 days after the Date of Entry, CITGO shall develop and submit to EPA for review a comprehensive Sulfur Pit Operation and Maintenance Plan ("Sulfur Pit O&M Plan") that is designed to ensure operation and maintenance of all sulfur pits in accordance with good air pollution control practices for minimizing emissions. CITGO shall include the following minimum elements in the Sulfur Pit O&M Plan:

i. a description of sulfur pit air sweep operations;

ii. flow meter and eductor maintenance procedures;

iii. flow meter inlet minimum air flow associated with no sulfur pit venting and the method used to determine such set point;

iv. flow meter inlet alarm air flow set point(s) for operators to trouble shoot and take action to improve the eductor performance; and

v. response procedures when sulfur pit air sweep flow is low.

b. EPA Review and Comment on Sulfur Pit O&M Plan. EPA may provide written comments on CITGO's Sulfur Pit O&M Plan or EPA may decline to comment. The procedures of this Subparagraph shall apply as follows:

i. If EPA provides written comments within 60 days of receipt of CITGO's Sulfur Pit O&M Plan, then within 45 days of receipt of such comments, CITGO shall either: *(1)* modify the Sulfur Pit O&M Plan consistent with EPA's written comments; or *(2)* submit the matter for dispute resolution under Section XIII of this Consent Decree.

ii. If EPA does not provide written comments within 60 days of receipt of CITGO's Sulfur Pit O&M Plan, EPA nonetheless may still provide written comments requiring changes to the Sulfur Pit O&M Plan. Within 60 days of receipt of such comments, CITGO shall either: *(1)* implement all of the actions required by the comments; or *(2)* notify EPA that CITGO has determined that implementation of one or more those actions (which CITGO shall specifically identify) would be either unduly burdensome to implement given the degree to which CITGO has proceeded with implementing the Sulfur Pit O&M Plan or would be otherwise unreasonable. If CITGO notifies EPA that it will not implement all of the actions required by the comments, then within sixty days of receipt of CITGO's notification, EPA may either accept CITGO's position or invoke dispute resolution pursuant to Section XIII of this Consent Decree.

iii. During the pendency of any dispute resolution proceeding pursuant to this Paragraph 28, CITGO shall implement all parts of the Sulfur Pit O&M Plan that are not the subject of the dispute and shall also implement the disputed parts consistent with CITGO's proposal. After completion of the dispute resolution proceeding, CITGO shall implement the disputed parts of the Sulfur Pit O&M Plan consistent with the results of the dispute resolution proceeding.

E. CEMS Operation and Maintenance Plan and PEMS Monitoring Protocol; CEMS and PEMS Downtime Root Cause Analyses and Corrective Actions

29. CEMS Operation and Maintenance Plan and PEMS Monitoring Protocol. By no later than 180 days after the Date of Entry of this Consent Decree, CITGO shall develop and submit to EPA for review a comprehensive CEMS Operation and Maintenance Plan ("CEMS O&M Plan") and a comprehensive PEMS Monitoring Protocol (as identified in Appendix E) that is designed to enhance the performance of the CEMS and the PEMS, improve CEMS and PEMS

accuracy and stability, and minimize periods of CEMS and PEMS downtime. The CEMS O&M Plan shall include, at a minimum, each element identified in Paragraphs 30–34. The PEMS Monitoring Protocol shall include, at a minimum, each element identified in Appendix E. EPA's review of CITGO's CEMS O&M Plan and its PEMS Monitoring Protocol shall be undertaken pursuant to Paragraph 35.

30. CEMS and PEMS Operations and Maintenance Training. At least once every 12-month period that commences 90 days after CITGO's submission of the CEMS O&M Plan and the PEMS Monitoring Protocol, CITGO shall provide training to all individuals (CITGO employees and contractors) involved in CEMS and/or PEMS operations and maintenance in order to ensure and maintain necessary levels of competence in maintaining and operating CEMS and/or PEMS. All newly-hired individuals (CITGO employees and contractors) involved in CEMS and/or PEMS operations and maintenance shall receive CEMS and/or PEMS training, as applicable, which shall include a review of the CEMS O&M Plan and/or the PEMS Monitoring Protocol, prior to undertaking any CEMS-related and/or PEMS-related responsibilities. All individuals involved in CEMS and/or PEMS operations and maintenance shall have access to and be familiar with the CEMS O&M Plan and/or PEMS Monitoring Protocol. These requirements shall be identified and described in the CEMS O&M Plan and the PEMS Monitoring Protocol.

31. CEMS Testing and Calibration. Commencing on the Date of Lodging for Existing CEMS and on the date required by this Consent Decree for CEMS that will be installed pursuant to this Consent Decree, CITGO shall certify, calibrate, maintain, and operate all CEMS in accordance with the provisions of 40 C.F.R. § 60.13 that are applicable to CEMS (excluding those provisions applicable only to Continuous Opacity Monitoring Systems) and 40 C.F.R.

Part 60, Appendices A and F, and the applicable performance specification test of 40 C.F.R. Part 60, Appendix B. However, unless a federal or state regulation or a permit condition otherwise requires compliance with 40 C.F.R. Part 60, Appendix F §§ 5.1.1, 5.1.3, and 5.1.4, CITGO may conduct: (1) either a Relative Accuracy Audit ("RAA") or a Relative Accuracy Test Audit ("RATA") once every three (3) years; and (2) a Cylinder Gas Audit ("CGA") each calendar quarter in which a RAA or RATA is not performed. Provided however, that for CEMS that monitor flares that do not receive routine flow, CITGO may use the alternative relative accuracy procedures described in Section 16.0 of Performance Specification 2 of Appendix B to Part 60 (cylinder gas audits) for conducting relative accuracy evaluations, except that it is not necessary to include as much of the sampling probe or sampling line as practical.

32. CEMS Operation. Commencing on the Date of Lodging for Existing CEMS and on the date required by this Consent Decree for CEMS that will be installed pursuant to this Consent Decree, CITGO shall operate each CEMS at all times, including during periods of process unit Startup, Shutdown, and/or Malfunction.

33. Notice of Removal of CEMS from list of Existing CEMS. If CITGO determines that it no longer needs to operate an Existing CEMS because an underlying legal requirement (*e.g.*, this Consent Decree, a federal or state statute or regulation, or a permit) no longer requires the operation of the CEMS, then CITGO shall notify EPA, pursuant to Section XVII (Notices), that CITGO has modified the list of "Existing CEMS" set forth in Section IV (Definitions) to delete the CEMS that is the subject of the submission from the list. CITGO shall submit this notice within 60 days of the date that the operation of the CEMS no longer was required. In the Notice, CITGO shall identify the legal requirement that formerly required the CEMS' operation and the date that the legal requirement no longer was applicable.

34. Preventive Maintenance, Quality Assurance/Quality Control ("QA/QC"), and Repair. By no later than the date of submission of the CEMS O&M Plan, CITGO shall develop the programs set forth in Subparagraphs 34.a–34.c for CEMS. By no later than the date of submission of the PEMS Monitoring Protocol, CITGO shall develop the programs set forth in the Monitoring Protocol. Commencing 90 days after submission of the CEMS O&M Plan and the PEMS Monitoring Protocol, and continuing until termination of this Consent Decree, CITGO shall implement these programs, as updated by the requirements of Subparagraph 34.d and/or the results of EPA's review and comment pursuant to Paragraph 35 and/or the results of dispute resolution pursuant to Paragraph 35.

a. CEMS Routine Preventive Maintenance Program. The CEMS Routine Preventive Maintenance Program shall identify and require implementation of a regularly-scheduled set of activities designed to minimize problems that cause CEMS downtime. Such activities and procedures may be based initially on the CEMS vendor's recommendations. Routine preventive maintenance procedures shall include regular (*e.g.*, daily, weekly, monthly) internal (and, as needed, external) operation and maintenance ("O&M") checks designed to minimize CEMS downtime. Internal O&M checks include, but are not limited to, CEMS inspections, routine cleaning of components, and any other routine maintenance. External O&M checks include, but are not limited to, independent third party CEMS audits or other assessments to ensure continuous CEMS operation. For the CEMS, both internal and external O&M checks are in accordance with the actions already required by 40 C.F.R. Part 60, Appendix F.

b. CEMS QA/QC Program. The CEMS QA/QC Program shall identify and require implementation of activities to assess and maintain the quality of continuous emissions monitoring data, including regular (e.g., daily, weekly monthly) internal (and, as needed,

external) QA/QC and operation checks designed to maintain or improve data quality. Internal QA/QC and operation checks include, but are not limited to, periodic calibrations, drift tests, relative accuracy tests, and any other sampling and analyses to assess the quality of CEMS data (*i.e.*, accuracy and precision). External QA/QC and operation checks include, but are not limited to, independent third party CEMS audits, third party sampling and analysis for accuracy and precision, or other assessments to ensure accurate CEMS operations. Both internal and external QA/QC and operation checks for CEMS are in accordance with the actions already required by 40 C.F.R. Part 60, Appendix F.

c. CEMS Repair Program. The CEMS Repair Program shall identify and require the implementation of procedures designed to ensure the prompt repair of CEMS to address both routine and non-routine maintenance and repair. As part of its CEMS Repair Program, CITGO shall: (i) maintain a spare parts inventory adequate to support normal operating and preventive maintenance requirements; and (ii) establish written procedures for the acquisition of parts on an emergency basis (*e.g.*, vendor availability on a next-day basis). At all times during the pendency of this Consent Decree, CITGO shall ensure that a current employee of the Lemont Refinery has been designated with the responsibility for maintaining the adequacy of the spare parts inventory. The on-site spare parts inventory may be based initially on CEMS vendor recommendations.

d. Review and Update of Programs. No less than one time per 12-month period commencing in the 12-month period that is one year after the date that CITGO submits its CEMS O&M Plan and its PEMS Monitoring Protocol, CITGO shall review and update, as needed, its CEMS Routine Preventive Maintenance Programs, its CEMS QA/QC Program, its CEMS Repair Program, and/or its PEMS Monitoring Protocol to incorporate necessary or

appropriate modifications based on operating experience with each CEMS and with the PEMS. CITGO also shall review and update, as needed, its CEMS Routine Preventive Maintenance Program, its CEMS QA/QC Program, its CEMS Repair Program, and/or its PEMS Monitoring Protocol based on the results of each CEMS and/or PEMS Downtime Root Cause Analysis and Corrective Action Report written pursuant to Paragraph 36 by no later than 135 days after the CEMS and/or PEMS Downtime Root Cause Analysis and Corrective Action Report is due.

35. EPA Review and Comment on CEMS Operation and Maintenance Plan and the PEMS Monitoring Protocol. EPA may provide written comments on CITGO's CEMS O&M Plan and/or CITGO's PEMS Monitoring Protocol, or EPA may decline to comment. The procedures of this Paragraph shall apply.

a. If EPA provides written comments within 60 days of receipt of CITGO's CEMS O&M Plan or its PEMS Monitoring Protocol, then within 45 days of receipt of such comments, CITGO shall either: (i) modify the Plan and/or Protocol consistent with EPA's written comments; or (ii) submit the matter for dispute resolution under Section XIII of this Consent Decree.

b. If EPA does not provide written comments within 60 days of receipt of CITGO's CEMS O&M Plan or its PEMS Monitoring Protocol, EPA nonetheless may still provide written comments requiring changes to one or both of these documents. Within 60 days of receipt of such comments, CITGO shall either: (i) implement all of the actions required by the comments; or (ii) notify EPA that CITGO has determined that implementation of one or more of those actions (which CITGO shall specifically identify) would be either: *(1)* unduly burdensome to implement given the degree to which CITGO has proceeded with implementing the CEMS O&M Plan or the PEMS Monitoring Protocol, as applicable; or *(2)* would be otherwise

unreasonable. If CITGO notifies EPA that it will not implement all of the actions required by the comments, then within 60 days of receipt of CITGO's notification, EPA may either accept CITGO's position or invoke dispute resolution pursuant to Section XIII of this Consent Decree.

c. During the pendency of any dispute resolution proceeding pursuant to this Paragraph 35, CITGO shall implement all parts of the CEMS O&M Plan and/or PEMS Monitoring Protocol that are not the subject of the dispute and shall also implement the disputed parts consistent with CITGO's proposal. After completion of the dispute resolution proceeding, CITGO shall implement the disputed parts of the CEMS O&M Plan and/or PEMS Monitoring Protocol consistent with the results of the dispute resolution proceeding.

36. CEMS and PEMS Downtime Root Cause Analysis and Corrective Action.

a. CEMS and PEMS Downtime Triggering Event. At any time that, in two consecutive calendar quarters, a CEMS or the PEMS has downtime greater than 5% of the time in each such calendar quarter, CITGO shall conduct a CEMS Downtime Root Cause Analysis or a PEMS Downtime Root Cause Analysis, as applicable. For purposes of the 5% downtime calculation, "downtime" shall mean the period of time during the operation of the emission unit being monitored in which any of the required CEMS data or PEMS data either are not recorded or are invalid for any reason (*e.g.*, monitor malfunctions, data system failures, preventive maintenance, unknown causes, *etc.*), but shall not include downtime associated with routine CEMS zero and span checks and QA/QC activities required by this Consent Decree and/or an applicable regulation. CEMS and PEMS data that meet the requirements of 40 C.F.R. § 60.13 shall be considered "valid" for purposes of determining downtime.

b. CEMS and PEMS Downtime Root Cause Analysis and Corrective Action Report. By no later than 45 days after an event that triggers a CEMS Downtime Root Cause

Analysis or a PEMS Downtime Root Cause Analysis, CITGO shall prepare a CEMS Downtime Root Cause Analysis and Corrective Action Report and/or a PEMS Downtime Root Cause Analysis, as applicable, that shall, at a minimum, include the following elements:

i. An identification and detailed analysis setting forth the root cause and any contributing cause(s) of the CEMS and/or PEMS downtime;

ii. The steps, if any, taken to limit the duration of the CEMS and/or PEMS downtime;

iii. An analysis of the measures reasonably available to prevent the root cause and any contributing cause(s) of the CEMS and/or PEMS downtime from recurring. This analysis shall include an evaluation of possible design, operational, and maintenance measures; and

iv. The corrective actions taken or to be taken consistent with the requirements of Subparagraph 36.c.

c. CEMS and PEMS Downtime Corrective Action. CITGO shall undertake as expeditiously as reasonably possible all reasonably available corrective actions that are necessary to correct the cause of the CEMS and/or PEMS downtime, as applicable, and to prevent a recurrence of the root and any contributing cause(s) identified in the CEMS and/or PEMS Downtime Root Cause Analysis and Corrective Action Report. In this Report, CITGO shall include a description of any corrective actions already completed or, for corrective actions that are not yet completed, a schedule for their implementation.

d. CEMS and PEMS Downtime Third Party Evaluation. For any specific CEMS and/or PEMS for which a CEMS and/or PEMS Downtime Root Cause Analysis and Corrective Action Report is required twice within twelve (12) consecutive calendar quarters, CITGO shall retain an independent third party to evaluate CITGO's assessment of the CEMS and/or PEMS downtime cause(s). By no later than 120 days after CITGO's required preparation

of the second CEMS and/or PEMS Downtime Root Cause Analysis and Corrective Action Report, the independent third party shall prepare a written report ("CEMS Downtime Third Party Report" and/or "PEMS Downtime Third Party Report") which may include recommendations for additional corrective actions and/or modifications to CITGO's CEMS O&M Plan and/or to CITGO's PEMS Monitoring Protocol. CITGO shall implement all recommended corrective action(s) or implement other actions that address the root cause and any contributing causes identified by the third party. CITGO shall document its basis for not implementing any elements of the third party's recommended corrective action(s). Dispute resolution under Section XIII may be invoked for disputes arising under this Subparagraph.

e. CEMS and/or PEMS Downtime Root Cause Analyses and CEMS and/or PEMS Downtime Third Party Evaluations: Reports to EPA. CITGO shall include a copy of each CEMS and/or PEMS Downtime Root Cause Analysis and Corrective Action Report and each CEMS and/or PEMS Downtime Third Party Report in the first semi-annual report due under Section IX of the Consent Decree (Reporting and Recordkeeping) that CITGO submits after this (these) Report(s) is (are) required to be completed. In any semi-annual report that includes a CEMS and/or PEMS Downtime Third Party Report, CITGO also shall include, if applicable, documentation of its basis for not implementing any element of the third party's recommended corrective action.

f. EPA Review and Comment on CEMS and/or PEMS Downtime Corrective Actions; CITGO Response; Dispute Resolution.

i. EPA Review. After a review of a CEMS and/or PEMS Downtime Root Cause Analysis and Corrective Action Report, EPA may notify CITGO in writing of: *(1)* any deficiencies in the corrective actions identified; and/or *(2)* any objections to the schedules of implementation of the corrective actions. In the notification, EPA will provide an explanation of the basis for its objections.

ii. CITGO Response.

(1) If CITGO has not yet commenced implementation of the corrective action, CITGO will implement an alternative or revised corrective action or implementation schedule based on EPA's comments.

(2) If a corrective action that EPA has identified as deficient has already commenced or is already completed, then CITGO is not obligated to implement any alternative or additional corrective action identified by EPA. However, CITGO shall be on notice that EPA considers such corrective action deficient and not acceptable for remedying any subsequent, similar root cause(s) of any future CEMS and/or PEMS monitor downtime.

iii. If EPA and CITGO cannot agree on the appropriate corrective action(s) or implementation schedule(s), if any, to be taken in response to a CEMS and/or PEMS Downtime Root Cause Analysis and Corrective Action Report, either party may invoke the dispute resolution provisions of Section XIII of the Consent Decree.

F. Emissions Controls for Vacuum Trucks

37. Use of Carbon Canisters on Vacuum Trucks. By no later than the Date of Entry, for all vacuum trucks that are used at the Lemont Refinery for the collection and transportation of purged process fluids subject to the requirements of 40 C.F.R. Part 63, Subpart H, CITGO shall comply with 40 C.F.R. § 63.166(b)(3) by using carbon canisters as emissions control devices on the vacuum trucks.

G. Flaring Emission Reductions and Controls

38. Emission Reductions from Flares and Control of Flaring Events. CITGO shall implement and comply with the Emissions Reductions from Flares and Control of Flaring Events set forth in Appendix A to this Consent Decree by the dates specified therein to control and minimize emissions from the flaring devices at the Lemont Refinery.

H. Leak Detection and Repair

39. NSPS Applicability. Upon the Date of Entry, each "process unit" (as defined by 40 C.F.R. § 60.590a(e)) at the Lemont Refinery shall be an "affected facility" for purposes of 40 C.F.R. Part 60, Subpart GGGa ("Subpart GGGa"), and shall be subject to and comply with the requirements of Subpart GGGa by no later than one year from the Date of Entry, except as specifically provided in this Paragraph.

a. The requirements of Subpart GGGa shall not apply to compressors at the Lemont Refinery.

b. Process units on which construction commenced prior to January 4, 1983, shall not be subject to the requirements in 40 C.F.R. § 60.482-7a(h)(2)(ii) regarding difficult--to-monitor valves.

c. Entry of this Consent Decree shall satisfy the following notification and testing requirements that are triggered by initial applicability of 40 C.F.R. Part 60, Subparts A and GGGa: 40 C.F.R. §§ 60.7, 60.8, 60.482-1a(a) and 60.487a(e).

d. CITGO previously conducted two consecutive months of monitoring following the initial applicability of Subpart GGGa at the Lemont Refinery. Those two consecutive months of monitoring satisfy the requirement to conduct such monitoring under Subpart GGGa.

40. Enhanced Leak Detection and Repair. CITGO shall implement and comply with the requirements of the Enhanced Leak Detection and Repair Program ("ELP") set forth in Appendix B to this Consent Decree by the dates specified therein. The requirements of Appendix B are in addition to the applicable requirements under 40 C.F.R. Part 60, Subpart GGGa; 40 C.F.R. Part 61, Subparts J and V; and 40 C.F.R. Part 63, Subparts H and CC.

The terms "in light liquid service" and "in gas/vapor service" shall have the definitions set forth in the applicable provisions of 40 C.F.R. Part 60, Subpart GGGa and 40 C.F.R. Part 63, Subpart CC.

41. Nothing in this Subsection V.H or in Appendix B of this Consent Decree shall relieve CITGO of its independent obligation to comply with the requirements of any other federal, state or local Leak Detection and Repair ("LDAR") regulation that may be applicable to "equipment" (as that term is defined in applicable LDAR regulations) at the Lemont Refinery.

I. Benzene Waste Operations NESHAP

42. At all times, CITGO shall utilize the provisions found at 40 C.F.R. § 61.342(e) (the "6 BQ compliance option") for compliance with the BWON at the Lemont Refinery. CITGO shall not seek to change from the 6 BQ compliance option.

43. Carbon Canisters. CITGO shall comply with the requirements of this Paragraph at all locations at the Lemont Refinery where a carbon canister(s) is utilized as a control device under the Benzene Waste NESHAP.

a. CITGO shall continue to use primary and secondary carbon canisters and operate them in series at the Lemont Refinery where such systems are in use as of the Date of Lodging of the Consent Decree and shall maintain a complete, accurate and up-to-date list at the Lemont Refinery that identifies the location where each secondary carbon canister is installed and whether VOC or benzene is used to monitor for breakthrough at each such canister under Subparagraph 43.d, including the date of any change to the constituent being monitored for breakthrough.

b. Except as expressly permitted under Subparagraph 43.f, CITGO shall not use single carbon canisters for any new units or installations that require controls pursuant to the Benzene Waste NESHAP at the Lemont Refinery.

c. For dual carbon canister systems, "breakthrough" between the primary and secondary canister is defined as any reading equal to or greater than 50 ppm volatile organic compounds, excluding ethane and methane (hereinafter in this Paragraph only "VOC"), or 5 ppm benzene.

d. CITGO shall monitor for breakthrough between the primary and secondary carbon canisters monthly or in accordance with the frequency specified in 40 C.F.R. § 61.354(d), whichever is more frequent. This requirement shall commence: (i) upon Date of Entry where dual carbon canisters currently are in service; and (ii) within seven days after installation of a new, dual carbon canister system.

e. CITGO shall replace the original primary carbon canisters immediately when breakthrough is detected between the primary and secondary canister. The original secondary carbon canister will become the new primary carbon canister and a fresh carbon canister will become the secondary canister. For purposes of this Paragraph, "immediately" shall mean within twelve (12) hours of the detection of a breakthrough for canisters of 55 gallons or less, and within twenty-four (24) hours of the detection of a breakthrough for canisters greater than 55 gallons. In lieu of replacing the primary canister immediately, CITGO may elect to monitor the outlet of the secondary canister the day breakthrough between the primary and secondary canister is identified and each calendar day thereafter. This daily monitoring shall continue until the primary canister is replaced. If the constituent being monitored (either benzene or VOC) is detected at the outlet of the secondary canister during this period of daily

monitoring, the primary canister must be replaced within twelve (12) hours of the detection of a breakthrough. The original secondary carbon canister will become the new primary carbon canister and a fresh carbon canister will become the secondary canister.

f. Temporary Applications. CITGO may utilize properly sized single canisters for short-term operations such as with temporary storage tanks or as temporary control devices. For canisters operated as part of a single canister system, breakthrough is defined for purposes of this Decree as any reading of VOC above background or benzene above 1 ppm. Beginning no later than the Date of Lodging, CITGO shall monitor for breakthrough from single carbon canisters each day such canister is used. CITGO shall replace the single carbon canister with a fresh carbon canister, discontinue flow, or route the stream to an alternate, appropriate device immediately when breakthrough is detected. For this Paragraph, "immediately" shall mean within twelve (12) hours of the detection of a breakthrough for canisters of 55 gallons or less and within twenty-four (24) hours of the detection of a breakthrough for canisters greater than 55 gallons. If CITGO discontinues flow to the single carbon canister or routes the stream to an alternate, appropriate control device, such canister must be replaced before it is returned to service.

g. CITGO shall maintain a readily available supply of fresh carbon canisters at the Lemont Refinery at all times or otherwise ensure that such canisters are readily available to implement the requirements of this Paragraph 43.

h. CITGO shall maintain records associated with the requirements of this Paragraph, including carbon canister monitoring readings and the constituents being monitored for at least five (5) years after such readings occur.

J. Incorporation of Consent Decree Requirements into Federally Enforceable Permits

44. Permits Needed to Meet Compliance Obligations. If any compliance obligation under this Section V (Compliance Requirements) requires CITGO to obtain a federal, state, or local permit or approval, CITGO shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals. CITGO may seek relief under the provisions of Section XII of this Decree (Force Majeure) for any delay in the performance of any such obligation resulting from a failure to obtain, or a delay in obtaining, any permit or approval required to fulfill such obligation, if CITGO has submitted timely and complete applications and has taken all other actions necessary to obtain all such permits or approvals.

45. Permits to Ensure Survival of Consent Decree Limits and Standards after Termination of Consent Decree.

a. Prior to termination of this Consent Decree, CITGO shall submit to permitting authorities in the State of Illinois complete applications, amendments and/or supplements to incorporate as "applicable requirements" the limits and standards listed in Subparagraph 45.b into non-Title V, federally enforceable permits that will survive termination of this Consent Decree.

b. The limits and standards imposed by the following Paragraphs of this Consent Decree and its Appendices shall survive termination:

i. Heater and Boiler NO_x Emissions Monitoring and Limits. All of the requirements and limits set forth in Subparagraphs 14.a, 14.b, 15.a, 15.b, 16.a, and 16.b, reflecting any emission limit modifications pursuant to Paragraph 17;

ii. PM, PM_{10}, and $PM_{2.5}$ Emissions Limits at Certain Heaters. All of the limits set forth in Paragraph 19;

iii. FCCU PM Emission Control and Limit. All of the requirements and limits set forth in Paragraphs 20 and 21, reflecting any emission limit modifications pursuant to Paragraph 22;

iv. Sulfur Pit Emissions, Operation, and Maintenance. All of the requirements and limits set forth in Paragraphs 26 and 27, and a requirement to have and comply with a Sulfur Pit O&M Plan with the minimum elements specified in Subparagraph 28.a;

v. Flaring Emission Reductions and Controls. All of the requirements and limits set forth in Appendix A, Paragraphs A4–A12, A18, A22–A24, A26–A27, A28.b, and A29.

vi. Leak Detection and Repair. All of the applicable requirements set forth in Paragraph 39; and

vii. All of Section VI (Emission Credit Generation); provided however, that CITGO is not required to incorporate into a federally enforceable permit the prohibitions/other language of Section VI on the use of any CD Emissions Reductions or 2005 CD Emissions Reductions (as defined in Section VI) that CITGO, upon seeking termination of this Consent Decree, demonstrate no longer are capable of being used in a manner prohibited by Section VI.

46. Modifications to Title V Operating Permits. Prior to termination of this Consent Decree, CITGO shall submit complete applications to permitting authorities in the State of Illinois to modify, amend, or revise the Title V permit of the Lemont Refinery to incorporate the limits and standards identified in the preceding Paragraph into the Title V permit. The

Parties agree that the incorporation of these emission limits and standards into Title V Permits shall be done in accordance with applicable state or local Title V rules. The Parties agree that the incorporation may be by "amendment" under 40 C.F.R. § 70.7(d) and analogous state Title V rules, where allowed by state law.

VI. EMISSION CREDIT GENERATION

47. Definitions.

a. "CD Emissions Reductions" shall mean any emissions reductions that result from any projects, controls, or any other actions used to comply with this Consent Decree.

b. "2005 CD Emissions Reductions" shall mean any emissions reductions that result from any projects, controls, or any other actions used to comply with the 2005 Consent Decree.

48. Prohibitions. CITGO shall neither generate nor use any CD Emissions Reductions nor any 2005 CD Emissions Reductions: (i) as netting reductions; (ii) as emissions offsets; or (iii) to apply for, obtain, trade, or sell any emission reduction credits. Baseline actual emissions for each unit during any 24-month period selected by CITGO shall be adjusted downward to exclude any portion of the baseline emissions that would have been eliminated as CD Emissions Reductions or 2005 CD Emissions Reductions had CITGO been complying with this Consent Decree and the 2005 Consent Decree during that 24-month period.

49. Outside the Scope of the Prohibitions. Nothing in this Section is intended to prohibit CITGO from seeking to, nor Illinois EPA from denying CITGO's request to:

a. Use or generate emission reductions from emissions units that are covered by this Consent Decree to the extent that the proposed emissions reductions represent the difference between CD Emissions Reductions and more stringent control requirements that

CITGO may elect to accept for those emissions units in a permitting process, except as provided in Paragraph 50;

b. Use or generate emissions reductions from emissions units that are not subject to an emission limitation or control requirement pursuant to this Consent Decree and were not subject to an emission limitation or control requirement pursuant to the 2005 Consent Decree; or

c. Use CD Emissions Reductions or 2005 CD Emissions Reductions for compliance with any rules or regulations designed to address regional haze or the non-attainment status of any area (excluding Prevention of Significant Deterioration and non-attainment New Source Review rules, but including, for example, Reasonably Achievable Control Technology (RACT) rules that apply to the Lemont Refinery); provided, however, that CITGO shall not be allowed to trade or sell any CD Emissions Reductions or 2005 CD Emissions Reductions.

50. Additional Prohibition. Even if the Waste Gas minimization requirements of Paragraphs A13–A15 of Appendix A result in emissions lower than the allowable level under the flaring limitation in Paragraph A19 of Appendix A, such reductions shall be considered CD Emissions Reductions and shall be subject to the general prohibition set forth in Paragraph 48.

VII. SUPPLEMENTAL ENVIRONMENTAL PROJECTS

51. Fence Line Monitoring System. CITGO shall implement as a Supplemental Environmental Project ("SEP") a project to install, operate, and maintain a fence line monitoring system at the Lemont Refinery to monitor certain pollutants and make the data publicly available ("Fence Line Monitoring System SEP" or "FLMS SEP"). CITGO shall implement the FLMS SEP in accordance with this Paragraph and the criteria, terms and procedures in Appendix C. CITGO shall spend not less than $650,000 to implement the FLMS SEP. CITGO shall not

include its internal personnel costs in implementing or overseeing the implementation of the FLMS SEP as Project Dollars.

52. Green Lighting Project. CITGO shall implement as a SEP a project designed to reduce emissions of carbon dioxide, sulfur dioxide, and nitrogen dioxide through the conversion of certain lighting fixtures to more efficient lighting fixtures within facilities owned and operated by the Lemont-Bromberek Consolidated School District ("Green Lighting SEP"). CITGO shall implement this Green Lighting SEP in accordance with this Paragraph and the criteria, terms and procedures in Appendix D. CITGO shall spend not less than $350,000 to implement this Green Lighting SEP and shall complete the implementation by no later than 18 months after the Date of Entry. CITGO shall not include its internal personnel costs in implementing or overseeing the implementation of the Green Lighting SEP as Project Dollars.

53. CITGO is responsible for the satisfactory completion of the Fence Line Monitoring SEP and the Green Lighting SEP in accordance with the requirements of this Consent Decree. CITGO may use contractors or consultants in planning and implementing the SEPs.

54. With regard to the Fence Line Monitoring SEP and the Green Lighting SEP, CITGO certifies the truth and accuracy of each of the following:

a. That all cost information provided to EPA in connection with the SEPs is complete and accurate and that CITGO in good faith estimates that the cost to implement the FLMS SEP is at least $650,000 and the cost to implement the Green Lighting SEP is at least $350,000;

b. That, as of the date of executing this Consent Decree, CITGO is not required to perform or develop the SEPs by any federal, state, or local law or regulation and is

not required to perform or develop the SEPs by agreement, grant, or as injunctive relief awarded in any other action in any forum;

c. That the SEPs are not projects that CITGO was planning or intending to construct, perform, or implement other than in settlement of the claims resolved in this Consent Decree;

d. That CITGO has not received and will not receive credit for the SEPs in any other enforcement action;

e. That CITGO will not receive any reimbursement for any portion of the SEPs from any other person;

f. That CITGO is not a party to any Open Federal Financial Assistance Transaction that is or could be used to fund the same activity as the SEPs; and

g. That, to the best of CITGO's knowledge and belief, based upon a reasonable inquiry:

i. The activity covered by these SEPs has not been described in an unsuccessful Federal Financial Assistance Transaction proposal submitted by CITGO to EPA within two years of the date of executing this Consent Decree (unless the project was barred from funding as statutorily ineligible); and

ii. CITGO is not aware of any open Federal Financial Assistance Transaction that is funding or could fund the same activity as the SEPs.

55. CITGO shall include in each report required by Paragraph 63 a description of its progress toward implementing the SEPs required by this Section. In addition, the report required by Paragraph 63 for the period in which a SEP is completed shall contain the following information with respect to that SEP ("SEP Completion Report"):

a. a detailed description of the SEP as implemented;

b. a description of any problems encountered in completing the SEP and the solutions thereto;

c. an itemized list of all eligible SEP costs expended;

d. certification that the SEP has been fully implemented pursuant to the provisions of this Decree; and

e. a description of the environmental and public health benefits resulting from implementation of the SEP (with a quantification of the benefits and pollutant reductions, if feasible).

EPA may require information in addition to that described in this Paragraph in order to evaluate CITGO's SEP Completion Report.

56. Disputes concerning the satisfactory performance of a SEP and/or the amount of eligible SEP costs may be resolved under Section XIII (Dispute Resolution). No other disputes arising under this Section shall be subject to Dispute Resolution.

57. Any public statement, oral or written, in print, film, or other media, made by CITGO making reference to one or both SEPs under this Decree shall include the following language: "This project was undertaken in connection with the settlement of an enforcement action, *United States v. Citgo Petroleum Corporation*, taken on behalf of the U.S. Environmental Protection Agency under the Clean Air Act."

58. For federal and state income tax purposes, CITGO agrees that it will neither capitalize into inventory or basis nor deduct any costs or expenditures incurred in performing either of the SEPs.

VIII. ENVIRONMENTAL MITIGATION

59. By no later than December 31, 2015, CITGO shall complete implementation and commence operation of the Environmental Mitigation Project described in Paragraph 60 for the purpose of reducing emissions of VOCs and benzene from the Lemont Refinery.

60. CITGO shall install controls that conform to the requirements of the Benzene Waste Operations NESHAP ("BWON"), 40 C.F.R. Part 61, Subpart FF, for the waste stream that is drained from the Refinery's Wet Slops (Rerun) Oil Tank Number TK-433 in the Refinery's water treatment unit from the point at which that waste stream ("TK-433 Waste Stream") leaves TK-433 until such time as it flows into a controlled waste management unit from which all waste streams exiting that unit are fully controlled thereafter in conformance with the BWON. CITGO shall undertake at least the following actions in order to fully control the TK-433 Waste Stream in conformance with the BWON: (i) install approximately 800 feet of three-inch diameter, electric heat-traced piping from TK-433 to the Refinery's process sewer effluent sump; and (ii) install and operate a pump and control valve to allow a ratable discharge of the TK-433 Waste Stream.

61. By signing this Consent Decree, CITGO certifies that it is not required to perform or develop this Mitigation Project by any federal, state, or local law or regulation and is not required to perform or develop this Project by agreement, grant, or as injunctive relief awarded in any other action in any forum; that this Project is not one that CITGO was planning or intending to construct, perform, or implement other than in settlement of the claims resolved by this Decree; and that CITGO will not receive any reimbursement for any portion of the costs of this Project from any other person.

62. Mitigation Project Progress and Completion Reports. CITGO shall include in each report required under Paragraph 63, a status update on the Mitigation Project required by this Section until the Project is completed. In addition, the report required by Paragraph 63 for the period in which the Project is completed shall contain the following information:

a. A detailed description of the Project as implemented;

b. A description of any problems encountered in completing the Project and the solutions thereto;

c. A description of the environmental and public health benefits resulting from implementation of the Project (with a quantification of the benefits and an estimate of the pollutant reductions); and

d. A certification that the Project has been fully implemented pursuant to the provisions of this Decree.

IX. REPORTING AND RECORDKEEPING

63. Semi-Annual Compliance Status Reports. On the dates and for the time periods set forth in Paragraph 66, CITGO shall submit to EPA in the manner set forth in Section XVII (Notices) the following information:

a. A progress report on the implementation of the requirements of Section V of this Decree (Compliance Requirements);

b. The total downtime of each CEMS and PEMS at the Refinery, expressed as a percentage of operating time for the calendar quarter;

c. An identification of all times during the reporting period that the sulfur pit air sweep was below the minimum level set in the Sulfur Pit O&M Plan and a description of the corrective action(s) taken to address the incident, including whether those actions conformed to the procedures set forth in the Sulfur Pit O&M Plan;

d. The information required in Part J (Reporting) of Appendix A of this Decree;

e. The information required in Part N (Reporting) of Appendix B of this Decree;

f. A description of any problems anticipated with respect to meeting the requirements of Section V, Appendix A, and/or Appendix B at the Lemont Refinery;

g. A description of the status of the SEPs in Section VII of this Decree;

h. A description of the status of the Mitigation Project in Section VIII of this Decree;

i. For the semi-annual report due on August 30, the information required by Paragraph 64;

j. The information required by Paragraph 65;

k. Any additional matters required by any other Paragraph of this Consent Decree to be submitted in the semi-annual report; and

l. Any additional matters that CITGO believes should be brought to the attention of EPA.

64. Emissions Data. In the semi-annual report required to be submitted on August 30 of each year for the Lemont Refinery, CITGO will provide a summary of annual emissions data for the prior calendar year to include:

a. NO_x emissions in tons per year for each heater and boiler subject to an emissions limit under this Decree;

b. PM, PM_{10}, and $PM_{2.5}$ emissions in tons per year for each of the following heaters: the 590H-1 heater, the 590H-2 heater, the 115B-1/115B-2 heaters, and the 125B-1/125B-2 heaters;

c. SO_2 emissions in tons per year from the Sulfur Recovery Plant;

d. PM emissions in tons per year for the FCCU;

e. NO_x, SO_2, and PM emissions in tons per year as a sum at the Lemont Refinery for all other emissions units for which emissions information is required to be included in the Refinery's annual emissions summaries and are not identified above;

f. Emissions from Covered Flares as specified in Paragraph A33 of Appendix A; and

g. for each of the estimates in Subparagraphs a–e, the basis for the emissions estimate or calculation (i.e., stack tests, CEMS, emission factor, *etc*.).

To the extent that the required emissions summary data is available in other reports generated by CITGO, such other reports can be attached, or the appropriate information can be extracted from such other reports and attached to the August 30 semi-annual report to satisfy the requirement.

65. Emissions Exceedances. In each semi-annual compliance status report, CITGO will provide a summary of all exceedances of emission limits required or established by this Consent Decree, which will include the following:

a. For operating unit emission limits that are required by this Consent Decree and monitored with CEMS or PEMS, for each CEMS or PEMS:

i. total period where the emissions limit was exceeded, if applicable, expressed as a percentage of operating time for each calendar quarter;

ii. where the operating unit has exceeded the emissions limit more than 1% of the total time of the calendar quarter, identification of each averaging period that exceeded the limit by time and date, the actual emissions of that averaging period (in the units of the limit) and any identified cause for the exceedance (including startup, shutdown, maintenance or malfunction), and, if it was a malfunction, an explanation and any corrective actions taken;

iii. total downtime of the CEMS or PEMS, if applicable, expressed as a percentage of operating time for the calendar quarter;

iv. where the CEMS or PEMS downtime is greater than 5% of the total time in a calendar quarter for a unit, identify the periods of downtime by time and date, and any identified cause of the downtime (including maintenance or malfunction), and, if it was a malfunction, an explanation and any corrective action taken; and

v. if a report filed pursuant to another applicable legal requirement contains all of the information required by this Subparagraph 65.a in similar or same format, the requirements of this Subparagraph 65.a may be satisfied by attaching a copy of such report.

b. For any exceedance of any emissions limit required by this Consent Decree from an operating unit monitored through stack testing:

i. a summary of the results of the stack test in which the exceedance occurred;

ii. a copy of the full stack test report in which the exceedance occurred; and

iii. to the extent that CITGO has already submitted the stack test results, CITGO need not resubmit them, but may instead reference the submission in the report (e.g., date, addressee, reason for submission).

66. Due Dates. The first compliance status report shall be due two months after the first full half-year after the Effective Date of this Consent Decree (*i.e.*, either: (i) February 28 of the year after the Effective Date, if the Effective Date is between January 1 and June 30 of the preceding year; or (ii) August 30 of the year after the Effective Date, if the Effective Date is between July 1 and December 31). The initial report shall cover the period between the Effective Date and the first full half-year after the Effective Date (a "half-year" runs between January 1 and June 30 and between July 1 and December 31). Until termination of this Decree, each subsequent report will be due on February 28 and August 30 and shall cover the prior half-year (*i.e.*, January 1 to June 30 or July 1 to December 31).

67. Each report submitted under this Consent Decree shall be signed by the plant manager (or his/her designee) or the person responsible for environmental management and compliance and shall include the following certification:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

This certification requirement does not apply to emergency or similar notifications where compliance would be impractical.

68. The reporting requirements of this Consent Decree do not relieve CITGO of any reporting obligations required by the Clean Air Act or implementing regulations, or by any other federal, state, or local law, regulation, permit, or other requirement.

69. Any information provided pursuant to this Consent Decree may be used by the United States in any proceeding to enforce the provisions of this Consent Decree and as otherwise permitted by law.

X. CIVIL PENALTY

70. By no later than 30 days after the Date of Entry of this Consent Decree, CITGO shall pay the sum of $1,955,000 as a civil penalty. CITGO shall pay the penalty by FedWire Electronic Funds Transfer ("EFT") to the U.S. Department of Justice in accordance with written instructions to be provided to CITGO following entry of the Consent Decree, by the Financial Litigation Unit of the U.S. Attorney's Office for the Northern District of Illinois, 219 S. Dearborn St., Fifth Floor, Chicago, IL 60604. At the time of payment, CITGO shall send a copy of the EFT authorization form, the EFT transaction record, and a transmittal letter: (i) to the United States in accordance with Section XVII of this Decree (Notices); (ii) by email to acctsreceivable.CINWD@epa.gov; and (iii) by mail to:

EPA Cincinnati Finance Office
26 Martin Luther King Drive
Cincinnati, Ohio 45268

The transmittal letter shall state that the payment is for the civil penalty owed pursuant to the Consent Decree in *United States v. CITGO Petroleum Corporation, et al.*, and shall reference the civil action number and DOJ case number 90-5-2-1-07277/4.

71. If any portion of the civil penalty due to the United States is not paid when due, CITGO shall pay interest on the amount past due, accruing from the Effective Date through the

date of payment, at the rate specified in 28 U.S.C. § 1961. Interest payment under this Paragraph shall be in addition to any stipulated penalty due.

72. CITGO shall not deduct any penalties paid under this Decree pursuant to this Section or Section XI (Stipulated Penalties) in calculating its federal income tax.

XI. STIPULATED PENALTIES

73. Failure to Pay Civil Penalty. If CITGO fails to pay any portion of the civil penalty required to be paid under Section X of this Decree (Civil Penalty) when due, CITGO shall pay a stipulated penalty of $2,500 per day for each day that the payment is late. Late payment of the civil penalty and any accrued stipulated penalties shall be made in accordance with Paragraph 70.

74. Failure to Meet all Other Consent Decree Obligations. CITGO shall be liable for stipulated penalties to the United States for violations of this Consent Decree as specified in Paragraphs 75, 76, and 78 unless excused under Section XII of this Decree (Force Majeure). For those provisions where a stipulated penalty of either a fixed amount or 1.2 times the economic benefit of delayed compliance is available, the decision of which alternative to seek rests exclusively within the discretion of the United States.

75. Failure to Meet Obligations in Sections V–IX of this Consent Decree (except for Subsections V.G and V.H (which are covered in Paragraphs 76 and 78)).

STIPULATED PENALTY TABLE 1

Violation	Stipulated Penalty	
75.a. Violation of Subparagraphs 14.a, 15.a, 16.a (if applicable) or Paragraph 31. For failure to install, certify, calibrate, maintain, or operate a CEMS in accordance with the requirements of Subparagraphs 14.a, 15.a, 16.a (if applicable) or Paragraph 31	Period of Delay or Noncompliance	Penalty per Day per CEMS
	Days 1–30	$ 500
	Days 31–60	$1,000
	Days 61 and later	$2,000 or an amount equal to 1.2 times the economic benefit of noncompliance

75.b. Violation of Subparagraphs 14.b, 15.b, or 16.b. For failure to comply with a NO_x emission limit as set forth in Subparagraphs 14.b, 15.b, or 16.b	Period of Delay or Noncompliance Days 1–30 Days 31–60 Days 61 and later	Penalty per Day per Unit $ 500 $1,000 $2,000 or an amount equal to 1.2 times the economic benefit of noncompliance
75.c Violation of Subparagraph 16.a if CITGO chooses to monitor the 123B-2 Heater by means of a PEMS. If CITGO elects to monitor the 123B-2 Heater by means of a PEMS, then for failure to develop, certify, calibrate, maintain, or operate a NO_x PEMS in accordance with the requirements of Subparagraph 16.a and Appendix E.	Period of Delay or Noncompliance Days 1–30 Days 31–60 Days 61 and later	Penalty per Day per Limit $ 500 $1,000 $2,000 or an amount equal to 1.2 times the economic benefit of noncompliance
75.d. Violation of Paragraph 18. For failure to permanently shut down the heaters identified in Paragraph 18 by the Date of Entry or for restarting them at any time after the Date of Entry in a manner inconsistent with Paragraph 18	$10,000 per day per unit	
75.e. Violation of Paragraph 19. For failure to comply with a PM, PM_{10}, or $PM_{2.5}$ emission limit as set forth in Paragraph 19	Period of Delay or Noncompliance Days 1–30 Days 31–60 Days 61 and later	Penalty per Day $ 500 $1,000 $2,000
75.f. Violation of Paragraph 19. For failure to conduct a PM performance test in accordance with the requirements of Paragraph 19	Period of Delay or Noncompliance Days 1–30 Days 31–60 Days 61 and later	Penalty per Day per Test $ 200 $ 500 $1,000
75.g. Violation of Paragraph 21. For failure to comply with the FCCU PM emission limit as set forth in Paragraph 21	$750 per day for each day from the date of the violation until compliance is demonstrated	
75.h. Violation of Paragraph 23. For failure to conduct a PM performance test in accordance with the requirements of Paragraph 23	Period of Delay or Noncompliance Days 1–30 Days 31–60 Days 61 and later	Penalty per Day per Test $ 200 $ 500 $1,000

75.i. Violation of Paragraph 24. For failure to comply with the coke burn rate reductions as set forth in Paragraph 24	$5,000 per day or an amount equal to 1.2 times the economic benefit of delayed compliance
75.j. Violation of Subparagraph 25.b or 25.c. For failure to prepare a WESP Root Cause Analysis and Corrective Action Report in accordance with the requirements of Subparagraph 25.b or 25.c.	$5,000 per month or partial month, per Report
75.k. Violation of Subparagraph 25.d. For failure to undertake and complete WESP corrective action(s) in accordance with the requirements of Subparagraph 25.d	Period of Delay or Noncompliance — Penalty per Day Days 1–30 — $1,250 Days 31–60 — $3,000 Days 61 and later — $5,000 or an amount equal to 1.2 times the economic benefit of noncompliance
75.l. Violation of Subparagraph 25.e. For failure to retain a third party, have the third party prepare a report, or implement any recommendations made by the third party in accordance with the requirements of Subparagraph 25.e	$10,000 per month or partial month
75.m. Violation of Paragraph 26. For failure to route or re-route all sulfur pit emissions in accordance with the requirements of Paragraph 26	Period of Delay or Noncompliance — Penalty per Day Days 1–30 — $1,000 Days 31–60 — $1,750 Days 61 and later — $4,000 or an amount equal to 1.2 times the economic benefit of noncompliance
75.n. Violation of Paragraph 26. For failure to comply with NSPS Subpart J emission limits at the SRP	Period of Delay or Noncompliance — Penalty per Day Days 1–30 — $1,000 Days 31–60 — $2,000 Days 61 and later — $3,000 or an amount equal to 1.2 times the economic benefit of noncompliance

75.o. Violation of Paragraph 28. For failure to develop or implement the Sulfur Pit O&M plan in accordance with the requirements of Paragraph 28	Period of Delay or Noncompliance — Penalty per Day Days 1–30 — $ 500 Days 31–60 — $1,500 Days 61 and later — $2,000
75.p. Violation of Paragraph 29. For failure to develop or submit a CEMS O&M Plan in accordance with the requirements of Paragraphs 29 or for failure to include the CEMS Testing and Calibration requirements in the CEMS O&M Plan as required by Paragraph 31	Period of Delay or Noncompliance — Penalty per Day Days 1–30 — $ 200 Days 31–60 — $1,000 Days 61 and later — $2,000
75.q. Violation of Paragraph 29. For failure to develop or submit a PEMS Monitoring Protocol in accordance with the requirements of Paragraphs 29	Period of Delay or Noncompliance — Penalty per Day Days 1–30 — $ 200 Days 31–60 — $1,000 Days 61 and later — $2,000
75.r. Violation of Paragraph 30. For failure to develop or implement the CEMS or PEMS training requirements in accordance with Paragraph 30	For failing to develop: $5,000 per month or partial month For failing to implement: $1000 per person per month late
75.s. Violation of Paragraphs 5, 6, 7, or 8 of Appendix E. For failure to comply with any of the requirements of Paragraphs 5, 6, 7, or 8 of Appendix E.	Period of Delay or Noncompliance — Penalty per Day Days 1–30 — $ 500 Days 31–60 — $1,000 Days 61 and later — $2,000
75.t. Violation of Paragraph 34. For failure to develop or implement a preventive maintenance program, a QA/QC program or a repair program in accordance with the requirements of Paragraph 34	Period of Delay or Noncompliance — Penalty per Day Days 1–30 — $ 500 Days 31–60 — $1,000 Days 61 and later — $2,000
75.u. Violation of Subparagraph 36.b. For failure to prepare a CEMS and/or PEMS Root Cause Analysis and Corrective Action Report in accordance with the requirements of Subparagraph 36.b	$5000 per month or partial month, per Report

75.v. Violation of Subparagraph 36.c. For failure to undertake and complete CEMS and/or PEMS corrective action(s) in accordance with the requirements of Subparagraph 36.c	Period of Delay or Noncompliance	Penalty per Day
	Days 1–30	$1,250
	Days 31–60	$3,000
	Days 61 and later	$5,000 or an amount equal to 1.2 times the economic benefit of noncompliance
75.w. Violation of Subparagraph 36.d. For failure to retain a third party, have the third party prepare a report, or implement any recommendations made by the third party in accordance with the requirements of Subparagraph 36.d	$10,000 per month or partial month	
75.x. Violation of Paragraph 37. For failure to comply with the requirements of Paragraph 37 for vacuum trucks	$1,000 per incident of non-compliance, per day	
75.y. Violation of Paragraph 43. For failure to comply with the requirements of Paragraph 43 for carbon canisters.	$1,000 per incident of non-compliance, per day	
75.z. Violation of Paragraphs 44 or 45. For failure to submit an application for a permit in accordance with the requirements of Paragraph 44 or 45.	Period of Delay or Noncompliance	Penalty per Day
	Days 1–30	$ 800
	Days 31–60	$1,500
	Days 61 and later	$3,000
75.aa. Violation of Paragraph 51, 52, 53, 54, 55, 57, 58, 59, 60, 61, or 62 or Appendix C or Appendix D. For failure to comply with and of the requirements of Paragraphs 51, 52, 53, 54, 55, 57, 58, 59, 60, 61, or 62 or Appendix C or Appendix D	Period of Delay or Noncompliance	Penalty per Day per Requirement
	Days 1–30	$1,000
	Days 31–60	$1,500
	Days 61 and later	$2,000
75.bb. Violation of Section IX. For failure to submit reports in accordance with the requirements of Section IX	Period of Delay or Noncompliance	Penalty per Day per Report
	Days 1–30	$ 300
	Days 31–60	$1,000
	Days 61 and later	$5,000 per month

76. Failure to Meet Obligations in Appendix A of this Consent Decree.

STIPULATED PENALTY TABLE 2

Violation	**Stipulated Penalty**	
76.a. Violation of Paragraph A2. Failure to timely submit a report (¶ A2) that conforms to the requirements of that Paragraph	Period of delay or noncompliance Days 1–30 Days 31–60 Days 61 and later	Penalty per day $ 300 $ 400 $ 500
76.b. Violation of Paragraph A14. Failure to timely submit a plan (¶ A14) that conforms to the requirements of that Paragraph	Period of delay or noncompliance Days 1–30 Days 31–60 Days 61 and later	Penalty per day $ 500 $ 750 $ 1000
76.c. Violation of Paragraph A3, A4, A5, A6, A7, A8.a.ii, A8.a.iii, A8a.iv, the Column labeled "Minimum accuracy requirements" in Table 13 of 40 C.F.R. Part 63, Subpart CC, or A9. Failure to timely install the equipment and monitoring systems required by Paragraphs A3–A7 in accordance with the respective, applicable technical specifications in: *(1)* those Paragraphs or *(2)* Paragraph A8.a.ii, A8.a.iii, or A8.a.iv. or *(3)* the Column labeled "Minimum accuracy requirements" in Table 13 of 40 C.F.R. Part 63, Subpart CC; or *(4)* Paragraph A9	Period of delay or noncompliance, per monitoring system Days 1–30 Days 31–60 Days 61 and later	Penalty per day per monitoring system $ 750 $ 1250 $ 2000 or an amount equal to 1.2 times the economic benefit of delayed compliance, whichever is greater
76.d. Violation of the QA/QC requirements in Table 13 of 40 C.F.R. Part 63, Subpart CC. Failure to comply with the requirements that have a periodic compliance basis (*e.g.*, "daily," "weekly,") in the column labeled "Calibration requirements" in Table 13 of 40 C.F.R. Part 63, Subpart CC	Violation of a: Daily requirement Weekly requirement Quarterly requirement Annual requirement Biennial requirement	Penalty $ 100 $ 125 per day late $ 200 per day late $ 500 per day late $1,000 per day late

76.e. Violation of Subparagraph A8.b, A8.c, or A8.d or of any requirement of Table 13 of 40 C.F.R. Part 63, Subpart CC not covered by Subparagraphs 76.c. or 76.d. Failure to comply with the requirements of Subparagraph A8.b, A8.c, or A8.d or of any requirement of Table 13 of 40 C.F.R. Part 63, Subpart CC, not covered by Subparagraph 76.c. or 76.d	Period of Delay or Noncompliance Days 1–30 Days 31–60 Days 61 and later	Penalty per Day per Requirement $ 250 $ 500 $1,000
76.f. Violation of Paragraph A10. Failure to comply with a requirement of Paragraph A10	Per monitoring system, number of hours per calendar quarter in violation 0.25–50.0 50.25–100.0 Over 100.0	Penalty per hour per monitoring system $ 250 $ 500 $ 1000
76.g. Violation of Paragraph A17. Failure to timely install, in accordance with Paragraph A17, a Flare Gas Recovery System that conforms to the requirements of Paragraph A17	Period of delay or noncompliance, per FGRS Days 1–30 Days 31–60 Days 61 and later	Penalty per day per FGRS $ 1250 $ 3000 $ 5000 or an amount equal to 1.2 times the economic benefit of delayed compliance, whichever is greater

<table>
<tr><td>76.h. Violation of Certain Subparagraph A18.b.i and ii Requirements. Each failure to comply with the following requirements in Subparagraph A18.b.i or Subparagraph A18.b.ii:
(1) Subparagraph A18.b.i requirement to have the Primary Compressor in the South Plant FGRS Available for Operation and/or in operation 90% of the time;
(2) Subparagraph A18.b.i requirement to have the Secondary Compressor in the South Plant FGRS Available for Operation and/or in operation 98% of the time that the Primary Compressor is not in operation;
(3) Subparagraph A.18.b.ii requirement to have one Compressor in the C1 FGRS Available for Operation and/or in operation 98% of the time; and *(4)* Subparagraph A18.b.ii requirement to have two Compressors in the C1 FGRS Available for Operation and/or in operation 90% of the time.</td><td>Per FGRS, the number of hours or fraction thereof–over the allowed percentage—in a rolling 8760-hour period that a Compressor required to be Available for Operation is not: $750; provided however, that stipulated penalties shall not apply for any hour or fraction thereof in which a Compressor’s unavailability did not result in flaring.</td></tr>
<tr><td>76.i. Violation of Subparagraph A19.a.i. Failure to comply with the refinery-wide 365-day rolling average limit on Waste Gas flaring</td><td>Pollutant — Penalty per Day per ton
SO_2 — $ 40
VOC — $ 120

The amount of excess emissions during the event(s) which precipitate(s) the exceedance(s) of the 365-day rolling average limit is not the sole basis for calculating the stipulated penalty due. Instead, each day on which the 365-day rolling average limit is violated—which violations most likely continue even though the precipitating event and the excess emissions do not—counts as a separate day. CITGO shall comply with Appendix 1.13 to calculate the stipulated penalties resulting from violating the flaring limitation in Subparagraph A19.a.i.</td></tr>
</table>

76.j. Violation of Paragraph A22. Failure to comply with the 365-day rolling sum emission limit on VOCs from the C4 Flare	$2,500 per calendar day on which the limit is exceeded
76.k. Violation of Paragraph A23. Failure to comply with the 365-day rolling sum emission limit on VOCs from the C5 Flare	$2,500 per calendar day on which the limit is exceeded
76.l. Violation of Paragraph A26. For each Covered Flare or Portable Flare, if any, failure to comply with the Net Heating Value in the Combustion Zone Gas ("NHV_{cz}") standard in Paragraph A26	On a per Flare basis, hours per calendar quarter in noncompliance / Penalty per hour, or fraction thereof per flare Hours 0.25–50.0 — $ 25 Hours 50.25–100.0 — $ 75 Hours over 100.0 — $ 150 For purposes of calculating the number of hours of noncompliance with the NHV_{cz} standard, all 15-minute periods of violation shall be added together to determine the total.
76.m. Violation of Paragraph A27. Failure to record any information required to be recorded pursuant to Paragraph A27	$100 per day
76.n. Violation of Paragraph A28. Failure to comply with the H_2S emission limit at a Covered Flare after that Covered Flare is required to comply with 40 C.F.R. Part 60, Subpart J, or 40 C.F.R. Part 60, Subpart Ja	On a per Covered Flare basis, hours (on a three-hour rolling average basis) per calendar quarter in noncompliance / Penalty per hour per Covered Flare Hours 1–50.0 — $ 50 Hours 51–100.0 — $ 100 Hours over 100.0 — $ 200 For purposes of calculating the number of hours of noncompliance with the H_2S limit, all one-hour periods of violation shall be added together to determine the total. The averaging period for this standard is a three-hour rolling average.
76.o. Violation of Paragraph A29. Failure to comply with a requirement of 40 C.F.R. §§ 63.670 and 63.671 to the extent that the failure is not already subject to a stipulated penalty in Subparagraphs 76.a – 76.n.	Period of Delay or Noncompliance / Penalty per Day per Requirement per Flare Days 1–30 — $ 250 Days 31–60 — $ 500 Days 61 and later — $1,000

77. For purposes of the Table in Paragraph 76, for a given calendar day, where a failure to comply with the 365-day rolling average limit on Waste Gas flaring at the Refinery required by Subparagraph A19.a.i of Appendix A of this Decree (and potentially subject to the stipulated penalty provisions of Subparagraph 76.i) is the result of a failure to have the requisite number of Compressors Available for Operation as required by Subparagraph A18.b of Appendix A of this Decree (and potentially subject to the stipulated penalty provisions of Subparagraph 76.h), only the stipulated penalty provision that results in the higher penalty shall be applicable for that calendar day (*i.e.*, stipulated penalties under *both* Subparagraph 76.i *and* Subparagraph 76.h shall not be assessed).

78. Failure to Meet Obligations in Appendix B of this Consent Decree.

STIPULATED PENALTY TABLE 3

Violation	**Stipulated Penalty**	
78.a. Violation of Paragraph B3. Failure to timely develop and complete the Facility-Wide LDAR Program document required in Paragraph B3 and to update it on an annual basis if needed pursuant to Paragraph B3	Period of noncompliance 1 - 15 days 16 - 30 days 31 days or more	Penalty per day late $ 300 $ 400 $ 500
78.b. Violation of Paragraph B4. Each failure to perform monitoring at the frequencies set forth in Paragraph B4	$100 per component per missed monitoring event, not to exceed $25,000 per month	

<table>
<tr>
<td>78.c. Violation of Paragraph B6. Each failure to comply with Method 21 (or the AWP, as applicable) in performing LDAR monitoring, as indicated by the leak percentage ratio calculated under Paragraph B28, but only if the auditor identified a leak rate of at least 0.5% per component type in the process unit</td>
<td>Comparative Monitoring Leak Ratio calculated Paragraph B28

≥ 3.0 < 4.0
≥ 4.0 < 5.0
≥ 5.0 < 6.0
≥ 6.0</td>
<td>Penalty per Covered Process Unit

$15,000
$30,000
$45,000
$60,000</td>
</tr>
<tr>
<td>78.d. Violation of Paragraph B6. Each failure to use a monitoring device that is attached to a data logger or equivalent equipment; or each failure, during each monitoring event, to directly electronically record the Screening Value, date, time, identification number of the monitoring equipment, or the identification of the technician in accordance with the requirements of Paragraph B6</td>
<td colspan="2">$100 per failure per piece of Covered Equipment, but no greater than $2,500 per Covered Process Unit per month</td>
</tr>
<tr>
<td>78.e. Violation of Paragraph B6. Each failure to transfer monitoring data to an electronic database on at least a weekly basis in accordance with the requirements of Paragraph B6</td>
<td colspan="2">$150 per day for each day that the transfer is late</td>
</tr>
<tr>
<td>78.f. Violation of Paragraph B7. Each failure to conduct and record the calibrations and calibration drift assessments in accordance with the requirements of Paragraph B7</td>
<td colspan="2">$100 per missed event</td>
</tr>
<tr>
<td>78.g. Violation of Paragraph B10. Each failure of an LDAR monitoring technician to undertake a repair attempt under the circumstances identified in Paragraph B10</td>
<td colspan="2">$150 per day for each day up to the day the repair is made, not to exceed $1500 per leak (at which time, if the repair still is not made, the penalties in Subparagraph 78.i apply)</td>
</tr>
<tr>
<td>78.h. Violation of Paragraph B11. Each failure to timely perform a first attempt at repair as required by Paragraph B11. For purposes of these stipulated penalties, the term “repair” includes the required remonitoring in Paragraph B12 after the repair attempt; the stipulated penalties in Subparagraph 78.j do not apply.</td>
<td colspan="2">$ 150 per day for each late day, not to exceed $1500 per leak</td>
</tr>
</table>

<table>
<tr>
<td>78.i. Violation of Paragraph B11. Each failure to timely perform a final attempt at repair as required by Paragraph B11. For purposes of these stipulated penalties, the term “repair” includes the required remonitoring in Paragraph B12 after the repair attempt; the stipulated penalties in Subparagraph 78.j do not apply.</td>
<td>
<table>
<tr><th>Equipment type</th><th>Penalty per Component per day late</th><th>Not to Exceed</th></tr>
<tr><td>Valves, connectors</td><td>$ 300</td><td>$ 18,750</td></tr>
<tr><td>Pumps, agitators</td><td>$1,200</td><td>$ 75,000</td></tr>
</table>
</td>
</tr>
<tr>
<td>78.j. Violation of Paragraph B12. Each failure to timely perform Repair Verification Monitoring as required by Paragraph B12 in circumstances where the first attempt to adjust, or otherwise alter, the piece of equipment to eliminate the leak was made within 5 days and the final attempt to adjust, or otherwise alter, the piece of equipment to eliminate the leak was made within 15 days</td>
<td>
<table>
<tr><th>Equipment type</th><th>Penalty per Component per day late</th><th>Not to Exceed</th></tr>
<tr><td>Valves, connectors</td><td>$ 150</td><td>$ 9,375</td></tr>
<tr><td>Pumps, agitators</td><td>$ 600</td><td>$ 37,500</td></tr>
</table>
</td>
</tr>
<tr>
<td>78.k. Violation of Paragraph B13. Each failure to undertake the drill-and-tap method in accordance with the requirements of Paragraph B13.</td>
<td>
<table>
<tr><th>Period of noncompliance</th><th>Penalty per component per day late</th></tr>
<tr><td>Between 1 and 15 days</td><td>$ 200</td></tr>
<tr><td>Between 16 and 30 days</td><td>$ 350</td></tr>
<tr><td>Over 30 days</td><td>$ 500 per day for each day over 30, not to exceed $37,500</td></tr>
</table>
</td>
</tr>
<tr>
<td>78.l. Violation of Paragraph B14. Each failure to record the information required by Paragraph B14</td>
<td>$ 100 per component per item of missed information</td>
</tr>
<tr>
<td>78.m. Violation of Paragraph B16. Each improper placement of a piece of Covered Equipment on the DOR list (i.e., placing a piece of Covered Equipment on the DOR list even though it is feasible to repair it without a process unit shutdown) in violation of the requirements of Paragraph B16</td>
<td>
<table>
<tr><th>Equipment Type</th><th>Penalty per component per day on list</th><th>Not to exceed</th></tr>
<tr><td>Valve, connectors</td><td>$ 300</td><td>$ 37,500</td></tr>
<tr><td>Pumps, Agitators</td><td>$ 1200</td><td>$ 150,000</td></tr>
</table>
</td>
</tr>
<tr>
<td>78.n. Violation of Subparagraph B16.a. Each failure to comply with the requirement in Subparagraph B16.a that a relevant unit supervisor or person of similar authority sign off on placing a piece of Covered Equipment on the DOR list</td>
<td>$250 per piece of Covered Equipment</td>
</tr>
</table>

78.o. Violation of Subparagraph B16.c. Each failure to comply with the 0.10% limit on valves that may be placed on the DOR list in violation of the requirements of Subparagraph B16.c	$5,000 per valve
78.p. Violation of Paragraph B18. Each failure to install a Low-E Valve or a valve fitted with Low-E Packing when required to do so pursuant to Paragraph B18	$1000 per valve required by Subparagraph B18.b or B18.c; $10,000 per valve required by Subparagraph B18.d
78.q. Violation of Paragraph B23. Each failure to add a piece of Covered Equipment to the LDAR program in accordance with the requirements of Paragraph B23	$300 per piece of Covered Equipment (plus an amount, if any due under Subparagraph 78.b for any missed monitoring for a component that should have been added to the LDAR program)
78.r. Violation of Paragraph B23. Each failure to remove a piece of Covered Equipment from the LDAR program in violation of Paragraph B23	$150 per piece of Covered Equipment
78.s. Violation of Paragraph B24. Each failure to develop a training protocol in accordance with the requirements of Paragraph B24	$50 per day of noncompliance
78.t. Violation of Paragraph B24. Each failure to perform initial, refresher, or new personnel training as required by the training program identified in Paragraph B24	$1,000 per person per month late
78.u. Violation of Paragraph B25. Each failure of a monitoring technician or LDAR database coordinator to complete the certification required in Paragraph B25	$100 per failure per technician or database coordinator
78.v. Violation of Paragraph B26. Each failure to perform any of the requirements relating to QA/QC in Paragraph B26	$750 per missed requirement per quarter
78.w. Violation of Paragraph B27. Each failure to conduct an LDAR audit in accordance with the schedule set forth in Paragraph B27	Period of noncompliance — Penalty per day 1 – 15 days — $300 16 – 30 days — $400 31 days or more — $500, not to exceed $ 50,000 per audit
78.x. Violation of Paragraph B27. Each failure to use a third-party auditor or each use of a third-party auditor that is not experienced in LDAR audits, in violation of Paragraph B27	$25,000 per audit

78.y. Violation of Paragraph B27. Except for the requirement to undertake Comparative Monitoring, each failure to substantially comply with the LDAR audit requirements in Paragraph B28	$10,000 per missed requirement, not to exceed $100,000 per audit
78.z. Violation of Subparagraphs B28.a–B28.c. Each failure to substantially comply with the Comparative Monitoring requirements of Subparagraphs B28.a–B28.c	$50,000 per audit
78.aa. Violation of Paragraph B30. Each failure to timely submit a Final Corrective Action Plan that substantially conforms to the requirements of Paragraph B30	Period of noncompliance — Penalty per day per violation 1 - 15 days — $ 100 16 - 30 days — $ 250 31 days or more — $ 500 Not to exceed $50,000 per audit
78.bb. Violation of Paragraph B30. Each failure to implement a corrective action within 90 days after the LDAR Audit Completion Date or pursuant to the schedule that CITGO must propose pursuant to Subparagraph B30.a if the corrective action cannot be completed in 90 days	Period of noncompliance — Penalty per day per violation 1 - 15 days — $ 500 16 - 30 days — $ 750 31 days or more — $1,000 Not to exceed $100,000 per audit
78.cc. Violation of Paragraph B31. Each failure to timely submit a Certification of Compliance that substantially conforms to the requirements of Paragraph B31	Period of noncompliance — Penalty per day per violation 1 - 15 days — $ 100 16 - 30 days — $ 250 31 days or more — $ 500 Not to exceed $50,000

79. Waiver of Payment. The United States may, in its unreviewable discretion, reduce or waive payment of stipulated penalties otherwise due to it under this Consent Decree.

80. Demand for Stipulated Penalties. A written demand by the United States for the payment of stipulated penalties will identify the particular violation(s) to which the stipulated penalty relates, the stipulated penalty amount that the United States is demanding for each violation (as can be best estimated), the calculation method underlying the demand, and the

grounds upon which the demand is based. Prior to issuing a written demand for stipulated penalties, the United States may, in its unreviewable discretion, contact CITGO for informal discussion of matters that the United States believes may merit stipulated penalties.

81. Stipulated Penalties Accrual. Stipulated penalties under this Section shall begin to accrue on the Day after performance is due or on the Day a violation occurs, whichever is applicable, and shall continue to accrue, except as specifically set forth in Subparagraphs 17.d and 22.d, until performance is satisfactorily completed or until the violation ceases. Stipulated penalties shall accrue simultaneously for separate violations of this Consent Decree.

82. Stipulated Penalties Payment Due Date. Stipulated penalties shall be paid no later than thirty (30) days after receipt of a written demand by the United States unless the demand is disputed through compliance with the requirements of the dispute resolution provisions of this Decree.

83. Manner of Payment of Stipulated Penalties. Stipulated penalties owing to the United States of under $10,000 shall be paid by check and made payable to the "U.S. Department of Justice," referencing DOJ Number 90-5-2-1-07277/4 and delivered to the U.S. Attorney's Office in the Northern District of Illinois, 219 S. Dearborn St., Fifth Floor, Chicago, IL 60604. Stipulated penalties owing to the United States of $10,000 or more shall be paid in the manner set forth in Section X of this Decree (Civil Penalty). All transmittal correspondence shall state that the payment is for stipulated penalties, shall identify the violations to which the payment relates, and shall include the same identifying information required by Paragraph 70, except that the transmittal letter shall state that the payment is for stipulated penalties and shall state for which violation(s) the penalties are being paid.

84. Stipulated Penalties Dispute. Stipulated penalties shall continue to accrue as provided in Paragraph 81, during any dispute resolution, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of EPA that is not appealed to the Court, CITGO shall pay accrued penalties determined to be owing, together with interest, to the United States within 30 days of the effective date of the agreement or the receipt of EPA's decision or order.

b. If the dispute is appealed to the Court and the United States prevails in whole or in part, CITGO shall pay all accrued penalties determined by the Court to be owing, together with interest, within 60 days of receiving the Court's decision or order, except as provided in subparagraph c, below.

c. If any Party appeals the District Court's decision, CITGO shall pay all accrued penalties determined to be owing, together with interest, within 15 days of receiving the final appellate court decision.

85. Obligations Prior to the Effective Date. Upon the Effective Date, the stipulated penalty provisions of this Decree shall be retroactively enforceable with regard to any and all violations that have occurred prior to the Effective Date, provided that stipulated penalties that may have accrued prior to the Effective Date may not be collected unless and until this Consent Decree is entered by the Court.

86. If CITGO fails to pay stipulated penalties according to the terms of this Consent Decree, CITGO shall be liable for interest on such penalties, as provided for in 28 U.S.C. § 1961, accruing as of the date payment became due. Nothing in this Paragraph shall be construed to limit the United States from seeking any remedy otherwise provided by law for CITGO's failure to pay any stipulated penalties.

87. Subject to the provisions of Section XV (Effect of Settlement/Reservation of Rights), the stipulated penalties provided for in this Consent Decree shall be in addition to any other rights, remedies, or sanctions available to the United States for CITGO's violation of this Consent Decree or applicable law. In addition to injunctive relief or stipulated penalties, the United States may seek mitigating emissions reductions equal to or greater than the excess amounts emitted if the violations result in excess emissions. CITGO reserves the right to oppose the United States' request for mitigating emission reductions. CITGO shall be allowed a credit, for any stipulated penalties paid, against any statutory penalties imposed for such violation.

XII. FORCE MAJEURE

88. "Force majeure," for purposes of this Consent Decree, is defined as any event arising from causes beyond the control of CITGO, of any entity controlled by CITGO, or of CITGO's contractors, that delays or prevents the performance of any obligation under this Consent Decree despite CITGO's best efforts to fulfill the obligation. The requirement that CITGO exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any such event (a) as it is occurring and (b) after it has occurred, to prevent or minimize any resulting delay to the greatest extent possible. "Force Majeure" does not include CITGO's financial inability to perform any obligation under this Consent Decree.

89. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree, whether or not caused by a force majeure event, CITGO shall notify EPA in writing not later than fifteen calendar days after the time that CITGO first knew that the event might cause a delay. In the written notice, CITGO shall specifically reference this Paragraph 89 and shall provide an explanation and description of the reasons for

the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; CITGO's rationale for attributing such delay to a force majeure event if it intends to assert such a claim; and a statement as to whether, in the opinion of CITGO, such event may cause or contribute to an endangerment to public health, welfare or the environment. Defendant shall be deemed to know of any circumstance of which Defendant, any entity controlled by Defendant, or Defendant's contractors knew or should have known. CITGO shall include with any notice all available documentation supporting the claim that the delay was attributable to a force majeure. The written notice required by this Paragraph shall be effective upon the mailing of the same by overnight mail or by certified mail, return receipt requested, to EPA in the manner set forth in Section XVII of this Decree (Notices).

90. Failure by CITGO to comply with the requirements of Paragraph 89 shall preclude CITGO from asserting any claim of force majeure for that event for the period of time of such failure to comply, and for any additional delay caused by such failure.

91. If EPA agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Consent Decree that are affected by the force majeure event will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. EPA will notify CITGO in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

92. If EPA does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, or if the EPA and CITGO fail to agree on the length of the delay attributable to the Force Majeure event, EPA will notify CITGO in writing of its decision.

93. If Defendant elects to invoke the dispute resolution procedures set forth in Section XIII (Dispute Resolution), it shall do so no later than 45 days after receipt of EPA's notice. In any such proceeding, CITGO shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Defendant complied with the requirements of Paragraphs 88 and 89. If CITGO carries this burden, the delay at issue shall be deemed not to be a violation by Defendant of the affected obligation of this Consent Decree identified to EPA and the Court.

XIII. DISPUTE RESOLUTION

94. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under or with respect to this Consent Decree.

A. For All Disputes Except Those Arising Under Subparagraph A20.c of Appendix A.

95. Informal Dispute Resolution. Any dispute subject to Dispute Resolution under this Consent Decree shall first be the subject of informal negotiations. The dispute shall be considered to have arisen when one Party sends the other Party a written Notice of Dispute. Such Notice of Dispute shall state clearly the matter in dispute. The period of informal negotiations shall not exceed 60 days from the date the dispute arises, unless that period is modified by written agreement. If the Parties cannot resolve a dispute by informal negotiations, then the

position advanced by the United States shall be considered binding unless, within 30 days after the United States has notified CITGO of the conclusion of the informal negotiation period, CITGO invokes formal dispute resolution procedures set forth below.

96. Formal Dispute Resolution. CITGO shall invoke formal dispute resolution procedures, within the time period provided in the preceding Paragraph, by serving on the United States a written Statement of Position regarding the matter in dispute. The Statement of Position shall include, but need not be limited to, any factual data, analysis, or opinion supporting CITGO's position and any supporting documentation relied upon by CITGO.

97. The United States shall serve its Statement of Position within 45 days of receipt of CITGO's Statement of Position. The United States' Statement of Position shall include, but need not be limited to, any factual data, analysis, or opinion supporting that position and any supporting documentation relied upon by the United States. The United States' Statement of Position shall be binding on CITGO unless CITGO files a motion for judicial resolution of the dispute in accordance with the following Paragraph.

98. CITGO may seek judicial review of the dispute by filing with the Court and serving on the United States, in accordance with Section XVII of this Consent Decree (Notices), a motion requesting judicial resolution of the dispute. The motion must be filed within 45 days of receipt of the United States' Statement of Position pursuant to the preceding Paragraph. The motion shall contain a written statement of CITGO's position on the matter in dispute, including any supporting factual data, analysis, opinion, or documentation, and shall set forth the relief requested and any schedule within which the dispute must be resolved for orderly implementation of the Consent Decree.

99. The United States shall respond to CITGO's motion within the time period allowed by the Local Rules of this Court. CITGO may file a reply memorandum, to the extent permitted by the Local Rules.

100. Standard of Review. In all disputes arising under the Consent Decree, CITGO shall bear the burden of demonstrating that its position complies with this Consent Decree and the CAA and that CITGO is entitled to relief under applicable principles of law. The United States reserves the right to argue that its position is reviewable only on the administrative record and must be upheld unless arbitrary and capricious or otherwise not in accordance with law, and CITGO reserves the right to argue to the contrary.

101. The invocation of dispute resolution procedures under this Section shall not, by itself, extend, postpone, or affect in any way any obligation of CITGO under this Consent Decree unless and until final resolution of the dispute so provides. Stipulated penalties with respect to the disputed matter shall continue to accrue from the first Day of noncompliance, but payment shall be stayed pending resolution of the dispute as provided in Paragraph 84. If CITGO does not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section X (Stipulated Penalties). As part of the resolution of any dispute under this Section, the Parties, by agreement, or the Court, by order, may, in appropriate circumstances, extend or modify the schedule for completion of work under this Consent Decree to account for the delay in work that occurred as a result of the dispute resolution process. CITGO shall be liable for stipulated penalties for its failure thereafter to complete the work in accordance with the extension or modified schedule.

B. For Disputes Arising Under Subparagraph A20.c of Appendix A.

102. For disputes arising under Subparagraph A20.c of Appendix A, the provisions of this Subsection XIII.B shall apply if CITGO invokes the accelerated dispute resolution as allowed by Subparagraph A.20.c. Paragraphs 95–101 are incorporated herein by reference except for the following changes:

Reference	Instead Of	Use
Para. 95; 4th Sentence	60 days	15 days
Para. 95; 5th Sentence	30 days	10 days
Para. 97; 1st Sentence	45 days	15 days
Para. 98; 2nd Sentence	45 days	15 days
Para.99; 1st Sentence	"within the time period allowed by the Local Rules of this Court for responses to dispositive motions"	"within 21 days"

103. If a dispute under Subparagraph A20.c comes before this Court for disposition, both Parties jointly shall advise the Court that time is of the essence.

XIV. INFORMATION COLLECTION AND RETENTION

104. The United States and its representatives, including attorneys, contractors, and consultants, shall have the right of entry into the Lemont Refinery, at all reasonable times, upon presentation of credentials, to:

a. monitor the progress of activities required under this Consent Decree;

b. verify any data or information submitted to the United States in accordance with the terms of this Consent Decree;

c. obtain documentary evidence, including photographs and similar data; and

d. assess CITGO's compliance with this Consent Decree.

105. Except for data recorded by any video camera that may be required pursuant to Paragraph A6 of Appendix A, until one year after the termination of this Consent Decree, CITGO shall retain all non-identical copies of all documents, records, or other information (including documents, records, or other information in electronic form) in its possession or control that directly relate to CITGO's performance of its obligations under this Consent Decree. Except for data recorded by any video camera that may be required pursuant to Paragraph A6 of Appendix A, until one year after termination of this Consent Decree, CITGO shall instruct its contractors and agents to preserve all documents, records, or other information, regardless of storage medium (*e.g.*, paper or electronic) in its contractors' or agents' possession or control, or that come into its or its contractors' or agents' possession or control, that demonstrate or document CITGO's compliance or non-compliance with the obligations of this Consent Decree. This information-retention requirement shall apply regardless of any contrary corporate or institutional policies or procedures. At any time during this information-retention period, upon request by the United States, CITGO shall provide copies of any documents, records, or other information required to be maintained under this Paragraph. CITGO shall retain the data recorded by any video camera required pursuant to Paragraph A6 of Appendix A for one year from the date of recording.

106. Except for emissions data, CITGO may also assert that information required to be provided under this Section is protected as Confidential Business Information ("CBI") under 40 C.F.R. Part 2. As to any information that CITGO seeks to protect as CBI, CITGO shall follow the procedures set forth in 40 C.F.R. Part 2.

107. This Consent Decree in no way limits or affects any right of entry and inspection, or any right to obtain information, held by the United States pursuant to applicable

federal laws, regulations, or permits, nor does it limit or affect any duty or obligation of CITGO to maintain documents, records, or other information imposed by applicable federal or state laws, regulations, or permits.

XV. EFFECT OF SETTLEMENT/RESERVATION OF RIGHTS

108. Definitions. For purposes of this Section XV, the following definitions apply:

a. "Hazardous Air Pollutants" or "HAPs" shall have the meaning set forth in 42 U.S.C. § 7412(b)(1).

b. "FCCU Wet Electrostatic Precipitator Shutdown" or "FCCU WESP Shutdown" shall mean the physical and operational changes surrounding the shutdown and restarting of the FCCU WESP in the time period between November 11, 2008, through October 17, 2010.

c. "PSD/NNSR Requirements" shall mean the Prevention of Significant Deterioration and Non-Attainment New Source Review requirements found in the following:

i. 42 U.S.C. § 7475;

ii. 40 C.F.R. §§ 52.21(a)(2)(iii) and 52.21(j)–52.21(r)(5);

iii. 42 U.S.C. §§ 7502(c)(5), 7503(a)–(c);

iv. 40 C.F.R. Part 51, Appendix S, Part IV, Conditions 1–4;

v. any applicable, federally enforceable state or local regulation that implements, adopts, or incorporates the federal provisions cited in this Subparagraph; and

vi. any Title V permit requirement that implements, adopts, or incorporates the federal, or federally enforceable state, provisions cited in this Subparagraph.

d. "Post-Lodging Compliance Dates" shall mean any dates in this Section XV after the Date of Lodging.

e. "Ultra Low Sulfur Diesel Project" or "ULSD Project" shall mean the physical and operational changes that CITGO made to certain process units in approximately 2010 to enable the Refinery to comply with EPA's ULSD requirements.

109. Resolution of Claims Alleged in Complaint. Entry of this Consent Decree shall resolve the civil claims of the United States for the violations alleged in the Complaint filed in this action through the Date of Lodging unless, pursuant to Paragraphs 111, 114, or 116, the liability is resolved past the Date of Lodging.

110. Resolution of Claims Alleged in Notices and Findings of Violations ("NOV/FOVs"). Entry of this Consent Decree shall resolve the civil claims of the United States for the violations that occurred through the Date of Lodging of the Consent Decree as alleged in the following Notices and Findings of Violation ("NOV/FOVs"): *(1)* EPA-5-09-05-IL (February 26, 2009); and *(2)* EPA-5-11-IL-10 (September 30, 2011). These NOV/FOVs are attached as Appendix F to this Consent Decree.

111. Resolution of Claims for Violating PSD/NNSR Requirements at the Covered Flares. With respect to emissions of H_2S, SO_2, VOCs, and CO from the following Flares, entry of this Consent Decree shall resolve the civil claims of the United States against CITGO for violations of the PSD/NNSR Requirements resulting from construction or modification from the date of the pre-Lodging construction or modification through the following dates:

Flare	**Date**
C1	Date of Lodging
C4 and C5	January 1, 2017
C2 and C3	December 31, 2017

112. Resolution of Claims for Violating PSD/NNSR Requirements at Other Process Units. With respect to emissions of the following pollutants from the following process units during the following events, entry of this Consent Decree shall resolve the civil claims of the United States against CITGO for violations of the PSD/NNSR Requirements resulting from construction or modification during the following events that occurred from the dates those claims accrued through the Date of Lodging:

Event	**Process Unit(s)**	**Pollutant(s)**
FCCU WESP Shutdown	FCCU	PM, PM_{10}, Sulfuric Acid Mist
ULSD Project	Heater 590H-1 Heater 590H-2 Heater 115B-1 Heater 115B-2 Heater 125B-1 Heater 125B-2	NO_x, PM_{10}, $PM_{2.5}$

113. Resolution of Pre-Lodging Claims under Listed Regulations at the Covered Flares and Other Specified Process Units. With respect to emissions of the following pollutants from the following flares and process units, entry of this Consent Decree shall resolve the civil claims of the United States against CITGO for violations of the following regulations (and any applicable state regulations that implement, adopt, or incorporate any of the following regulations) that occurred from the date of accrual through the Date of Lodging:

Flare(s)/ Process Unit(s)	**Pollutant(s)**	**Regulation(s)**
Covered Flares	VOCs and HAPs	40 C.F.R. § 60.11(d); 40 C.F.R. §§ 60.18(c)(1)-(2), (c)(3)(ii), (c)(4), (d), (e) and (f); 40 C.F.R. § 63.6(e)(1)(i); 40 C.F.R. §§ 63.11(b)(1), (3)-(5), (6)(ii), and (7); 40 C.F.R. §§ 60.482-10(d), 60.482-10a(d), but only to the extent that these provisions require compliance with 40 C.F.R. §§ 60.18(c)(3)(ii) and (d); 40 C.F.R. §§ 60.482-10(e), 60.482-10a(e), but only to the extent that these provisions relate to flares; 40 C.F.R. §§ 60.592(a), 60.592a(a), but only to the extent that these provisions: (a) relate to flares, and (b) require compliance with 40 C.F.R. §§ 60.18(c)(3)(ii) and (d); 40 C.F.R. § 63.643(a)(1), but only to the extent that this provision: (a) relates to flares, and (b) requires compliance with 40 C.F.R. §§ 63.11(b)(1) and (b)(6)(ii); 40 C.F.R. § 63.648(a), but only to the extent that this provision: (a) relates to flares, and (b) requires compliance with 40 C.F.R. §§ 60.18(c)(3)(ii) and (d); Table 6 of 40 C.F.R. Part 63, Subpart CC, but only to the extent that Table 6 requires compliance with 40 C.F.R. § 63.6(e)(1)(i); 40 C.F.R. § 63.1566(a)(1)(i) and Table 15 of Part 63, Subpart UUU, but only to the extent that Table 15: (a) relates to flares, and (b) requires compliance with 40 C.F.R. §§ 63.11(b)(1) and (b)(6)(ii); 40 C.F.R. § 63.1566(a)(1)(i) and Table 44 of Part 63, Subpart UUU, but only to the extent that Table 44 requires compliance with 40 C.F.R. § 63.6(e)(1).

Flare(s)/ Process Unit(s)	**Pollutant(s)**	**Regulation(s)**
C1, C2, C3, and C5 Flares	SO_2 and H_2S	40 C.F.R. Part 60, Subparts A, J, and Ja
C4 Flare	SO_2 and H_2S	40 C.F.R. Part 60, Subparts A and J
FCCU	PM	40 C.F.R. §§ 60.11(d) and 60.102(a)(1)

114. Resolution of Claims Continuing Post-Lodging for Failure to Comply with Requirements Related to Monitoring, Operation, and Maintenance According to Flare Design at the C1, C4, and C5 Flares. With respect to emissions of VOCs and HAPs at the following flares, entry of this Consent Decree shall resolve the civil claims of the United States against CITGO for violations of the listed regulations from the Date of Lodging through the following dates, but only to the extent that these claims are based upon CITGO's use of too much steam in relation to vent gas flow:

Flares	**Date**	**Regulation(s)**
C1	January 30, 2019	40 C.F.R. § 60.18(d);
C4	December 31, 2016	40 C.F.R. § 63.11(b)(1);
C5	December 31, 2016	40 C.F.R. §§ 60.482-10(d) and 60.482-10a(d), but only to the extent that these provisions require compliance with 40 C.F.R. § 60.18(d); 40 C.F.R. §§ 60.482-10(e) and 60.482-10a(e), but only to the extent that these provisions relate to flares; 40 C.F.R. §§ 60.592(a) and 60.592a(a), but only to the extent that these provisions: (a) relate to flares; and (b) require compliance with 40 C.F.R. § 60.18(d); 40 C.F.R. § 63.643(a)(1), but only to the extent that this provision requires compliance with 40 C.F.R. § 63.11(b)(1);

		40 C.F.R. § 63.648(a), but only to the extent that this provision: (a) relates to flares, and (b) requires compliance with 40 C.F.R. § 60.18(d) 40 C.F.R. § 63.1566(a)(1)(i) and Table 15 of Part 63, Subpart UUU, but only to the extent that these provisions: (a) relate to flares, and (b) require compliance with 40 C.F.R. § 63.11(b)(1).

115. Resolution of LDAR Violations. Entry of this Consent Decree shall resolve the civil claims of the United States against CITGO for violations of: *(1)* 40 C.F.R. Part 60, Subparts GGG and GGGa; *(2)* 40 C.F.R. Part 61, Subparts J and V; *(3)* the Equipment Leak Standards of 40 C.F.R. Part 63, Subpart CC; and *(4)* any applicable, federally enforceable state or local regulation that implements, adopts, or incorporates the federal provisions cited in this Paragraph that occurred from the date of accrual through the Date of Lodging of this Consent Decree at each process unit (as defined as 40 C.F.R. § 60.590a(e)) at the Lemont Refinery.

116. Resolution of Title V Violations. Entry of this Consent Decree shall resolve the civil claims of the United States against CITGO for the violations of Sections 502(a), 503(c), and 504(a) of the CAA, 42 U.S.C. §§ 7661a(a), 7661b(c), 7661c(a), and of 40 C.F.R. §§ 70.1(b), 70.5(a) and (b), 70.6(a), 70.6(c), and 70.7(b), that are based upon the violations resolved by Paragraphs 111–115 for the time frames set forth in those Paragraphs.

117. Resolution of Consent Decree Violations. Entry of this Consent Decree shall resolve the civil and stipulated penalty claims of the United States against CITGO for the following alleged violations of the Consent Decree entered on January 27, 2005 in *United States, et al. v. CITGO Petroleum Corporation, et al.*, Civil No. 4:04-cv-3883 (S.D. Texas):

a. Violation of Paragraphs 136 and 137 by using CD Emissions Reductions (as defined in the 2005 Consent Decree) as netting credits for NO_x, SO_2, and PM for the ULSD Project without having a federally enforceable NO_x limit of 0.020 lb/MMBtu on Heaters 590H-1 and 590H-2.

b. Violations of Paragraph 46 by not complying with a limit at the FCCU of 1.0 lb PM/1000 lb coke burned on a 3-hour rolling average from approximately June 30, 2010, through September 1, 2010.

c. Violations of Paragraph 71 by failing to route or re-route all sulfur pit emissions from the Lemont Refinery sulfur recovery plant ("SRP") so as to eliminate, control, or include and monitor them as part of the SRP's emissions subject to 40 C.F.R. Part 60, Subpart J, on numerous days between January 2005 and June 2010.

d. Violations of Subparagraphs 64.a, 67.b, 67.c, and 68.b by failing to continuously operate a CEMS on certain units on certain days between 2005 and 2009.

e. Violations of Paragraph 127 (failing to complete a calibration drift assessment for remonitored components on several occasions between October 2005 and July 2007); Paragraph 128 (improperly placing two components—338NSPSLL00086 and 331NSPSLL02106—on delay of repair list); and Paragraph 219 (failing to conduct initial monthly monitoring for 14 valves in the 111 crude process unit).

f. Violation of Paragraphs 54, 57, and 132 for failing to timely apply for permits setting forth emission limits in "lb/MMBtu" and not "tons per year" on heaters included in CITGO's final NO_x Control Plan.

g. Violation of Paragraph 30A by not complying with a NO_x emission limit at the FCCU of 40 ppmvd on a 7-day rolling average on various days in the second quarters of 2013 and 2014 and by not complying with a NO_x emission limit of 20 ppmvd on a 365-day rolling average on various days in the second quarter of 2013.

118. The resolutions of liability in this Section are based exclusively on claims arising at CITGO's Lemont Refinery.

119. Reservation of Rights: Resolution of Liability in Paragraphs 111, 114, and 116 Can be Rendered Void. Notwithstanding the resolutions of liability in Paragraphs 111, 114, and 116 for the period of time between the Date of Lodging and the Post-Lodging Compliance Dates, those resolutions of liability shall be rendered void if CITGO materially fails to comply with any of the obligations and requirements in Appendix A. However, the resolutions of liability in

Paragraphs 111, 114, and 116 shall not be rendered void if CITGO remedies such material failure as expeditiously as practicable and pays all stipulated penalties due as a result of such material failure.

120. The United States reserves all legal and equitable remedies available to enforce the provisions of this Consent Decree. This Consent Decree shall not be construed to limit the rights of the United States to obtain penalties or injunctive relief under the CAA or implementing regulations, or under other federal or state laws, regulations, or permit conditions, except as expressly specified in Paragraphs 109–117. The United States further reserves all legal and equitable remedies to address any imminent and substantial endangerment to the public health or welfare or the environment arising at, or posed by, the Lemont Refinery, whether related to the violations addressed in this Consent Decree or otherwise.

121. In any subsequent administrative or judicial proceeding initiated by the United States for injunctive relief, civil penalties, or other appropriate relief relating to the Lemont Refinery or CITGO's CAA violations, CITGO 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 upon any contention that the claims raised by the United States in the subsequent proceeding were or should have been brought in the instant case, except with respect to claims that have been specifically resolved pursuant to Paragraphs 109–117 of this Section and for which the resolution of liability has not been voided pursuant to Paragraph 119.

122. This Consent Decree is not a permit, or a modification of any permit, under any federal, state, or local laws or regulations. CITGO is responsible for achieving and maintaining complete compliance with all applicable federal, State, and local laws, regulations,

and permits; and CITGO's compliance with this Consent Decree shall be no defense to any action commenced pursuant to any such laws, regulations, or permits, except as set forth herein. The United States does not, by its consent to the entry of this Consent Decree, warrant or aver in any manner that CITGO's compliance with any aspect of this Consent Decree will result in compliance with provisions of the Act, 42 U.S.C. § 7401 *et seq.*, or with any other provisions of federal, state, or local laws, regulations, or permits.

123. This Consent Decree does not limit or affect the rights of CITGO or of the United States against any third parties, not party to this Consent Decree, nor does it limit the rights of third parties, not party to this Consent Decree, against CITGO, except as otherwise provided by law.

124. This Consent Decree shall not be construed to create rights in, or grant any cause of action to, any third party not party to this Consent Decree.

XVI. COSTS

125. The Parties shall bear their own costs of this action, including attorneys' fees, except that the United States shall be entitled to collect the costs (including attorneys' fees) incurred in any action necessary to collect any portion of the civil penalty or any stipulated penalties due but not paid by CITGO.

XVII. NOTICES

126. Unless otherwise specified herein, whenever notifications, submissions, or communications are required by this Consent Decree, they shall be made in writing and addressed as follows:

As to the United States:

Required only where the "United States" (and not "EPA") is a recipient:

Chief
Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, DC 20044-7611
Reference Case No. 90-5-2-1-07277/4

As to EPA (Headquarters):

Required where either the "United States" or "EPA" is a recipient.
For EPA Headquarters, only electronic submissions are required. Those shall be addressed to:

refinerycd@erg.com

If the submission cannot be sent by email, it shall be sent to:

Eastern Research Group, Inc.
14555 Avion Parkway, Suite 200
Chantilly, VA 20151

As to EPA (Region 5):

Required where either the "United States" or "EPA" is a recipient.
Hard copy and electronic submissions are required.
Hard copies shall be addressed to:

Compliance Tracker (AE-17J)
Air Enforcement and Compliance Assurance Branch
U.S. EPA, Region 5
77 W. Jackson Blvd.
Chicago, IL 60604

Electronic submissions shall be addressed to:

Galinsky.virginia@epa.gov
Wagner.william@epa.gov

As to CITGO:

CITGO Lemont Refinery
Manager HSSE
135th Street and New Avenue
Lemont, IL 60439

CITGO Petroleum Corporation
Environmental Manager
1293 Eldridge Parkway
Houston, TX 77077

CITGO Petroleum Corporation
General Counsel
1293 Eldridge Parkway
Houston, TX 77077

By no later than the Date of Entry, CITGO shall provide the United States, EPA (Headquarters), and EPA (Region 5) the email addresses of the above-referenced CITGO contacts.

127. Date of Submission and Date of Receipt. Unless otherwise provided herein, notifications to or communications between the Parties shall be deemed submitted on the date they are postmarked and sent by U.S. Mail or overnight mail, postage prepaid, or, if the communication is required to be submitted solely to EPA, then on the date sent by electronic mail; provided however, that notices under Section XII (Force Majeure) and Section XIII (Dispute Resolution) shall be sent by overnight mail or by certified or registered mail, return receipt requested. Notifications to or communications mailed to CITGO shall be deemed to be received on the earlier of: (i) actual receipt by CITGO; or (ii) receipt of an electronic version sent to the addressees set forth in this Paragraph. If the date for submission of a report, study, notification, or other communication falls on a Saturday, Sunday or federal holiday, the report, study, notification, or other communication will be deemed timely if it is submitted the next business day.

128. Any Party may change either the notice recipient or the address for providing notices to it by serving the other Party with a notice setting forth such new notice recipient or address.

XVIII. EFFECTIVE DATE

129. The Effective Date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court or a motion to enter the Consent Decree is granted, whichever occurs first, as recorded on the Court's docket; provided however, that CITGO hereby agrees that it shall be bound to perform duties scheduled to occur prior to the Effective Date. In the event the United States withdraws or withholds consent to this Consent Decree before entry, or the Court declines to enter the Consent Decree, then the preceding requirement to perform duties scheduled to occur before the Effective Date shall terminate.

XIX. RETENTION OF JURISDICTION

130. The Court shall retain jurisdiction over this case until termination of this Consent Decree, for the purpose of resolving disputes arising under this Decree or entering orders modifying this Decree, or effectuating or enforcing compliance with the terms of this Decree.

XX. MODIFICATION

131. The terms of this Consent Decree, including the attached Appendices, may be modified only by a subsequent written agreement signed by the United States and CITGO. Where the modification constitutes a material change to this Decree, it shall be effective only upon approval by the Court.

132. The nature and frequency of reports required by this Consent Decree may be modified by mutual agreement of the Parties. The agreement of the United States to such

modification must be in the form of a written notification from EPA, but need not be filed with the Court to be effective.

133. Any disputes concerning modification of this Decree shall be resolved pursuant to Section XIII (Dispute Resolution), provided, however, that, instead of the burden of proof provided by Paragraph 100, the Party seeking the modification bears the burden of demonstrating that it is entitled to the requested modification in accordance with Federal Rule of Civil Procedure 60(b).

XXI. TERMINATION

134. Termination: Conditions Precedent. Prior to termination, CITGO must have completed all of the following requirements of this Consent Decree:

a. Payment of all civil penalties, stipulated penalties and other monetary obligations;

b. Satisfactory compliance with all provisions of Section V (Compliance Requirements), Appendix A (Emission Reductions from Flares and Control of Flaring Events), and Appendix B (Enhanced LDAR Program);

c. Operation for at least one year in satisfactory compliance with the limitations and standards set forth in Paragraphs 14.b, 15.b, 16.b, 19, 21, A18.b, A19, A22, A23, and A26;

d. Completion of the Supplemental Environmental Projects in Section VII;

e. Completion of the Environmental Mitigation Project in Section VIII;

f. Application for and receipt of all non-Title V air permits necessary to ensure survival of the Consent Decree limits and standards after termination of this Consent Decree (the Paragraph 45 requirement); and

g. Application for a modification or amendment to the Title V permit to incorporate the limits and standards in Paragraph 45 into the Title V permit of the Lemont Refinery.

135. Termination: Procedure.

a. At such time as CITGO believes that it has satisfied the conditions for termination set forth in Paragraph 134, CITGO may submit a request for termination to the United States by certifying such compliance in accordance with the certification language in Paragraph 67. In the Request for Termination, CITGO must demonstrate that it has satisfied the conditions for termination set forth in Paragraph 134. The Request for Termination shall include all necessary supporting documentation.

b. Following receipt by the United States of CITGO's Request for Termination, the Parties shall confer informally concerning the Request. If the United States agrees that the Decree may be terminated, the Parties shall submit a joint motion to terminate this Consent Decree.

c. If the United States does not agree that the Consent Decree may be terminated, or if CITGO does not receive a written response from the United States within 60 days of CITGO's submission of the Request for Termination, CITGO may invoke dispute resolution under Section XIII of this Decree (Dispute Resolution).

XXII. PUBLIC PARTICIPATION

136. This Consent Decree shall be lodged with the Court for a period of not less than 30 Days for public notice and comment in accordance with 28 C.F.R. § 50.7. The United States reserves the right to withdraw or withhold its consent if the comments regarding the Consent Decree disclose facts or considerations indicating that the Consent Decree is

inappropriate, improper, or inadequate. CITGO consents to entry of this Consent Decree without further notice and agrees not to withdraw from or oppose entry of this Consent Decree by the Court or to challenge any provision of the Decree, unless the United States has notified CITGO in writing that it no longer supports entry of the Decree.

XXIII. SIGNATORIES/SERVICE

137. Each undersigned representative of CITGO and the Assistant Attorney General for the Environment and Natural Resources Division of the Department of Justice certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind the Party he or she represents to this document.

138. This Consent Decree may be signed in counterparts, and its validity shall not be challenged on that basis. CITGO agrees to accept service of process by mail with respect to all matters arising under or relating to this Consent Decree and to waive the formal service requirements set forth in Rules 4 and 5 of the Federal Rules of Civil Procedure and any applicable Local Rules of this Court including, but not limited to, service of a summons.

XXIV. INTEGRATION

139. This Consent Decree and its Appendices constitute the final, complete, and exclusive agreement and understanding among the Parties with respect to the settlement embodied in the Decree and its Appendices and supersede all prior agreements and understandings, whether oral or written, concerning the settlement embodied herein. No other document, nor any representation, inducement, agreement, understanding, or promise, constitutes any part of this Decree or the settlement it represents, nor shall it be used in construing the terms of this Decree.

XXV. FINAL JUDGMENT

140. Upon approval and entry of this Consent Decree by the Court, this Consent Decree shall constitute a final judgment of the Court as to the United States and CITGO. The Court finds that there is no just reason for delay and therefore enters this judgment as a final judgment under Fed. R. Civ. P. 54 and 58.

Dated this _____ day of _____, 201__.

_____
UNITED STATES DISTRICT JUDGE

Subject to the notice and comment provisions of 28 C.F.R. § 50.7, THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of *United States v. CITGO Petroleum Corporation, et al.* (N.D. Ill.).

FOR PLAINTIFF THE UNITED STATES OF AMERICA:

s/ John C. Cruden
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Subject to the notice and comment provisions of 28 C.F.R. § 50.7, THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of *United States v. CITGO Petroleum Corporation, et al.* (N.D. Ill.).

FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY:

s/ Cynthia Giles***
CYNTHIA GILES
Assistant Administrator
Office of Enforcement and Compliance Assurance
United States Environmental Protection Agency
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s/ Susan Shinkman***
SUSAN SHINKMAN
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s/ Phillip A. Brooks***
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*** Signed with permission.

Subject to the notice and comment provisions of 28 C.F.R. § 50.7, THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of *United States v. CITGO Petroleum Corporation, et al.* (N.D. Ill.).

FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION 5:

s/ Robert A. Kaplan***
Acting Regional Administrator
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United States Environmental Protection Agency
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*** Signed with Permission.

We hereby consent to the entry of the Consent Decree in the matter of *United States v. CITGO Petroleum Corporation, et al.* (N.D. Ill.).

FOR DEFENDANT CITGO PETROLEUM CORPORATION:

s/ Eduardo Assef***
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Vice President of Refining
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We hereby consent to the entry of the Consent Decree in the matter of *United States v. CITGO Petroleum Corporation, et al.* (N.D. Ill.).

FOR DEFENDANT PDV MIDWEST REFINING, LLC:

s/ Richard Esser***
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United States et al. v. CITGO Petroleum Corporation and PDV Midwest Refining, L.L.C.
(N.D. Ill.)

APPENDIX A

EMISSION REDUCTIONS FROM FLARES AND CONTROL OF FLARING EVENTS

WHEREAS the Covered Flares that are subject to this Appendix A are all Steam-Assisted Flares; none are Air-Assisted;

WHEREAS CITGO voluntarily installed the Primary Compressor of the South Plant Flare Gas Recovery System ("FGRS") in 1980/1981 and undertook waste gas minimization projects after that installation;

WHEREAS the flare gas recovery and waste gas minimization actions that CITGO undertook at the South Plant prior to the negotiation of this Consent Decree have allowed the Parties to agree, pursuant to this Consent Decree, to the installation and operation of a Secondary Compressor at the South Plant FGRS that is not designed to be a Duplicate Spare Compressor but rather, will have capacity sufficient to ensure high flare gas recovery;

Part A: Definitions

A1. The definitions set forth in the Consent Decree shall apply for purposes of this Appendix A. For purposes of this Appendix A to the Consent Decree, the following definitions shall also apply:

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

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

c. "Assist Steam" shall mean all steam that intentionally is introduced prior to or at a Flare tip through nozzles or other hardware conveyance for the purposes 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.

d. "Available for Operation" shall mean, with respect to a Compressor within a Flare Gas Recovery System, that the Compressor is capable of commencing the recovery of Potentially Recoverable Gas as soon as practicable but not more than one hour after the Need for the Compressor to Operate arises. The period of time, not to exceed one hour, allowed by this definition for the startup of a Compressor shall be included in the amount of time that a compressor is Available for Operation.

e. "Barrels per day" or "bpd" shall mean barrels per calendar day.

f. "Baseload Waste Gas Flow Rate" shall mean, as calculated separately for the C2 Flare and the C3 Flare, the daily average flow rate, in scfd, to the Flare, excluding all flows during periods of Startup, Shutdown, and Malfunction. The

flow rate data period that shall be used to determine Baseload Waste Gas Flow Rate is set forth in Subparagraph A14.b.ii.

g. "BTU/scf" shall mean British Thermal Unit per standard cubic foot.

h. "C1 Flare Gas Recovery System" or "C1 FGRS" shall mean the Flare Gas Recovery System associated with the C1 Flare.

i. "C2/C3 Primary Compressor" shall mean the reciprocating Compressor that CITGO installed in 1980/1981 with a design capacity, at suction, of 256.4 kscfh serving the C2 and C3 Flares.

j. "C2/C3 Secondary Compressor" shall mean the Compressor that CITGO must install pursuant to Paragraph A17 of this Appendix A. The C2/C3 Secondary Compressor will service the C2 and C3 Flares.

k. "Capable of Receiving Sweep, Supplemental, and/or Waste Gas" shall mean, for a Flare, that the flow of Sweep, Supplemental, and/or Waste Gas is/are not prevented from being directed to the Flare by means of closed valves and/or blinds.

l. "Center Steam" shall mean the portion of Assist Steam introduced into the stack of a Flare to reduce burnback. Diagrams illustrating the meaning and location of Center, Lower, and Upper Steam are set forth in Appendix A1.1 to this Consent Decree.

m. "Combustion Zone" shall mean the area of the Flare flame where the Combustion Zone Gas combines for combustion.

n. "Combustion Zone Gas" shall mean all gases and vapors found after the Flare tip. This gas includes all Vent Gas, Pilot Gas, Total Steam, and Premix Air.

o. "Compressor" shall mean, with respect to a Flare Gas Recovery System, a mechanical device designed and installed to recover gas from a flare header. Types of Flare Gas Recovery System compressors include but are not limited to reciprocating compressors, centrifugal compressors, liquid ring compressors and liquid jet ejectors.

p. "Covered Flare" shall mean each of the following Flares:

- C1 Flare
- C2 Flare
- C3 Flare
- C4 Flare (sometimes referred to as the "Coker Flare")
- C5 Flare (sometimes referred to as the "Alky Flare")

All Covered Flares are Elevated, Steam-Assisted Flares.

q. "Duplicate Spare Compressor" shall mean, with respect to a Flare Gas Recovery System, an installed compressor, designed to be identical or functionally equivalent to the other compressor(s) of the FGRS. In order to qualify as a "Duplicate Spare Compressor," the compressor must be functionally interchangeable with the other FGRS compressor(s) such that the Operating Design Capacity of the FGRS is Available for Operation while any one compressor of the FGRS is out of service. The capacity of a Duplicate Spare Compressor depends upon the number of compressors installed to meet the Operating Design Capacity of the FGRS. For example, if one compressor is installed to provide an Operating Design Capacity of 270 kscfh, the Duplicate Spare Compressor shall have a capacity of 270 kscfh; if, instead, three, 90 kscfh compressors are installed, the Duplicate Spare Compressor shall have a capacity of 90 kscfh.

r. "Elevated Flare" shall mean a Flare that supports combustion at a tip that is situated at the upper end of a vertical conveyance (*e.g.,* pipe, duct); the combustion zone is elevated in order to separate the heat generated by combustion from people, equipment, or structures at grade level.

s. "External Utility Loss" shall mean a loss in the supply of electrical power or other third-party utility to the Lemont Refinery that is caused by events occurring outside the boundaries of the Lemont Refinery, excluding utility losses due to an interruptible utility service agreement.

t. "Flare" shall mean a combustion device lacking an enclosed combustion chamber that uses an uncontrolled volume of Ambient Air to burn gases.

u. "Flare Gas Recovery System" or "FGRS" shall mean a system of one or more compressors, piping, and associated water seal, rupture disk, or similar device used to divert gas from a Flare and direct the gas to a fuel gas system, to a combustion device other than the Flare, or to a product, co-product, by-product, or raw material recovery system.

v. "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.

w. "KSCFH" or "kscfh" shall mean thousand standard cubic feet per hour.

x. "Lower Steam" shall mean the portion of Assist Steam piped to an exterior annular ring near the lower part of a Flare tip, which then flows through tubes to the Flare tip, and ultimately exits the tubes at the Flare tip. Diagrams illustrating the meaning and location of Center, Lower, and Upper Steam are set forth in Appendix A1.1 to this Consent Decree.

y. "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 Appendix A involving this definition, CITGO shall have the burden of proving all of the following:

(1) The excess emissions were caused by a sudden, unavoidable breakdown of technology, beyond the control of the owner or operator;

(2) The excess emissions (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;

(3) 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;

(4) 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;

(5) The amount and duration of the excess emissions (including any bypass) were minimized to the maximum extent practicable during periods of such emissions;

(6) All possible steps were taken to minimize the impact of the excess emissions on Ambient Air quality;

(7) All emission monitoring systems were kept in operation if at all possible;

(8) The owner or operator's actions during the period of excess emissions were documented by properly signed, contemporaneous operating logs, or other relevant evidence;

(9) The excess emissions were not part of a recurring pattern indicative of inadequate design, operation, or maintenance; and

(10) The owner or operator properly and promptly notified the appropriate regulatory authority.

z. "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 Consent Decree involving this definition, CITGO shall have the burden of proving all of the following:

(1) The instrument or monitoring system downtime was caused by a sudden, unavoidable breakdown of technology, beyond the control of the owner or operator;

(2) 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;

(3) 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;

(4) 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;

(5) The amount and duration of the instrument or monitoring system downtime was minimized to the maximum extent practicable;

(6) 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

(7) The instrument or monitoring system downtime was not part of a recurring pattern indicative of inadequate design, operation, or maintenance.

aa. "Need for a Compressor to Operate" shall mean:

(1) <u>For a situation in which no Compressor within the FGRS is recovering gas</u>: When a Potentially Recoverable Gas flow rate (determined on a five-minute block average) to the Covered Flare(s) serviced by the Flare Gas Recovery System exists; or

(2) <u>For a situation in which one or more Compressors within the FGRS already are recovering gas</u>: When the Potentially

Recoverable Gas flow rate (determined on a five-minute block average) exceeds the capacity of the operating Compressor(s).

bb. "Net Heating Value" shall mean the energy released as heat when a compound undergoes complete combustion with oxygen to form gaseous carbon dioxide and gaseous water (also referred to as lower heating value).

cc. "Net Heating Value Analyzer" or "NHV Analyzer" shall mean an instrument capable of measuring the Net Heating Value of Vent Gas in BTU/scf. The sample extraction point of a Net Heating Value Analyzer may be located upstream of the introduction of Supplemental and/or Sweep and/or Purge Gas if the composition and flow rate of any such Supplemental and/or Sweep and/or Purge Gas is a known constant and if this constant then is used in the calculation of the Net Heating Value of the Vent Gas.

dd. "Net Heating Value of Combustion Zone Gas" or "NHV_{cz}" shall mean the Net Heating Value, in BTU/scf, of the Combustion Zone Gas in a Flare. NHV_{cz} shall be calculated in accordance with Step 3 of Appendix A1.3.

ee. "Net Heating Value of Vent Gas" or "NHV_{vg}" shall mean the Net Heating Value, in BTU/scf, of the Vent Gas directed to a Flare. NHV_{vg} shall be calculated in accordance with Step 1 of Appendix A1.3.

ff. "Operating Design Capacity" shall mean:

(1) With respect to the C1 Flare Gas Recovery System: The design capacity, in kscfh, of one of the flare gas recovery Compressors, excluding the capacity of the other Duplicate Spare Compressor.

(2) With respect to the South Plant Flare Gas Recovery System: The design capacity, in kscfh, of the C2/C3 Primary Compressor, excluding the design capacity of the C2/C3 Secondary Compressor.

gg. "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 Assis Air include all Assist Air except Premix Assist Air.

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

ii. "Portable Flare" shall mean a Flare that is not permanently installed that receives Waste Gas that has been redirected to it from a Covered Flare.

jj. "Potentially Recoverable Gas" shall mean the Sweep Gas, Supplemental Gas introduced prior to a Covered Flare's water seal, and/or Waste Gas (including

hydrogen, nitrogen, oxygen, carbon dioxide, carbon monoxide, and/or water) directed to a Covered Flare's or group of Covered Flares' FGRS. Purge Gas and Supplemental Gas introduced between a Covered Flare's water seal and a Covered Flare's tip is not Potentially Recoverable Gas. Hydrogen venting from a steam methane reformer (hydrogen plant) is not Potentially Recoverable Gas. Recycled hydrogen that bypasses the FGRS to reestablish hydrogen balance in the event that hydrogen demand declines or stops rapidly is also not Potentially Recoverable Gas. Excess Fuel Gas and excess gases generated during Shutdown, in turnaround, and during Startup, caused by a gas imbalance that cannot be consumed by Fuel Gas consumers in the refinery, because there is not sufficient demand for the gas, is not Potentially Recoverable Gas provided that when the excess gas is routed around the FGRS, no natural gas is being supplied to the Fuel Gas mix drum. Nitrogen purges of process units that are being Shutdown, in turnaround and during Startup, or the nitrogen purging of operating process units during a partial refinery turnaround scenario, that cause the NHV of the Fuel Gas at the exit of the mix drum to fall below 740 BTU/scf, shall not be considered Potentially Recoverable Gas, and may be routed around the FGRS.

kk. "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 Center Steam.

ll. "Prevention Measure" shall mean an instrument, device, piece of equipment, system, process change, physical change to process equipment, procedure, or program to minimize or eliminate flaring.

mm. "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.

nn. "SCFD" or "scfd" shall mean standard cubic feet per day.

oo. "SCFH" or "scfh" shall mean standard cubic feet per hour.

pp. "SCFM" or "scfm" shall mean standard cubic feet per minute.

qq. "Smoke Emissions" shall have the definition set forth in Section 3.5 of Method 22 of 40 C.F.R. Part 60, Appendix A. For purposes of this Consent Decree, Smoke Emissions may be either documented by a video camera or determined by an observer knowledgeable with respect to the general procedures for determining the presence of Smoke Emissions per Method 22.

rr. "South Plant Flare Gas Recovery System" or "South Plant FGRS" shall mean the Flare Gas Recovery System associated with the C2 and C3 Flares. The South Plant FGRS currently includes the C2/C3 Primary Compressor and will include, upon installation, the C2/C3 Secondary Compressor.

ss. "Standard Conditions" shall mean a temperature of 68 degrees Fahrenheit and a pressure of 1 atmosphere (29.92 inches Hg). Unless otherwise expressly set forth in this Appendix, Standard Conditions shall apply.

tt. "Steam-Assisted Flare" shall mean a Flare that utilizes steam piped to a Flare tip to assist in combustion.

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

vv. "Sweep Gas" shall mean:

(1) For a Flare with an FGRS: Gas intentionally introduced into a Flare header system to prevent oxygen buildup in the Flare header. Sweep Gas in these Flares is introduced prior to and recovered by the Flare Gas Recovery System; and

(2) For a Flare without an FGRS: Gas intentionally introduced into a Flare header system to maintain a constant flow of gas through the flare header and out the flare tip in order to prevent oxygen buildup in the Flare header and to prevent oxygen infiltration (backflow) into the Flare tip.

ww. "Total Capacity" shall mean:

(1) With respect to the C1 Flare Gas Recovery System: The sum of the capacities, in kscfh, of the installed flare gas recovery Compressors, including the capacity of the one installed Duplicate Spare Compressor.

(2) With respect to the South Plant Flare Gas Recovery System: The capacity, in kscfh:

(a) Of the Primary Compressor when it is Available for Operation or in operation; or

(b) Of the Secondary Compressor when it is Available for Operation or in operation *and* when the Primary Compressor is not Available for Operation and not in operation.

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

yy. "Upper Steam" shall mean the portion of Assist Steam introduced via nozzles located on the exterior perimeter of the upper end of a Flare tip. Diagrams

illustrating the meaning and location of Center, Lower, and Upper Steam are set forth in Appendix A1.1 to this Consent Decree.

zz. "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.

aaa. "Visible Emissions" shall mean five minutes or more of Smoke Emissions during any two consecutive hours.

bbb. "Waste Gas" shall mean the mixture of all gases from facility operations that is directed to a Flare for the purpose of disposing of the gas. "Waste Gas" does not include gas introduced to a 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 a 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. Depending upon the instrumentation that monitors Waste Gas, certain compounds (hydrogen, nitrogen, oxygen, carbon dioxide, carbon monoxide, and/or water (steam)) that are directed to a Flare for the purpose of disposing of these compounds may be excluded from calculations relating to Waste Gas flow. The circumstances in which such exclusions are permitted are specifically identified in the applicable provisions of this Appendix. Appendix A1.7 to this Consent Decree depicts the meaning of "Waste Gas," together with its relation to other gases associated with Flares.

ccc. "Waste Gas Minimization Plan" or "WGMP" shall mean the document submitted pursuant to Paragraph A14.

Part B: Instrumentation and Monitoring Systems

A2. Flare Data and Monitoring Systems and Protocol Report ("Flare Data and Monitoring Systems and Protocol Report"). For the Covered Flares, by no later than the dates set forth in Column B of Appendix A2.1, CITGO shall submit a report, consistent with the requirements in Appendix A1.8, to EPA that includes the following:

a. The information, diagrams, and drawings specified in Paragraphs 1–7 of Appendix A1.8;

b. A detailed description of each instrument and piece of monitoring equipment, including the specific model and manufacturer, that CITGO has installed or will install in compliance with Paragraphs A4, A5, and A7 of this Appendix (Paragraphs 8–9 of Appendix A1.8); and

c. A narrative description of the monitoring methods and calculations that CITGO shall use to comply with the requirements of Paragraph A26 (Paragraph 10 of Appendix A1.8).

For any H_2S CEMS required pursuant to 40 C.F.R. Part 60, Subpart J or Subpart Ja, this report shall satisfy the notification requirements of 40 C.F.R. § 60.7(a)(5).

A3. Installation and Operation of Monitoring Systems. By no later than the dates set forth in Column C of Appendix A2.1, for each Covered Flare, CITGO shall have completed the installation and commenced the operation of the instrumentation, controls, and monitoring systems set forth in Paragraphs A4–A7.

A4. Vent Gas and Assist Steam Monitoring Systems.

a. CITGO 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 Covered Flare. 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. CITGO 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 Covered 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, CITGO 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 CITGO converts the mass flow rates to volumetric flow rates pursuant to the methodology in Step 2 of Appendix A1.3;

ii. Mass flow monitors may be used for determining the volumetric flow rate of Vent Gas, provided CITGO determines the molecular weight of such Vent Gas using compositional analysis data collected pursuant to the monitoring method specified in Paragraph A7.a or A7.b and provided that CITGO converts the mass flow rates to volumetric flow rates pursuant to the methodology in Step 2 of Appendix A1.3; 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 CITGO complies with the methodology in Step 2 of Appendix A1.3 for calculating volumetric flow rates. For Vent Gas, CITGO must determine molecular weight using compositional analysis data collected pursuant to the monitoring method specified in Paragraph A7.a or A7.b.

A5. Steam Control Equipment. This equipment, including, as necessary, main and trim control valves and piping, shall enable CITGO to control Assist Steam flow in a manner sufficient to ensure compliance with this Decree.

A6. Video Camera. This instrument shall record, in digital format, the flame of and any Smoke Emissions from, the Covered Flares.

A7. Vent Gas Compositional Monitoring or Direct Monitoring of Net Heating Value of Vent Gas. For each Covered Flare except the C4 Flare, CITGO 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 A7.a–A7.d. CITGO may elect to use different monitoring methods (of the methods provided in Subparagraphs A7.a–A7.d) 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, and maintain a grab sampling system capable of collecting an evacuated canister sample for subsequent compositional analysis at least once every eight hours while Waste Gas is being sent to the Flare. Subsequent compositional analysis of the samples must be performed according to Method 18 of 40 CFR Part 60, Appendix A-6, ASTM D6420-99 (Reapproved 2010), ASTM D1945-03 (Reapproved 2010), ASTM D1945-14, or ASTM UOP539-12; or

c. Install, operate, calibrate, and maintain a calorimeter capable of continuously measuring, calculating, and recording the NHV_{vg} at standard conditions. If CITGO elects this method, CITGO 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

d. 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.

A8. Instrumentation and Monitoring Systems: Specifications, Calibration, Quality Control, and Maintenance.

a. The instrumentation and monitoring systems identified in Paragraphs A4 and A7 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 CITGO;

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. CITGO shall operate, maintain, and calibrate each instrumentation and monitoring system identified in Paragraphs A4 and A7 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 A7.a must also meet the requirements of 40 C.F.R. § 63.671(e)(1) through (3).

d. For each instrumentation and monitoring system identified in Paragraphs A4 and A7, CITGO 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).

A9. Instrumentation and Monitoring Systems: Recording and Averaging Times. The instrumentation and monitoring systems identified in Paragraphs A4, A6, and A7 shall be able to produce and record data measurements and calculations for each parameter at the following time intervals.

Instrumentation and Monitoring System	Recording and Averaging Times
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 A7.a)	Measure no less than once every 15 minutes and record that value
Vent Gas Compositional Monitoring (if using the methodology in Paragraph A7.b)	Measure no less than once every 8 hours and record that value
Vent Gas Net Heating Value Analyzer (if using the methodology in Paragraph A7.c)	Measure continuously and record 15 minute block averages
Video Camera	Record at a rate of no less than 4 frames per minute

Nothing in this Paragraph is intended to prohibit CITGO 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 Consent Decree.

A10. 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), CITGO shall operate each of the instruments and monitoring systems required in Paragraphs A4, A6, and A7 and collect data on a continuous basis at all times when the Covered Flare that the instrument and/or monitoring system is associated with is Capable of Receiving Sweep, Supplemental, and/or Waste Gas.

A11. Portable Flares. If CITGO uses a Portable Flare during the pendency of this Consent Decree, then by no later than the date of installation, CITGO shall comply with the requirements of Paragraphs A4–A10 for the Portable Flare.

Part C: Determining Whether a Covered Flare that has a Water Seal is Not Receiving Potentially Recoverable Gas Flow

A12. For a Covered Flare that has a water seal, if all of the following conditions are met, then the Covered Flare is not receiving Potentially Recoverable Gas flow:

a. For the water seal associated with the respective Covered Flare, the pressure difference between the inlet pressure and the outlet pressure is less than the water seal pressure as set by the static head of water between the opening of the dip tube and the level of the water in the water seal; and

b. Downstream of the water seal, there is no flow of Supplemental Gas directed to the Covered Flare.

Part D: Waste Gas Minimization

A13. Applicability. The provisions of this Part D apply to the C2 Flare and the C3 Flare.

A14. Waste Gas Minimization Plan ("WGMP"). By no later than the dates set forth in Column D of Appendix A2.1, for the C2 Flare and the C3 Flare, CITGO shall submit to EPA a Waste Gas Minimization Plan that discusses and evaluates flaring Prevention Measures both Facility-wide and on a Flare-specific basis. The WGMP shall include but not be limited to:

a. Updates. CITGO shall submit updates, if and as necessary, to the information, diagrams, and drawings provided in the Flare Data and Monitoring Systems and Protocol Report required under Paragraph A2.

b. Waste Gas Characterization and Mapping. CITGO shall undertake to characterize the Waste Gas being disposed of at the C2 and C3 Flares and determine its source as follows:

i. Volumetric (in scfm) and mass (in pounds) flow rate. CITGO shall identify the volumetric flow of Waste Gas, in scfm on a 30-day rolling average, and the mass flow rate, in pounds per hour on a 30-day rolling average, vented to the C2 Flare and the C3 Flare for the one-year period of time prior to 31 days before the submission of the WGMP. To the extent that, for either Flare, CITGO has instrumentation capable of measuring and/or calculating the volumetric and mass flow rate of hydrogen, nitrogen, oxygen, carbon monoxide, carbon dioxide, and/or water (steam) in the Waste Gas, CITGO may break down the volumetric and mass flow as between: (i) All Waste Gas flows excluding hydrogen, nitrogen, oxygen, carbon monoxide, carbon dioxide, and/or water (steam); and (ii) hydrogen, nitrogen, oxygen, carbon monoxide, carbon dioxide, and/or water (steam) flows in the Waste Gas. CITGO may use an engineering evaluation, monitoring data, or a combination to determine flow rate. In determining flow rate, flows during all periods (including but not limited to normal operations and periods of Startup, Shutdown, Malfunction, process upsets, relief valve leakages, utility losses due to an interruptible utility service agreement, and emergencies arising from events within the boundaries of the Lemont Refinery), except those described in the next sentence, shall be included. Flows that could not be prevented through reasonable planning and are in anticipation of or caused by a natural disaster, act of war or terrorism, or External Utility Loss are the only flows that shall be excluded

from the calculation of flow rate. CITGO shall specifically describe the date, time, and nature of the event that results in the exclusion of any flows from the calculation.

ii. Baseload Waste Gas Flow Rates. CITGO shall utilize flow rate data for the one-year period of time prior to 31 days before the submission of the WGMP to determine the Baseload Waste Gas Flow Rate, in scfd, to the C2 Flare and to the C3 Flare. The Baseload Waste Gas Flow Rate shall not include flows during periods of Startup, Shutdown, and Malfunction.

iii. Identification of Constituent Gases. CITGO shall use best efforts to identify the constituent gases within the Waste Gas of the C2 Flare and the C3 Flare and the percentage contribution of each such constituent during baseload conditions. CITGO may use monitoring data, an engineering evaluation, or a combination of monitoring data and an engineering evaluation to determine Waste Gas constituents.

iv. Waste Gas Mapping. Using instrumentation, isotopic tracing, and/or engineering calculations, CITGO shall identify and estimate the flow from each process unit header (sometimes referred to as a "subheader") to the main header(s) servicing the C2 Flare and the C3 Flare. Using that information and all other available information, CITGO shall complete an identification of each Waste Gas tie-in to the main header(s) and process unit header(s), as applicable, consistent with Appendix A1.11. Temporary connections to the main header(s) of the C2 Flare or the C3 Flare and/or process unit header(s) are not required to be included in the mapping.

c. Reductions previously realized. CITGO shall describe the equipment, processes and procedures installed or implemented since 2010 to reduce flaring at the C2 and C3 Flares. The description shall specify the date of installation or implementation and the amount of reductions realized.

d. Planned reductions. CITGO shall describe the equipment, processes, or procedures that CITGO plans to install or implement to eliminate or reduce flaring. The description shall specify a schedule for expeditious installation and commencement of operation and a projection of the amount of reductions to be realized. Subsequent to the submission of the WGMP, CITGO may revise the installation and operation dates provided that CITGO does so in writing to EPA within a reasonable time of determining that such a revision(s) is(are) necessary and provides a reasonable explanation for the revised date(s). In formulating this plan, CITGO specifically shall review and evaluate the results of the Waste Gas Mapping required by Subparagraph A14.b.iv.

e. Prevention Measures. CITGO shall describe and evaluate all Prevention Measures, including a schedule for the expeditious implementation and commencement of operation of all Prevention Measures, to address the following:

i. Flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including Startup and Shutdown. The evaluation shall include a review of flaring that has occurred during these activities since January 2010 and shall consider the feasibility of performing these activities without flaring.

ii. Flaring that may reasonably be expected to occur due to issues of gas quantity and quality. The evaluation shall include a general audit of the existing flare gas recovery capacity of the C2 and C3 Flares, the storage capacity available for excess Waste Gases, and the scrubbing capacity available for Waste Gases including any limitations associated with scrubbing Waste Gases for use as fuel.

iii. Flaring caused by the recurrent failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. The evaluation shall consider the adequacy of existing maintenance schedules and protocols for such equipment. A failure is "recurrent" if it occurs more than twice during any five year period as a result of the same cause.

A15. Waste Gas Minimization Plan: Implementation. By no later than the dates specified in the WGMP, CITGO shall implement the actions described therein. If (i) no implementation date and/or (ii) no completion date for actions that do not require ongoing implementation (such as the installation of a piece of equipment) is (are) set forth in the WGMP, the implementation and/or completion date shall be deemed the date of the submission of the WGMP.

A16. Enforceability of the WGMP. The terms of the WGMP are enforceable under this Consent Decree.

Part E: Flare Gas Recovery Systems

A17. Flare Gas Recovery Systems: Capacity and Start-Up Dates. By no later than the following dates for the following Covered Flares, CITGO shall complete installation and commence operation of the following Flare Gas Recovery Systems:

FGRS ID	Covered Flares	FGRS Operating Design Capacity (kscfh) (at suction)	Total No. of Compressors	Capacity of each Compressor (kscfh) (at suction)	FGRS Total Capacity (kscfh) (at suction)	Date
South Plant	C2 and C3 Flares	256.4 for Primary; 135.4 for Secondary	2	256.4 for Primary; 135.4 for Secondary	If the Primary is operating: 256.4; If the Secondary is operating: 135.4	DOE for Primary; 12/31/2017 for Secondary
C1	C1 Flare	24.4	2	24.4	48.8	DOE

A18. Flare Gas Recovery Systems: Operation.

a. General. CITGO shall operate each FGRS in a manner to minimize Waste Gas to the respective Covered Flares while ensuring safe refinery operations. CITGO also shall operate each FGRS consistent with good engineering and maintenance practices and in accordance with its design and the manufacturer's specifications.

b. Requirements Related to Compressors Being Available for Operation and/or in Operation. By no later than the Date of Entry for the C1 FGRS, and by no later than December 31, 2017 for the South Plant FGRS, CITGO shall comply with the following requirements when Potentially Recoverable Gas is being generated:

i. South Plant Flare Gas Recovery System. CITGO shall have the Primary Compressor Available for Operation and/or in operation 90% of the time and shall use best efforts to have the Secondary Compressor Available for Operation and/or in operation at all times that the Primary Compressor is not operating; provided however, that, at a minimum, CITGO shall have the Secondary Compressor Available for Operation and/or in operation no less than 98% of the time that the Primary Compressor is not in operation. Periods of maintenance and subsequent restart of the Primary Compressor may be included in the amount of time that the Primary Compressor is Available for Operation when determining compliance with the requirement to have the Primary Compressor Available for Operation and/or in operation 90% of the time, provided that:

(1) These periods shall not exceed 1344 hours in a five-year rolling sum period, rolled daily;

(2) CITGO complies with the requirement to use best efforts to have the Secondary Compressor Available for Operation and/or in operation during these periods; and

(3) CITGO, at a minimum, has the Secondary Compressor Available for Operation and/or in operation 98% of the time during these periods.

ii. C1 Flare Gas Recovery System. For the C1 Flare Gas Recovery System, CITGO shall have one Compressor Available for Operation and/or in operation 98% of the time and two Compressors Available for Operation and/or in operation 90% of the time. Periods of maintenance and subsequent restart on the Compressors within the C1 Flare FGRS may be included in the amount of time that the Compressors are Available for Operation when determining compliance with the requirement to have two Compressors Available for Operation and/or in operation 90% of the time, provided that these periods shall not exceed 1344 hours per Compressor in a five-year rolling sum period, rolled daily.

iii. Period to be Used for Computing Percentage of Time. For purposes of calculating compliance with the 90% and the 98% of time that a Compressor or group of Compressors must be Available for Operation and/or in operation, as required by Subparagraphs A18.b.i and A18.b.ii, the period to be used shall be an 8760-hour rolling sum, rolled hourly, using only hours when Potentially Recoverable Gas was generated during all or part of the hour but excluding hours for flows that could not have been prevented through reasonable planning and were in anticipation of or caused by a natural disaster, act of war or terrorism, or External Utility Loss. When no Potentially Recoverable Gas was generated during an entire hour, then that hour shall not be used in computing the 8760-hour rolling sum. The rolling sum shall include only the prior 8760 1-hour periods when Potentially Recoverable Gas was generated during all or part of the hour, provided that the Potentially Recoverable Gas was not generated by flows that could not have been prevented through reasonable planning and were in anticipation of or caused by a natural disaster, act of war or terrorism, or External Utility Loss.

Part F: Flaring Limitations

A19. Limitation on Flaring at the Lemont Refinery: Initial Limit.

a. On and after the following dates, CITGO shall comply with the following limitation on flaring from all Covered Flares and Portable Flares (if any):

i. Refinery-Wide 365-day Rolling Average. By no later than January 1, 2018, CITGO shall comply with the following Refinery-wide, long-term limit: 906,346 scfd of Waste Gas on a 365-day rolling average basis, rolled daily. The first complete 365-day average compliance period shall end on December 31, 2018.

ii. The rolling average period shall include only the prior 365 days when any Covered Flare or Portable Flare was/were In Operation.

Each exceedance of the 365-day rolling average limit shall constitute one day of violation. An exceedance of the limit shall not prohibit ongoing refinery operations.

b. The limitation set forth in Subparagraph A19.a was calculated using the equation set forth in Subparagraph A20.a. Appendix A2.2 sets forth the actual calculation. The "*Lemont Ref. Crude Capacity*" was taken from the "Total Operable" atmospheric crude oil distillation capacity, in barrels per calendar day, found in Part 5, Code 401, of the Form EIA-820 that CITGO submitted to the Energy Information Agency ("EIA") for the 2014 report year. The value reported was 172,045 barrels per calendar day. A copy of that Form is included in Appendix A2.2. The "*Lemont Complexity*" and "*Industry Avg Complexity*" were calculated pursuant to the methodology set forth in Appendix A1.14.

A20. Limitation on Flaring at the Lemont Refinery: Requesting an Increase in the Limit.

a. CITGO Request. Once per calendar year commencing no sooner than January 1, 2020, CITGO may submit a request to EPA to increase the limitation on flaring set forth in Subparagraph A19.a.i. CITGO may request an increase in the limit, and EPA will approve such an increase, only if the request is based on post-Lodging changes in crude capacity and/or complexity that are or will be permitted by the State of Illinois and only if the changes in crude capacity and/or complexity result in a new limit that is higher by at least 20% than the limit set forth in Subparagraphs A19.a.i. In any such request, CITGO shall propose

a new limit (hereafter referred to as "New Limit Based on Projections") based upon the following equation:

$$\text{Refinery Flaring} \leq 500{,}000 \text{ scfd} \times \frac{\textit{Lemont Ref. Crude Cap.}}{100{,}000 \text{ bpd}} \times \frac{\textit{Lemont Complexity}}{\textit{Industry Avg Complexity}}$$

Nothing in this Paragraph or Consent Decree shall be construed to relieve CITGO of an obligation to evaluate, under applicable Prevention of Significant Deterioration and Nonattainment New Source Review requirements, any increase in a Refinery-Wide limit on flaring or any increase in flaring at the Lemont Refinery.

b. For purposes of Subparagraph A20.a, the following shall apply:

i. The items in italics are variables that will change over time.

ii. The *Lemont Ref. Crude Capacity* shall be determined as follows:

(1) **If the post-Lodging modification does not affect the Refinery's crude capacity then:** use the Atmospheric Crude Oil Distillation Capacity, in barrels per calendar day, that the Refinery reported under "Total Operable" capacity on Part 5, Code 401, of the Applicable Form EIA-820. The definition of "Applicable Form EIA-820" is found in the "Definitions" section of Appendix A1.14. To the extent that the "Parts" or "Codes" on Form EIA-820 change in the future, the intent of the Parties is that the "Parts" and "Codes" of future forms that correspond most closely to those found on the Form EIA-820 for Report Year 2014 (see Attachment 2 to Appendix A1.14) will be used; or

(2) **If the post-Lodging modification does affect the Refinery's crude capacity then:** use the projected, new capacity set forth in the air permit application(s) for the post-Lodging modification.

iii. *Lemont Complexity* shall be calculated in accordance with Equation 1 of Appendix A1.14. CITGO shall certify the accuracy of the projected crude capacity and/or process unit capacities used to support the calculations.

iv. The *Industry Average Complexity* shall be calculated in accordance with Equation 2 of Appendix A1.14.

c. EPA Response to Request. EPA shall evaluate any request under Subparagraph A20.a on the basis of consistency with that Subparagraph. If EPA does not act on CITGO's request within 90 days of submission, CITGO may invoke the accelerated dispute resolution provisions of Subsection XIII.B of this Decree.

d. The New Limit Based on Projections shall take effect, if ever, beginning on the later of the date that EPA approves the request or a dispute is resolved in CITGO's favor or the date(s) specified in the modification permit(s).

e. In the event that CITGO amends, modifies or withdraws the air permit application(s) that is/are the basis for the New Limit(s) Based on Projections requested pursuant to Subparagraph A20.a in a manner that affects the limit(s) calculation(s), CITGO shall, within 15 days of amending, modifying, or withdrawing its air permit application(s), revise or withdraw its request under Subparagraph A20.a. To the extent that CITGO revises, rather than withdraws, its request under Subparagraph A20.a, the 90-day deadline under Subparagraph A20.c for EPA's response to the revised request shall commence upon the date of EPA's receipt of CITGO's revised request.

f. Consequences of a Mistake in Projected Capacities.

i. By no later than 30 days after the Startup of the permitted modifications, CITGO shall determine whether the projected "*Lemont Ref. Crude Capacity*" or the projected capacities for new or modified units that CITGO relied upon pursuant to Subparagraphs A20.b.ii and/or b.iii, respectively, were or are different from the actual capacities that CITGO has or will report to the EIA or the Oil & Gas Journal after the Startup of the permitted modification. If there are differences, CITGO shall re-calculate the flaring limitation using the actual capacities that CITGO has or will report to the EIA or the Oil & Gas Journal (hereafter referred to as "New Limit Based on Actuals").

ii. If the New Limit Based on Actuals that CITGO calculates under Subparagraph A20.f.i is greater than the New Limit Based on Projections that CITGO calculated under Subparagraph A20.a, then no further action shall be required and the New Limit Based on Projections shall remain in effect.

iii. If the New Limit Based on Actuals that CITGO calculates under Subparagraph A20.f.i is less than the New Limit Based on Projections that CITGO calculated under Subparagraph A20.a, then by no later than 30 days after the Startup of the permitted modifications, CITGO shall: *(1)* commence complying with the

New Limit Based on Actuals; and *(2)* submit the revised, recalculated New Limit Based on Actuals to EPA. After submission to EPA, CITGO shall consult with EPA about the New Limit Based on Actuals and secure EPA's approval.

iv. Stipulated Penalties. If Subparagraph A20.f.iii applies, then by no later than 60 days after the Startup of the permitted modifications, the New Limit Based on Actuals identified in the submission to EPA under Subparagraph A20.f.iii*(2)* shall apply and form the basis for determining compliance for purposes of the stipulated penalty provisions of Subparagraph 76.i. If EPA disapproves the New Limit Based on Actuals, the New Limit Based on Actuals shall continue to apply for purposes of stipulated penalties until such time as another limitation either is agreed upon between EPA and CITGO or a dispute is resolved that sets forth a revised limitation.

A21. Limitations on Flaring at the Lemont Refinery: Meaning and Calculation of "Waste Gas" Flow for Purposes of the Limitation on Flaring. For purposes of the meaning and calculation of "Waste Gas" flow in the limitation on flaring in Subparagraph A19.a.i, and any revised limitation on flaring developed pursuant to Paragraph A20, the following shall apply:

a. To the extent that CITGO has instrumentation capable of calculating the volumetric flow rate of hydrogen, nitrogen, oxygen, carbon monoxide, carbon dioxide, and/or water (steam) in the Waste Gas, the contribution of all measured flows of any of these elements/compounds may be excluded from the Waste Gas flow rate calculation.

b. Flows during all periods (including but not limited to normal operations and periods of Startup, Shutdown, Malfunction, process upsets, relief valve leakages, utility losses due to an interruptible utility service agreement, and emergencies arising from events within the boundaries of the Refinery), except those expressly described in the next sentence, shall be included. Flows that could not be prevented through reasonable planning and are in anticipation of or caused by a natural disaster, act of war or terrorism, or External Utility Loss may be excluded from the calculation of flow rate.

c. Except for hydrogen, nitrogen, oxygen, carbon monoxide, carbon dioxide, and/or water (steam) contributions to the flow rate that are excluded by virtue of instrumentation measuring these flows, for any flow that CITGO does not include in a computation, CITGO shall submit the following information in the semi-annual report due under Part F of this Appendix A: a description of the event that resulted in the exclusion; the date(s) and duration(s) of the flows caused by the event; the estimated VOC and SO_2 emissions during the event; whether flows from the event are anticipated to persist after the notice, and if so, for how long; and the measures taken or to be taken to prevent or minimize the flows, including, for future anticipated flow, the schedule by which those measures will be implemented.

A22. Limitation on VOC Emissions from the C4 Flare. By no later than January 1, 2017, CITGO shall not emit from the C4 Flare more than 20 tons per year of VOCs in a 365-day rolling sum period, rolled daily. The first complete 365-day average compliance period shall end on December 31, 2017. CITGO shall utilize the equations set forth in Appendix A2.3 to calculate VOC emissions from the C4 Flare in any given 365-day rolling sum period. After incorporation of the limit into a federally-enforceable permit, nothing in this Consent Decree shall prohibit CITGO from seeking an increase in this limit (regardless of the amount of the increase) prior to termination of this Consent Decree if CITGO undertakes a LAER analysis through appropriate Illinois state permitting authorities in order to secure the increase.

A23. Limitation on VOC Emissions from the C5 Flare. By no later than January 1, 2017, CITGO shall not emit from the C5 Flare more than 20 tons per year of VOCs in a 365-day rolling sum period, rolled daily. The first complete 365-day average compliance period shall end on December 31, 2017. CITGO shall utilize the equations set forth in Appendix A2.4 to calculate VOC emissions from the C5 Flare in any given 365-day rolling sum period. After incorporation of the limit into a federally-enforceable permit, nothing in this Consent Decree shall prohibit CITGO from seeking an increase in this limit (regardless of the amount of the increase) prior to termination of this Consent Decree if CITGO undertakes a LAER analysis through appropriate Illinois state permitting authorities in order to secure the increase.

Part G: Flare Combustion Efficiency

A24. General Emission Standards Applicable to Covered Flares and Portable Flares (if any). For each Covered Flare and Portable Flare (if any), by no later than the dates set forth in Column E of Appendix A2.1, CITGO shall comply with the requirements set forth in this Paragraph at all times when a Covered Flare or Portable Flare (if any) is In Operation.

a. Operation during Vent Gas Venting. CITGO shall operate each Covered Flare or Portable Flare (if any) at all times when Vent Gas may be vented to it.

b. Pilot Flame Presence. CITGO shall comply with the requirements of 40 C.F.R. § 63.670(b).

c. No Visible Emissions. CITGO shall comply with the requirements of 40 C.F.R. § 63.670(c).

d. Flare Tip Velocity. CITGO shall comply with the requirements of 40 C.F.R. § 63.670(d).

e. Monitoring According to Applicable Provisions. CITGO shall comply with all applicable Subparts of 40 C.F.R. Parts 60, 61, and 63 that state how a particular Covered Flare or Portable Flare (if any) must be monitored.

f. Good Air Pollution Control Practices. At all times, including during periods of Startup, Shutdown, and/or Malfunction, CITGO shall implement good air pollution control practices to minimize emissions from each Covered Flare or Portable Flare (if any); provided however, that CITGO shall not be in violation of this requirement for any practice that this Consent Decree requires CITGO to implement after the Date of Lodging for the period between the Date of Lodging and the implementation date or compliance date (whichever is applicable) for the particular practice.

For Subparagraphs A24.b–d, CITGO shall comply with the requirements of 40 C.F.R. §§ 63.670(b)–(d) at any time that the Covered Flare or Portable Flare (if any) is In Operation. Language in 40 C.F.R. §§ 63.670(b)–(d), or in any regulatory provision referred to in any of the references in Sections 63.670(b)–(d), that limits the applicability of these regulatory requirements to periods when "regulated material" (as defined in 40 C.F.R. § 63.641) is routed to a flare is not applicable for purposes of this Consent Decree.

A25. Revisions to 40 C.F.R. §§ 63.670(b)–(d). To the extent that, from the Date of Lodging of this Consent Decree until its termination, revisions to 40 C.F.R. §§ 60.670(b)–(d) are final and effective that are different from the terms and conditions of 40 C.F.R. §§ 60.670(b)–(d) as they exist as of the Date of Lodging of this Consent Decree, CITGO shall comply with the final, effective regulations.

A26. Combustion Zone Net Heating Value Standard. By no later than the date in Column F of Appendix A2.1, at any time that Supplemental, Sweep, and/or Waste Gas is routed to the C1, C2, C3, or C5 Flare or a Portable Flare (if any) for at least 15 minutes, CITGO shall operate the such Flare or Portable Flare (if any) to maintain the NHV_{cz} at or above 270 BTU/scf determined on a 15-minute block period basis. CITGO shall monitor and calculate NHV_{cz} in accordance with Appendix A1.3.

A27. Recordkeeping: Timing and Substance. CITGO shall comply with the following recordkeeping requirements:

a. By no later than three months after the dates set forth in Column C of Appendix A2.1, CITGO shall calculate and record each of the following parameters:

i. 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 A4 and Step 2 of Appendix A1.3);

ii. Assist Steam volumetric flow rate (in scfm) (in 15-minute block averages and in accordance with any calculation requirements of Paragraph A4 and Step 2 of Appendix A1.3);

iii. NHV_{vg} (in BTU/scf) (in 15-minute block averages in accordance with Step 1 of Appendix A1.3);

iv. NHV_{cz} (in BTU/scf) (in 15-minute block averages in accordance with Step 3 of Appendix A1.3); and

b. By no later than the dates required in Column E of Appendix A2.1 for compliance with the standards in Paragraph A24, and by no later than the dates required in Column F of Appendix A2.1 for compliance with the standard in Paragraph A26, at any time that CITGO deviates from those standards, CITGO shall record the duration of the deviation, an explanation of the cause(s) of the deviation, and a description of the corrective action(s) that CITGO took.

Part H: 40 C.F.R. Part 60, Subpart A, J, and Ja Applicability; 40 C.F.R. Part 63, Subpart CC Applicability

A28. 40 C.F.R. Part 60, Subparts A, J, and Ja.

a. NSPS Subparts A and J. As of the Date of Lodging, the C4 Flare shall continue to be an "affected facility" within the meaning of Subparts A and J of 40 C.F.R. Part 60 and shall comply with all of the requirements of Subparts A and J, including but not limited to 40 C.F.R. §§ 60.104(a)(1) and 60.105(a)(4). For the C4 Flare, Subpart J shall not apply after December 31, 2016.

b. NSPS Subparts A and Ja.

i. As of the Date of Lodging, the C1, C2, C3, and C5 Flares shall each be an "affected facility" within the meaning of Subparts A and Ja of 40 C.F.R. Part 60, and shall comply with all of the requirements of Subparts A and Ja.

ii. By no later than December 31, 2016, the C4 Flare shall be an "affected facility" within the meaning of Subparts A and Ja of 40 C.F.R. Part 60, and shall comply with all of the requirements of Subparts A and Ja; provided however, that if CITGO undertakes modifications to the C4 Flare prior to December 31, 2016, the C4 Flare will comply with all of the requirements of Subparts A and Ja as of the date required by Subpart Ja for modifications to flares.

A29. 40 C.F.R. Part 63, Subpart CC. By no later than the dates in Column H of Appendix A2.1, the C1, C2, C3, and C5 Flares shall be subject to and comply with the requirements of 40 C.F.R. §§ 63.670 and 63.671.

Part I: Recordkeeping

A30. CITGO shall keep all records to document compliance with the requirements of this Appendix in accordance with Section XIV (Information Collection and Retention) of this Consent Decree. All records will be retained for five years, except for data recorded by any video camera required pursuant to Paragraph A6, which will be retained for one year from the date of recording. Upon request by EPA, CITGO shall make all such documents available to EPA.

Part J: Reporting

A31. Compliance Status Reports. In the reports due under Section IX (Recordkeeping and Reporting), CITGO shall submit the following information relating to Appendix A:

a. A progress report on the implementation of the requirements in this Appendix A;

b. A description of any problems anticipated with respect to meeting the requirements of this Appendix A;

c. Monitoring equipment/instrument downtime; exceedances of emission standards; and compliance with compressor availability requirements; as described in Paragraph A32;

d. For the semi-annual report due on August 30 of each year, annual emissions data, as described in Paragraph A33;

e. Any additional matters required by any other Paragraph of this Appendix to be submitted in the semi-annual report; and

f. Any additional matters that CITGO believes should be brought to the attention of EPA.

A32. Monitoring Instrument/Equipment Downtime and Failure to Meet Emission Standard. On and after the date of applicability of any standard, CITGO shall provide a summary of the following, per Covered Flare or per Portable Flare (if applicable) per calendar quarter (hours shall be rounded to the nearest tenth):

a. Monitoring Instrument/Equipment Downtime. The total number of hours of downtime of each monitoring instrument/equipment required pursuant to Paragraphs A4, A6, and A7 expressed as both an absolute number and a percentage of time the Covered Flare or Portable Flare (if any) that the instrument/equipment monitors is In Operation and Capable of Receiving Sweep, Supplemental, and/or Waste Gas;

b. Monitoring Instrument/Equipment Downtime. An identification of the periods of downtime by date, time, cause (including Monitoring System Malfunction or maintenance), and, if the cause is asserted to be a Monitoring System Malfunction, the corrective action taken;

c. Inapplicability of Emissions Standard. The total number of hours, expressed as both an absolute number of hours and a percentage of time during a calendar quarter in which the requirement of Paragraph A26 was not applicable because Supplemental, Sweep, and/or Waste Gas was/were not being vented to the C1, C2, C3, or C5 Flare or Portable Flare (if any) for at least 15 minutes; for purposes of Subparagraph A32.d, all remaining hours shall be termed "Hours of Applicability";

d. Failure to Meet Emissions Standard. During the Hours of Applicability, the total number of hours, expressed as both an absolute number of hours and a percentage of time the C1, C2, C3, or C5 Flare or Portable Flare (if any) was receiving Supplemental, Sweep, and/or Waste Gas for at least 15 minutes, of a failure to meet the emission standard in Paragraph A26; a specific identification of each block period that failed to meet that standard, by time and date; the cause of the failure, and if the cause is asserted to be a Malfunction, an explanation and any corrective actions taken.

e. Flaring Limitation Exceedances.

i. For any Waste Gas flows that are excluded from the calculation of flow rate because they are asserted to be based on one or more of the excludible events identified in Subparagraph A21.b, the information required in Subparagraph A21.c;

ii. An identification of each calendar day in which the limitation on flaring set forth in Paragraph A19 was exceeded;

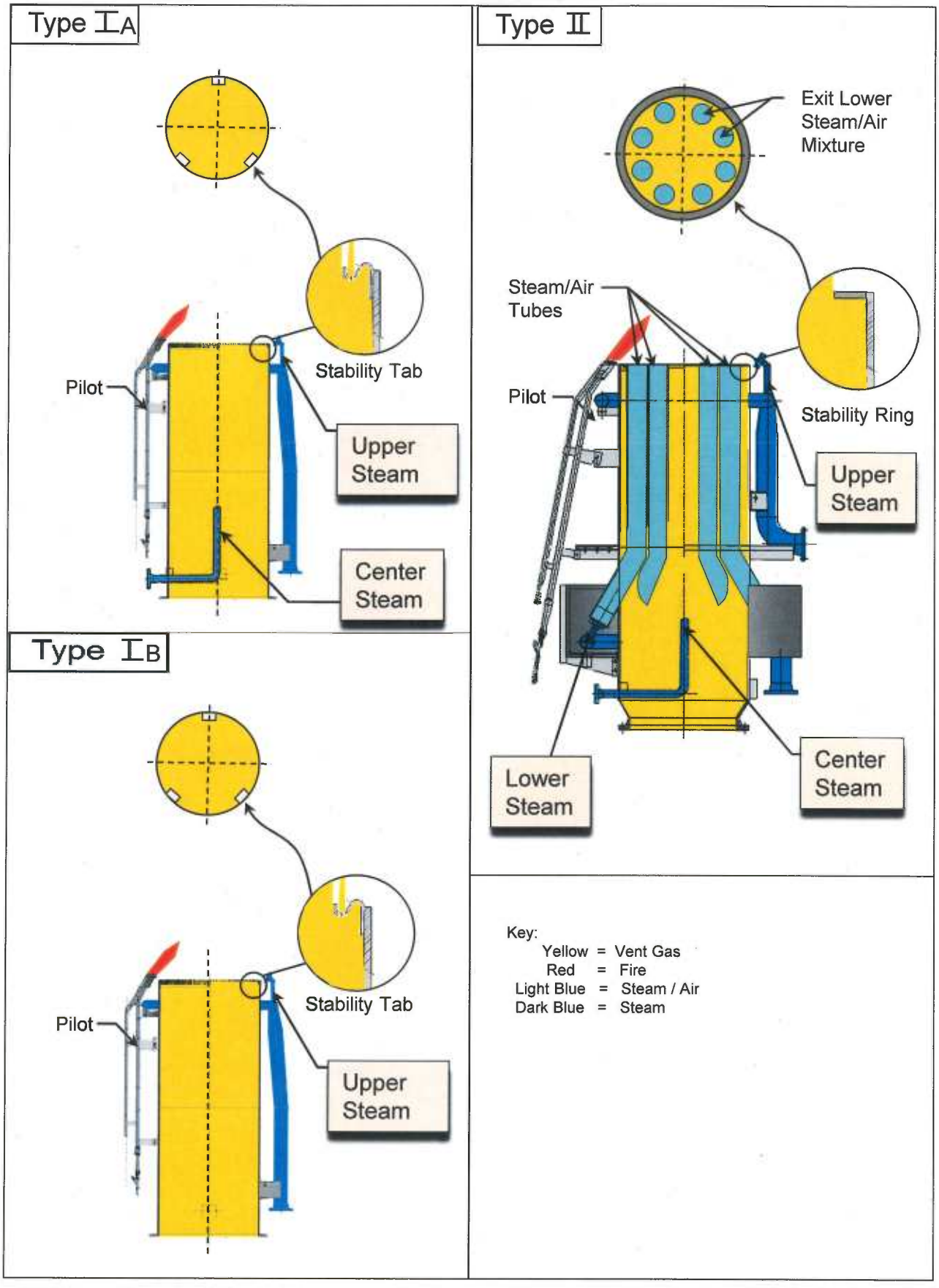
iii. The cause of the exceedance; and

iv. If the cause is asserted to be a Malfunction, an explanation and any corrective actions taken.

f. Compliance with Compressor Availability Requirements. In each semi-annual report starting on and after August 30, 2016, CITGO shall provide sufficient information to document compliance with the Compressor availability requirements of Subparagraph A18.b. For any period of non-compliance, CITGO shall identify the date, cause, and corrective action taken.

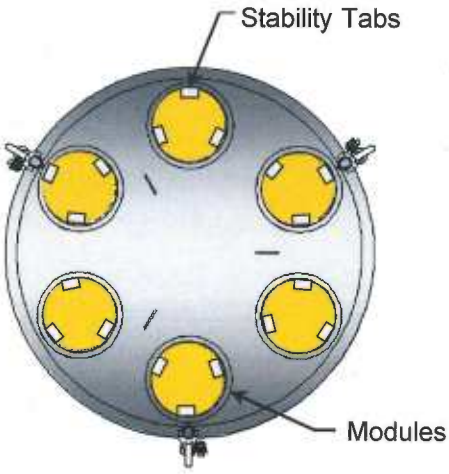
A33. Emissions Data. In the semi-annual report that is submitted on August 30 of each year, CITGO shall provide, for each Covered Flare and Portable Flare (if applicable), for the prior calendar year, the calculated amount of emissions of the following compounds (in tons per year): VOCs, SO_2, H_2S, CO_2, methane, and ethane.

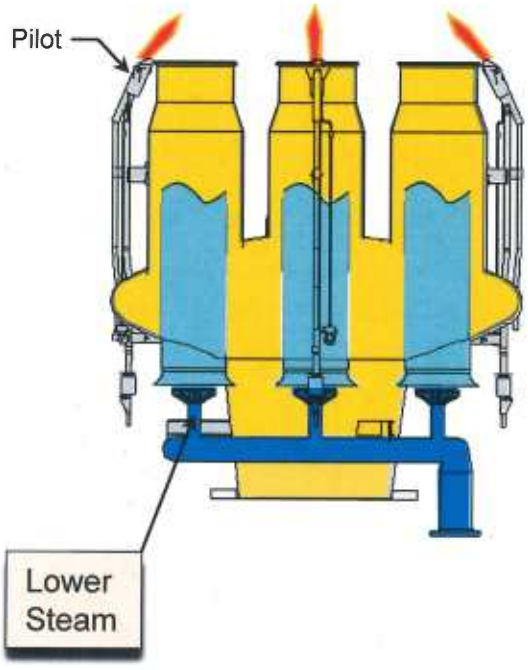
Appendix A1.1



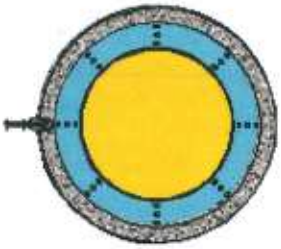
Appendix A1.1

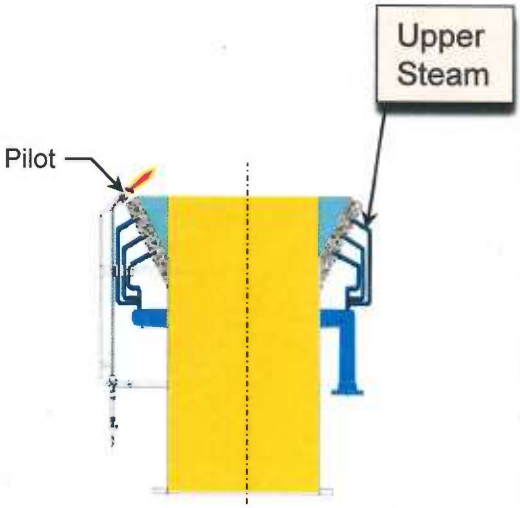
Type III





Type IV





Key:

Yellow	=	Vent Gas
Red	=	Fire
Light Blue	=	Steam / Air
Dark Blue	=	Steam

APPENDIX A1.3

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

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_{vg})

The Company 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 the Company monitors separate gas streams that combine to comprise the total vent gas flow to a Covered 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 the Company complies with Paragraph A7 by collecting compositional analysis data in accordance with the method set forth in A7.a or A7.b: 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.

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

For any gas stream for which the Company complies with Paragraph A7 by collecting direct Net Heating Value monitoring data in accordance with the method set forth in A7.c 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 the Company complies with Paragraph A7 by collecting direct Net Heating Value monitoring data in accordance with the method set forth in A7.c 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 Consent Decree, a Net Heating Value of 1,212 Btu/scf may be used (1,212 – 274 = 938 BTU/scf).

$$NHV_{vg} = NHV_{measured} + 938x_{H2} \qquad \textit{Equation 2}$$

APPENDIX A1.3

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

For any Covered Flare for which the Company complies with Paragraph A7 by using a continuous monitoring system in accordance with the method set forth in A7.a or A7.c: The Company 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). The Company need not elect to use the same methodology at all Covered Flares with a continuous monitoring system; however, for each such Covered Flare, the Company 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 Covered Flare. If the Company intends to change the calculation method that applies to a Covered Flare, the Company 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.

For any Covered Flare for which the Company complies with Paragraph A7 by using a grab sampling system in accordance with the method set forth in A7.b: The Company shall use the analytical results from the first grab sample collected for an event for all 15-minute

periods from the start of the event through the 15-minute block prior to the 15-minute block in which a subsequent grab sample is collected. The Company shall use the results from subsequent grab sampling events for all 15-minute periods starting with the 15-minute block in which the sample was collected and ending with the 15-minute block prior to the 15-minute block in which the next grab sample is collected. For the purpose of this requirement, use the time the sample was collected rather than the time the analytical results become available.

Step 2: Determine Volumetric Flow Rates of Gas Streams

The Company 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 the Company complies with Paragraph A4 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 the Company complies with Paragraph A4 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 the Company elects to use a mass flow monitor to determine volumetric flow rate of Vent Gas, the Company must collect compositional analysis data for such Vent Gas in accordance with the method set forth in A7.a or A7.b. 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.

$$Q_{vol} = \frac{Q_{mass} * 385.3}{MWt} \qquad \textit{Equation 3}$$

For gas streams for which the molecular weight of the gas is known and for which the Company complies with Paragraph A4 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 A7.a or A7.b.

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

For any Covered 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.

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

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, the Company 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 Covered 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, $NHV_{cz} = NHV_{vg}$.

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

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 Covered Flare for at least 15-minutes. Equation 6 shows this relationship.

$$NHV_{cz} \geq 270\ BTU/scf \qquad \textit{Equation 6}$$

APPENDIX A1.3

Key to the Abbreviations:

$385.3 = conversion\ factor\ (scf/lb\text{-}mol)$
$i = individual\ component\ in\ Vent\ Gas\ (unitless)$
$MWt = molecular\ weight\ of\ the\ gas\ at\ the\ flow\ monitoring\ location\ (lb/lb-mol)$
$n = number\ of\ components\ in\ Vent\ Gas\ (unitless)$
$NHV_{cz} = Net\ Heating\ Value\ of\ Combustion\ Zone\ Gas\ (BTU/scf)$
$NHV_i = Net\ Heating\ Value\ of\ component\ i\ according\ to\ Table\ 1\ of\ this\ Appendix\ (BTU/scf)$
$NHV_{measured} = Net\ Heating\ Value\ of\ Vent\ Gas\ stream\ as\ measured\ by\ monitoring\ system\ (BTU/scf)$
$NHV_{NG} = Net\ Heating\ Value\ of\ Supplemental\ Gas\ to\ flare\ during\ the\ 15-minute\ block\ period\ (BTU/scf)$
$NHV_{vg} = Net\ Heating\ Value\ of\ Vent\ Gas\ (BTU/scf)$
$Q_{a,premix} = cumulative\ vol\ flow\ of\ premix\ assist\ air\ during\ the\ 15-minute\ block\ period\ (scf)$
$Q_{mass} = massflow\ rate\ (pounds\ per\ second)$
$Q_{NG1} = cumulative\ vol\ flow\ of\ Supplemental\ Gas\ to\ flare\ during\ previous\ 15-minute\ block\ period\ (scf)$
$Q_{NG2} = cumulative\ vol\ flow\ of\ Supplemental\ Gas\ to\ flare\ during\ the\ 15-minute\ block\ period\ (scf)$
$Q_s = cumulative\ vol\ flow\ of\ Total\ Steam\ during\ the\ 15-minute\ block\ period\ (scf)$
$Q_{vg} = cumulative\ vol\ flow\ of\ Vent\ Gas\ during\ the\ 15-minute\ block\ period\ (scf)$
$Q_{vol} = volumetric\ flow\ rate\ (scf\ per\ second)$
$x_i = concentration\ of\ component\ i\ in\ Vent\ Gas\ (vol\ fraction)$
$x_{H2} = concentration\ of\ H2\ in\ Vent\ Gas\ at\ time\ sample\ was\ input\ into\ NHV\ monitoring\ system\ (vol\ fraction)$

APPENDIX A1.3

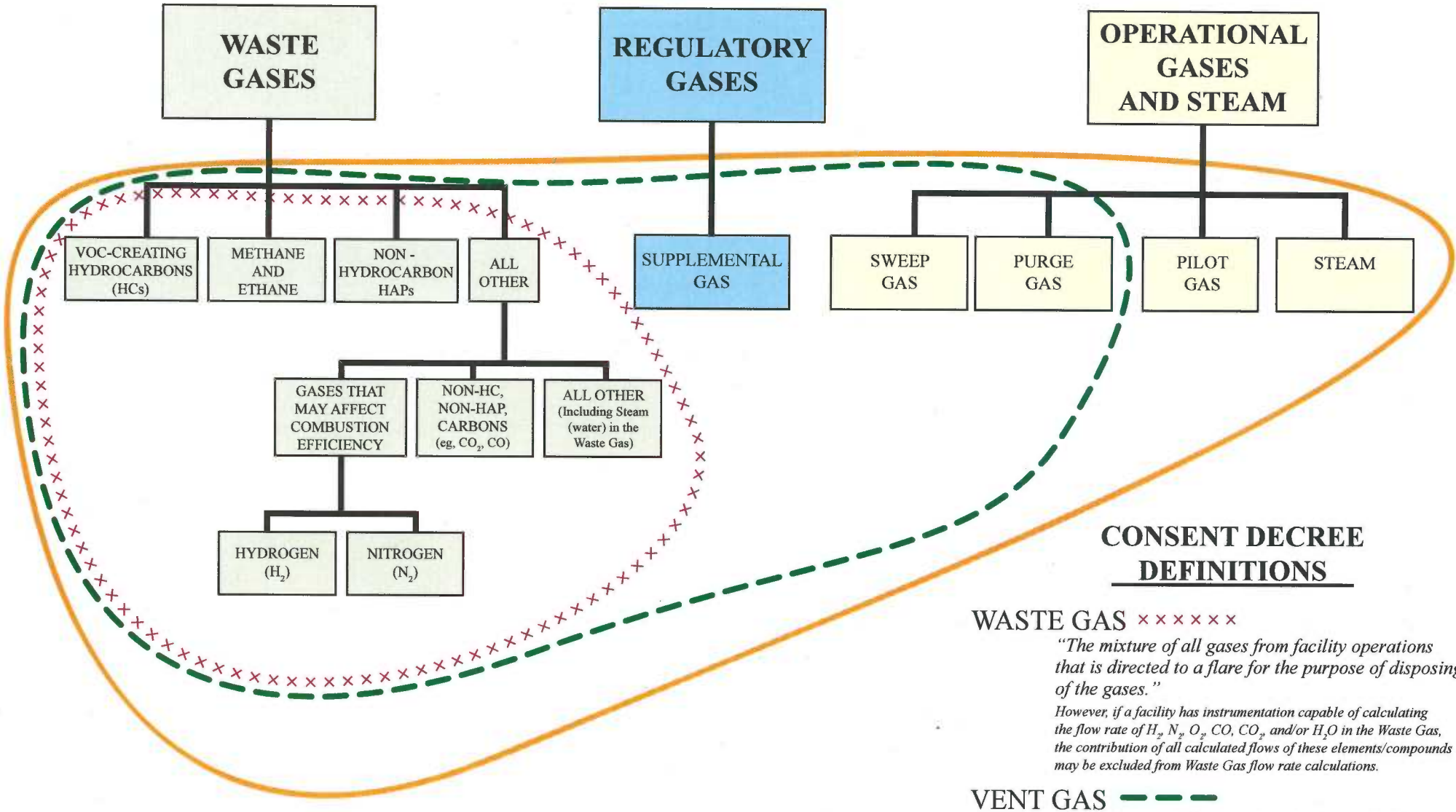
Table 1
Individual Component Properties

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_2H_2	26.04	2	1,404	2.5
Benzene	C_6H_6	78.11	6	3,591	1.3
1,2-Butadiene	C_4H_6	54.09	4	2,794	2.0
1,3-Butadiene	C_4H_6	54.09	4	2,690	2.0
iso-Butane	C_4H_{10}	58.12	4	2,957	1.8
n-Butane	C_4H_{10}	58.12	4	2,968	1.8
cis-Butene	C_4H_8	56.11	4	2,830	1.6
iso-Butene	C_4H_8	56.11	4	2,928	1.8
trans-Butene	C_4H_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_3H_6	42.08	3	2,185	2.4
Ethane	C_2H_6	30.07	2	1,595	3.0
Ethylene	C_2H_4	28.05	2	1,477	2.7
Hydrogen	H_2	2.02	0	1,212[A]	4.0
Hydrogen Sulfide	H_2S	34.08	0	587	4.0
Methane	CH_4	16.04	1	896	5.0
Methyl-Acetylene	C_3H_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_5H_{12}	72.15	5	3,655	1.4
Propadiene	C_3H_4	40.06	3	2,066	2.16
Propane	C_3H_8	44.10	3	2,281	2.1
Propylene	C_3H_6	42.08	3	2,150	2.4
Water	H_2O	18.02	0	0	∞

[A] The theoretical Net Heating Value for hydrogen is 274 Btu/scf, but for the purposes of this Consent Decree, 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.

DEPICTION OF GASES ASSOCIATED WITH STEAM-ASSISTED FLARES



CONSENT DECREE DEFINITIONS

WASTE GAS ××××××

"The mixture of all gases from facility operations that is directed to a flare for the purpose of disposing of the gases."

However, if a facility has instrumentation capable of calculating the flow rate of H_2, N_2, O_2, CO, CO_2, and/or H_2O in the Waste Gas, the contribution of all calculated flows of these elements/compounds may be excluded from Waste Gas flow rate calculations.

VENT GAS – – –

"The mixture of all gases found prior to the flare tip. This includes all Waste Gas, Supplemental Gas, Sweep Gas, and Purge Gas."

COMBUSTION ZONE GAS ——

"The mixture of all gases and steam found just after the flare tip. This includes all Vent Gas, Pilot Gas, and Total Steam."

APPENDIX A1.7

APPENDIX A1.8

OUTLINE OF REQUIREMENTS FOR THE FLARE DATA AND INITIAL MONITORING SYSTEMS REPORT

1. Facility-Wide

    1.1 Facility plot plan showing the location of each flare in relation to the general plant layout

2. General Description of Flare

    2.1 Ground or elevated
    2.2 Type of assist system
    2.3 Simple or integrated (*e.g.*, sequential, staged)
    2.4 Date first installed
    2.5 History of any physical changes to the Flare
    2.6 Whether the Flare is a Temporary-Use Flare, and if so, the duration and time periods of use
    2.7 Flare Gas Recovery System ("FGRS"), if any, and date first installed

3. Flare Components: Complete description of each major component of the Flare, except the Flare Gas Recovery System (*see* Part 5), including but not limited to:

    3.1 Flare stack (for elevated flares)
    3.2 Flare tip
        3.1.2.1 Date installed
        3.1.2.2 Manufacturer
        3.1.2.3 Tip Size
        3.1.2.4 Tip Drawing
    3.3 Knockout or surge drum(s) or pot(s), including dimensions and design capacities
    3.4 Water seal(s), including dimensions and design parameters
    3.5 Flare header(s)
    3.6 Sweep Gas system
    3.7 Purge gas system
    3.8 Pilot gas system
    3.9 Supplemental gas system
    3.10 Assist system
    3.11 Ignition system

4. Simplified process diagram(s) showing the configuration of the components listed in Paragraph 3

APPENDIX A1.8

5. Existing Flare Gas Recovery System ("FGRS")

    5.1 Complete description of each major component, including but not limited to:
        5.1.1 Compressor(s), including design capacities
        5.1.2 Water seal(s), rupture disk, or similar device to divert the flow
    5.2 Maximum actual past flow on an scfm basis and the annual average flow in scfm for the five years preceding Date of Lodging
    5.3 Simplified schematic showing the FGRS
    5.4 Process Flow Diagram that adds the FGRS to the PDF(s) in Part 4

6. Flare Design Parameters

    6.1 Maximum Vent Gas Flow Rate and/or Mass Rate
    6.2 Maximum Sweep Gas Flow Rate and/or Mass Rate
    6.3 Maximum Purge Gas Flow and/or Mass Rate, if applicable
    6.4 Maximum Pilot Gas Flow and/or Mass Rate
    6.5 Maximum Supplemental Gas Flow Rate and/or Mass Rate
    6.6 If steam-assisted, Minimum Total Steam Rate, including all available information on how that Rate was derived

7. Gases Venting to Flare

    7.1. Sweep Gas
        7.1.1 Type of gas used
        7.1.2 Actual set operating flow rate (in scfm)
        7.1.3 Average lower heating value expected for each type of gas used
    7.2 Purge Gas, if applicable
        7.2.1 Type of gas used
        7.2.2 Actual set operating flow rate (in scfm)
        7.2.3 Average lower heating value expected for each type of gas used
    7.3 Pilot Gas
        7.3.1 Type of gas used
        7.3.2 Actual set operating flow rate (in scfm)
        7.3.3 Average lower heating value expected for each type of gas used
    7.4 Supplemental Gas
        7.4.1 Type of gas used
        7.4.2 Average lower heating value expected for each type of gas used
    7.5 Steam (if applicable)
        7.5.1 Drawing showing points of introduction of Lower, Center, Upper, and any other steam
    7.6 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 7.5.1 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

APPENDIX A1.8

and show(s) its(their) location in relation to the location of the introduction of the other gases is all that is required)

8. Existing Monitoring Systems

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

8.1.1 Waste Gas and/or Vent Gas flow monitoring
8.1.2 Waste Gas and/or Vent Gas heat content analyzer
81.3 Sweep Gas flow monitoring
8.1.4 Purge Gas flow monitoring
8.1.5 Supplemental Gas flow monitoring
8.1.6 Steam flow monitoring
8.1.7 Waste Gas or Vent Gas molecular weight analyzer
8.1.8 Gas Chromatograph
8.1.9 Sulfur analyzer(s)
8.1.10 Video camera
8.1.11 Thermocouple

8.2 Drawing(s) showing locations of all existing monitoring systems

9. Monitoring Equipment to be Installed to Comply with Consent Decree

10. Narrative Description of the Monitoring Methods and Calculations that will be used to comply with the NHV_{CZ} Requirements in the Consent Decree

APPENDIX A1.11

WASTE GAS MAPPING:
LEVEL OF DETAIL NEEDED TO SHOW MAIN HEADERS AND PROCESS UNIT HEADERS

Purpose:

Waste Gas Mapping is required in order to identify the source(s) of waste gas entering each Covered Flare. Waste Gas Mapping can be done using instrumentation, isotopic tracing, acoustic monitoring, and/or engineering estimates for all sources entering a flare header (e.g. pump seal purges, sample station purges, compressor seal nitrogen purges, relief valve leakage, and other sources under normal operations). This Appendix outlines what needs to be included as the Waste Gas Mapping section within the Waste Gas Minimization Plan ("WGMP")

Waste Gas Mapping Criteria:

For purposes of waste gas mapping, a main header is defined as the last pipe segment prior to the flare knock out drum. Process unit headers are defined as pipes from inside the battery limits of each process unit that connect to the main header. For process unit headers that are greater than or equal to six (6) inches in diameter, flow ("Q") must be identified and quantified if it is technically feasible to do so. In addition, all sources feeding each process unit header must be identified and listed in a table, but not necessarily individually quantified. For process unit headers that are less than six (6) inches in diameter, sources must be identified, but they do not need to be quantified.

Waste Gas Mapping Submission Requirements:

For each Covered Flare, the following shall be included within the Waste Gas Mapping section of the WGMP:

1. Simplified Schematic consistent with the example schematic included on the second page of this Appendix.

2. Table of all sources connected to each flare main header and process unit header consistent with the Table included on the third page of this Appendix.

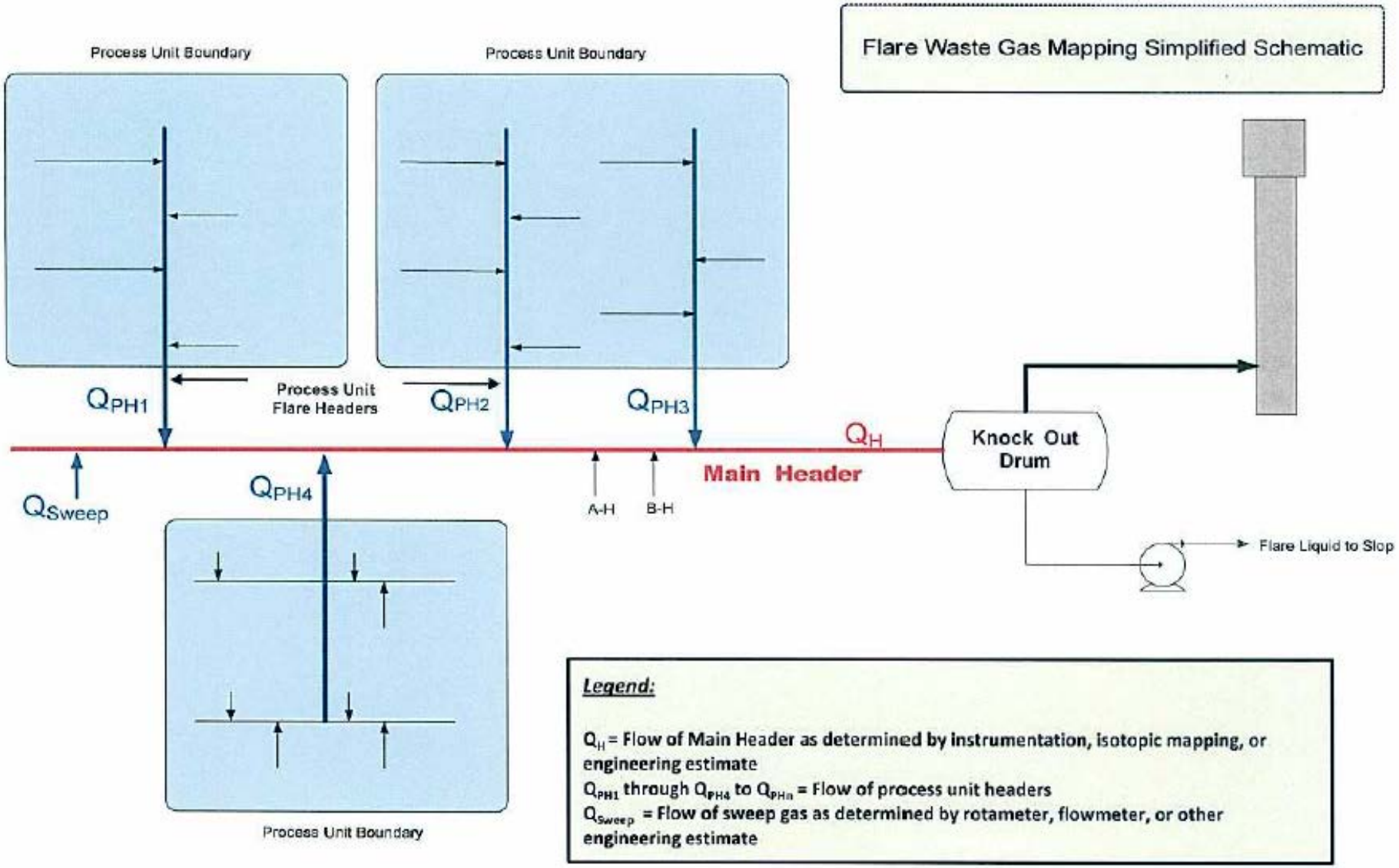

Flare Waste Gas Mapping Simplified Schematic
Process Unit Boundary
Process Unit Boundary
QPH1
Process Unit
Flare Headers
QPH2
QPH3
QH
Main Header
Knock Out
Drum
QSweep
QPH4
A-H
B-H
Flare Liquid to Slop
Process Unit Boundary
Legend:
QH = Flow of Main Header as determined by instrumentation, isotopic mapping, or engineering estimate
QPH1 through QPH4 to QPHn = Flow of process unit headers
QSweep = Flow of sweep gas as determined by rotameter, flowmeter, or other engineering estimate

Table 1: Example of Flare Source Description Table

Process Unit Header	Sources	Detailed Source Description
Q_{PH1} (Ex: FCCU Gas Con Unit)	3 PSVs	PSV-14 on 110-D-5 Gas Con Absorber PSV-12 on 110-D-1 Amine Scrubber PSV-7 on 110-F-1 Batch Caustic Vessel
	2 Pump Seal Purges	110-G-1 LPG Pump 110-G-2 Rich Amine Pump
	1 Sample Station	110-S-1 LPG
	1 PSV	PSV 17 on 112-D-1 Main Column
	1 Pressure Control Valve	PCV 21 – Emergency Wet Gas Compressor
	1 PSV	PSV-21 on Flush Oil Drum
	1 Pump Seal Purge	110-G-23 Slurry Oil Pump
Q_{PH2} (Ex: Gas Oil Treater)	Continue same as PH1	Continue same as PH1
Q_{PH3}	Continue same as PH1	Continue same as PH1
Q_{PH4}	Continue same as PH1	Continue same as PH1
A-H	1 PSVs	PSV-17 on 109-E-42 Slurry Heat Exchanger
B-H	2 Pump Seal Purges	110-G-3 Gas Oil Feed 110-G-4 Main Column Reflux

APPENDIX A1.13

CALCULATING THE AMOUNT OF STIPULATED PENALTIES DUE FOR VIOLATING LIMITATIONS ON FLARING WHEN THE STIPULATED PENALTIES ARE BASED ON EXCESS VOCs AND SO_2 EMITTED

I. Stipulated Penalties for Violating the 365-day Rolling Average Limit. The following equation shall be used to calculate the amount of stipulated penalties due for violating the 365-day rolling average limit on flaring:

$$\text{Penalty due} = \sum_{i=1}^{n} [\$\$_{365d,VOC} \times EE_{365d,VOC}] + [\$\$_{365d,SO2} \times EE_{365d,SO2}] \quad \textbf{(Eq. 1)}$$

Where:

n	=	Each day the 365-day rolling average limit is exceeded
$\$\$_{365d,VOC}$	=	Dollars per ton of VOC for violating 365-day limit ($120/ton because CITGO Refinery is in an ozone nonattainment area)
$EE_{365d,VOC}$	=	365-day average VOC emissions above the flow limit on day limit is violated; *see* Equation 2
$\$\$_{365d,SO2}$	=	Dollars per ton of SO_2 for violating 365 day cap ($40/ton)
$EE_{365d,SO2}$	=	365-day average SO_2 emissions above the flow limit on day limit is violated; *see* Equation 3

II. Calculating Average Emissions of VOCs Above the Flow Limit When Violating the 365-Day Rolling Average Limit. The following equation shall be used to calculate the 365-day average VOC emissions above the flow limit for the day that the 365-day rolling average limit is violated:

$$EE_{365d,VOC} = [Q_{365d,actual} - Q_{365d,allowable}][VOC_{365d,vol\ fraction}]\ [.0026]\ [MW_{365d,VOC}]\ [.0005][1 - CE_{365d,as\ fraction}] \quad \textbf{(Eq. 2)}$$

Where:

$EE_{365d,VOC}$	=	365-day average VOC emissions above the flow limit on the day that the 365-day rolling average limit is violated, in tons per day
$Q_{365d,actual}$	=	Actual 365-day rolling average Waste Gas Flow Rate on the day that the 365-day rolling average limit is violated, in scfd

APPENDIX A1.13

$Q_{365d,allowable}$ = Allowable 365-day rolling average Waste Gas Flow Rate taken from the Consent Decree, in scfd

$VOC_{365d,vol\ fraction}$ = 365-day flow weighted rolling average VOC volume fraction in the Waste Gas on the day that the 365-day rolling average limit is violated. [NOTE: This is the VOC fraction in the Waste Gas, not the Vent Gas.] The daily flow weighted average VOC volume fraction shall be determined from an average of the hourly average VOC concentration weighted by waste gas flow. The 365-day flow weighted rolling average VOC volume fraction shall be determined from daily flow weighted CE and daily flow of waste gas.

.0026 = 1 lb-mole VOC/385.5 scf

$MW_{365d,VOC}$ = 365-day flow weighted rolling average Molecular Weight of VOCs on the day that the 365-day rolling average limit is violated, in lb/lb-mole. The daily flow weighted average molecular weight (MW) shall be determined from an average of the hourly average MW weighted by waste gas flow. The 365-day flow weighted rolling average MW shall be determined from daily flow weighted MW and daily flow of waste gas.

.0005 = 1 ton/2000 lb

$CE_{365d,as\ fraction}$ = 365-day rolling average Combustion Efficiency ("CE") determined from the NHV_{cz} of the Combustion Zone Gas as follows:

NHV_{cz} (BTU/scf)	$CE_{as\ fraction}$
$NHV_{cz} < 95$	0.0
$95 <= NHV_{cz} < 300$	$[0.16*(-95+ NHV_{cz})]/[1+0.16*(-95+ NHV_{cz})]$
$300 <= NHV_{cz} < 350$	0.98
$350 <= NHV_{cz} < 425$	0.985
$425 <= NHV_{cz} < 500$	0.9875
$500 <= NHV_{cz} < 600$	0.99
$600 <= NHV_{cz}$	0.995

Combustion Efficiency shall be determined hourly from the hourly average NHV_{cz} using the table above. The daily flow weighted average CE shall be determined from an average of the hourly average CE values weighted by waste gas flow. The 365-day flow weighted rolling average CE shall be determined from daily flow weighted CE and daily flow of waste gas.

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III. <u>Calculating the Average Emissions of SO_2 Above the Flow Limit when Violating the 365-Day Rolling Average Limit</u>. The following equation shall be used to calculate the 365-day average SO_2 emissions above the flow limit for the day that the 365-day rolling average limit is violated:

$$EE_{365d,SO2} = [Q_{365d,actual} - Q_{365d,allowable}] [C_{365d,H2S}/1{,}000{,}000] [8.30 \times 10^{-5}] \quad \textbf{(Eq. 3)}$$

Where:

$EE_{365d,SO2}$	=	365-day average SO_2 emissions above the flow limit on the day that the 365-day rolling average limit is violated, in tons per day
$Q_{365d,actual}$	=	Actual 365-day rolling average Waste Gas Flow Rate on the day that the 365-day rolling average limit is violated, in scfd
$Q_{365d,allowable}$	=	Allowable 365-day rolling average Waste Gas Flow Rate taken from the Consent Decree, in scfd
$C_{365d,H2S}$	=	365-day rolling average concentration of H_2S in Waste Gas on the day that the that the 365-day rolling average limit is violated, in ppmv
8.30×10^{-5}	=	[1 lb-mole H_2S/385.5 scf] [64 lb SO_2/lb-mole H_2S] [Ton/2000 lb]

[End of Appendix]

APPENDIX A1.14

EQUATIONS AND METHODOLOGY TO CALCULATE REFINERY-SPECIFIC AND INDUSTRY-AVERAGE COMPLEXITY USING NELSON COMPLEXITY INDEX

DEFINITIONS:

"Applicable EIA Annual Refinery Publication" shall mean the Annual EIA Refinery Publication that was the most recent one posted on EIA's website prior to a refinery's request for an increase in flaring caps.

"Applicable Form EIA-820" shall mean the Form EIA-820 that forms the source for the requesting refinery's capacity information that is summarized and compiled in the Applicable Annual EIA Refinery Publication.

> *For example, if a refinery requests an increase in flaring caps in March of 2017, the "Applicable Form E1A-820," is the Form EIA-820 that the Refinery submitted prior to February 15, 2016, for its capacities as of January 1, 2016, (and not the Form EIA-820 that the Refinery submitted prior to February 15, 2017, for its capacities as of January 1, 2017). This is because the Applicable EIA Annual Refinery Publication is the one published in June of 2016 (i. e., the last one published prior to March of 2017).*

"Applicable O&GJ Refining Survey" shall mean the survey that is published in December of the year prior to the year of the Applicable EIA Annual Refinery Publication.

> *For example, if the Applicable EIA Annual Refinery Publication is the one published in June of 2015, then the Applicable O&GJ Refinery Survey is the one published in December of 2014 for capacities as of January 1, 2015.*

"EIA" shall mean the United States Energy Information Agency.

"EIA Annual Publication of the Number and Capacity of Petroleum Refineries" or "EIA Annual Refinery Publication" shall mean the information posted on EIA's website on approximately June 21 of each year that compiles and summarizes the data submitted on the Form EIA-820s that each refinery submits prior to February 15 of that year. As of March 2016, the most recent Annual EIA Refinery Publication *(i.e.*, the one from June of 2015) is found at http://www.eia.gov/dnav/pet/pet pnp capl dcu nus a.htm. A printout of this publication is Attachment 1 to this Appendix A1.14.

"Form EIA-820" shall mean the annual report that each refinery is required to submit to the EIA prior to February 15 of each year. The "Report Year" of a Form EIA-820 refers to the capacities that exist as of January 1 of the "Report Year." A copy of a typical Form EIA-820 is Attachment 2 to this Appendix A1.14.

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"Oil & Gas Journal Worldwide Refining Survey" or "O&GJ Refining Survey" shall mean the survey that the Oil & Gas Journal publishes in December of each year that lists refining capacities as of January 1 of the following year. A copy of the national refining capacities listed in the December 1, 2014 O&GJ Refining Survey for January 1, 2015 is Attachment 3 to this Appendix A1.14. The relevant United States capacities are highlighted in yellow on the fourth page of Attachment 3.

REFINERY COMPLEXITY. The complexity of the Refinery is to be calculated using the following formula:

$$Complexity = \sum_{n=1}^{i} \left(\frac{NCI_i \times CAP_i}{CAP_{DIST}} \right) \qquad \textbf{\textit{Equation 1}}$$

Where:

NCI_i	=	The 2011 Nelson Complexity Index Coefficient shown in Table 1 below for Process Unit i
CAP_i	=	The throughput capacity for the Refinery's Process Unit i, in barrels per calendar day, which shall be determined as follows: (a) for a Process Unit that is not new or modified and for which the Applicable EIA Annual Refinery Publication lists total US throughput for that process, the capacity, in barrels per calendar day, that the Refinery reported for Process i on Part 6 or 7[1] of the Applicable Form EIA-820. If the Refinery did not report the capacity of Process i in "barrels per calendar day," but instead reported it in "barrels per stream day," then "barrels per stream day" will be converted to "barrels per calendar day" by multiplying "barrels per stream day" by the following factors: 0.95 for a vacuum distillation unit and 0.9 for all other units; or (b) for a process unit that is not new or modified, if and only if the Applicable EIA Annual Refinery Publication does not list total US throughput capacity for that process unit, then the Refinery's capacity for that process unit, in barrels per calendar day, listed in the Applicable O&GJ Refining Survey; or (c) for a Process Unit that is new or modified, where the new or modified capacity was not reported on the Applicable Form EIA-820, the projected new or modified unit capacity that is set forth in the air permit application(s) for the post-Lodging modification.
CAP_{DIST}	=	The Refinery's Atmospheric Crude Oil Distillation Capacity, in barrels per calendar day, which shall be determined as follows: (a) if the post-Lodging modification does not affect the crude capacity, the Atmospheric Crude Oil Distillation Capacity, in barrels per calendar day, that the Refinery reported under "Total Operable" capacity on Part 5, Code 401[/1] of the Applicable Form EIA-820; or (b) if the post-Lodging modification does affect crude capacity, the projected, new capacity set forth in the air permit application(s) for the post-Lodging modification.

[1] The references to particular "Parts" or "Codes" of Form EIA-820 are to the Parts and Codes as they exist for the Form EIA-820 that was used for Report Year 2015. See Attachment 2. To that extent that the "Parts" or "Codes" on Form EIA-820 are changed in the future, the intent of the Parties is that the "Parts" and "Codes" of future forms that correspond most closely to those found on the Form EIA-820 for Report Year 2015 will be used.

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INDUSTRY AVERAGE COMPLEXITY: The Industry Average Complexity is to be calculated using the following formula:

$$Industry\_Average\_Complxity = \sum_{n=1}^{i} \left(\frac{NCI_i \times ICAP_i}{ICAP_{DIST}} \right) \qquad \textbf{Equation 2}$$

Where:

NCI_i	=	The 2011 Nelson Complexity Index Coefficient shown in Table 1 below for Process Unit i
$ICAP_i$	=	Total US throughput capacity, in barrels per calendar day, for Process Unit i which shall be determined as follows: (a) from the Applicable EIA Annual Refinery Publication, the total US capacity of Process Unit i in barrels per calendar day. For the total US capacity of those process units that the EIA lists only in "barrels per stream day" and not in "barrels per calendar day," the "barrels per stream day" shall be converted to "barrels per calendar day" by multiplying "barrels per stream day" by the following factors: 0.95 for a vacuum distillation unit and 0.9 for all other units.[2] (b) if and only if the Applicable EIA Annual Refinery Publication does not list a total US throughput capacity for a process unit that the Refinery operates, then the total US throughput capacity for that process unit listed in the Applicable O&GJ Refining Survey.
$ICAP_{DIST}$	=	From the Applicable EIA Annual Refinery Publication, the total "Operable" US Atmospheric Crude Oil Distillation Capacity, in barrels per calendar day.[3]

[2] For example, for catalytic reforming, the total US capacity as of January 1, 2015, is 3,392,641 barrels per calendar day. See Attachment 1 at page 2 (green highlight). Note that the capacity for catalytic reforming on page 1 of Attachment 1 should not be used because that value (3,740,763) is listed in "barrels per stream day," not bpcd. For vacuum distillation, the total US capacity for 2015 is 8,979,485 barrels per stream day. See id. at page 1 (orange highlight). This figure would be converted to 8,530,511 barrels per calendar day (8,979,485 x .95).

[3] Total Operable US Atmospheric Crude Oil Distillation Capacity (total $ICAP_{DIST}$) as of January 1, 2015, is 17,967,088 barrels per calendar day. See Attachment 1 at page 1 (yellow highlight).

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Table 1: 2011 Nelson Complexity Index Coefficients

Refining Process	NCI Coefficients
Distillation Capacity	1.00
Vacuum Distillation	1.30
Thermal Processes	2.75
Coking	7.50
Catalytic Cracking	6.00
Catalytic Reforming	5.00
Catalytic Hydrocracking	8.00
Catalytic Hydrorefining	2.50
Catalytic Hydrotreating	2.50
Alkylation	10.00
Polymerization	10.00
Aromatics	20.00
Isomerization	3.00
Lubes	60.00
Asphalt	1.50
Hydrogen (MCFD)	1.00
Oxygenates	10.00
Sulfur Extraction	240.00

APPENDIX A1.14

ATTACHMENT 1

eia U.S. Energy Information Administration

PETROLEUM & OTHER LIQUIDS

Number and Capacity of Petroleum Refineries

Area: U.S. Period: Annual (as of January 1)

Show Data By: Data Series / Area	Graph / Clear	2010	2011	2012	2013	2014	2015	View History
Number of Operable Refineries								
Total Number of Operable Refineries	☐	148	148	144	143	142	140	1982-2015
Operating	☐	137	137	134	139	139	137	1982-2015
Idle	☐	11	11	10	4	3	3	1982-2015
Atmospheric Crude Oil Distillation Capacity								
Operable (Barrels per Calendar Day)	☐	17,583,790	17,736,370	17,322,178	17,823,659	17,924,530	17,957,088	1982-2015
Operating	☐	16,850,194	16,937,024	16,744,291	16,775,658	17,730,200	17,767,588	1982-2015
Idle	☐	733,596	799,346	577,887	1,048,001	194,430	189,500	1982-2015
Operable (Barrels per Stream Day)	☐	18,581,089	18,953,189	18,560,350	18,971,643	19,064,210	19,134,102	1982-2015
Operating	☐	17,808,082	18,109,682	17,945,443	17,863,443	18,853,210	18,916,102	1982-2015
Idle	☐	773,007	843,307	614,907	1,108,200	211,000	218,000	1982-2015
Downstream Charge Capacity (Barrels per Stream Day)								
Vacuum Distillation	☐	8,542,643	8,650,243	8,679,643	8,938,093	8,987,443	8,979,485	1982-2015
Thermal Cracking	☐	2,631,676	2,672,376	2,763,356	2,877,456	2,958,556	2,974,508	1982-2015
Total Coking	☐	2,605,076	2,645,776	2,736,756	2,850,856	2,931,956	2,947,908	1987-2015
Delayed Coking	☐	2,500,876	2,486,876	2,577,856	2,691,956	2,773,056	2,789,008	1987-2015
Fluid Coking	☐	104,400	158,900	158,900	158,900	158,900	158,900	1987-2015
Visbreaking	☐	16,000	16,000	16,000	16,000	16,000	16,000	1987-2015
Other (Including Gas Oil)	☐	10,600	10,600	10,600	10,600	10,600	10,600	1987-2015
Catalytic Cracking - Fresh Feed	☐	6,140,121	6,219,721	6,032,512	6,089,366	6,031,866	6,012,478	1982-2015
Catalytic Cracking - Recycle Feed	☐	91,840	95,640	84,890	84,390	75,890	75,890	1982-2015
Catalytic Hydro-Cracking	☐	1,819,700	1,855,600	1,879,600	2,080,700	2,208,231	2,305,400	1982-2015
Distillate	☐	595,200	540,100	598,500	621,300	686,131	687,000	2004-2015
Gas Oil	☐	1,079,500	1,170,500	1,161,100	1,337,400	1,400,100	1,491,400	2004-2015
Residual	☐	145,000	145,000	122,000	122,000	122,000	127,000	2004-2015
Catalytic Reforming	☐	3,700,463	3,720,613	3,641,813	3,758,347	3,759,323	3,740,763	1982-2015
Low Pressure	☐	2,322,700	2,390,950	2,347,850	2,488,550	2,541,250	2,615,750	1987-2015
High Pressure	☐	1,377,763	1,329,663	1,293,963	1,271,797	1,218,073	1,125,013	1987-2015
Catalytic Hydrotreating/Desulfurization	☐	16,023,206	16,682,897	16,565,262	16,860,186	17,094,543	17,323,829	1982-2015
Naphtha/Reformer Feed	☐	4,281,046	4,441,323	4,360,593	4,522,347	4,564,693	4,595,573	1987-2015
Gasoline	☐	2,394,882	2,578,782	2,519,082	2,582,182	2,539,235	2,727,384	2004-2015
Heavy Gas Oil	☐	2,796,798	2,809,298	2,877,138	2,895,938	2,949,638	2,972,438	1987-2015
Distillate Fuel Oil	☐	5,676,032	6,113,846	6,063,001	6,237,071	6,343,039	6,420,486	1987-2015
Kerosene/Jet Fuel	☐	1,339,150	1,484,850	1,489,750	1,544,850	1,539,250	1,563,850	2004-2015
Diesel Fuel	☐	3,647,211	3,917,611	3,981,411	4,108,581	4,251,931	4,297,181	2004-2015
Other Distillate	☐	689,671	711,385	591,840	583,640	556,855	559,455	2004-2015
Residual Fuel Oil/Other	☐	874,448	739,648	745,448	622,648	592,948	607,948	1987-2015
Residual Fuel Oil	☐	246,200	241,000	246,000	246,000	246,000	246,000	2004-2015
Other	☐	628,248	498,648	499,448	376,648	346,948	361,948	2004-2015

Fuels Solvent Deasphalting	☐	383,250	382,750	374,550	367,550	369,550	370,050	1987-2015
Downstream Charge Capacity (Barrels per Calendar Day)								
Catalytic Reforming	☐	3,378,841	3,346,457	3,246,874	3,405,017	3,419,407	3,392,641	2010-2015
Total Coking	☐	2,387,896	2,396,787	2,499,293	2,596,369	2,686,917	2,686,298	1987-2015
Catalytic Cracking - Fresh Feed	☐	5,675,830	5,794,214	5,611,191	5,681,643	5,616,015	5,583,169	1987-2015
Catalytic Hydro-Cracking	☐	1,663,115	1,687,745	1,706,540	1,887,024	2,034,689	2,123,431	1987-2015

Click on the source key icon to learn how to download series into Excel, or to embed a chart or map on your website.

- = No Data Reported; -- = Not Applicable; NA = Not Available; W = Withheld to avoid disclosure of individual company data

Notes: Idle refineries represent refineries where distillation units were completely idle but not permanently shutdown as of January 1 of the year. See Definitions, Sources, and Notes link above for more information on this table.

Release Date: 6/19/2015
Next Release Date: 6/30/2016

U.S. Energy Information Administration

PETROLEUM & OTHER LIQUIDS

Production Capacity of Operable Petroleum Refineries

(Barrels per Stream Day, Except Where Noted)

Area: U.S. Period: Annual (as of January 1)

Show Data By: Product / Area	Graph / Clear	2010	2011	2012	2013	2014	2015	View History
Alkylate	☐	1,248,514	1,262,443	1,246,675	1,269,361	1,266,352	1,267,246	1982-2015
Aromatics	☐	270,820	297,311	296,911	317,511	295,511	316,411	1982-2015
Asphalt & Road Oil	☐	844,078	828,003	795,687	740,587	743,987	709,987	1982-2015
Isomers	☐	715,317	703,042	687,860	736,913	738,580	757,286	1982-2015
Isobutane	☐	221,374	213,449	191,467	191,760	192,960	189,346	1982-2015
Isopentane & Isohexane	☐	480,043	487,993	494,793	544,953	545,420	567,740	1982-2015
Isooctane	☐	13,900	1,600	1,600	200	200	200	2009-2015
Lubricants	☐	239,760	242,840	242,340	240,740	240,240	265,340	1982-2015
Marketable Petroleum Coke	☐	780,441	778,114	823,090	867,139	882,931	887,478	1982-2015
Hydrogen (Million Cu. Ft. per Day)	☐	2,985	3,082	3,215	3,047	3,094	3,102	1982-2015
Sulfur (Short Tons per Day)	☐	34,058	35,483	36,663	39,478	41,375	41,266	1987-2015

Click on the source key icon to learn how to download series into Excel, or to embed a chart or map on your website.

- = No Data Reported, -- = Not Applicable, NA = Not Available, W = Withheld to avoid disclosure of individual company data.

Notes: Hydrogen production capacity includes capacity of hydrogen plants on refinery grounds. See Definitions, Sources, and Notes link above for more information on this table.

Release Date: 6/19/2015
Next Release Date: 6/30/2016

APPENDIX A1.14

ATTACHMENT 2

U.S. Energy Information Administration

OMB No. 1905-0165
Expiration Date: 05/31/2016
Version No.:2013.01

FORM EIA-820
ANNUAL REFINERY REPORT
REPORT YEAR 2015

This report is mandatory under the Federal Energy Administration Act of 1974 (Public Law 93-275). Failure to comply may result in criminal fines, civil penalties and other sanctions as provided by law. For further information concerning sanctions and data protections see the provision on sanctions and the provision concerning the confidentiality of information in the instructions. **Title 18 USC 1001 makes it a criminal offense for any person knowingly and willingly makes to any Agency or Department of the United States any false, fictitious, or fraudulent statements as to any matter within its jurisdiction.**

PART 1. RESPONDENT IDENTIFICATION DATA

EIA ID NUMBER: 3938108101

If any Respondent Identification Data has changed since the last report, enter an "X" in the box: X

Company Name: PDV Midwest Refining, LLC
Doing Business As:
Site Name: CITGO Lemont Refinery
Terminal Control Number (TCN):

Physical Address (e.g., Street Address, Building Number, Floor, Suite):
135th Street and New Avenue
City Lemont State: IL Zip: 60439 -

Mailing Address of Contact (e.g., PO Box, RR): If the physical and mailing addresses are the same, only complete the physical address.

City State: Zip: -

Contact Name: REDACTED
Phone No.: Ext:
Fax No.:
Email address:

PART 2. SUBMISSION/RESUBMISSION INFORMATION

If this is a resubmission, enter an "X" in the box:

A completed form must be received by February 17th of the designated report year.

Forms may be submitted using one of the following methods:

Email: OOG.SURVEYS@eia.gov

Fax: (202) 586-1076

Secure File Transfer:
https://signon.eia.doe.gov/upload/noticeoog.jsp

Questions? Call: 202-586-6281

Comments: Explain any unusual or substantially different aspects of your current year's operations that affect the data reported. For example, note new processing units, major modifications or retirement of processing units, sale of refinery, etc. (To separate one comment from another, press ALT+ENTER)

REDACTED

U.S. Energy Information Administration

OMB No. 1905-0165
Expiration Date: 05/31/2016
Version No.:2013.01

FORM EIA-820
ANNUAL REFINERY REPORT
REPORT YEAR 2015

EIA ID NUMBER: 3938108101 **RESUBMISSION:**

PART 3. FUEL, ELECTRICITY, AND STEAM PURCHASED & CONSUMED AT THE REFINERY DURING 2014

Item	Code	Quantity Used As Fuel or Feedstock	Item	Code	Quantity Used as Fuel
Natural Gas (million standard cubic feet):		REDACTED	Coal (thousand short tons)	109	REDACTED
Fuel	105		Purchased Electricity (million kWh)	114	
Hydrogen Feedstock	107		Purchased Steam (million pounds)	113	

PART 4. REFINERY RECEIPTS OF CRUDE OIL BY METHOD OF TRANSPORTATION DURING 2014 (Thousand Barrels)

Source	Code	Pipelines	Tankers	Barges	Tank Cars	Trucks	Total[1]
Domestic	010	REDACTED					
Foreign	020						

[1] Total Domestic and Total Foreign Refinery Receipts (Codes 010 and 020) **must equal the sum** of the comparable refinery receipts on the Form EIA-810, "Monthly Refinery Report," filed for January through December 2014.

PART 5. ATMOSPHERIC CRUDE OIL DISTILLATION CAPACITY AS OF JANUARY 1

Atmospheric Crude Oil Distillation Capacity	Code	Barrel per Calendar Day[2]	Barrels per Stream Day
2015: Operating	399	175940	185200
Idle	400		
Total Operable	401	175940	185200
2016: Operable	501		185200

[2] Barrels per Calendar Day Operating, Idle and Total Operable Capacity (Codes 399, 400 and 401) **must match** the comparable capacity numbers reported on the Form EIA-810, "Monthly Refinery Report," filed for January 2015.

eia U.S. Energy Information Administration

OMB No. 1905-0165
Expiration Date: 05/31/2016
Version No.:2013.01

FORM EIA-820
ANNUAL REFINERY REPORT
REPORT YEAR 2015

EIA ID NUMBER: 3938108101 **RESUBMISSION:**

PART 6. DOWNSTREAM CHARGE CAPACITY AS OF JANUARY 1

Downstream Charge Capacity	Code	2015 Barrels per Calendar Day	2015 Barrels per Stream Day	2016 Barrels per Stream Day
Vacuum Distillation	402		77200	77200
Thermal Cracking:				
Visbreaking	403			
Fluid Coking (incl. Flexicoking)	404			
Delayed Coking	405	36360	40400	40400
Other (incl. Gas Oil)	406			
Catalytic Cracking:				
Fresh Feed	407	62100	69000	69000
Recycled	408			
Catalytic Hydrocracking:				
Distillate	439			
Gas Oil	440			
Residual	441			
Desulfurization (including Catalytic Hydrotreating):				
Naphtha/Reformer Feed	426		110200	110200
Gasoline	420			
Kerosene and Jet	421		13000	13000
Diesel Fuel	422		94200	94200
Other Distillate	423			
Residual	424			
Heavy Gas Oil	413			
Other	425		6800	6800
Catalytic Reforming:				
Low Pressure	430			
High Pressure	431	31050	34500	34500
Fuels Solvent Deasphalting	432			

PART 7. PRODUCTION CAPACITY AS OF JANUARY 1 (Barrels per Stream Day, Except Where Noted)

Production Capacity	Code	2015 Barrels per Stream Day	2016 Barrels per Stream Day
Alkylates	415	21000	21000
Aromatics	437	9400	9400
Asphalt and Road Oil	931		
Isobutane (C4)	644		
Isopentane (C5), Isohexane (C6)	438		
Isooctane (C8)	635		
Lubricants	854		
Petroleum Coke - Marketable	021	12000	12000
Hydrogen (million cubic ft. per day)	091	12	12
Sulfur (short tons per day)	435	487	487

APPENDIX A1.14

ATTACHMENT 3

2014 Worldwide Refining Survey

Leena Koottungal
Survey Editor/News Writer

All figures in barrels per calendar day (b/cd)

All figures are as of January 1, 2015

LEGEND
Numbers identify processes in table

Coking
1. Fluid coking
2. Delayed coking
3. Other

Thermal process
1. Thermal cracking
2. Visbreaking

Catalytic cracking
1. Fluid
2. Other

Catalytic reforming
1. Semiregenerative
2. Cyclic
3. Continuous regen.
4. Other

Catalytic hydrocracking
1. Distillate upgrading
2. Residual upgrading
3. Lube oil manufacturing
4. Other
c. Conventional (high pressure) hydrocracking: (>100 barg or 1,450 psig)
m. Mild to moderate hydrocracking (<100 barg or 1,450 psig)

Catalytic hydrotreating
1. Pretreatment of cat reformer feeds
2. Other naphtha desulfurization
3. Naphtha aromatics saturation
4. Kerosine/jet desulfurization
5. Diesel desulfurization
6. Distillate aromatics saturation
7. Other distillates
8. Pretreatment of cat cracker feeds
9. Other heavy gas oil hydrotreating
10. Resid hydrotreating
11. Lube oil polishing
12. Post hydrotreating of FCC naphtha
13. Other

Alkylation
1. Sulfuric acid
2. Hydrofluoric acid

Polymerization/Dimerization
1. Polymerization
2. Dimerization

Aromatics
1. BTX
2. Hydrodealkylation
3. Cyclohexane
4. Cumene

Isomerization
1. C_4 feed
2. C_5 feed
3. C_5 and C_6 feed

Oxygenates
1. MTBE
2. ETBE
3. TAME
4. Other

Hydrogen
Production:
1. Steam methane reforming
2. Steam naphtha reforming
3. Partial oxidation
a. Third-party plant
Recovery:
4. Pressure swing adsorption
5. Cryogenic
6. Membrane
7. Other

NOTES

A Previously listed as Interoil
B Previously listed as Lion Oil Co.
C Previously listed as US Oil & Refining Co.
D Idle
E Previously listed as North Atlantic Refining Ltd.
F New
G Previously listed as Northern Tier Energy LLC
H Previously listed as ERG Raffinerie Mediterranee North
I Previously listed as Shell Refining (Australia) Pty. Ltd.

Capacity definitions:
Capacity expressed in barrels per calendar day (b/cd) is the maximum number of barrels of input that can be processed during a 24-hour period, after making allowances for the following: (a) Types and grades of inputs to be processed, (b) Types and grades of products to be manufactured, (c) Environmental constraints associated with refinery operations, (d) Scheduled downtime such as mechanical problems, repairs, and slowdown. Capacity expressed in barrels per stream day (b/sd) is the amount a unit can process when running at full capacity under optimal feedstock and product slate conditions. An asterisk (*) beside a refinery location indicates that the number has been converted from b/sd to b/cd using the conversion factor 0.95 for crude and vacuum distillation units and 0.9 for all downstream cracking and conversion units.

Hydrogen:

Hydrogen volumes presented here represent either generation or upgrading to 90+% purity.

Catalytic reforming:
1. Semiregenerative reforming is characterized by shutdown of the reforming unit at specified intervals, or at the operators's convenience, for in situ catalyst regeneration.
2. Cyclic regeneration reforming is characterized by continuous or continual regeneration of catalyst in situ in any one of several reactors that can be isolated from and returned to the reforming operation. This is accomplished without changing feed rate or octane.
3. Continuous regeneration reforming is characterized by the continuous addition of this regenerated catalyst to the reactor.
4. "Other" includes nonregenerative reforming (catalyst is replaced by fresh catalyst) and moving-bed catalyst systems.

REFINERY REMOVALS

Name	Location	Country	Crude b/cd	Reason
Caltex Australia Ltd.	Kurnell	Australia	135,000	Converting to fuel import terminal
Flint Hills Resources	North Pole	Alaska	132,050	Costs, contamination
Gulf Atlantic Operations	Alabama	US	20,000	
Italiana Energia E Servizi SPA (c)	Mantova	Italy	69,420	Converting to products logistics hub
LyondellBasell Industries	Berre l'Etang	France	105,000	Converting to terminal
Murco Petroleum Ltd.	Milford Haven	Wales, UK	135,000	Converting to terminal
Pertamina	Pangakalan Brandan, North Sumatra	Indonesia	4,750	

Worldwide Refineries—Capacities as of Jan. 1, 2015

Country	No. of refineries	Crude	Charge capacity, b/cd: Vacuum distillation	Coking	Thermal operations	Catalytic cracking	Catalytic reforming	Catalytic hydrocracking	Catalytic hydrotreating	Alkylation	Production capacity, b/cd: Pet./Dim.	Aromatics	Isomerization	Lubes	Oxygenates	Hydrogen (MMcfd)	Coke (tonnes per day)	Sulfur (tonnes per day)	Asphalt
Albania	2	30,000	10,500	12,000	—	—	3,500	—	17,400	—	—	600	—	700	—	6.5	700	60	—
Algeria	5	493,000	10,894	—	—	—	88,900	—	81,950	—	—	—	—	—	—	—	—	—	—
Angola	1	39,000	2,500	—	—	—	1,900	—	6,600	—	—	—	—	—	—	—	—	—	950
Argentina	10	611,175	248,365	91,233	31,420	134,910	56,630	17,000	175,600	4,300	520	—	12,700	7,290	2,600	19.0	3,810	108	12,700
Australia	5	541,148	146,865	—	—	155,843	120,053	17,557	402,360	15,869	5,909	1,000	34,777	—	—	68.9	—	140	5,000
Austria	1	203,892	78,805	—	12,580	28,281	22,525	57,752	134,627	—	—	—	22,195	—	3,278	62	—	180	1,130
Azerbaijan	2	396,978	137,200	38,529	—	57,750	24,466	—	67,492	930	—	—	—	16,200	—	—	1,400	—	5,000
Bahrain	1	253,650	198,170	—	21,600	35,100	13,500	54,000	76,500	—	3,330	—	—	—	—	164.0	—	340	8,730
Bangladesh	1	33,000	4,000	—	10,000	—	1,800	1,200	2,000	—	—	—	—	—	—	2.0	—	—	—
Belarus	2	493,323	105,800	—	60,000	44,000	92,000	30,000	262,100	—	—	2,785	4,500	3,760	—	22.8	—	85	9,630
Belgium	4	727,750	240,502	—	26,448	130,025	104,318	—	699,785	16,441	—	—	0	—	4,183	99.0	—	971	26,500
Bolivia	2	52,350	2,200	—	—	—	12,100	—	6,899	—	—	—	—	—	—	14.0	—	—	—
Bosnia	1	240,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Brazil	13	1,917,325	810,140	115,319	9,800	505,287	24,386	—	284,446	6,290	—	—	—	20,009	6,460	126.0	6,974	771	27,100
Brunei	1	8,600	—	—	—	—	5,700	—	—	—	—	—	—	—	—	—	—	—	—
Bulgaria	1	115,240	49,900	—	20,600	23,300	4,060	—	64,200	2,600	—	2,000	—	—	790	10.3	—	63	1,500
Cameroon	1	37,000	—	—	—	—	6,500	—	16,140	—	—	—	—	—	—	—	—	—	—
Canada	17	2,007,500	645,930	60,100	122,000	491,318	354,447	234,478	1,396,304	70,203	19,240	62,689	53,590	3,000	—	405.0	2,535	1,889	66,000
Chile	3	233,150	85,050	13,860	13,860	50,540	26,460	50,400	—	910	—	—	8,510	—	1,580	—	656	90	—
China	56	7,542,000	407,448	240,000	—	719,753	277,813	337,000	578,000	18,700	—	55,600	—	18,000	2,100	178	4,020	1,526	—
China, Taiwan	4	1,310,000	248,500	51,000	—	217,900	115,000	25,000	672,500	14,200	—	14,000	26,000	15,300	11,266	341.0	4,522	3,745	15,270
Colombia	5	290,850	141,000	—	52,000	90,000	—	—	19,800	2,100	2,100	2,200	—	1,400	—	18.0	—	—	—
Congo, Republic of	1	21,000	8,000	—	—	—	2,000	2,000	3,500	—	—	—	—	—	—	—	—	—	—
Costa Rica	1	24,000	600	—	6,500	—	1,200	—	2,000	—	—	—	—	—	—	—	—	—	—
Croatia	3	250,317	87,040	5,000	23,526	51,002	49,368	12,264	68,256	—	—	9,438	5,431	470	—	—	200	123	—
Cuba	4	301,400	75,700	—	—	14,700	20,000	—	55,850	—	—	—	—	—	—	5.0	—	—	1,080
Czech Republic	3	194,000	78,870	—	14,000	24,000	27,470	36,000	103,780	—	—	660	7,210	2,180	2,160	112.0	—	144	10,880
Denmark	2	169,400	22,000	—	68,000	—	21,990	—	42,760	—	—	—	6,400	—	—	—	—	—	8,000
Dominican Republic	2	50,000	—	—	—	—	8,200	—	20,813	—	—	—	—	—	—	0.6	—	—	—
Ecuador	3	176,000	45,300	—	31,500	18,000	12,800	—	24,500	—	—	—	—	—	—	—	—	—	—
Egypt	9	726,250	95,200	39,270	—	—	62,240	33,500	207,802	9,000	—	1,584	10,700	4,441	—	62.5	1,601	290	4,623
El Salvador	1	22,000	4,000	—	—	—	3,000	—	15,500	—	—	—	—	—	—	—	—	—	—
Eritrea	1	14,564	2,219	—	—	—	1,465	—	2,742	—	—	—	—	—	—	—	—	—	—
Finland	2	260,575	146,085	—	34,420	56,690	50,060	90,110	298,325	7,750	600	—	—	5,280	5,730	160.0	—	540	6,800
France	9	1,405,913	551,257	—	110,996	245,382	194,867	76,740	1,105,393	27,969	—	2,887	25,800	29,590	2,702	132.0	—	1,358	19,272
Gabon	1	24,000	—	—	9,220	—	1,400	—	9,430	—	—	—	—	—	—	—	—	—	—
Germany	15	2,187,899	1,089,483	104,260	308,375	349,847	401,702	191,719	1,968,510	30,849	8,301	68,245	94,226	14,220	13,172	682.6	3,863	2,917	58,980
Ghana	1	45,000	—	—	—	14,000	65,000	—	—	—	—	—	—	—	—	—	—	—	—
Greece	4	423,000	152,000	—	49,000	75,550	49,200	43,900	361,635	2,400	1,720	9,100	23,650	3,500	3,940	23.5	—	519	16,950
Hungary	1	161,000	77,500	16,900	14,000	24,000	29,600	—	120,700	3,300	—	12,000	3,500	6,100	1,200	76.2	600	226	6,300
India	23	4,642,761	811,986	169,625	72,600	508,405	51,673	165,600	203,638	85,000	—	6,619	—	8,240	—	111.7	6,480	290	33,677
Indonesia	7	1,007,075	265,980	32,580	58,860	101,450	92,970	99,720	23,430	16,200	—	—	—	—	—	—	—	—	—
Iran	8	1,167,000	440,400	—	198,800	35,000	135,100	106,500	180,160	—	—	—	—	9,200	—	216.0	—	400	26,800
Iraq	9	637,500	145,000	—	—	—	88,000	74,241	292,000	—	—	—	2,500	9,420	—	64.0	—	—	38,738
Ireland	1	71,000	—	—	—	—	11,000	—	53,600	—	—	—	7,600	—	—	10.3	—	10	—

Worldwide Refineries—Capacities as of Jan.1, 2015

Country	No. of refineries	Charge capacity, b/cd: Crude	Vacuum distillation	Coking	Thermal operations	Catalytic cracking	Catalytic reforming	Cat hydro-cracking	Cat hydro-treating	Production capacity, b/cd: Alkylation	Pol./Dim.	Aromatics	Isomerization	Lubes	Oxygenates	Hydrogen (MMcfd)	Coke (tonnes per day)	Sulfur	Asphalt
Israel	2	220,000	118,000	—	66,000	49,500	26,500	—	96,000	—	2,200	—	—	—	750	—	—	—	2,700
Italy	14	2,046,309	750,317	45,000	328,964	321,000	239,169	284,800	1,085,083	40,330	1,500	13,400	92,145	24,000	11,720	300.2	2,046	1,650	12,206
Ivory Coast	1	63,990	23,990	—	—	—	12,330	14,480	27,310	—	—	—	—	—	—	—	—	—	4,330
Jamaica	1	36,000	1,800	—	—	—	3,700	—	23,800	—	—	—	—	—	—	—	—	—	850
Japan	28	4,466,640	1,619,340	123,400	20,000	946,150	763,235	181,690	4,647,210	65,690	5,760	199,157	22,330	34,013	2,978	1,425.4	1,863	9,029	82,370
Jordan	1	90,400	21,500	—	—	4,000	10,900	5,220	17,300	—	—	—	—	—	—	16.0	—	—	4,250
Kazakhstan	3	340,000	121,037	24,997	52,071	38,356	51,586	—	177,890	—	—	—	—	—	—	21.5	1,000	124	8,550
Kenya	1	90,000	1,700	—	—	—	8,260	—	36,000	—	—	—	—	—	—	—	—	—	1,000
Kuwait	3	936,000	327,750	72,000	—	36,000	46,620	115,650	588,780	5,616	—	—	—	—	6,561	741.6	2,800	4,200	—
Kyrgyzstan	1	10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Liberia	1	15,000	1,000	—	—	—	2,000	—	3,300	—	—	—	—	—	—	—	—	—	200
Libya	5	378,000	3,775	—	—	—	20,250	—	43,330	—	—	—	—	635	—	—	—	—	3,432
Lithuania	1	190,000	89,300	—	28,800	43,200	45,900	—	153,900	—	7,200	—	18,900	—	2,700	25.0	—	320	—
Macedonia	1	50,000	—	—	—	—	10,860	—	22,050	—	—	—	4,390	—	—	—	—	—	—
Malaysia	7	526,832	101,000	24,000	—	39,000	75,070	36,000	216,800	—	—	—	10,800	—	—	147.2	2,245	460	8,000
Martinique	1	17,329	—	—	—	—	2,862	—	14,269	—	—	—	—	—	—	—	—	—	—
Mexico	6	1,540,000	754,000	191,000	—	380,500	279,300	—	926,050	128,456	—	17,000	—	16,600	15,490	183.0	—	—	58,000
Morocco	2	154,901	24,921	—	—	5,040	24,359	—	35,539	—	—	—	—	2,460	—	—	—	—	5,630
Myanmar	3	57,000	4,000	5,200	—	—	—	—	—	—	—	—	—	500	—	—	120	—	—
Netherlands	6	1,194,673	711,604	41,500	91,404	103,731	148,510	197,985	817,899	15,450	—	36,468	8,730	11,600	2,715	358.9	—	1,673	16,500
Netherlands Antilles	1	320,000	195,000	—	80,000	50,000	20,000	—	119,500	9,000	2,000	—	—	12,000	—	54.6	—	300	26,000
New Zealand	1	107,000	38,270	—	—	—	25,840	30,000	104,490	—	—	—	—	—	—	60.0	—	111	5,490
Nicaragua	1	19,950	1,425	—	—	—	2,700	—	14,085	—	—	—	—	—	—	—	—	—	378
Nigeria	4	445,000	124,490	—	—	82,700	70,070	—	109,231	9,870	2,274	291	3,610	3,878	—	—	—	—	14,850
North Korea	2	71,000	—	—	—	—	7,300	—	7,400	—	—	1,000	—	—	1,000	—	—	—	—
Norway	2	319,000	—	23,000	32,000	55,000	34,900	—	126,000	—	11,000	—	3,840	—	—	—	610	20	—
Oman	1	85,000	—	—	—	—	16,000	—	21,000	—	—	—	—	—	—	—	—	—	—
Pakistan	6	182,196	19,815	—	—	—	11,650	—	54,870	—	—	1,400	—	3,800	—	—	—	—	4,200
Papua New Guinea	1	32,000	—	—	—	—	3,500	—	3,500	—	—	—	—	—	—	—	—	—	—
Paraguay	1	7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Peru	6	192,950	94,000	—	25,700	33,500	2,100	—	2,800	—	—	—	—	—	—	—	—	—	3,800
Philippines	3	276,000	61,000	—	31,000	19,000	51,000	—	184,990	—	—	—	10,000	3,700	—	37.0	—	70	1,200
Poland	4	492,950	265,123	—	—	32,985	67,514	145,908	259,507	3,372	—	10,262	23,194	17,796	2,514	167.0	—	560	33,371
Portugal	2	304,172	87,785	—	36,540	40,500	50,182	9,180	201,537	5,400	—	17,276	—	—	—	85.3	—	252	—
Puerto Rico	1	73,000	34,000	—	—	—	21,000	20,000	21,000	—	—	—	—	—	—	20.0	—	34	—
Qatar	2	338,700	—	—	—	60,000	29,400	20,000	39,350	—	—	—	25,000	—	—	—	—	—	—
Romania	9	461,789	247,593	74,005	26,300	103,579	49,154	—	272,022	2,300	—	12,417	7,213	9,614	2,996	38.9	2,935	156	10,441
Russia	40	5,499,993	2,091,314	94,369	382,593	330,817	748,733	122,256	2,170,966	10,006	1,729	54,697	27,469	82,842	7,175	93.3	3,720	726	210,545
Saudi Arabia	8	2,496,000	445,950	—	191,100	103,600	240,500	135,000	493,460	31,500	—	6,500	33,000	—	3,700	190.7	—	—	—
Senegal	1	25,030	7,160	—	—	—	1,590	—	1,930	—	—	—	—	—	—	—	—	—	—
Serbia & Montenegro	2	214,826	50,583	—	20,340	18,950	18,822	—	50,910	3,070	—	200	—	300	—	0.5	—	59	2,400
Sierra Leone	1	10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Singapore	3	1,344,500	342,500	—	145,210	80,000	142,470	147,500	742,000	9,000	—	—	—	52,500	1,400	297.0	—	963	39,500
Slovakia	1	115,000	55,000	—	—	18,000	21,000	42,000	87,800	4,500	—	9,250	6,000	2,000	1,500	89.6	—	270	2,600
Slovenia	1	13,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worldwide Refineries—Capacities as of Jan.1, 2015

Country	No. of refineries	Charge capacity, b/cd								Production capacity, b/cd									
		Crude	Vacuum distillation	Coking	Thermal operations	Catalytic cracking	Catalytic reforming	Cat hydro-cracking	Cat hydro-treating	Alkylation	Pol./Dim.	Aromatics	Isomerization	Lubes	Oxygenates	Hydrogen (MMcfd)	Coke (tonnes per day)	Sulfur	Asphalt
South Africa	4	503,000	201,375	26,800	60,000	108,640	77,142	11,774	227,772	9,595	4,940	6,900	12,223	8,000	—	50.2	240	607	7,100
South Korea	6	2,968,500	515,650	19,000	—	367,000	394,000	339,000	1,543,380	48,700	12,800	167,300	—	71,300	15,700	1,472.5	1,200	5,280	86,327
Spain	9	1,427,500	414,245	61,100	149,200	191,300	196,750	131,500	827,630	16,916	—	25,800	36,000	9,600	9,600	300.1	3,565	1,762	25,600
Sri Lanka	1	50,000	24,000	—	12,500	—	5,300	—	19,295	—	—	—	—	—	—	—	—	—	1,000
Sudan	3	121,700	—	—	—	—	1,900	—	8,100	—	—	—	—	—	—	—	—	—	—
Suriname	1	7,000	7,000	—	2,800	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sweden	5	437,000	135,600	—	66,800	29,700	70,660	48,600	268,540	—	3,420	—	28,530	—	—	53.8	—	334	27,460
Switzerland	1	72,000	—	—	—	20,400	12,000	—	33,200	—	3,800	—	6,400	—	—	28.0	—	—	—
Syria	2	239,865	63,135	18,200	22,689	—	31,242	26,410	80,886	—	—	—	11,493	—	—	27.0	500	150	2,223
Tanzania	1	14,900	—	—	2,500	—	2,500	—	4,400	—	—	—	—	—	—	—	—	—	—
Thailand	4	645,000	201,500	—	16,983	90,490	96,770	43,073	466,917	—	—	—	19,596	—	—	33.5	—	420	2,500
Trinidad & Tobago	1	168,000	119,200	—	24,000	24,000	18,000	45,000	41,000	1,200	1,580	—	—	—	1,000	30.0	—	100	—
Tunisia	1	34,000	—	—	—	—	3,300	—	—	—	—	—	—	—	—	—	—	—	—
Turkey	6	663,000	201,767	—	23,590	28,935	65,662	53,820	265,005	—	—	—	14,055	5,870	—	217.5	180	315	20,216
Turkmenistan	2	236,970	91,645	28,568	—	15,151	52,540	—	63,500	1,028	1,223	—	—	2,000	—	—	1,040	—	415
Ukraine	6	879,759	343,002	22,149	17,291	70,100	146,735	7,200	315,013	—	—	3,464	—	500	125	21.5	705	176	12,786
United Arab Emirates	5	773,250	92,870	—	—	34,350	25,875	31,050	158,627	1,140	1,900	—	—	—	—	58.8	—	57	700
United Kingdom	8	1,401,705	682,963	67,850	101,571	347,867	283,866	36,000	1,070,990	67,033	9,500	14,590	85,798	13,999	3,063	133.0	2,400	752	26,000
United States	123	18,024,750	8,068,197	2,692,625	33,520	5,569,316	3,486,029	1,905,050	14,507,177	1,158,072	69,770	344,289	662,793	222,800	29,650	4,271.8	137,666	34,332	488,117
Uruguay	1	50,000	25,000	—	7,000	12,000	12,000	—	23,000	—	—	—	6,000	—	—	—	—	—	—
Uzbekistan	3	224,271	45,671	17,667	9,585	—	23,487	—	30,804	—	—	—	—	9,397	—	—	650	—	4,151
Venezuela	5	1,282,100	585,780	144,900	—	231,800	49,500	—	389,700	65,800	—	2,000	20,700	12,020	12,830	147.8	5,200	1,471	36,000
Vietnam	1	140,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Yemen	2	140,000	10,500	—	—	—	14,500	—	—	—	—	—	—	—	—	—	—	—	3,000
Zambia	1	23,750	2,280	—	—	—	5,320	—	8,550	—	—	—	—	—	—	—	—	—	5,527
Total	643	87,958,735	28,339,811	4,807,005	3,488,176	14,338,190	11,218,277	5,942,828	44,503,370	2,048,055	184,316	1,195,069	1,548,497	812,024	196,328	14,391	208,146	83,518	1,724,524

APPENDIX A2.1

Covered Flares and Applicability Dates for Certain Consent Decree Requirements for CITGO Petroleum Corporation, Lemont Refinery

FLARE	FLARE DATA AND MONITORING SYSTEMS AND PROTOCOL REPORT	INSTALLATION AND OPERATION OF MONITORING SYSTEMS				WASTE GAS MINIMIZATION PLAN	GENERAL EMISSION STANDARDS FOR COVERED FLARES	COMBUSTION ZONE NET HEATING VALUE STANDARD	40 CFR 60 SUPBART A AND Ja APPLICABIILITY	40 CFR 63 SUPBART CC APPLICABIILITY
A	B	C				D	E	F	G	H
-- REFERENCED PARAGRAPHS --										
A1.p	A2	A4	A5	A6	A7	A14	A24	A26	A28.b.	A29
844C-1	DOE + 365 days, with Update Due on 1/30/2020	12/31/2016	12/31/2016	DOE	1/30/2019	Not applicable	DOE	1/30/2019	DOL	1/30/2019
844C-2	DOE + 365 days, with Update Due on 1/30/2020	DOE	DOE	DOE	1/30/2019	DOE + 365 days	DOE	1/30/2019	DOL	1/30/2019
844C-3	DOE + 365 days, with Update Due on 1/30/2020	DOE	DOE	DOE	1/30/2019	DOE + 365 days	DOE	1/30/2019	DOL	1/30/2019
844C-4	12/31/2016	12/31/2016	12/31/2016	DOE	Not applicable	Not applicable	12/31/2016	Not applicable	12/31/2016	Not applicable
844C-5	12/31/2016	DOE	DOE	DOE	12/31/2016	Not applicable	DOE	12/31/2016	DOL	1/30/2019

Legend:
DOE = Date of Entry
DOL = Date of Lodging

APPENDIX A2.2
Methodology for Calculating Refinery Flaring Limitation

Refinery	*Calculation Basis*	*Refinery Crude Capacity (b/cd)*	*Refinery Complexity*	*US Complexity*	*Refinery/US Complexity*	*365-Day Rolling Average SCFD*
CITGO Lemont Refinery	EIA/O&GJ (b/cd)[1]	175,940	11.65	11.31	1.03	906,346

Notes:

[1] Data in barrels per calendar day (b/cd) are shown on the next page. US capacities as of 1/1/2015 as taken from US EIA report "U.S. Number and Capacity of Petroleum Refineries" (published 6/19/2015) were used preferentially. See Attachment 1 to this Appendix A2.2, along with the corresponding CITGO Lemont Refinery capacities as of 1/1/2015 submitted by CITGO Lemont Refinery on Form EIA-820 Annual Refinery Report Parts 5, 6, and 7. See Attachment 2 to this Appendix A2.2. For processes where U.S. capacities were not included on the US EIA report, Oil & Gas Journal Worldwide Refining Survey (published 12/1/2014) calendar day capacities were used for both the US and CITGO Lemont Refinery. See Attachment 3 of this Appendix A2.2. Where b/cd data was not available in the EIA report, barrels per stream day (b/sd) data from EIA report were converted to b/cd for some processes using O&GJ factors (0.95 for vacuum distillation and 0.9 for any other processes) where noted.

[2] Nelson Complexity factors are shown on the next page, and are specified in CD Appendix A1.14.

APPENDIX A2.2
Methodology for Calculating Refinery Flaring Limitation

Process	*Nelson Complexity Factor*	*CITGO Lemont Refinery Capacity as of 1/1/2015*		*U.S. Capacity as of 1/1/2015*	
		b/cd, except H2 and S	*Source[1, 2, 3]*	*b/cd, except H2 and S*	*Source[1,2, 5, 6]*
Atmospheric Distillation	1.00	175,940	Part 5, Lemont Refinery's 2015 EIA-820, b/cd	17,967,088	EIA Website 2015 Data – No. and Cap., b/cd
Vacuum Distillation	1.30	73,340	Part 6, Lemont Refinery's 2015 EIA-820, b/sd*0.95	8,530,511	EIA Website 2015 Data – No. and Cap., b/sd*0.95
Coking	7.50	36,360	Part 6, Lemont Refinery's 2015 EIA-820, b/cd	2,686,299	EIA Website 2015 Data – No. and Cap., b/cd
Catalytic Cracking - Fresh Feed	6.00	62,100	Part 6, Lemont Refinery's 2015 EIA-820, b/cd	5,583,169	EIA Website 2015 Data – No. and Cap., b/cd
Catalytic Cracking - Recycle Feed	6.00	0	Part 6, Lemont Refinery's 2015 EIA-820, b/sd*0.9	68,301	EIA Website 2015 Data – No. and Cap., b/sd*0.9
Reforming	5.00	31,050	Part 6, Lemont Refinery's 2015 EIA-820, b/cd	3,392,641	EIA Website 2015 Data – No. and Cap., b/cd
Hydrocracking[4]	8.00	0	Part 6, Lemont Refinery's 2015 EIA-820, b/cd	2,123,431	EIA Website 2015 Data – No. and Cap., b/cd
Hydrotreating	2.50	201,780	Part 6, Lemont Refinery's 2015 EIA-820, b/sd*0.9	15,591,446	EIA Website 2015 Data – No. and Cap., b/sd*0.9
Alkylates	10.00	18,900	Part 7, Lemont Refinery's 2015 EIA-820, b/sd*0.9	1,140,521	EIA Website 2015 Data – Prod. Cap., bb/sd*0.9
Hydrogen (mmcfd)	1000	11	Part 7, Lemont Refinery's 2015 EIA-820, b/sd*0.9	2,792	EIA Website 2015 Data – Prod. Cap., bb/sd*0.9
Sulfur (short tons/day)	240.00	438	Part 7, Lemont Refinery's 2015 EIA-820, b/sd*0.9	37,139	EIA Website 2015 Data – Prod. Cap., bb/sd*0.9
Thermal Processes (Visbreaking)[4]	2.75	0	Part 6, Lemont Refinery's 2015 EIA-820, b/sd*0.9	23,940	EIA Website 2015 Data – No. and Cap., b/sd*0.9
Polymerization[4]	10.00	0	O&GJ (12/1/2014), "Worldwide Refining", p. 48, b/cd,	69,770	O&GJ (12/1/2014), WW Refining - Capacities b/cd
Aromatics	20.00	8,460	Part 7, Lemont Refinery's 2015 EIA-820, b/sd*0.9	284,770	EIA Website 2015 Data – Prod. Cap., bb/sd*0.9
Isomerization[4]	3.00	0	Part 7, Lemont Refinery's 2015 EIA-820, b/sd*0.9	681,557	EIA Website 2015 Data – Prod. Cap., bb/sd*0.9
Oxygenates[4]	10.00	0	O&GJ (12/1/2014), "Worldwide Refining", p. 48, b/cd	29,650	O&GJ (12/1/2014), WW Refining - Capacities b/cd
Lubes[4]	60.00	0	Part 7, Lemont Refinery's 2015 EIA-820, b/sd*0.9	238,806	EIA Website 2015 Data – Prod. Cap., bb/sd*0.9
Asphalt[4]	1.50	0	Part 7, Lemont Refinery's 2015 EIA-820, b/sd*0.9	638,988	EIA Website 2015 Data – Prod. Cap., bb/sd*0.9
Complexity		**11.65**		**11.31**	

Notes:

[1] Capacities in barrels per calendar day (b/cd) are shown. US capacities as of 1/1/2015 from US EIA reports "U.S. Number and Capacity of Petroleum Refineries" and "Production Capacity of Operable Petroleum Refineries" (published 6/19/2015 and available at www.eia.gov) were used preferentially, along with the corresponding Lemont Refinery charge capacities as of 1/1/2015 submitted by Lemont Refinery on Form EIA-820 Annual Refinery Report Parts 5, 6, and 7. For processes where US capacities were not included on the US EIA reports (i.e., those not found in Parts 5, 6, or 7 of EIA-820), Oil and Gas Journal Worldwide Refining Survey (published 12/1/2014) calendar day capacities were used for both the US and Lemont Refinery. Where b/cd data was not available in the EIA reports, barrels per stream day (b/sd) data from the EIA report were converted to b/cd for some process using O&GJ factors (0.95 for vacuum distillation and 0.9 for any other processes) where noted.

[2] O&GJ (12/1/2014) = Oil & Gas Journal Worldwide Refining Survey (published 12/1/2014) of petroleum refinery capacities as of 1/1/2015, published 12/1/2014).
"Worldwide Refineries – Capacities as of 1/1/2015". U.S. data on p. 3. See Attachment 3 of this Appendix A2.2.
"Worldwide Refining". CITGO Lemont Refinery data on p. 48. See also Attachment 4 of this Appendix A2.2

[3] Part 5, 6, or 7, Lemont Refinery 2015 EIA-820 = U.S. Energy Information Administration Form EIA-820 submitted by Lemont Refinery. See Attachment 2 of this Appendix A2.2.

[4] Process not at Lemont Refinery

[5] EIA Website 2015 Data – No. and Cap. = U.S. Energy Information Administration Website (www.eia.gov), "Number and Capacity of Petroleum Refineries" for the Year 2015. See Attachment 1 of this Appendix A2.2

[6] EIA Website 2015 Data – Prod. Cap. = U.S. Energy Information Administration "Production Capacity of Operable Petroleum Refineries" for the year 2015. See Attachment 1 of this Appendix A2.2

APPENDIX A2.2

ATTACHMENT 1

eia U.S. Energy Information Administration

PETROLEUM & OTHER LIQUIDS

Number and Capacity of Petroleum Refineries

Area: U.S. Period: Annual (as of January 1)

Show Data By: Data Series / Area	Graph / Clear	2010	2011	2012	2013	2014	2015	View History
Number of Operable Refineries								
Total Number of Operable Refineries	☐	148	148	144	143	142	140	1982-2015
Operating	☐	137	137	134	139	139	137	1982-2015
Idle	☐	11	11	10	4	3	3	1982-2015
Atmospheric Crude Oil Distillation Capacity								
Operable (Barrels per Calendar Day)	☐	17,583,790	17,736,370	17,322,178	17,823,659	17,924,630	17,967,088	1982-2015
Operating	☐	16,850,194	16,937,024	16,744,291	16,775,658	17,730,200	17,767,588	1982-2015
Idle	☐	733,596	799,346	577,887	1,048,001	194,430	199,500	1982-2015
Operable (Barrels per Stream Day)	☐	18,581,089	18,953,189	18,560,350	18,971,643	19,064,210	19,134,102	1982-2015
Operating	☐	17,808,082	18,109,882	17,945,443	17,863,443	18,853,210	18,916,102	1982-2015
Idle	☐	773,007	843,307	614,907	1,108,200	211,000	218,000	1982-2015
Downstream Charge Capacity (Barrels per Stream Day)								
Vacuum Distillation	☐	8,542,643	8,650,243	8,679,643	8,938,093	8,987,443	8,979,485	1982-2015
Thermal Cracking	☐	2,631,676	2,672,376	2,763,356	2,877,456	2,958,556	2,974,508	1982-2015
Total Coking	☐	2,605,076	2,645,776	2,736,756	2,850,856	2,931,956	2,947,908	1987-2015
Delayed Coking	☐	2,500,676	2,486,876	2,577,856	2,691,956	2,773,056	2,789,008	1987-2015
Fluid Coking	☐	104,400	158,900	158,900	158,900	158,900	158,900	1987-2015
Visbreaking	☐	16,000	16,000	16,000	16,000	16,000	16,000	1987-2015
Other (Including Gas Oil)	☐	10,600	10,600	10,600	10,600	10,600	10,600	1987-2015
Catalytic Cracking - Fresh Feed	☐	6,140,121	6,219,721	6,032,512	6,089,366	6,031,888	6,012,478	1982-2015
Catalytic Cracking - Recycle Feed	☐	91,840	95,640	84,890	84,390	75,890	75,890	1982-2015
Catalytic Hydro-Cracking	☐	1,819,700	1,855,600	1,879,600	2,080,700	2,208,231	2,305,400	1982-2015
Distillate	☐	595,200	540,100	596,500	621,300	686,131	687,000	2004-2015
Gas Oil	☐	1,079,500	1,170,500	1,161,100	1,337,400	1,400,100	1,491,400	2004-2015
Residual	☐	145,000	145,000	122,000	122,000	122,000	127,000	2004-2015
Catalytic Reforming	☐	3,700,463	3,720,613	3,641,813	3,758,347	3,759,323	3,740,763	1982-2015
Low Pressure	☐	2,322,700	2,390,950	2,347,850	2,486,550	2,541,250	2,515,750	1987-2015
High Pressure	☐	1,377,763	1,329,663	1,293,963	1,271,797	1,218,073	1,125,013	1987-2015
Catalytic Hydrotreating/Desulfurization	☐	16,023,206	16,882,897	16,585,262	16,860,188	17,094,540	17,323,829	1982-2015
Naphtha/Reformer Feed	☐	4,281,046	4,441,323	4,360,593	4,522,347	4,564,683	4,595,573	1987-2015
Gasoline	☐	2,394,882	2,578,782	2,519,082	2,582,182	2,639,235	2,727,384	2004-2015
Heavy Gas Oil	☐	2,796,798	2,809,298	2,877,138	2,895,938	2,949,638	2,972,438	1987-2015
Distillate Fuel Oil	☐	5,676,032	6,113,846	6,063,001	6,237,071	6,348,039	6,420,486	1987-2015
Kerosene/Jet Fuel	☐	1,339,150	1,484,850	1,489,750	1,544,850	1,539,250	1,563,850	2004-2015
Diesel Fuel	☐	3,647,211	3,917,611	3,981,411	4,108,581	4,251,931	4,297,181	2004-2015
Other Distillate	☐	689,671	711,385	591,840	583,640	556,855	559,455	2004-2015
Residual Fuel Oil/Other	☐	874,448	739,848	745,448	622,648	592,848	607,948	1987-2015
Residual Fuel Oil	☐	246,200	241,000	246,000	246,000	246,000	246,000	2004-2015
Other	☐	628,248	498,848	499,448	376,648	346,848	361,948	2004-2015

Fuels Solvent Deasphalting	☐	383,250	382,750	374,550	367,550	369,550	370,050	1987-2015
Downstream Charge Capacity (Barrels per Calendar Day)								
Catalytic Reforming	☐	3,378,841	3,346,457	3,246,874	3,405,017	3,419,407	3,392,641	2010-2015
Total Coking	☐	2,387,896	2,396,787	2,499,293	2,596,369	2,686,917	2,686,299	1987-2015
Catalytic Cracking - Fresh Feed	☐	5,675,830	5,794,214	5,611,191	5,681,643	5,616,015	5,583,169	1987-2015
Catalytic Hydro-Cracking	☐	1,653,115	1,687,745	1,706,540	1,887,024	2,034,689	2,123,431	1987-2015

Click on the source key icon to learn how to download series into Excel, or to embed a chart or map on your website.

- = No Data Reported; -- = Not Applicable; NA = Not Available; W = Withheld to avoid disclosure of individual company data.

Notes: Idle refineries represent refineries where distillation units were completely idle but not permanently shutdown as of January 1 of the year. See Definitions, Sources, and Notes link above for more information on this table.

Release Date: 6/19/2015
Next Release Date: 6/30/2016

U.S. Energy Information Administration

PETROLEUM & OTHER LIQUIDS

Production Capacity of Operable Petroleum Refineries

(Barrels per Stream Day, Except Where Noted)

Area: U.S. Period: Annual (as of January 1)

Show Data By: Product / Area	Graph / Clear	2010	2011	2012	2013	2014	2015	View History
Alkylate	☐	1,248,514	1,252,443	1,246,875	1,269,361	1,266,352	1,287,248	1982-2015
Aromatics	☐	270,820	297,311	296,911	317,511	296,511	316,411	1982-2015
Asphalt & Road Oil	☐	844,078	828,003	795,687	740,587	743,987	709,987	1982-2015
Isomers	☐	715,317	703,042	687,860	738,913	738,580	757,288	1982-2015
Isobutane	☐	221,374	213,449	191,467	191,760	192,960	189,346	1982-2015
Isopentane & Isohexane	☐	480,043	487,993	494,793	544,953	545,420	567,740	1982-2015
Isooctane	☐	13,500	1,600	1,600	200	200	200	2009-2015
Lubricants	☐	239,760	242,840	242,340	240,740	240,240	265,340	1982-2015
Marketable Petroleum Coke	☐	760,441	778,114	823,090	867,139	882,931	887,478	1982-2015
Hydrogen (Million Cu. Ft. per Day)	☐	2,985	3,082	3,215	3,047	3,094	3,102	1982-2015
Sulfur (Short Tons per Day)	☐	34,058	35,483	36,663	39,478	41,375	41,266	1987-2015

Click on the source key icon to learn how to download series into Excel, or to embed a chart or map on your website.

- = No Data Reported; -- = Not Applicable; NA = Not Available; W = Withheld to avoid disclosure of individual company data.

Notes: Hydrogen production capacity includes capacity of hydrogen plants on refinery grounds. See Definitions, Sources, and Notes link above for more information on this table.

Release Date: 6/19/2015
Next Release Date: 6/30/2016

APPENDIX A2.2

ATTACHMENT 2

eia U.S. Energy Information Administration

OMB No. 1905-0165
Expiration Date: 05/31/2016
Version No.:2013.01

FORM EIA-820
ANNUAL REFINERY REPORT
REPORT YEAR 2015

This report is **mandatory** under the Federal Energy Administration Act of 1974 (Public Law 93-275). Failure to comply may result in criminal fines, civil penalties and other sanctions as provided by law. For further information concerning sanctions and data protections see the provision on sanctions and the provision concerning the confidentiality of information in the instructions. **Title 18 USC 1001 makes it a criminal offense for any person knowingly and willingly makes to any Agency or Department of the United States any false, fictitious, or fraudulent statements as to any matter within its jurisdiction.**

PART 1. RESPONDENT IDENTIFICATION DATA

EIA ID NUMBER: 3938108101

If any Respondent Identification Data has changed since the last report, enter an "X" in the box: X

Company Name: PDV Midwest Refining, LLC
Doing Business As:
Site Name: CITGO Lemont Refinery
Terminal Control Number (TCN):

Physical Address (e.g., Street Address, Building Number, Floor, Suite):
135th Street and New Avenue
City Lemont **State:** IL **Zip:** 60439 -

Mailing Address of Contact (e.g., PO Box, RR): If the physical and mailing addresses are the same, only complete the physical address.

City **State:** **Zip:** -

Contact Name: REDACTED
Phone No.: **Ext:**
Fax No.:
Email address:

PART 2. SUBMISSION/RESUBMISSION INFORMATION

If this is a resubmission, enter an "X" in the box:

A completed form must be received by February 17th of the designated report year.

Forms may be submitted using one of the following methods:

Email: OOG.SURVEYS@eia.gov

Fax: (202) 586-1076

Secure File Transfer:
https://signon.eia.doe.gov/upload/noticeoog.jsp

Questions? **Call: 202-586-6281**

Comments: Explain any unusual or substantially different aspects of your current year's operations that affect the data reported. For example, note new processing units, major modifications or retirement of processing units, sale of refinery, etc. (To separate one comment from another, press ALT+ENTER)

REDACTED

U.S. Energy Information Administration

OMB No. 1905-0165
Expiration Date: 05/31/2016
Version No.:2013.01

FORM EIA-820
ANNUAL REFINERY REPORT
REPORT YEAR 2015

EIA ID NUMBER: 3938108101 **RESUBMISSION:**

PART 3. FUEL, ELECTRICITY, AND STEAM PURCHASED & CONSUMED AT THE REFINERY DURING 2014

Item	Code	Quantity Used As Fuel or Feedstock	Item	Code	Quantity Used as Fuel
Natural Gas (million standard cubic feet):		REDACTED	Coal (thousand short tons)	109	REDACTED
Fuel	105		Purchased Electricity (million kWh)	114	
Hydrogen Feedstock	107		Purchased Steam (million pounds)	113	

PART 4. REFINERY RECEIPTS OF CRUDE OIL BY METHOD OF TRANSPORTATION DURING 2014 (Thousand Barrels)

Source	Code	Pipelines	Tankers	Barges	Tank Cars	Trucks	Total[1]
Domestic	010	REDACTED					
Foreign	020						

[1] Total Domestic and Total Foreign Refinery Receipts (Codes 010 and 020) **must equal the sum** of the comparable refinery receipts on the Form EIA-810, "Monthly Refinery Report," filed for January through December 2014.

PART 5. ATMOSPHERIC CRUDE OIL DISTILLATION CAPACITY AS OF JANUARY 1

Atmospheric Crude Oil Distillation Capacity	Code	Barrel per Calendar Day[2]	Barrels per Stream Day
2015: Operating	399	175940	185200
Idle	400		
Total Operable	401	175940	185200
2016: Operable	501		185200

[2] Barrels per Calendar Day Operating, Idle and Total Operable Capacity (Codes 399, 400 and 401) **must match** the comparable capacity numbers reported on the Form EIA-810, "Monthly Refinery Report," filed for January 2015.

U.S. Energy Information Administration

OMB No. 1905-0165
Expiration Date: 05/31/2016
Version No.:2013.01

FORM EIA-820
ANNUAL REFINERY REPORT
REPORT YEAR 2015

EIA ID NUMBER: 3938108101 **RESUBMISSION:**

PART 6. DOWNSTREAM CHARGE CAPACITY AS OF JANUARY 1

Downstream Charge Capacity	Code	2015 Barrels per Calendar Day	2015 Barrels per Stream Day	2016 Barrels per Stream Day
Vacuum Distillation	402		77200	77200
Thermal Cracking:				
Visbreaking	403			
Fluid Coking (incl. Flexicoking)	404			
Delayed Coking	405	36360	40400	40400
Other (incl. Gas Oil)	406			
Catalytic Cracking:				
Fresh Feed	407	62100	69000	69000
Recycled	408			
Catalytic Hydrocracking:				
Distillate	439			
Gas Oil	440			
Residual	441			
Desulfurization (including Catalytic Hydrotreating):				
Naphtha/Reformer Feed	426		110200	110200
Gasoline	420			
Kerosene and Jet	421		13000	13000
Diesel Fuel	422		94200	94200
Other Distillate	423			
Residual	424			
Heavy Gas Oil	413			
Other	425		6800	6800
Catalytic Reforming:				
Low Pressure	430			
High Pressure	431	31050	34500	34500
Fuels Solvent Deasphalting	432			

PART 7. PRODUCTION CAPACITY AS OF JANUARY 1 (Barrels per Stream Day, Except Where Noted)

Production Capacity	Code	2015 Barrels per Stream Day	2016 Barrels per Stream Day
Alkylates	415	21000	21000
Aromatics	437	9400	9400
Asphalt and Road Oil	931		
Isobutane (C4)	644		
Isopentane (C5), Isohexane (C6)	438		
Isooctane (C8)	635		
Lubricants	854		
Petroleum Coke - Marketable	021	12000	12000
Hydrogen (million cubic ft. per day)	091	12	12
Sulfur (short tons per day)	435	487	487

APPENDIX A2.2

ATTACHMENT 3

2014 Worldwide Refining Survey

Leena Koottungal
Survey Editor/News Writer

All figures in barrels per calendar day (b/cd)

All figures are as of January 1, 2015

LEGEND
Numbers identify processes in table

Coking
1. Fluid coking
2. Delayed coking
3. Other

Thermal process
1. Thermal cracking
2. Visbreaking

Catalytic cracking
1. Fluid
2. Other

Catalytic reforming
1. Semiregenerative
2. Cyclic
3. Continuous regen.
4. Other

Catalytic hydrocracking
1. Distillate upgrading
2. Residual upgrading
3. Lube oil manufacturing
4. Other
c. Conventional (high pressure) hydrocracking: (>100 barg or 1,450 psig)
m. Mild to moderate hydrocracking (<100 barg or 1,450 psig)

Catalytic hydrotreating
1. Pretreatment of cat reformer feeds
2. Other naphtha desulfurization
3. Naphtha aromatics saturation
4. Kerosine/jet desulfurization
5. Diesel desulfurization
6. Distillate aromatics saturation
7. Other distillates
8. Pretreatment of cat cracker feeds
9. Other heavy gas oil hydrotreating
10. Resid hydrotreating
11. Lube oil polishing
12. Post hydrotreating of FCC naphtha
13. Other

Alkylation
1. Sulfuric acid
2. Hydrofluoric acid

Polymerization/Dimerization
1. Polymerization
2. Dimerization

Aromatics
1. BTX
2. Hydrodealkylation
3. Cyclohexane
4. Cumene

Isomerization
1. C_4 feed
2. C_5 feed
3. C_5 and C_6 feed

Oxygenates
1. MTBE
2. ETBE
3. TAME
4. Other

Hydrogen
Production:
1. Steam methane reforming
2. Steam naphtha reforming
3. Partial oxidation
a. Third-party plant
Recovery:
4. Pressure swing adsorption
5. Cryogenic
6. Membrane
7. Other

NOTES

A Previously listed as Interoil
B Previously listed as Lion Oil Co.
C Previously listed as US Oil & Refining Co.
D Idle
E Previously listed as North Atlantic Refining Ltd.
F New
G Previously listed as Northern Tier Energy LLC
H Previously listed as ERG Raffinerie Mediterranee North
I Previously listed as Shell Refining (Australia) Pty. Ltd.

Capacity definitions:
Capacity expressed in barrels per calendar day (b/cd) is the maximum number of barrels of input that can be processed during a 24-hour period, after making allowances for the following: (a) Types and grades of inputs to be processed, (b) Types and grades of products to be manufactured, (c) Environmental constraints associated with refinery operations, (d) Scheduled downtime such as mechanical problems, repairs, and slowdown. Capacity expressed in barrels per stream day (b/sd) is the amount a unit can process when running at full capacity under optimal feedstock and product slate conditions. An asterisk (*) beside a refinery location indicates that the number has been converted from b/sd to b/cd using the conversion factor 0.95 for crude and vacuum distillation units and 0.9 for all downstream cracking and conversion units.

Hydrogen:

Hydrogen volumes presented here represent either generation or upgrading to 90+% purity.

Catalytic reforming:
1. Semiregenerative reforming is characterized by shutdown of the reforming unit at specified intervals, or at the operators's convenience, for in situ catalyst regeneration.
2. Cyclic regeneration reforming is characterized by continuous or continual regeneration of catalyst in situ in any one of several reactors that can be isolated from and returned to the reforming operation. This is accomplished without changing feed rate or octane.
3. Continuous regeneration reforming is characterized by the continuous addition of this regenerated catalyst to the reactor.
4. "Other" includes nonregenerative reforming (catalyst is replaced by fresh catalyst) and moving-bed catalyst systems.

REFINERY REMOVALS

Name	Location	Country	Crude b/cd	Reason
Caltex Australia Ltd.	Kurnell	Australia	135,000	Converting to fuel import terminal
Flint Hills Resources	North Pole	Alaska	132,050	Costs, contamination
Gulf Atlantic Operations	Alabama	US	20,000	
Italiana Energia E Servizi SPA (c)	Mantova	Italy	69,420	Converting to products logistics hub
LyondellBasell Industries	Berre l'Etang	France	105,000	Converting to terminal
Murco Petroleum Ltd.	Milford Haven	Wales, UK	135,000	Converting to terminal
Pertamina	Pangkalan Brandan, North Sumatra	Indonesia	4,750	

Worldwide Refineries—Capacities as of Jan. 1, 2015

Country	No. of refineries	Crude	Charge capacity, b/cd								Production capacity, b/cd								
			Vacuum distillation	Coking	Thermal operations	Catalytic cracking	Catalytic reforming	Catalytic hydrocracking	Catalytic hydrotreating	Alkylation	Pol./Bim.	Aromatics	Isomerization	Lubes	Oxygenates	Hydrogen (MMcfd)	Coke (tonnes per day)	Sulfur	Asphalt
Albania	2	30,000	10,500	12,000	—	—	3,500	—	17,400	—	—	600	—	700	—	6.5	700	60	—
Algeria	5	493,000	10,894	—	—	—	88,900	—	81,950	—	—	—	—	—	—	—	—	—	—
Angola	1	39,000	2,500	—	—	—	1,900	—	6,600	—	—	—	—	—	—	—	—	—	950
Argentina	10	611,175	248,365	91,233	31,420	134,910	56,630	17,000	175,600	4,300	520	—	12,700	7,290	2,600	19.0	3,810	108	12,700
Australia	5	541,148	146,865	—	—	155,843	120,053	17,557	402,360	15,869	5,909	1,000	34,777	—	—	68.9	—	140	5,000
Austria	1	203,892	78,805	—	12,580	28,281	22,525	57,752	134,627	—	—	—	22,195	—	3,278	62	—	180	1,130
Azerbaijan	2	398,978	137,200	38,529	—	57,750	24,466	—	67,492	930	—	—	—	16,200	—	—	1,400	—	5,000
Bahrain	1	253,650	198,170	—	21,600	35,100	13,500	54,000	76,500	—	3,330	—	—	—	—	164.0	—	340	8,730
Bangladesh	1	33,000	4,000	—	10,000	—	1,800	1,200	2,000	—	—	—	—	—	—	2.0	—	—	—
Belarus	2	493,323	105,800	—	60,000	44,000	92,000	30,000	262,100	—	—	2,785	4,500	3,760	—	22.8	—	85	9,630
Belgium	4	727,750	240,502	—	26,448	130,025	104,318	—	699,785	16,441	—	—	0	—	4,183	99.0	—	971	26,500
Bolivia	2	52,350	2,200	—	—	—	12,100	—	6,899	—	—	—	—	—	—	14.0	—	—	—
Bosnia	1	240,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Brazil	13	1,917,325	810,140	115,319	9,800	505,287	24,386	—	284,446	6,290	—	—	—	20,009	6,460	126.0	6,974	771	27,100
Brunei	1	8,600	—	—	—	—	5,700	—	—	—	—	—	—	—	—	—	—	—	—
Bulgaria	1	115,240	49,900	—	20,600	23,300	4,060	—	64,200	2,600	—	2,000	—	—	790	10.3	—	63	1,500
Cameroon	1	37,000	—	—	—	—	6,500	—	16,140	—	—	—	—	—	—	—	—	—	—
Canada	17	2,007,500	645,930	60,100	122,000	491,318	354,447	234,478	1,396,304	70,203	19,240	62,689	53,590	3,000	—	405.0	2,635	1,889	66,000
Chile	3	233,150	85,050	13,860	13,860	50,540	26,460	50,400	—	910	—	—	8,510	—	1,580	—	656	90	—
China	56	7,542,000	407,448	240,000	—	719,753	277,813	337,000	578,000	18,700	—	55,600	—	18,000	2,100	178	4,020	1,526	—
China, Taiwan	4	1,310,000	248,500	51,000	—	217,900	115,000	25,000	672,500	14,200	—	14,000	26,000	15,300	11,266	341.0	4,522	3,745	15,270
Colombia	5	290,850	141,000	—	52,000	90,000	—	—	19,800	2,100	2,100	2,200	—	1,400	—	18.0	—	—	—
Congo, Republic of	1	21,000	8,000	—	—	—	2,000	2,000	3,500	—	—	—	—	—	—	—	—	—	—
Costa Rica	1	24,000	600	—	6,500	—	1,200	—	2,000	—	—	—	—	—	—	—	—	—	—
Croatia	3	250,317	87,040	5,000	23,526	51,002	49,368	12,264	68,256	—	—	9,438	5,431	470	—	—	200	123	—
Cuba	4	301,400	75,700	—	—	14,700	20,000	—	55,850	—	—	—	—	—	—	5.0	—	—	1,080
Czech Republic	3	194,000	78,870	—	14,000	24,000	27,470	36,000	103,780	—	—	660	7,210	2,180	2,160	112.0	—	144	10,880
Denmark	2	169,400	22,000	—	68,000	—	21,990	—	42,760	—	—	—	6,400	—	—	—	—	—	8,000
Dominican Republic	2	50,000	—	—	—	—	8,200	—	20,813	—	—	—	—	—	—	0.6	—	—	—
Ecuador	3	176,000	45,300	—	31,500	18,000	12,800	—	24,500	—	—	—	—	—	—	—	—	—	—
Egypt	9	726,250	95,200	39,270	—	—	62,240	33,500	207,802	9,000	—	1,584	10,700	4,441	—	62.5	1,601	290	4,623
El Salvador	1	22,000	4,000	—	—	—	3,000	—	15,500	—	—	—	—	—	—	—	—	—	—
Eritrea	1	14,564	2,219	—	—	—	1,465	—	2,742	—	—	—	—	—	—	—	—	—	—
Finland	2	260,575	146,085	—	34,420	56,690	50,060	90,110	298,325	7,750	600	—	—	5,280	5,730	160.0	—	540	6,800
France	9	1,405,913	551,257	—	110,996	245,382	194,867	76,740	1,105,393	27,969	—	2,887	25,800	29,590	2,702	132.0	—	1,358	19,272
Gabon	1	24,000	—	—	9,220	—	1,400	—	9,430	—	—	—	—	—	—	—	—	—	—
Germany	15	2,187,899	1,089,483	104,260	308,375	349,847	401,702	191,719	1,968,510	30,849	8,301	68,245	94,226	14,220	13,172	682.6	3,863	2,917	58,980
Ghana	1	45,000	—	—	—	14,000	65,000	—	—	—	—	—	—	—	—	—	—	—	—
Greece	4	423,000	152,000	—	49,000	75,550	49,200	43,900	361,635	2,400	1,720	9,100	23,650	3,500	3,940	23.5	—	519	16,950
Hungary	1	161,000	77,500	16,900	14,000	24,000	29,600	—	120,700	3,300	—	12,000	3,500	6,100	1,200	76.2	600	226	6,300
India	23	4,642,761	811,986	169,625	72,600	508,405	51,673	165,600	203,638	85,000	—	6,619	—	8,240	—	111.7	6,480	290	33,677
Indonesia	7	1,007,075	265,980	32,580	58,860	101,450	92,970	99,720	23,430	16,200	—	—	—	—	—	—	—	—	—
Iran	8	1,167,000	440,400	—	198,800	35,000	135,100	106,500	180,160	—	—	—	—	9,200	—	216.0	—	400	26,800
Iraq	9	637,500	145,000	—	—	—	88,000	74,241	292,000	—	—	—	2,500	9,420	—	64.0	—	—	38,738
Ireland	1	71,000	—	—	—	—	11,000	—	53,600	—	—	—	7,600	—	—	10.3	—	10	—

Worldwide Refineries—Capacities as of Jan.1, 2015

Country	No. of refineries	Charge capacity, b/cd							Production capacity, b/cd									
		Crude	Vacuum distillation	Coking	Thermal operations	Catalytic cracking	Catalytic reforming	Cat hydro-cracking	Cat hydro-treating	Alkylation	Pol./Dim.	Aromatics	Isomerization	Lubes	Oxygenates	Hydrogen (MMcf/d)	Coke (tonnes per day)	Sulfur	Asphalt
Israel	2	220,000	118,000	—	66,000	49,500	26,500	—	96,000	—	2,200	—	—	—	750	—	—	—	2,700
Italy	14	2,046,309	750,317	45,000	328,984	321,000	239,169	284,800	1,085,083	40,330	1,500	13,400	92,145	24,000	11,720	300.2	2,046	1,650	12,206
Ivory Coast	1	63,990	23,990	—	—	—	12,330	14,480	27,310	—	—	—	—	—	—	—	—	—	4,330
Jamaica	1	36,000	1,800	—	—	—	3,700	—	23,800	—	—	—	—	—	—	—	—	—	850
Japan	28	4,466,640	1,619,340	123,400	20,000	946,150	763,235	181,690	4,647,210	65,690	5,760	199,157	22,330	34,013	2,978	1,425.4	1,863	9,029	82,370
Jordan	1	90,400	21,500	—	—	4,000	10,900	5,220	17,300	—	—	—	—	—	—	16.0	—	—	4,250
Kazakhstan	3	340,000	121,037	24,997	52,071	38,356	51,586	—	177,890	—	—	—	—	—	—	21.5	1,000	124	8,550
Kenya	1	90,000	1,700	—	—	—	8,260	—	36,000	—	—	—	—	—	—	—	—	—	1,000
Kuwait	3	936,000	327,750	72,000	—	36,000	46,620	115,650	588,780	5,616	—	—	—	—	6,561	741.6	2,800	4,200	—
Kyrgyzstan	1	10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Liberia	1	15,000	1,000	—	—	—	2,000	—	3,300	—	—	—	—	—	—	—	—	—	200
Libya	5	378,000	3,775	—	—	—	20,250	—	43,330	—	—	—	—	635	—	—	—	—	3,432
Lithuania	1	190,000	89,300	—	28,800	43,200	45,900	—	153,900	—	7,200	—	18,900	—	2,700	25.0	—	320	—
Macedonia	1	50,000	—	—	—	—	10,860	—	22,050	—	—	—	4,390	—	—	—	—	—	—
Malaysia	7	526,832	101,000	24,000	—	39,000	75,070	36,000	216,800	—	—	—	10,800	—	—	147.2	2,245	460	8,000
Martinique	1	17,329	—	—	—	—	2,862	—	14,269	—	—	—	—	—	—	—	—	—	—
Mexico	6	1,540,000	754,000	191,000	—	380,500	279,300	—	926,050	128,456	—	17,000	—	16,600	15,490	183.0	—	—	58,000
Morocco	2	154,901	24,921	—	—	5,040	24,359	—	35,539	—	—	—	—	2,460	—	—	—	—	5,630
Myanmar	3	57,000	4,000	5,200	—	—	—	—	—	—	—	—	—	500	—	—	120	—	—
Netherlands	6	1,194,573	711,604	41,500	91,404	103,731	148,510	197,985	817,899	15,450	—	36,468	8,730	11,600	2,715	358.9	—	1,673	16,500
Netherlands Antilles	1	320,000	195,000	—	80,000	50,000	20,000	—	119,500	9,000	2,000	—	—	12,000	—	54.6	—	300	26,000
New Zealand	1	107,000	38,270	—	—	—	25,840	30,000	104,490	—	—	—	—	—	—	60.0	—	111	5,490
Nicaragua	1	19,950	1,425	—	—	—	2,700	—	14,085	—	—	—	—	—	—	—	—	—	378
Nigeria	4	445,000	124,490	—	—	82,700	70,070	—	109,231	9,870	2,274	291	3,610	3,878	—	—	—	—	14,850
North Korea	2	71,000	—	—	—	—	7,300	—	7,400	—	—	1,000	—	—	1,000	—	—	—	—
Norway	2	319,000	—	23,000	32,000	55,000	34,900	—	126,000	—	11,000	—	3,840	—	—	—	610	20	—
Oman	1	85,000	—	—	—	—	16,000	—	21,000	—	—	—	—	—	—	—	—	—	—
Pakistan	6	182,196	19,815	—	—	—	11,650	—	54,870	—	—	1,400	—	3,800	—	—	—	—	4,200
Papua New Guinea	1	32,000	—	—	—	—	3,500	—	3,500	—	—	—	—	—	—	—	—	—	—
Paraguay	1	7,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Peru	6	192,950	94,000	—	25,700	33,500	2,100	—	2,800	—	—	—	—	—	—	—	—	—	3,800
Philippines	3	276,000	61,000	—	31,000	19,000	51,000	—	184,990	—	—	—	10,000	3,700	—	37.0	—	70	1,200
Poland	4	492,950	265,123	—	—	32,985	67,514	145,908	259,507	3,372	—	10,262	23,194	17,796	2,514	167.0	—	560	33,371
Portugal	2	304,172	87,785	—	36,540	40,500	50,182	9,180	201,537	5,400	—	17,276	—	—	—	85.3	—	252	—
Puerto Rico	1	73,000	34,000	—	—	—	21,000	20,000	21,000	—	—	—	—	—	—	20.0	—	34	—
Qatar	2	338,700	—	—	—	60,000	29,400	20,000	39,350	—	—	—	25,000	—	—	—	—	—	—
Romania	9	461,789	247,593	74,005	26,300	103,579	49,154	—	272,022	2,300	—	12,417	7,213	9,614	2,996	38.9	2,935	156	10,441
Russia	40	5,499,993	2,091,314	94,369	382,593	330,817	748,733	122,256	2,170,966	10,006	1,729	54,697	27,469	82,842	7,175	93.3	3,720	726	210,545
Saudi Arabia	8	2,496,000	445,950	—	191,100	103,600	240,500	135,000	493,460	31,500	—	6,500	33,000	—	3,700	190.7	—	—	—
Senegal	1	25,030	7,160	—	—	—	1,590	—	1,930	—	—	—	—	—	—	—	—	—	—
Serbia & Montenegro	2	214,826	50,583	—	20,340	18,950	18,822	—	50,910	3,070	—	200	—	300	—	0.5	—	59	2,400
Sierra Leone	1	10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Singapore	3	1,344,500	342,500	—	145,210	80,000	142,470	147,500	742,000	9,000	—	—	—	52,500	1,400	297.0	—	963	39,500
Slovakia	1	115,000	55,000	—	—	18,000	21,000	42,000	87,800	4,500	—	9,250	6,000	2,000	1,500	89.6	—	270	2,600
Slovenia	1	13,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worldwide Refineries—Capacities as of Jan.1, 2015

Country	No. of refineries	Charge capacity, b/cd: Crude	Vacuum distillation	Coking	Thermal operations	Catalytic cracking	Catalytic reforming	Cat hydro-cracking	Cat hydro-treating	Production capacity, b/cd: Alkylation	Pol./Dim.	Aromatics	Isomerization	Lubes	Oxygenates	Hydrogen (MMcf/d)	Coke (tonnes per day)	Sulfur (tonnes per day)	Asphalt
South Africa	4	503,000	201,375	26,800	60,000	108,640	77,142	11,774	227,772	9,595	4,940	6,900	12,223	8,000	—	50.2	240	607	7,100
South Korea	6	2,968,500	515,650	19,000	—	367,000	394,000	339,000	1,543,380	48,700	12,800	167,300	—	71,300	15,700	1,472.5	1,200	5,280	86,327
Spain	9	1,427,500	414,245	61,100	149,200	191,300	196,750	131,500	827,630	16,916	—	25,800	36,000	9,600	9,600	300.1	3,565	1,762	26,600
Sri Lanka	1	50,000	24,000	—	12,500	—	5,300	—	19,295	—	—	—	—	—	—	—	—	—	1,000
Sudan	3	121,700	—	—	—	—	1,900	—	8,100	—	—	—	—	—	—	—	—	—	—
Suriname	1	7,000	7,000	—	2,800	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sweden	5	437,000	135,600	—	66,800	29,700	70,660	48,600	268,540	—	3,420	—	28,530	—	—	53.8	—	334	27,460
Switzerland	1	72,000	—	—	—	20,400	12,000	—	33,200	—	3,800	—	6,400	—	—	28.0	—	—	—
Syria	2	239,865	63,135	18,200	22,689	—	31,242	26,410	80,886	—	—	—	11,493	—	—	27.0	500	150	2,223
Tanzania	1	14,900	—	—	2,500	—	2,500	—	4,400	—	—	—	—	—	—	—	—	—	—
Thailand	4	645,000	201,500	—	16,983	90,490	96,770	43,073	466,917	—	—	—	19,596	—	—	33.5	—	420	2,500
Trinidad & Tobago	1	168,000	119,200	—	24,000	24,000	18,000	45,000	41,000	1,200	1,580	—	—	—	1,000	30.0	—	100	—
Tunisia	1	34,000	—	—	—	—	3,300	—	—	—	—	—	—	—	—	—	—	—	—
Turkey	6	663,000	201,767	—	23,590	28,935	65,662	53,820	265,005	—	—	—	14,055	5,870	—	217.5	180	315	20,216
Turkmenistan	2	236,970	91,645	28,568	—	15,151	52,540	—	63,500	1,028	1,223	—	—	2,000	—	—	1,040	—	415
Ukraine	6	879,759	343,002	22,149	17,291	70,100	146,735	7,200	315,013	—	—	3,464	—	500	125	21.5	705	176	12,785
United Arab Emirates	5	773,250	92,870	—	—	34,350	25,875	31,050	158,627	1,140	1,900	—	—	—	—	58.8	—	57	700
United Kingdom	8	1,401,705	682,963	67,850	101,571	347,867	283,866	36,000	1,070,990	67,033	9,500	14,590	85,798	13,999	3,063	133.0	2,400	752	26,000
United States	123	18,024,750	8,068,197	2,692,625	33,520	5,569,316	3,486,029	1,905,050	14,507,177	1,158,072	69,770	344,289	662,793	222,800	29,650	4,271.8	137,666	34,332	488,117
Uruguay	1	50,000	25,000	—	7,000	12,000	12,000	—	23,000	—	—	—	6,000	—	—	—	—	—	—
Uzbekistan	3	224,271	45,671	17,667	9,585	—	23,487	—	30,804	—	—	—	—	9,397	—	—	650	—	4,151
Venezuela	5	1,282,100	585,780	144,900	—	231,800	49,500	—	389,700	65,800	—	2,000	20,700	12,020	12,830	147.8	5,200	1,471	36,000
Vietnam	1	140,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Yemen	2	140,000	10,500	—	—	—	14,500	—	—	—	—	—	—	—	—	—	—	—	3,000
Zambia	1	23,750	2,280	—	—	—	5,320	—	8,550	—	—	—	—	—	—	—	—	—	5,527
Total	643	87,958,735	28,339,811	4,807,005	3,488,176	14,338,190	11,218,277	5,942,828	44,503,370	2,048,055	184,316	1,195,069	1,549,497	812,024	196,328	14,391	208,146	83,518	1,724,524

APPENDIX A2.2

ATTACHMENT 4

WORLDWIDE REFINING

Company and refinery location	Charge capacity, b/cd: Crude	Vacuum distillation	Coking	Thermal operations	Catalytic cracking	Catalytic reforming	Catalytic hydrocracking	Catalytic hydrotreating	Production capacity, b/cd: Alkylation	Pol./Dim.	Aromatics	Isomerization	Lubes	Oxygenates	Hydrogen (MMcfd)	Coke (t/d)	Sulfur (t/d)	Asphalt
								[5]11,500 [8]37,000 [12]44,000										
Valero Energy Corp.—Wilmington	135,000	46,000	[1]28,000	—	[1]54,000	[3]17,500	—	[1]32,000 [5]30,000 [8]62,500 [12]15,000	[2]14,500	—	—	[1]10,200	—	—	[a 1]50.0	1,700	250	—
Total	**2,032,500**	**1,029,700**	**398,650**	**10,000**	**567,870**	**367,000**	**439,250**	**1,489,490**	**161,500**	**9,070**	**—**		**20,000**	**—**	**1,125.0**	**18,659**	**3,966**	**61,500**
COLORADO																		
Suncor Energy —Commerce City	98,000	34,200	—	—	[1]30,225	[1]21,900	—	[1]21,900 [4]11,700 [5]21,200 [8]28,000 [13]5,000	—	[1]3,540	—	—	—	—	26	—	94	10,500
Total	**98,000**	**34,200**	**—**	**—**	**30,225**	**21,900**	**—**	**87,800**	**—**	**3,540**	**—**	**—**	**—**	**—**	**26.0**	**—**	**94**	**10,500**
DELAWARE																		
PBF Energy Co. LLC—Delaware City	190,000	102,000	—	—	[1]82,000	[3]43,000	[c 2]18,000	[1]45,000 [4]15,000 [5]34,000 [12]36,000	[1]11,000	[1]5,040	[1]1,260	[1]6,000	—	—	[1]40.0 [4]22.0	2,200	532	—
Total	**190,000**	**102,000**	**—**	**—**	**82,000**	**43,000**	**18,000**	**130,000**	**11,000**	**5,040**	**1,260**	**6,000**	**—**	**—**	**62.0**	**2,200**	**532**	**—**
HAWAII																		
Chevron Corp.—Kapolei	54,000	30,000	—	—	[1]21,000	—	—	[13]3,000	[1]4,000	[2]1,000	—	[1]1,200	—	—	[1]2.0	—	—	1,300
Par Petroleum—Kapolei	94,000	36,000	—	[2]11,000	—	[1]13,000	[c 1]18,000	[1]13,000	—	—	—	—	—	—	[a 2]18.0	—	34	1,000
Total	**148,000**	**66,000**	**—**	**11,000**	**21,000**	**13,000**	**18,000**	**16,000**	**4,000**	**1,000**	**—**	**1,200**	**—**	**—**	**20.0**	**—**	**34.0**	**2,300.0**
ILLINOIS																		
Citgo Petroleum Corp.*—Lemont	167,000	71,250	[2]36,000	—	[1]60,300	[1]28,080	—	[1]44,100 [3]3,960 [5]31,950 [7]13,500 [12]9,900	[2]18,900	—	[1]6,030	—	—	—	[1]4.5	2,102	344	—
ExxonMobil Refining & Supply Co.—Joliet	238,000	121,500	[2]56,500	—	[1]94,500	[3]50,000	—	[1]91,500 [2]21,000 [7]83,500 [12]56,000	[2]28,000	—	—	—	—	—	—	3,350	580	14,500
Marathon Petroleum Co. LP—Robinson	212,000	67,900	[2]27,600	—	[1]51,800	[2]36,600 [3]39,900	[1]29,000	[1]63,200 [5]75,100	[2]11,900	—	[1]3,100	[3]15,200	—	—	—	1,294	175	—

APPENDIX A2.3

Equations for Calculating the 365-day Rolling Sum Emissions of Volatile Organic Compounds from the C-4 (Coker) Flare

For the purpose of demonstrating compliance with the Volatile Organic Compound ("VOC") emissions limit for the C-4 Flare ("Coker Flare") in Paragraph A22 of this Consent Decree, the block sum of Coker Flare VOC emissions shall be calculated each day in accordance with Steps 1 through 5 below, and the 365-day rolling sum, rolled daily, shall be calculated using data from the prior 365 calendar days, in accordance with Step 6 below. All abbreviations, constants, and variables are defined in the "Key to the Abbreviations" at the end of this Appendix.

Step 1: Determine Mass Flow Rates of Gas Streams

CITGO shall determine the mass flow rates of Vent Gas and Assist Steam, in pounds over a 15-minute block average basis (lb/15 min). The 15-minute block average mass 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 CITGO complies with Paragraph A4 by using a mass flow monitor: Use the direct output (measured value) of the monitoring system(s) (in lb) to then calculate the average mass flow rate of that gas stream for the 15-minute block period.

For any gas streams for which CITGO complies with Paragraph A4 by using a monitoring system that directly records volumetric flow rate: Equation 1 shall be used to determine the mass flow rate of Vent Gas or Assist Steam by converting volumetric flow rate at standard conditions (i.e., a temperature of 20 °C (68 °F) and a pressure of 1 atmosphere) to mass flow rate. Equation 1 uses the molecular weight of the gas stream as an input to the equation; therefore, if CITGO elects to use a volumetric flow monitor to determine mass flow rate of Vent Gas, CITGO must collect compositional analysis data for such Vent Gas in accordance with the method set forth in Paragraph A7.a or A7.b. For natural gas used as Purge Gas and Sweep Gas, use a molecular weight of 17 pounds per pound-mole, based on the 2013 average of natural gas analyses by the Lemont Refinery Laboratory. For Assist Steam, use a molecular weight of 18 pounds per pound-mole. The converted mass flow rates from Equation 1 shall then be used to calculate the average mass flow rate of that gas stream for the 15-minute block period.

$$\dot{m}_i = \frac{Q_i * MWt}{385.3} \qquad \textit{Equation 1}$$

For gas streams for which the molecular weight of the gas is known and for which CITGO complies with Paragraph A4 by using continuous pressure/temperature monitoring system(s): Use appropriate engineering calculations to determine the average mass flow rate of that gas stream for the 15-minute block period. 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 Paragraph A7.a or A7.b. For natural gas used as Purge Gas and Sweep Gas, use a molecular weight of 17 pounds per pound-mole. For Assist Steam, use a molecular weight of 18 pounds per pound-mole.

APPENDIX A2.3

Step 2: Calculate the Steam Mass Flow Rate to Vent Gas Mass Flow Rate Ratio (S/VG_{mass})

CITGO shall use Equation 2 to determine the 15-minute block average S/VG_{mass} based on the 15-minute block average Vent Gas and Assist Steam flow rates.

$$S/VG_{mass} = \frac{\dot{m}_s}{\dot{m}_{vg}} \qquad \textit{Equation 2}$$

Step 3: Calculate the Combustion Efficiency (CE)

For periods when the Vent Gas volumetric flow rate is less than 1 mmcfd, the Vent Gas is expected to be comparable to natural gas used as Purge Gas and Sweep Gas, and CITGO shall determine the CE by Step 3a. For periods when the Vent Gas volumetric flow rate is greater than or equal to 1 mmcfd, the Vent Gas is expected to be comparable to the hydrogen plant design relief case mixture of Pressure Swing Absorber ("PSA") off-gas and natural gas, and CITGO shall determine the CE by Step 3b.

Step 3a: CE Calculation Method for Vent Gas Flow Rates Less than 1 mmcfd

Equation 3 shall be used to determine the 15-minute block average CE based on the 15-minute block average S/VG_{mass}.

$$CE = \frac{130.17 - 13.15 * S/VG_{mass}}{131.17 - 12.29 * S/VG_{mass}} \qquad \textit{Equation 3}$$

CE is equal to zero for S/VG_{mass} values greater than or equal to 9.9 lb/lb. Equation 3 assumes a Net Heating Value of the Vent Gas (NHV_{vg}) of 909 Btu/scf for natural gas used as Purge Gas and Sweep Gas, based on the 2013 average of natural gas analyses by the Lemont Refinery Laboratory.

Step 3b: CE Calculation Method for Vent Gas Flow Rates Greater than or Equal to 1 mmcfd

Equation 4 shall be used to determine the 15-minute block average CE based on the 15-minute block average S/VG_{mass}.

$$CE = \frac{144.24 - 8.66 * S/VG_{mass}}{145.24 - 8.09 * S/VG_{mass}} \qquad \textit{Equation 4}$$

CE is equal to zero for S/VG_{mass} values greater than or equal to 16.7 lb/lb. Equation 4 assumes an NHV_{vg} of 997 Btu/scf for a mixture of PSA off-gas from the hydrogen plant and natural gas used as Purge Gas and Sweep Gas (NHV_{vg} adjusted for hydrogen content).

APPENDIX A2.3

Step 4: Calculate the 15-Minute Block Sum VOC Emissions

CITGO shall use Equation 5 to determine the 15-minute block sum VOC emissions for each 15-minute period "j".

$$(\dot{m}_{VOC-Emit})_j = \dot{m}_{vg} * w_{VOC} * (1 - CE) \qquad \textit{Equation 5}$$

For Vent Gas flow rates less than 1 mmcfd, the VOC mass fraction (w_{voc}) is 0.009 for natural gas used as Purge Gas and Sweep Gas, based on the 2013 average of natural gas analyses by the Lemont Refinery Laboratory. For Vent Gas flow rates greater than or equal to 1 mmcfd, w_{voc} is 0.0009 for a mixture of PSA off-gas from the hydrogen plant and natural gas used as Purge Gas and Sweep Gas.

Step 5: Calculate the Calendar Day Block Sum VOC Emissions

CITGO shall use Equation 6 to determine the block sum mass of VOC emissions from the C-4 Flare during calendar day "d" as the sum of the 15-minute block sum VOC emissions calculated for each 15-minute period "j" during that calendar day.

$$(\dot{m}_{VOC-Emit})_d = \sum_{j=1}^{96} (\dot{m}_{VOC-Emit})_j \qquad \textit{Equation 6}$$

Step 6: Calculate the Tons per Year of VOC Emissions ($TPY_{VOC-Emit}$)

The results of Equation 6 for each day "d" of the 365-day rolling sum period are summed and converted to tons per year as per Equation 7 below. The result of Equation 7 is used to demonstrate compliance with the C-4 Flare VOC limit in the consent decree.

$$TPY_{VOC-Emit} = \frac{\sum_{d=1}^{365} (\dot{m}_{VOC-emit})_d}{2000} \qquad \textit{Equation 7}$$

Key to the Abbreviations:

$385.3 = conversion\ factor\ (scf/lb\text{-}mol)$
$CE = combustion\ efficiency\ (fraction)$
$MWt = molecular\ weight\ of\ the\ gas\ at\ the\ flow\ monitoring\ location\ (lb/lb-mol)$
$\dot{m}_i = mass\ flow\ rate\ of\ gas\ stream\ i\ (lb/time)$
$\dot{m}_s = mass\ flow\ rate\ of\ steam\ during\ the\ 15-minute\ block\ period\ (lb/15\ min.)$
$\dot{m}_{vg} = mass\ flow\ rate\ of\ vent\ gas\ during\ the\ 15-minute\ block\ period\ (lb/15\ min.)$
$(\dot{m}_{VOC-Emit})_j = VOC\ mass\ emissions\ during\ the\ 15-minute\ block\ period\ "j"\ (lb/15\ min.)$
$(\dot{m}_{VOC-Emit})_d = VOC\ mass\ emissions\ during\ the\ calendar\ day\ "d"\ (lb/day)$
$NHV_{vg} = Net\ Heating\ Value\ of\ Vent\ Gas\ (BTU/scf)$
$Q_i = volumetric\ flow\ rate\ of\ gas\ stream\ i\ (scf/time)$
$S/VG_{mass} = steam\ mass\ flow\ rate\ to\ vent\ gas\ mass\ flow\ rate\ ratio\ (lb/lb)$
$TPY_{VOC-Emit} = 365-day\ rolling\ total\ VOC\ mass\ emissions\ \left(\frac{ton}{year}\right)$
$w_{VOC} = concentration\ of\ VOC\ in\ Vent\ Gas\ (mass\ fraction)$

APPENDIX A2.4

Equations for Calculating the 365-day Rolling Sum Emissions of Volatile Organic Compounds from the C-5 (Alky) Flare

For the purpose of demonstrating compliance with the Volatile Organic Compound ("VOC") emissions limit for the C-5 Alkylation flare ("Alky Flare"), Identification No. 844C-5, in Paragraph A23 of this Consent Decree, the block sum of Alky Flare VOC emissions shall be calculated each day in accordance with Steps 1 and 2 below, and the 365-day rolling sum, rolled daily, shall be calculated using data from the prior 365 calendar days, in accordance with Step 3 below. All abbreviations, constants, and variables are defined in the "Key to the Abbreviations" at the end of this Appendix.

Step 1: Determine the Molecular Weight ("MW_i") of each Volatile Organic Compound ("VOC") in the Vent Gas.

Take the MW_i values for each individual Vent Gas VOC from the Component column of Table 1 in Appendix A1.3.

Step 2: Calculate the block sum mass of VOC emitted for each calendar day "*r*" ("$(\dot{M}_{VOC-Emit})_r$")

Step 2a: The mass of VOC in the Vent Gas shall be calculated for each 1-hour block sum period "*j*" of the calendar day "*r*" as follows using each hourly block average value for Q_{vg} and x_i (for the set "S" of individual Vent Gas constituent VOCs) that day:

$$(\dot{m}_{VOC-vg})_j = \sum_{i \in S} \frac{Q_{vg} * MW_i * x_i}{385.5} \qquad \textbf{Equation 1}$$

Step 2b: Calculate NHV_{cz} for each 1-hour block sum period "*j*" of the calendar day "*r*" ("$(NHV_{cz})_j$") using the equations and instructions of Appendix A1.3.

Step 2c: Calculate the Combustion Efficiency of VOC for each 1-hour block sum period "*j*" ("$(CE_{VOC})_j$") of calendar day "*r*":

If $(NHV_{cz})_j < 95$ BTU/scf:

$$(CE_{VOC})_j = 0 \qquad \textbf{Equation 2a}$$

If $(NHV_{cz})_j \geq 95\ BTU/scf$:

$$(CE_{VOC})_j = \frac{0.16 * (-95 + (NHV_{cz})_j)}{1 + 0.16 * (-95 + (NHV_{cz})_j)} * 100 \qquad \textbf{Equation 2b}$$

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Step 2d: The block sum mass of VOC emissions from the Alky Flare during calendar day "r" shall be calculated as shown below in Equation 3 as the sum of the hourly block sum VOC emissions calculated for each hour "*j*" during that calendar day.

$$(\dot{M}_{VOC-Emit})_r = \sum_{j=1}^{24} \left[\dot{m}_{VOC-vg} * (1 - (CE_{VOC})_j/100) \right] \qquad \textit{Equation 3}$$

Step 3: Calculate the tons per year of VOC emissions ("$TPY_{VOC-Emit}$").

The results of Equation 3 for each day "r" of the 365-day rolling sum period are summed and converted to tons per year as per Equation 4 below. The result of Equation 4 is used to demonstrate compliance with the Alky Flare VOC limit in the consent decree.

$$TPY_{VOC-Emit} = \frac{\sum_{r=1}^{365} (\dot{M}_{VOC-Emit})_r}{2000} \qquad \textit{Equation 4}$$

Key to the Abbreviations:

0.16 = *CE_{VOC} multiplier for NHV_{cz} (unitless)*
24 = *Number of hours in a calendar day (24 hr/d)*
95 = *NHV_{cz} below which CE_{VOC} empirically correlates to zero (BTU/scf)*
385.5 = *conversion from pound moles to standard cubic feet (385.5 lb/scf)*
2000 = *conversion from pounds to tons (2000 lb/ton)*
CE_{VOC} = *percent combustion efficiency of VOC in the Vent Gas (%)*
i = individual compound from Component column in Table 1 of Appendix A1.3
j = individually numbered hours in a calendar day
$(\dot{M}_{VOC-Emit})_r$ = *mass of VOC emitted for calendar day*
$\dot{m}_{VOC-vg}$ = *calendar day average mass flow rate of VOC in the Vent Gas (lb/hr)*
$(\dot{m}_{VOC-vg})_j$ = *average mass flow rate of VOC in the Vent Gas during hour "j" (lb/hr)*
MW_i = *molecular weight of individual compound (lb/lb-mole)*
NHV_{cz} = *net heating value of the combustion zone (BTU/scf)*
Q_{vg} = *vent gas volumetric flow rate (scfh)*
r = calendar day
S = *set of individual vent gas VOCs from Component column in Table 1 of Appendix A1.3*
$TPY_{VOC-Emit}$ = mass flow rate of VOC emissions (tons/yr)
VOC = *volatile organic compound in the vent gas (unitless)*
x_i = *individual compound volume fraction in the vent gas (volume fraction)*

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APPENDIX B

ENHANCED LDAR PROGRAM

Definitions:

B1. The definitions set forth in the Consent Decree shall apply for purposes of this Appendix B. For purposes of this Appendix B to the Consent Decree, the following definitions shall also apply:

a. "Covered Equipment" shall include all pumps and valves, excluding pressure relief valves, in light liquid or gas/vapor service in all Covered Process Units.

b. "Covered Process Units" shall mean all process units that are or, under Paragraph 39 in the body of this Consent Decree, become subject to the equipment leak provisions of 40 C.F.R. Part 60, Subpart GGGa.

c. "DOR" shall mean Delay of Repair.

d. "ELP" shall mean the Enhanced Leak Detection and Repair Program specified in this Appendix B.

e. "Equipment" shall have the meaning set forth in 40 C.F.R. § 60.591a.

f. "Extension," for purposes of Subparagraphs B1.k.(i)*(b)* and 9.k.(ii)*(b)*, shall mean that: (i) the tested and untested valves were produced by the same manufacturer to the same or essentially equivalent quality requirements; (ii) the characteristics of the valve that affect sealing performance (*e.g.,* type of valve, stem motion, tolerances, surface finishes, loading arrangement, and stem and body seal material, design, and construction) are the same or essentially equivalent as between the tested valve and the untested valve; and (iii) the temperature and pressure ratings of the tested valve are at least as high as the temperature and pressure ratings of the untested valve.

g. "LDAR" or "Leak Detection and Repair" shall mean the leak detection and repair activities required by any "equipment leak" provisions of 40 CFR Part 60, 61 or 63. LDAR also shall mean any state or local equipment leak provisions that require the use of Method 21 to monitor for equipment leaks and also require the repair of leaks discovered through such monitoring.

h. "LDAR Audit Commencement Date" or "Commencement of an LDAR Audit" shall mean the first day of the on-site inspection that accompanies an LDAR audit.

i. "LDAR Audit Completion Date" or "Completion of an LDAR Audit" shall mean one hundred twenty (120) calendar days after the LDAR Audit Commencement Date.

j. "Low Emissions Packing" or "Low-E Packing" shall mean either (i) or (ii) as follows:

(i) A valve packing product, independent of any specific valve, for which the manufacturer has issued a written warranty that the packing will not emit fugitives at greater than 100 ppm, and that, if it does so emit at any time in the first five years, the manufacturer will replace the product; provided however, that no packing product shall qualify as "Low-E" by reason of written warranty unless the packing first was tested by the manufacturer or a qualified testing firm pursuant to generally accepted good engineering practices for testing fugitive emissions and the results of the testing reasonably support the warranty;

or

(ii) A valve packing product, independent of any specific valve, that has been tested by the manufacturer or a qualified testing firm pursuant to generally accepted good engineering practices for testing fugitive emissions, and that, during the test, at no time leaked at greater than 500 ppm, and on average, leaked at less than 100 ppm

k. "Low Emissions Valve" or "Low E Valve" shall mean either (i) or (ii) as follows:

(i) A valve (including its specific packing assembly) for which the manufacturer has issued a written warranty that it will not emit fugitives at greater than 100 ppm, and that, if it does so emit at any time in the first five years, the manufacturer will replace the valve; provided however, that no valve shall qualify as "Low E" by reason of written warranty unless the valve (including its specific packing assembly) either:

(a) first was tested by the manufacturer or a qualified testing firm pursuant to generally accepted good engineering practices for testing fugitive emissions and the results of the testing reasonably support the warranty; or

(b) is as an Extension of another valve that qualified as "Low E" under Subparagraph B1.k.(i)(a);

or

(ii) A valve (including its specific packing assembly) that:

(a) Has been tested by the manufacturer or a qualified testing firm pursuant to generally accepted good engineering practices for testing fugitive emissions and that, during the test, at no time leaked at greater than 500 ppm, and on average, leaked at less than 100 ppm; or

(b) Is an Extension of another valve that qualified as "Low E" under Subparagraph B1.k.(ii)(a)

l. "Maintenance Shutdown" shall mean a shutdown of a Covered Process Unit that lasts longer than 30 calendar days.

m. "Method 21" shall mean the test method found at 40 C.F.R. Part 60, Appendix A, Method 21.

n. "Repair Verification Monitoring" shall mean the utilization of monitoring (or other method that indicates the relative size of the leak) by no later than the next calendar day after each attempt at repair of a leaking piece of Covered Equipment in order to verify that the leak has been eliminated or is below the applicable leak definition in this ELP.

o. "Screening Value" shall mean the highest emission level that is recorded at each piece of Covered Equipment as it is monitored in compliance with Method 21.

p. "Written LDAR Plan" shall mean a document that addresses, at a minimum, the requirements set forth in Paragraph B3 for the Lemont Refinery.

Part A: General

B2. The requirements of the ELP shall apply to all Covered Equipment. In addition, the requirements of Paragraphs B3, B23, and B31 shall also apply to all Equipment at the Lemont Refinery that is regulated under any federal, state, or local LDAR program. The requirements of this ELP are in addition to, and not in lieu of, the requirements of any federal, state or local LDAR regulation that may be applicable to a piece of Equipment. If there is a conflict between a federal, state or local LDAR regulation and this ELP, CITGO shall follow whichever regulation is more stringent.

B3. By no later than sixty (60) Days after the Date of Entry, CITGO shall develop a written facility-wide LDAR Program that describes: (i) its facility-wide LDAR program (*e.g.*, applicability of regulations to process units and/or specific Equipment; leak definitions; monitoring frequencies); (ii) a tracking program (*e.g.*, Management of Change) that ensures that new pieces of Equipment added to the Lemont Refinery for any reason are integrated into the LDAR program and that pieces of Equipment that are taken out of service are removed from the LDAR program; (iii) the roles and responsibilities of all employee and contractor

personnel assigned to LDAR functions at the Lemont Refinery; (iv) how the number of personnel dedicated to LDAR functions is sufficient to satisfy the requirements of the LDAR program; and (v) how the Lemont Refinery plans to implement this ELP. CITGO shall review this document on an annual basis and update it as needed by no later than December 31 of each year, beginning December 31, 2017.

Part B: Monitoring Frequency

B4. By no later than the Date of Entry, for all Covered Equipment, CITGO shall comply with the monitoring frequency for valves as required by 40 C.F.R. § 60.482-7a, 40 C.F.R. § 60.482-4a, 40 C.F.R. § 60.482-8a, and 40 C.F.R. § 60.482-10a, except as provided in 40 C.F.R. § 60.482-1a, and for pumps as required by 40 C.F.R. § 60.482-2a and 40 C.F.R. § 60.482-8a.

B5. Alternative Standards for Valves – Skip Period Leak Detection and Repair. CITGO may elect to comply with the skip period monitoring requirements set forth in 40 C.F.R. § 60.483-2a, if applicable.

Part C: Monitoring Methods and Equipment

B6. Method 21 and Alternative Work Practice Monitoring.

a. Method 21. Except as provided in Subparagraph B6.b, by no later than the Date of Entry, for all Covered Equipment, CITGO shall utilize and comply with Method 21 in performing LDAR monitoring, using a Toxic Vapor Analyzer 1000B Flame Ionization Detector (FID) attached to a data logger, or equivalent equipment, which directly electronically records the Screening Value detected at each piece of Covered Equipment, the date and time that each Screening Value is taken, and the identification numbers of the monitoring instrument and technician. CITGO shall transfer this monitoring data to an electronic database on at least a weekly basis for recordkeeping purposes. Notwithstanding the foregoing, CITGO may use paper logs where necessary or more feasible (*e.g.*, small rounds, re-monitoring, or when data loggers are not available or broken). Any manually recorded monitoring data shall be transferred to the electronic database as soon as reasonably practicable but not more than 14 days after the monitoring event.

b. Alternative Work Practice.

(i) From the Date of Entry, CITGO may utilize the Alternative Work Practice as defined at 40 C.F.R. 60.18(g) ("the AWP") for monitoring Equipment that meets the "difficult to monitor" criteria set out at 40 C.F.R. § 60.482-7a(h)(1).

(ii) No sooner than three (3) years from the Date of Entry, CITGO may submit a request for review and approval of an AWP for LDAR monitoring of all Covered Equipment. Such request

shall include a protocol that, at a minimum, addresses the following operational criteria:

(A) calibration procedures;

(B) startup (*i.e.,* warming-up the Optical Gas Imaging (OGI) Instrument)/shutdown procedures;

(C) video recording and storage;

(D) site-specific impact of weather conditions (*e.g.,* wind speed, temperature, and visibility);

(E) maintenance of the OGI Instrument;

(F) certification of personnel to use the OGI instrument;

(G) minimum number of hours of field use by certified personnel prior to certified personnel performing compliance monitoring; and

(H) identification of process unit(s) where certified personnel may monitor with an OGI instrument.

If such request is approved by EPA, CITGO may utilize the AWP for monitoring all Covered Equipment.

B7. Calibrations of LDAR Monitoring Equipment.

a. CITGO shall calibrate LDAR monitoring equipment in accordance with 40 C.F.R. Part 60, EPA Reference Test Method 21, using the calibration gases in 40 C.F.R. § 60.485a(b)(1), prior to each time LDAR monitoring equipment is placed into service before each monitoring shift, and, if the monitoring equipment is turned off during a monitoring shift, prior to restarting it during that monitoring shift.

b. CITGO shall conduct calibration drift assessment rechecks of the LDAR monitoring equipment at the end of each monitoring shift and prior to each time LDAR monitoring equipment is turned off during each monitoring shift, except when LDAR monitoring equipment is unable to function such that the calibration drift assessment recheck cannot be performed before the LDAR monitoring equipment turns off. Calibration drift assessment will be performed according to 40 C.F.R § 60.485a(b)(2).

c. CITGO is not required to conduct a calibration drift assessment re-check during the same monitoring shift in the event of a "flame-out" of the instrument if the instrument can be immediately re-ignited.

d. CITGO shall retain all calibration records for at least one year, or as otherwise required by any federal, state or local law, whichever is most stringent.

Part D: Leak Detection and Repair Action Levels

B8. Leak Definitions and Repairs for Valves and Pumps.

a. By no later than the Date of Entry, for each leak detected at or above the leak definition for valves defined at 40 C.F.R. § 60.482-7a(b), CITGO shall perform repairs in accordance with Paragraphs B10–B15 of this Appendix.

b. By no later than the Date of Entry, for each leak detected at or above the leak definition for pumps defined at 40 C.F.R. §60.482-2a(b)(1)(ii), CITGO shall perform repairs in accordance with Paragraphs B11, B12, B14, and B15 of this Appendix.

B9. By no later than the Date of Entry, for all Covered Equipment, at any time, including outside of periodic monitoring, that a leak is detected through audio, visual, or olfactory sensing, CITGO must repair the piece of Covered Equipment in accordance with 40 C.F.R. Part 60, Subpart GGGa and with Paragraphs B11–B15 of this Appendix.

Part E: Leak Repairs

B10. For any Covered Equipment valve for which an LDAR monitoring technician is authorized to attempt a repair (thus excluding, for example, control valves) and that has a Screening Value greater than 200 ppm, the LDAR monitoring technician shall attempt to repair the valve promptly after the technician has recorded the Screening Value.

B11. For each leak subject to Paragraph B8 of this Appendix, by no later than five days after detecting a leak, CITGO shall perform a first attempt at repair, as defined in 40 C.F.R. § 60.481a. By no later than fifteen days after detection, CITGO shall perform a final attempt at repair or may place the valve or pump on the Delay of Repair (DOR) list provided that CITGO has complied with 40 C.F.R. Part 60, Subpart GGGa and with the requirements of Paragraphs B12–B14 and B16 of this Appendix.

B12. For each attempt at repair as set forth in Paragraphs B10 and B11 of this Appendix, CITGO shall perform Repair Verification Monitoring.

B13. Drill-and-Tap Repairs.

a. Except as provided in Subparagraph B13.b, for leaking valves (other than control valves), when other repair attempts have failed to reduce emissions below the applicable leak definition and CITGO is not able to remove the leaking valve from service, CITGO shall attempt at least one drill-and-tap repair (with a second injection of sealant if the first

injection is unsuccessful at repairing the leak) before placing the valve on the DOR list.

b. Drill-and-tap is not required when there is a major safety, mechanical, product quality, or environmental issue with repairing the valve using the drill-and-tap method, in which case, CITGO shall document the reason(s) why any drill-and-tap attempt was not performed prior to placing any valve on the DOR list.

B14. For each leak, CITGO shall record the following information: the date of all repair attempts; the repair methods used during each repair attempt; the date, time and Screening Values for all re-monitoring events; and, if relevant, the information required under Paragraphs B13 and B16 of this Appendix for Covered Equipment placed on the DOR list.

B15. Nothing in Paragraphs B11–B14 of this Appendix is intended to prevent CITGO from taking a leaking piece of Covered Equipment out of service; provided however, that prior to placing the leaking piece of Covered Equipment back in service, CITGO must repair the leak or must comply with the requirements of Part F of this Appendix (Delay of Repair) to place the piece of Covered Equipment on the DOR list.

Part F: Delay of Repair

B16. Covered Equipment on the DOR List.

a. By no later than the Date of Entry, for all Covered Equipment placed on the DOR list, CITGO shall require sign-off from the plant manager, a corporate official responsible for environmental management and compliance, a corporate official responsible for plant engineering, an operations manager, or an unit supervisor that the piece of Covered Equipment is technically infeasible to repair without a process unit shutdown.

b. By no later than the Date of Entry, for all Covered Equipment placed on the DOR list, CITGO shall require periodic monitoring, at the frequency required for other pieces of Covered Equipment of that type in the process unit, of the Covered Equipment placed on the DOR list.

c. By no later than sixty (60) days following the Date of Entry, no more than 0.10% of all valves that meet the definition of Covered Equipment may be on the DOR list at any one time. If a valve:

(i) is isolated and taken out of VOC and/or HAP service and will be repacked with Low-E Packing or will be replaced with Low-E Valves before it is placed back into VOC and/or HAP service, or

(ii) will be repacked with Low-E Packing or replaced with Low-E Valves at the next Maintenance Shutdown,

such valve shall not be included in computing the applicable percentage limitation of valves that may be on the DOR list at any one time.

d. Covered Equipment may be removed from the DOR list if such Covered Equipment is monitored at the frequency required for other pieces of Covered Equipment of that type in the process unit for two successive monitoring periods without detecting a leak greater than the Leak Definition as set forth in 40 C.F.R. Part 60, Subpart GGGa for that type of Covered Equipment.

Part G: Valve Replacement/Improvement Program

B17. Commencing no later than the Date of Entry, and continuing until termination, CITGO shall implement the program set forth in Paragraphs B18 through B22 of this Appendix to replace and/or improve the emissions performance of the Covered Equipment valves.

B18. Valves.

a. By no later than the Date of Entry, CITGO shall implement modified purchasing procedures that evaluate the availability of valves and valve packing that meet the requirements for a Low-E Valve or Low-E Packing at the time that the valves and/or valve packing is acquired.

b. Except as provided in Paragraph B19, by no later than the Date of Entry, CITGO shall install valve packing material that meets the requirements for Low-E Packing whenever repacking any Covered Equipment valve.

c. Except as provided in Paragraph B19, by no later than ninety days after the Date of Entry, CITGO shall ensure that each new valve that would qualify as a Covered Equipment valve that it installs is a Low-E Valve or is fitted with Low-E Packing. Newly installed sampling and instrumentation valves in service on piping with a diameter of 5/8 inches or less are not required to be Low-E Valves or be fitted with Low-E Packing.

d. Chronic Leaker Valves. Except as provided in Paragraph B19, beginning on the Date of Entry, for each Covered Equipment valve that has a Screening Value at or above 2500 ppm during any two monitoring events (excluding repair verification monitoring) in a 60 month period, CITGO shall replace or repack such valve with a Low-E Valve or with Low-E Packing. The timing of such replacement or repacking shall be in accordance with Paragraph B20.

B19. Unavailability of a Low-E Valve or Low-E Packing.

a. Commercial Unavailability. CITGO shall not be required to utilize a Low-E Valve or Low-E Packing to replace or repack a valve if a Low-E Valve or Low-E Packing is commercially unavailable in accordance with the provisions in Part O of this Appendix. Prior to claiming this commercial unavailability exemption, CITGO must contact a reasonable number of vendors of valves and obtain a written representation or equivalent documentation from each vendor that the particular valve that CITGO needs is commercially unavailable either as a Low-E Valve or with Low-E Packing. In the Compliance Status Reports due under Part N of this Appendix, CITGO shall: (i) identify each valve for which it could not comply with the requirement to replace or repack the valve with a Low-E Valve or Low-E Packing; (ii) identify the vendors it contacted to determine the unavailability of such a Valve or Packing; and (iii) include the written representations or documentation that CITGO secured from each vendor regarding the unavailability.

b. Ongoing Assessment of Availability. CITGO may use a prior determination of Commercial Unavailability of a valve or valve packing pursuant to this Paragraph and Part O of this Appendix for a subsequent Commercial Unavailability claim for the same valve or valve packing (or valve or valve packing in the same or similar service), provided that the previous determination was completed within the preceding 12-month period. After one year, CITGO must conduct a new assessment of the availability of a valve or valve packing meeting Low-E Valve or Low-E Packing requirements.

B20. Timing of Valve Replacement/Improvement:

a. If Replacing or Repacking Does Not Require a Process Unit Shutdown. If replacing or repacking does not require a process unit shutdown, CITGO shall replace or repack such valve by no later than one month after the monitoring event that triggers the replacing or repacking requirement, unless CITGO complies with the following:

(i) Prior to the deadline, CITGO must take all actions necessary to obtain the required valve or valve packing, including all necessary associated materials, as expeditiously as practical, and retain documentation of the actions taken and the date of each such action;

(ii) If, despite CITGO's efforts to comply with Subparagraph B20.a.(i) the required valve or valve packing, including all necessary associated materials, is not available in time to complete the installation within one month, CITGO must take all reasonable actions to minimize emissions from the

valve pending completion of the required replacing or repacking. Examples include:

(A) Repair;

(B) More frequent monitoring, with additional repairs as needed; or

(C) Where practical, interim replacing or repacking of a valve with a valve that is not a Low-E Valve or with packing that is not Low-E Packing; and

(iii) CITGO must promptly perform the required replacing or repacking after CITGO's receipt of the valve or valve packing, including all necessary associated materials.

b. If Replacing or Repacking Requires a Process Unit Shutdown. If replacing or repacking requires a process unit shutdown, CITGO shall replace or repack such valve during the first Maintenance Shutdown that follows the monitoring event that triggers the requirement to replace or repack the valve, unless CITGO documents that insufficient time existed between the monitoring event and that Maintenance Shutdown to enable CITGO to purchase and install the required valve or valve packing technology. In that case, CITGO shall undertake the replacing or repacking at the next Maintenance Shutdown that occurs after CITGO's receipt of the valve or valve packing, including all necessary associated materials.

B21. Records of Low-E Valves and Low-E Packing. Prior to purchasing any Low-E Valves or Low-E Packing, CITGO shall secure, from each manufacturer, documentation that demonstrates that the proposed valve or packing technology meets the definition of "Low-E Valve" and/or "Low-E Packing." CITGO shall retain that documentation for five (5) years and make it available upon request.

B22. Valve Replacement/Improvement Report. In each Compliance Status Report due under Part N of this Appendix, CITGO shall include a separate section in the Report that: (i) describes the actions it took to comply with this Part G, including identifying each valve that was replaced or upgraded; and (ii) identifies the schedule for any future valve replacements or upgrades required as part of Paragraph B.20.

Part H: Management of Change

B23. Management of Change: For each Management of Change process or analysis, CITGO shall ensure that each piece of Equipment added to the Lemont Refinery or removed from the Lemont Refinery for any reason is evaluated to determine if it is or was subject to LDAR requirements and that such pieces of Equipment are integrated into or removed from the LDAR program.

Part I: Training

B24. By no later than Date of Entry, CITGO shall have ensured that all employees and contractors responsible for LDAR monitoring, maintenance of LDAR monitoring equipment, LDAR repairs, and/or any other duties generated by the LDAR program have completed training on all aspects of LDAR that are relevant to the person's duties. By that same time, CITGO shall develop a training protocol to ensure that refresher training is performed once per calendar year and that new personnel are sufficiently trained prior to any involvement in the LDAR program.

Part J: Quality Assurance ("QA")/Quality Control ("QC")

B25. Daily Certification by Monitoring Technicians and LDAR Database Coordinator. Commencing no later than the Date of Entry, on each day that monitoring occurs, at the end of such monitoring day to the extent practical but in no case later than the next work day for the monitoring technician, CITGO shall ensure that each monitoring technician and LDAR Database Coordinator signs a form that includes the following certification:

> For Monitoring Technicians:
>
> On [insert date], to the best of my knowledge and belief, I performed monitoring according to Method 21 and I captured in my datalogger or paper logs the data associated with all of the components I monitored.
>
> For LDAR Database Coordinator:
>
> On [insert date], I transferred to the Facility's LDAR database the data gathered on [insert date] by the monitoring technicians in their dataloggers or paper logs and I did not manipulate or otherwise alter the data I transferred.

In lieu of using a form for each day of monitoring, a log sheet may be created that includes the certifications that the monitoring technicians and LDAR Database Coordinator must date and sign.

B26. Commencing by no later than the first full calendar quarter after Date of Entry, at unannounced times, an LDAR-trained employee or contractor of CITGO, who does not serve as an LDAR monitoring technician on a routine basis, shall undertake the following no less than once per calendar quarter:

a. Review the LDAR database to:

i. Verify that Covered Equipment was monitored at the appropriate frequency;

ii. Verify that proper documentation and sign-offs have been recorded for all Covered Equipment placed on the DOR list;

iii. Ensure that repairs have been performed within the required timeframe;

iv. Review monitoring data and Covered Equipment counts (*e.g.*, number of pieces of Covered Equipment monitored per day) for feasibility and unusual trends;

v. Verify that proper calibration records and monitoring instrument maintenance information are maintained;

b. Conduct spot check of LDAR program records to verify that those records are maintained as required; and

c. Observe, in the field, each LDAR monitoring technician who is conducting leak detection monitoring to ensure that monitoring is being conducted as required.

CITGO shall correct any deficiencies detected or observed as soon as practicable. CITGO shall maintain a log that: (i) records the date and time that the reviews, verifications, and observations required by this Paragraph were undertaken; and (ii) describes the nature and timing of any corrective actions taken.

Part K: LDAR Audits and Corrective Action

B27. CITGO shall conduct LDAR audits pursuant to the requirements of Paragraph B28 of this Appendix by the use of a third party with experience in conducting LDAR audits. CITGO shall not use the same third party that undertakes its routine LDAR monitoring to undertake the LDAR audits required by this Decree. The Initial LDAR Audit Commencement Date shall be no later than 90 days after the Date of Entry of this Consent Decree. Until termination of this Decree, the LDAR Audit Commencement Date for each subsequent LDAR audit shall occur within 21–27 months after the month of the prior LDAR Audit Commencement Dates.

B28. Each LDAR audit shall include but not be limited to reviewing compliance with all applicable regulations, reviewing and/or verifying the same items that are required to be reviewed and/or verified in Paragraph B26 of this Appendix, and performing the following activities (called "comparative monitoring") for Covered Equipment in no less than three Covered Process Units:

a. Calculating a Comparative Monitoring Audit Leak Percentage. Covered Equipment shall be monitored to calculate a leak percentage for each Covered Process Unit broken down by Covered Equipment type (*i.e.*, valves and pumps). The monitoring that takes place during the audit shall be called "comparative monitoring" and the leak percentages derived from the comparative monitoring shall be called

the "Comparative Monitoring Audit Leak Percentage." Until termination of this Consent Decree, CITGO shall conduct a comparative monitoring audit pursuant to this Paragraph during each LDAR audit. During each LDAR audit, CITGO shall undertake comparative monitoring on no less than three Covered Process Units.

b. Calculating the Historic, Average Leak Percentage from Prior Periodic Monitoring Events. For the Covered Process Unit that is audited, the historic average leak percentage from prior monitoring events, broken down by Covered Equipment type (*i.e.*, valves and pumps) shall be calculated. The following number of complete monitoring periods immediately preceding the comparative monitoring audit shall be used for this purpose: valves – 4 quarters; and pumps - 12 months.

c. Calculating the Comparative Monitoring Leak Ratio. For the Covered Process Unit that is audited, the ratio of the comparative monitoring audit leak percentage from Paragraph B.28.a to the historic average leak percentage from Paragraph B.28.b shall be calculated. If a calculated ratio yields an infinite result, CITGO shall assume one leaking piece of Covered Equipment was found in the process unit through its routine monitoring during the 12-month period before the audit, and the ratio shall be recalculated.

Each Covered Process Unit at the Lemont Refinery shall have a comparative monitoring audit at least once before a previously-audited Covered Process Unit is audited again.

LDAR audits after the first audit shall also include reviewing the Lemont Refinery's compliance with this ELP.

B29. When More Frequent Periodic Monitoring is Required. If a comparative monitoring audit leak percentage calculated pursuant to Paragraph B28.a triggers a more frequent monitoring schedule under any applicable federal, state, or local law or regulation than the frequencies listed in Paragraphs B4 or B5 of this Appendix for the equipment type in that Covered Process Unit, CITGO shall monitor the affected type of Covered Equipment at the greater frequency unless and until less frequent monitoring is again allowed under the specific federal, state, or local law or regulation. At no time may CITGO monitor at intervals less frequently than those in the applicable Paragraph (*i.e.*, B4 or B5) of this Appendix.

B30. Corrective Action Plan.

a. Requirements of a CAP. By no later than 30 days after each LDAR Audit Completion Date, CITGO shall develop a preliminary corrective action plan ("CAP") if the results of an LDAR audit identify any deficiencies or if the Comparative Monitoring Leak Ratio calculated pursuant to Paragraph B28.c is 3.0 or higher. The CAP shall describe the actions that CITGO shall take to correct the deficiencies and/or the systemic causes of a Comparative Monitoring Leak Ratio that is 3.0 or higher. The CAP also shall include a schedule by which those actions

shall be undertaken. CITGO shall complete each corrective action as expeditiously as possible with the goal of completing each action within 90 days after the LDAR Audit Completion Date. If any action is not completed or is not expected to be completed within 90 days after the LDAR Audit Completion Date, CITGO shall explain the reasons in the final CAP to be submitted under Paragraph B30.b, together with a proposed schedule for completion of the action(s) as expeditiously as practicable.

b. Submissions of the CAP to EPA. By no later than 120 days after the LDAR Audit Completion Date, CITGO shall submit the final CAP to EPA, together with a certification of the completion of corrective action(s). For any corrective actions requiring more than 90 days to complete, CITGO shall include an explanation together with a proposed schedule for completion as expeditiously as practicable.

c. Approval/Disapproval of All or Parts of a CAP.

(i) Unless within 60 days after receipt of the CAP, EPA disapproves all or part of a CAP's proposed actions and/or schedules, the CAP shall be deemed approved.

(ii) By no later than 60 days after receipt of CITGO's CAP, EPA may disapprove any or all aspects of the CAP. Each item that is not specifically disapproved shall be deemed approved. Except for good cause, EPA may not disapprove any action within the CAP that already has been completed. Within 45 days of receipt of any disapproval from EPA, CITGO shall submit a revised CAP that addresses the deficiencies that EPA identified. CITGO shall implement the revised CAP either pursuant to the schedule that EPA proposed, or, if EPA did not so specify, as expeditiously as practicable.

(iii) A dispute arising with respect to any aspect of a CAP shall be resolved in accordance with the dispute resolution provisions of this Decree.

Part L: Certification of Compliance

B31. Within 180 days after the Initial LDAR Audit Completion Date, CITGO shall submit a certification to EPA that, to the best of the certifier's knowledge and belief after reasonable inquiry: (i) the Lemont Refinery is in compliance with all applicable LDAR regulations; (ii) CITGO has completed all corrective actions, if applicable, or is in the process of completing all corrective actions pursuant to a CAP; and (iii) all Equipment at the Lemont Refinery that is regulated under any federal, state, or local leak detection program has been identified and included in the Lemont Refinery's LDAR program.

Part M: Recordkeeping

B32. CITGO shall keep all records, including copies of all LDAR audits, to document compliance with the requirements of this ELP in accordance with Section IX (Reporting and Recordkeeping) of this Consent Decree. All monitoring data, leak repair data, training records, and audits will be retained for five years, except for the calibration records (including calibration drift assessments) which will be retained for one year. Upon request by EPA, CITGO shall make all such documents available to EPA and shall provide, in their original electronic format, all LDAR monitoring data generated during the life of this Consent Decree.

Part N: Reporting

B33. Compliance Status Reports. On the dates and for the time periods set forth in Section IX (Recordkeeping and Reporting), CITGO shall submit a compliance status report regarding compliance with this ELP. The compliance status report shall include the following information:

a. The number of personnel assigned to LDAR functions at the Lemont Refinery and the percentage of time each person dedicated to performing his/her LDAR functions;

b. An identification and description of any non-compliance with the requirements of this Appendix;

c. An identification of any problems encountered in complying with the requirements of this Appendix;

d. The information required in Paragraph B.19 and B.22 of this Appendix;

e. A description of any LDAR training required in accordance with Part I of this Appendix;

f. Any deviations identified in the QA/QC performed under Part J of this Appendix, as well as any corrective actions taken under that Part;

g. A summary of LDAR audit results including specifically identifying all deficiencies; and

h. The status of all actions under any CAP that was submitted pursuant to Part K of this Appendix during the reporting period.

B34. Each compliance status report submitted under this Part shall signed and certified in accordance with Paragraph 67 of the body of this Consent Decree.

Part O: Process and Factors for "Commercial Unavailability" of Low-E Valve or Packing

B35. Summary: This Part outlines a process to be followed and factors to be taken into consideration to establish that a Low-E Valve or Low-E Packing is not "commercially available" pursuant to Paragraph B19 of this Appendix. Factors other than those identified in Paragraph B36 may also be utilized to establish that a Low-E Valve or Low-E Packing is not commercially available and procedures other than those identified in Paragraphs B37–B38 may be used if mutually agreed upon by the Parties in writing.

B36. Factors. The following factors shall be taken in to account for determining the availability of safe and suitable Low-E Valve or Low-E Packing Technologies:

(1) Valve type;
(2) Valve service and operating conditions;
(3) Type of refinery process equipment in which the valve is used;
(4) Seal performance;
(5) Service life;
(6) Packing friction;
(7) Temperature and pressure limitations; and
(8) Retrofit applications (*e.g.*, re-piping or space limitations).

The following factors may also be relevant for consideration, depending on the process unit or equipment in use at the refinery:

(9) Valve or valve packing specifications identified by the licensor of the process unit or equipment in use at the refinery (including components that are part of a design package by a specialty-equipment provider as part of a larger process unit); or
(10) Valve or valve packing vendor or manufacturer recommendations for the relevant refinery unit and/or process unit components.

B37. Process. The following procedure shall be followed for determining the availability of a Low-E Valve or Low-E Packing:

a. CITGO must contact a reasonable number of vendors of valves and valve packing technologies, taking into account the relevant factors identified above, prior to asserting a claim that Low-E Valve or Low-E Packing is not commercially available.

(i) For purposes of this Consent Decree, a reasonable number of vendors shall mean at least three vendors of valves or three vendors of valve packing technologies.

(ii) If fewer than three vendors of valve or valve packing technologies are contacted, the determination of whether such fewer number is reasonable for purposes of this Consent Decree shall be based on Factors (9) and/or (10) above, or on a

demonstration that fewer than three vendors offer valves or valve packing technologies for the service and operating conditions of the valve to be replaced, in consideration of Factors (1) through (8) above, as applicable.

b. CITGO shall obtain a written representation from each vendor contacted or equivalent documentation that the valve or valve packing does not meet the specifications for a Low-E Valve or Low-E Packing.

c. CITGO shall prepare a written report fully explaining the basis for each claim that a valve or valve packing is not commercially available, to include all relevant documentation and other information supporting the claim. Such report shall also identify the commercially-available valve or packing technology that comes closest to meeting the requirements for a Low-E Valve or Low-E Packing that is selected and installed by CITGO pursuant to Paragraph B.19 of this Appendix. Such report shall be included in the Semi-Annual Report required by Section IX of the Consent Decree, for the period in which the valve or valve packing is replaced.

B38. EPA Review of Claim of Commercial Unavailability. Upon discretionary review by EPA of any claim of commercial unavailability, if EPA disagrees that a valve or valve-packing technology is commercially unavailable, EPA shall notify CITGO in writing, specifying the valve or valve packing EPA believes to be commercially available and the basis for its availability for the service and operating conditions of the valve. Following receipt by CITGO of EPA's notice, the following shall apply:

a. CITGO is not required to retrofit the valve or valve packing for which the unavailability claim was asserted (unless otherwise required to do so pursuant to some other provision of this Consent Decree).

b. EPA's notification shall serve as notice to CITGO of EPA's intent that a future claim of commercial unavailability will not be accepted for (a) the valve or valve packing that was the subject of the unavailability claim, or (b) for a valve or valve packing in the same or similar service, taking into account the factors identified in this Appendix. If CITGO disagrees with EPA's notification, CITGO and EPA may informally discuss the basis for the claim of commercial unavailability. EPA may thereafter revise its notification, if necessary.

c. If CITGO makes a subsequent commercial unavailability claim for the same valve or valve packing (or valve or valve packing in the same or similar service) that was the subject of a prior unavailability claim which was not accepted by EPA, and such subsequent claim is also denied by EPA on the same basis as provided in EPA's prior notification, CITGO shall retrofit the valve or valve packing with the commercially available valve or valve packing technology at the next unit turnaround.

d. Any disputes concerning EPA's notification to CITGO of the commercial availability of a valve or valve packing technology in a particular application pursuant to Paragraph B38.c of this Appendix shall be addressed under the Dispute Resolution provisions in Section XIII of this Consent Decree.

United States et al. v. CITGO Petroleum Corporation and PDV Midwest Refining, L.L.C.
(N.D. Ill.)

APPENDIX C

FENCE LINE MONITORING SYSTEM

SUPPLEMENTAL ENVIRONMENTAL PROJECT

FENCE LINE MONITORING SYSTEM SUPPLEMENTAL ENVIRONMENTAL PROJECT

A. General Requirements

1. Pursuant to Section VII of the Consent Decree, and in accordance with the specifications and provisions in this Appendix, CITGO will install, operate, and maintain a fence line monitoring system ("FLMS") and make the data collected available to the public.

2. Within120 days of the Date of Entry of this Consent Decree, CITGO shall submit to EPA for review and approval a Fence Line Monitoring Plan which shall include, at a minimum:

    a. An identification of the location of the meteorological station required by this Appendix and how this location meets this Appendix's requirements.

    b. A Quality Assurance Project Plan ("QAPP") that describes the Quality Assurance/Quality Control procedures, specifications, and other technical activities to be implemented to ensure: (i) that the results of this FLMS SEP meet project specifications; and (ii) the accuracy, validity, representativeness, and usability of the data obtained by all monitoring equipment, including the stationary equipment and systems identified in Section B (Stationary Equipment Requirements) and the portable equipment such as PIDs, TVAs, and Infrared Gas-Imaging Cameras identified in Section D (Field Investigations/Corrective Action). The QAPP shall follow the outline and guidance in the EPA publication entitled "QA Handbook for Air Pollution Measurement Systems, Volume II, Ambient Air Quality Monitoring Program," EPA-454/B-13-003, May 2013.

    c. A description of the implementation of the Data Availability (Paragraph 18) and the Field Investigations/Corrective Action (Section D) requirements of this Appendix.

    d. A schedule—with a start date contingent upon approval of the Fence Line Monitoring Plan—for expeditiously purchasing, installing, upgrading, and commencing operation of specifically-identified systems and equipment that meet all requirements of this Appendix.

3. Upon EPA approval of the Fence Line Monitoring Plan, in compliance with the schedule in the approved Plan, CITGO shall purchase or lease all equipment specified in the Plan, shall complete the installation of all such equipment, and shall upgrade all systems or stations as set forth in the approved plan.

4. No later than one hundred eighty (180) days after the upgrade of the operation of the two air pollutant monitoring stations required by this Appendix, CITGO shall begin to

conduct Field Investigations into all Screening Conditions in accordance with the requirements set forth in Section D (Field Investigations/Corrective Action).

5. CITGO shall promptly correct deficient implementation of its Fence Line Monitoring Plan. Any disputes related to the Fence Line Monitoring Plan or this Appendix shall be resolved pursuant to the procedures set forth in Section XIII of this Consent Decree.

6. CITGO may seek EPA approval to modify the Fence Line Monitoring Plan at any time during the effective period of this Consent Decree.

B. Stationary Equipment Requirements

7. Overview. The FLMS shall consist of a station to monitor meteorological parameters (Paragraph 8); two stations to monitor air pollutants (Paragraphs 9–13); and a Data Acquisition System (Paragraph 14).

8. Instruments for Measuring and Recording Wind Speed, Wind Direction, Ambient Temperature, and Barometric Pressure. Specific meteorological parameters will be continuously monitored to obtain data representative of the meteorological conditions in the immediate Lemont refinery area. The data set produced shall be adequate to correlate hourly block average conditions and thirty-minute rolling average conditions (rolled on a five-minute basis) with pollutant measurements and transport.

    a. Continuously measured meteorological parameters shall include hourly block average and thirty-minute rolling average horizontal wind speed and wind direction, the standard deviation of the horizontal wind direction (sigma theta), air temperature, and barometric pressure. Wind speed and direction shall be measured at a height of approximately 10 meters. Temperature and barometric pressure shall be measured at a height of 2 to 3 meters. The sensors shall, to the extent practicable, be positioned away from, or above, obstructions such as buildings and process units that may interfere with wind direction measurements.

    b. Wind direction and sigma theta measurement data shall be auto-corrected to True North, rounded to the nearest whole degree. Wind speed data shall be reported in meters per second, rounded to the nearest tenth.

    c. Air temperature data shall be reported in degrees Fahrenheit or Celsius, rounded to the nearest tenth of a degree.

    d. Barometric pressure data may be in any unit of pressure.

9. Air Pollutant Monitoring Stations: Equipment and Pollutant Measurement Capability. CITGO shall upgrade two already-existing pollutant monitoring stations so that each station has each of the following:

a. Instruments capable of measuring and recording the concentrations of the following compounds in air at a minimum detection level of 1.0 part per billion by volume (ppbV): benzene, hexane, and hydrogen sulfide ("H_2S"). The benzene and hexane data will be recorded as hourly block averages and the H_2S data will be recorded as thirty-minute rolling averages rolled on a five-minute basis; and

b. Equipment as follows:

i. For benzene and hexane. The continuous measurement of benzene and hexane shall be accomplished using an auto-Gas Chromatograph ("GC"). The automated GCs shall be operated and maintained in accordance with the manufacturer's recommendations and shall have a measurement range of 1.0 to 500 ppbV for all gases.

ii. For H_2S. Ambient concentrations of H_2S will be continuously measured using a Thermo Environmental Model 43C or equivalent instrumentation.

10. Air Pollutant Monitoring Stations: Temperature-Controlled Shelter: Each air pollutant monitoring station shall be operated inside a temperature-controlled equipment shelter.

a. The temperature within each shelter shall be continuously monitored and recorded using a calibrated resistance temperature detector ("RTD") and microprocessor or PC-based data acquisition system.

b. The climate control system for each monitoring shelter will be capable of maintaining a stable temperature within the range of 20° C to 30° C.

c. The monitoring shelters shall measure approximately 8 feet wide by 12 feet long by 8 feet high.

d. Each shelter shall be anchored to the ground and be electrically grounded for safety.

e. The shelter walls and roofs will have a minimum insulation rating of R11.

f. Each shelter will be equipped with electrical service panels, interior electrical distribution circuits, lighting, workbench and sufficient space for housing, operating and maintaining the monitoring instruments. All electrical wiring and appurtenances will conform to the National Electric Code (NEC).

11. Air Pollutant Monitoring Stations: Location. The two air pollutant monitoring stations shall be located at the following coordinates and identified as follows:

a. Tank Farm Analyzer: Latitude: 41.66075
Longitude: -88.02942

b. Mink Farm Analyzer: Latitude: 41.6461083
Longitude: -88.04659167

12. Air Pollutant Monitoring Stations: Sampler Inlet Requirements. The sampler inlets for each monitoring station shall comply with the following requirements:

a. The sampler inlets should be 2 to 5 meters above ground and have unrestricted airflow 270 degrees around the sample inlet or 180 degrees if the sampler is on the side of a building.

b. The sampler inlets should be >20 meters from the dripline of any tree(s).

c. The sampler inlets should be >1 meter away from supporting structures and walls.

d. The distance from a sampler probe to an obstacle, such as a building, should be at least twice the height the obstacle protrudes above the sampler, probe, or monitoring path.

e. The sampler inlets should be away from minor sources, such as incineration flues, to avoid undue influences from minor sources. The separation distance is dependent on the height of the minor source's emission point (such as a flue), the type of fuel or waste burned, and the quality of the fuel.

13. Air Pollutant Monitoring Stations: Prohibition on Moving. CITGO shall not move the two pollutant monitoring stations to a new location without prior written approval by EPA. Movement of the pollutant monitoring station components for maintenance shall not be restricted by this Paragraph.

14. Data Acquisition System (DAS). A DAS will be used to log all numerical data generated by the air pollutant analyzers and weather instruments using a common time-stamp. The DAS will also be programmed to correct pollutant concentration data to standard temperature and pressure, and to automatically correlate pollutant data with wind direction. The DAS outputs shall be in a file format that can be used in common spreadsheet programs.

15. Nothing in this Appendix shall preclude the use of any other, additional fence line monitoring equipment and/or of monitoring other, additional pollutants at the fence line.

C. Operation of FLMS

16. CITGO shall comply with all terms of this Appendix and the Fence Line Monitoring Plan, including but not limited to operating and maintaining the monitors, equipment, and systems described herein, for a period of no less than two years commencing with the date that Field Investigations are required pursuant to Paragraph 4 of this Appendix.

17. Quality Assurance/Quality Control (QA/QC)**.** CITGO shall ensure that all data collected by the FLMS is subjected to the approved QA/QC procedures on a monthly basis. The QA/QC procedures for a given month's data shall be completed by no later than the end of the month following the month within which the data were collected.

18. Data Posting. On a calendar week basis, CITGO shall post the CITGO Relevant Data on the following website: http://www.citgorefining.com/lemont/environment. CITGO shall post this data for each calendar week no later than the last day of the following calendar week. CITGO shall post the data in a manner that allows pollutant concentrations, wind speed, and wind direction to be viewed concurrently (*i.e.*, in tabular form). CITGO shall maintain the CITGO Relevant Data collected through the FLMS on the aforementioned website for at least five years from the date of its collection. All numerical data shall be presented in a format that can be used in common spreadsheet programs.

D. Field Investigations/Corrective Actions

19. The following terms and requirements shall be defined as follows for the purposes of this Section D:

    a. "CITGO Relevant Data" shall mean the hourly block average benzene and hexane concentrations and the thirty-minute rolling average H_2S concentrations, wind speed, and wind direction that are collected during periods when both of the following conditions exist:

        i. For the Tank Farm Monitor, when the wind direction is from 170 to 275 degrees azimuth, clockwise, and for the Mink Farm Monitor, when the wind direction is from 230 to 40 degrees azimuth, clockwise; and

        ii. The direction sigma theta is 40 degrees azimuth or less.

    b. "Downwind" or "downwind" shall mean, for purposes of the PID and infrared gas imaging of storage tank emissions, winds that are between approximately 4 to 12 miles per hour during the time of the measurement, as indicated using a hand-held wind monitor.

    c. "Equipment" shall have the meaning assigned to it in the Leak Detection and Repair ("LDAR") regulations that are applicable to any particular process unit.

    d. "Field Investigation" shall mean the investigative process by which CITGO attempts to determine all potential cause(s) of a Screening Condition.

    e. "Infrared Gas-Imaging Camera" shall mean an organic gas-imaging camera. Infrared gas imaging must be conducted by trained personnel who maintain proficiency through regular use of the Infrared Gas-Imaging Camera.

f. "Investigation Team" shall mean one or more CITGO employees or contractors who conduct Field Investigations in response to a Screening Condition. Before allowing anyone to conduct or assist in conducting a Field Investigation, CITGO shall require appropriate training to ensure that team members have the requisite knowledge to carry out their responsibilities on the Investigation Team.

g. "Observes Emissions" or "Observable Emissions" shall mean any visual indication of organic gases on the screen or view finder of an Infrared Gas-Imaging Camera.

h. "Portable PID" shall mean a portable photo-ionization detector. For purposes of this Appendix, the Portable PID shall have a minimum detection limit of no greater than 10 parts per billion for organic gases measured as isobutylene.

i. "ppbV" shall mean parts per billion by volume normalized to standard temperature and pressure.

j. "Screening Condition" shall mean CITGO Relevant Data that consists of either: (i) for benzene or hexane, any one hour block average concentration that is 15 ppbV or greater as measured by either monitoring station; or (ii) for H_2S, any 30-minute rolling average concentration, rolled on a five-minute basis, that is 70 ppbV or greater.

k. "Toxic Vapor Analyzer" or "TVA" shall mean a portable flame-ionization detector suitable for use in performing EPA Method 21.

20. H_2S: Investigating and Taking Corrective Action in Response to an H_2S Screening Condition. Upon the occurrence of an H_2S Screening Condition, CITGO shall undertake at least all of the following:

a. If the source(s) of H_2S emissions that is/are contributing to the Screening Condition is/are immediately identifiable, CITGO shall immediately take action to reduce the generation of H_2S from the Facility, including taking action in accordance with CITGO's then-current sulfur shedding plan, if applicable. A copy of CITGO's sulfur shedding plan, as it exists on the Date of Lodging, is attached to this Appendix. Nothing in this Appendix shall preclude CITGO from updating that plan after the Date of Lodging.

b. If the source(s) of H_2S emissions that is/are contributing to the Screening Condition is/are not immediately identifiable, CITGO shall begin a Field Investigation as soon as possible, with the goal of commencing the Field Investigation within 24 hours after the Screening Condition unless inclement weather prevents the start of the Field Investigation within that time period. The Field Investigation shall be informed by a review of the pollutant-wind direction correlation data from the DAS and the relevant operational and CEMS data from the Facility in order to identify sources contributing to the Screening Condition.

As contributing sources are identified, CITGO will immediately take action to reduce the generation of H_2S from that source, including taking action in accordance with CITGO's then-current sulfur shedding plan, if applicable.

21. Benzene and Hexane: Investigating and Taking Corrective Action in Response to a Benzene or Hexane Screening Condition. Upon the occurrence of a benzene or hexane Screening Condition, CITGO shall begin a Field Investigation as soon as possible, with the goal of commencing the Field Investigation within 24 hours after the Screening Condition unless inclement weather prevents the start of the Field Investigation within that time period.

    a. The Field Investigation shall be informed by a review of the pollutant-wind direction correlation data from the DAS and relevant operational data from the Facility. Upon identifying the general area(s) or direction(s) from which the emissions originated, CITGO shall deploy an Investigation Team to the area(s).

    b. The Investigation Team shall survey potential sources of benzene and hexane emissions, including but not limited to process units and storage tanks, by conducting a monitoring survey using a Portable PID and Infrared Gas-Imaging Camera in accordance with the requirements of Subparagraph 21.c–21.e.

    c. Surveying Process Unit Equipment. CITGO shall monitor process units using the Portable PID and Infrared Gas-Imaging Camera. If the Portable PID Detects Emissions from Equipment or if the Infrared Gas-Imaging Camera Observes Emissions from Equipment, CITGO shall monitor the Equipment pursuant to Method 21 using a TVA. Leaks detected using Method 21 that exceed applicable LDAR regulatory limits shall be repaired consistent with the applicable LDAR requirements.

    d. Surveying External Floating Roof Tanks. For external floating roof tanks that contain materials that may emit benzene and/or hexane, CITGO shall survey the tank by taking Portable PID readings approximately 100 feet downwind from the tank. If, during the survey, downwind Portable PID readings have frequent peaks above 50 ppbV, then CITGO shall climb the tank's ladder and survey the floating roof using the Infrared Gas-Imaging Camera in high sensitivity mode to reveal potential emissions from the rim seals or deck fittings. If the Infrared Gas-Imaging Camera Observes Emissions and the floating roof is not resting on the landing legs, then CITGO shall comply with the requirements of Paragraph 22.a at the earliest opportunity permitted by weather conditions.

    e. Surveying Domed External Floating Roof Tanks. For domed external floating roof tanks that contain materials that may emit benzene and/or hexane, CITGO shall survey the tank by taking Portable PID readings approximately 100 feet downwind from the tank. If, during the survey, downwind Portable PID readings have frequent peaks above 50 ppbV, then CITGO shall comply with the

requirements of Paragraph 22.b at the earliest opportunity permitted by weather conditions.

f. Surveying Internal Floating Roof Tanks. For internal floating roof tanks that contain materials that may emit benzene and/or hexane, CITGO shall survey the downwind perimeter vents of the tank at a distance of no more than 50 feet using an Infrared Gas-Imaging Camera in automatic mode.

i. If the Infrared Gas-Imaging Camera does not Observe Emissions from the perimeter vents, then no further imaging of the tank is required.

ii. If the Infrared Gas-Imaging Camera Observes Emissions from the perimeter vents during months of November through April, then CITGO shall schedule the tank for re-imaging on or about May 1. If the Infrared Gas-Imaging Camera Observes Emissions from the perimeter vents during the months of May through October, then CITGO shall comply with the requirements of Paragraph 22.b at the earliest opportunity permitted by weather conditions.

22. Storage Tank Inspection, Repair, and Notification.

a. External Floating Roof Tanks. CITGO shall conduct an inspection of the external floating roof tank in accordance with the requirements of 40 C.F.R. §§ 63.1063(d)(1) and (3). After the inspection, CITGO shall repair conditions constituting an "inspection failure," as that term is used in § 63.1063(d), in accordance with the requirements of 40 C.F.R. § 63.1063(e).

b. Internal and Domed External Floating Roof Tanks. CITGO shall conduct a visual inspection in accordance with the requirements of 40 C.F.R. § 63.1063(d)(2). If the visual inspection fails to reveal the source of the Emissions Observed from the perimeter vents, CITGO may undertake an Infrared Gas-Imaging Camera inspection (in high sensitivity mode) of the floating roof deck fittings and rim seals through *(1)* the manholes and roof hatches of internal floating roof tanks; and *(2)* the manway of domed external floating roof tanks. After the inspection(s), CITGO shall repair conditions constituting an "inspection failure," as that term is used in § 63.1063(d), and also conditions resulting in Observable Emissions, in accordance with the requirements of 40 C.F.R. § 63.1063(e).

c. CITGO shall notify EPA in writing of the discovery of an "inspection failure," as that term is used in 40 C.F.R. § 63.1063(d), or Observable Emissions, within 60 days. Such notice shall describe in detail the inspection failure and/or Observable Emissions and CITGO's plans regarding repair of the tank and/or emptying of the tank.

d. In undertaking repairs, CITGO shall comply with the timing and documentation requirements of 40 C.F.R. § 63.1063(e)(2).

23. Compliance Status Determination and Corrective Action

a. In addition to the requirements in Paragraphs 19–22, by no later than 14 days after identifying an emissions source(s) that caused or contributed to a Screening Condition, CITGO shall determine whether the source is or was in violation of any applicable federal, state, or local regulations or permit requirements. CITGO shall implement, as soon as practicable, corrective action to address any past or present noncompliance.

b. If the compliance status determination in Paragraph 23.a. reveals that an identified source(s) of emissions is not in violation of any applicable regulation or permit requirement, CITGO shall evaluate the feasibility of reducing the emissions from that source in order to minimize the potential recurrence of a future Screening Condition from that source. In the Air Monitoring Semi-Annual Reports required by Paragraph 24, CITGO shall describe in detail the evaluation that it took and identify any reduction measures considered, taken, and/or rejected.

E. Reporting Requirements

24. CITGO shall submit Air Monitoring Semi-Annual Reports to EPA contemporaneously with the Semi-Annual Reports due under Paragraph 63 of the Decree. The Air Monitoring Semi-Annual Reports shall be certified in accordance with Paragraph 67 of the Consent Decree.

a. In the Air Monitoring Semi-Annual Reports submitted in the period before the FLMS is operational, CITGO shall report on its progress in implementing this SEP.

b. In the first Consent Decree semi-annual report that occurs more than six months after the approved date for the commencement of operation of the FLMS and in each semi-annual report thereafter until completion of this SEP, CITGO shall provide, in the Air Monitoring Semi-Annual Reports, a detailed summary of each Screening Condition, any associated Field Investigation, and the findings of the associated Compliance Status Determination and Corrective Action, including but not limited to the following information:

i. Measurement data collected by the FLMS that constituted a Screening Condition.

ii. A narrative description of any Infrared Gas-Imaging Camera gas-imaging done pursuant to the Fence Line Monitoring Plan and the requirements of this Appendix, including but not limited to:

1. A record of the camera operator, date, time, weather conditions, process units and tanks imaged, and a written summary of the

results. A notation should be made if a planned imaging was not completed due to inclement weather or other reasons.

2. The infrared recordings (10 to 30 seconds) of any emissions observed during Infrared Gas-Imaging Camera gas imaging conducted pursuant to the Fence Line Monitoring Plan and the requirements of this Appendix.

iii. Any Portable PID data.

iv. Process and operational data related to the occurrence of the Screening Condition.

v. A detailed description of any actions taken by CITGO to bring sources into compliance and/or to reduce emissions in response to the Screening Condition or in response to the findings of a Field Investigation, along with the status of each repair or emission reduction measure identified.

25. After the FLMS is operational, CITGO shall post the Air Monitoring Semi-Annual Reports on the Internet, with any confidential information redacted, at the same time as the submission to EPA.

26. CITGO shall submit to EPA a completion report on this SEP ("SEP Completion Report") at the time specified in Paragraph 55 of the Consent Decree. In addition to the information required in Paragraph 55, the SEP Completion Report for this SEP shall include: (i) the same information required in an Air Monitoring Semi-Annual Report; (ii) a summary of violations identified in the process of implementing this SEP; and (iii) a summary of physical, process, and/or operational changes made as a result of implementing this SEP.

SULFUR SHEDDING PLAN

Lemont Sulfur/BSRP - 121 Area 1 500 - Emergency Operations	Revision Effective Date: 06-May-2016	
	Procedure: **121500**	Revision Number: **25**
	MOC Number: Oper-15-20136	
Title: **Refinery Sulfur Train Load Shedding**	Operating Procedure	
Type: 500 - Emergency Operations	Review Cycle: 1 Year	
Authorized By: DRANEY, RODGER J.	Sponsored By: RODGER J. DRANEY	

Purpose

Provide actions and guidelines to be used during Refinery Sulfur Train Load Shedding.

Health, Safety and Environmental (HSE) Requirements

This procedure must be performed safely. Only perform the work that you have been trained and validated to do.

Unit specific environment operating guidelines must be reviewed and understood prior to beginning this procedure. This procedure must be completed without impact to the surrounding community or environment.

This procedure may be subject to Safe Operating Limits (SOL). Procedure user must review this procedure prior to using it to determine if SOL apply.

Personnel should be familiar with the Unit MSDS before proceding. All materials will be transferred in closed piping vessels unless noted otherwise.

This procedure involves the transfer of the following materials:

Applicability

This procedure will only be used for emergency operations by qualified operators.

Procedure Overview:

- The intent of this procedure is to direct the Refinery to take specific actions to shed Sulfur Gas generation as required in the event that "A" and "B" / "C" or "D" Train trips and then further action in the event that a second large Sulfur Train trips.

- Load Shedding will be accomplished by reducing Process Unit throughout and/or taking Units off-line if necessary in order to reduce the load to the Sulfur Trains.

- The objective of Load Shedding is to:

  Reduce Sulfur Gas load to a level within the combined capacity of remaining on-line trains and avoid Acid Gas flaring.

  Reduce Sulfur Gas load at a pace that avoids tripping another Sulfur Train due to high delta P (or back-end pressure, depending on the train trip). A subsequent trip would significantly increase the volume of Acid Gas flaring.

Precautions and Limitations

Prerequisite Actions

Additional Personal Protective Equipment (PPE) and Specialized Equipment

Approval and Notifications

- Udex/Unisar Console Supervisor
- Shift Superintendent
- Hydrotreating North
- ULSD
- Coker I
- FCC
- ISAL
- Conservation

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Type: 500 - Emergency Operations	Procedure: **121500** Rev: **25**

Procedure Steps

	CAUTION: **Regenerator relief valves are set to open at 34 PSIG.**
	UDEX/UNISAR Console WILL PERFORM the following steps in the event that either **"C" or "D"** Trains Shutdown or **"A" and "B"** both shutdown.
Inside	1. **SULFUR CONSOLE SUPERVISOR:** • NOTIFY the Udex/Unisar Console Supervisor.
Inside	2. **UDEX/UNISAR CONSOLE SUPERVISOR:** • DIRECT all Console Operators to START Load Shedding procedure. • NOTIFY the Shift Superintendent. • USE Load Shedding Checklist to MONITOR progress by each process unit involved in the Load Shedding procedure.
Inside	3. **SHIFT SUPERINTENDENT:** • CALL OUT another Sulfur Console Supervisor and Sulfur Unit Supervisor.

WARNING:
Console Supervisors MUST IMMEDIATELY INITIATE Step No.s 4. - 11. simultaneously.

Inside	4. **FCC:** • SHUT OFF LCO to Unit 125 (12F-136). • SHUT OFF LCO to Unit 590 (12F-4251). • REDUCE Charge at [redacted] BPD to [redacted] BPD.* • CONTINUE REDUCING Charge as fast as unit stability allows, until reaching [redacted] BPD or until supervision (Shift Super./Ops Mgr./Area Mgr./Unit Super.) directs to stop. • CONSULT with supervision after reaching [redacted] BPD to determine if further reductions are necessary. • START REDUCING Reactor top temperature, targeting [redacted]°F. • ADD CO Promoter to Regeneration to prevent potential afterburn. • TAKE OUT HCO Recycle to reduce gas make. *past experience indicates every [redacted] min. while maintaining stability is achievable but dependent on conditions

CAUTION:
The Steam System will be affected with FCC reduced steam, Coker reduced steam, and Linde 2 reduced steam production.

Inside	5. **CONSERVATION:** • IMMEDIATELY START Procedure No. 430208 - High H2S Readings in the Fuel Gas. • MONITOR Steam System and ADJUST as necessary.

Inside	6. **COKER 1:** **<u>DO NOT WAIT for a Crude rate reduction.</u>** • IMMEDIATELY CIRCULATE one (1) heater. • CONTINUE REDUCING Charge on remaining [redacted] on-line heaters. • TARGET [redacted] Bpd on remaining heater passes and HOLD remaining [redacted] heaters at minimum charge until further instructed.
Inside	7. **CRUDE:** • REDUCE Charge rate to accommodate excess VTB to storage.
Inside	8. **HYDROTREATING NORTH:** • REMOVE all LCO from Unit 125. • REMOVE all LCGO from Unit 125.
Inside	9. **ULSD:** • REMOVE all LCO. • PLACE Unit on internal circulation.
Inside	10. **ISAL:** • PLACE unit on internal circulation.

Inside	11. **SULFUR:** • PLACE remaining **C** or **D** Sulfur Train, (21F-124) C Train or (21F-1124) D Train on flow control, with [redacted] MCFD set point • PLACE LCN Sour Water Stripper(s) on Condensate. • MONITOR MDEA gas header pressure; if MDEA gas header pressure increases above [redacted] PSIG: PLACE (21F-138) Fuel Gas To Flare in **AUTO** with a set point of [redacted] MSCFD. START the following steps to OPTIMIZE charge to on-line Trains, as necessary, and maximize Acid Gas charge within operational limits. • REDUCE Regenerator steam ratios as required to assist with reducing acid gas production.

As initial Load Shed steps progress, the (Shift Super./Ops Mgr./Area Mgr./Unit Super.) will review current Sulfur Gas load and Train capacity status with the Sulfur Console Supervisor to determine if additional Load Shedding is required.

If another large Sulfur Train trips and additional Shedding is required, the (Shift Super./Ops Mgr./Area Mgr./Unit Super.) will indicate that subsequent Load Shedding is required.

If MDEA Gas Header pressure increases above [redacted] PSIG and/or additional Load Shedding is required, INITIATE the following reductions with the pertinent Console Supervisors until sufficient Load Shedding has occurred:

Inside	12. **COKER I:** • CIRCULATE [redacted] [redacted] sides of the Unit; TARGET remaining heater pass flows at [redacted]–[redacted] Bpd, once sufficient Crude rate reduction has been made.

CAUTION:
To allow a Heater to go on circulation, the "In-Service" drum must be on-line for a minimum of <u>six (6) hours</u> to ensure Coke formation has occurred.

Inside	13. **NAPHTHA HYDROTREATER:** • REMOVE all Heavy Coker Naphtha.

Inside	14. **CRUDE:** • REDUCE rate to a minimum of [redacted] MBPD.

PHASE I - A/B or C/D TRAINS

FCC:

- SHUT OFF LCO to Unit 125 (12F-136).
- SHUT OFF LCO to Unit 590 (12F-4251).
- REDUCE Charge at [redacted] BPD to [redacted] BPD.* (past experience indicates every [redacted] min. while maintaining stability is achievable but dependent on conditions)
- CONTINUE REDUCING Charge as fast as unit stability allows, until reaching [redacted] BPD or until supervision (Shift Super./Ops Mgr./Area Mgr./Unit Super.) directs to stop.
- CONSULT with supervision after reaching [redacted] BPD to determine if further reductions are necessary.
- START REDUCING Reactor top temperature, targeting [redacted]°F.
- ADD CO Promoter to Regeneration to prevent potential afterburn.
- TAKE OUT HCO Recycle to reduce gas make.

COKER I:

<u>DO NOT WAIT for crude rate reduction.</u>

- IMMEDIATELY CIRCULATE one (1) heater.
- CONTINUE REDUCING Charge on remaining [redacted] on-line heaters and HOLD at a pass flow minimum of [redacted] BPD until further instructions from supervision.

CRUDE:

- REDUCE Charge rate to accomodate excess VTB to Storage

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HYDROTREATING NORTH:

- REMOVE all LCO from Unit 125.
- REMOVE all LCGO from Unit 125.

PHASE I - A/B or C/D TRAINS

ULSD:

- REMOVE all LCO.
- PLACE unit on internal circulation.

ISAL:

- PLACE unit on internal circulation.

SULFUR:

- PLACE remaining C or D Sulfur Train on flow control.
- PLACE LCN Sour Water Stripper on Condensate.
- MONITOR MDEA gas header pressure; if pressure increases above [redacted] psig:
  - PLACE (21F-138) Fuel Gas to flare on AUTO with a set point of [redacted] Mscfd,
  - INITIATE remaining steps of procedure.
  - OPTIMIZE Charge to on-line trains, as necessary, to maximize Acid Gas Charge within operational limits.

COKER I:

- CIRCULATE [redacted] sides of unit; targeting remaining heater pass flows [redacted] BPD after sufficient Crude reduction has been completed.

NAPHTHA HYDROTREATER:

- REMOVE all Heavy Coker Naphtha

CRUDE:

- REDUCE to a minimum of [redacted] MBPD.

End of Procedure

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APPENDIX D

GREEN LIGHTING SUPPLEMENTAL ENVIRONMENTAL PROJECT

Green Lighting Supplemental Environmental Project

1. CITGO shall implement a Supplemental Environmental Project ("SEP") in accordance with the criteria, terms, and procedures specified in this Appendix D and in Paragraph 52 of the Consent Decree.

2. CITGO may carry out its SEP responsibilities directly or through contractors selected by CITGO. CITGO shall ensure that all contractor costs related to the SEP are reasonable and necessary for completion of the SEP.

3. CITGO shall spend no less than Three-Hundred, Fifty Thousand Dollars ($350,000) to implement this SEP, which is intended to reduce emissions of carbon dioxide, sulfur dioxide, and nitrogen oxides through the conversion of certain lighting fixtures to more efficient lighting fixtures within facilities owned and operated by the Lemont-Bromberek Consolidated School District.

4. CITGO shall fully fund the conversion of all 400 watt metal halide fixtures to 150 watt LED fixtures in the gymnasiums of the Old Quarry Middle School, the River Valley School, and the Oakwood School, all of which are within the Lemont-Bromberek Consolidated School District.

5. After subtracting from $350,000 the cost of converting the lighting in the gymnasiums identified above, CITGO shall spend the remaining balance to convert T-8 fluorescent tube fixtures into LED tubes in classrooms at the Old Quarry Middle School, the River Valley School, and the Oakwood School. Nothing in this Paragraph, however, is intended to prevent CITGO from commencing the conversion of lighting within classrooms at the school buildings before, during, or after the conversions in the gymnasiums; provided however, that all conversions in the gymnasiums shall be fully funded.

6. Implementation of this SEP shall be completed within 18 months after the Date of Entry of this Consent Decree.

7. In undertaking this SEP, CITGO shall coordinate with local officials, but CITGO retains responsibility for performance of the SEP.

[End of document.]

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(N.D. Ill.)

APPENDIX E

PARAMETRIC EMISSIONS MONITORING SYSTEM

PARAMETRIC EMISSIONS MONITORING SYSTEM

Unless CITGO elects to install a CEMS on Heater 123B-2, CITGO shall continuously monitor NOx from Heater 123B-2 in accordance with this Appendix to demonstrate compliance with the NOx requirements in Paragraph 16 of the Consent Decree. A PEMS is a mathematical model that predicts the gas concentration of NOx in the stack based on a set of operating data. Consistent with the CEMS data frequency requirements of 40 CFR Part 60, the PEMS shall calculate a pound per million BTU value at least once every 15 minutes, and all of the data produced in a calendar hour shall be averaged to produce a calendar hourly average value in pounds per million BTU.

The types of information needed for a PEMS are described below. The list of instruments and data sources shown below represent an ideal case. However, at a minimum, each PEMS shall include continuous monitoring for at least items 3-5 below. CITGO will identify and use existing instruments and refinery data sources to provide sufficient data for the development and implementation of the PEMs parametric software.

Basis Instrumentation:

1. Absolute Humidity reading (one instrument per refinery, if available);
2. Fuel density, composition, and/or specific gravity – on line readings (it may be possible, if the fuel gas does not vary widely, that a grab sample and analysis may be substituted);
3. Fuel flow rate;
4. Firebox temperature;
5. Stack excess oxygen reading;
6. Airflow to the firebox (if known or possibly estimated); and

7. Process variable data – steam flow rate, temperature, and pressure; process stream flow rate, temperature, and pressure; etc.

Computers & Software:

1. Software to calculate the predicted NOx emissions; and

2. Data management software to write the compliance monitoring reports.

Calibration and Setup:

1. Data will be collected for a period of 3 to 7 days of all the data that is to be used to construct the mathematical model. The data will be collected over an operating range that represents 80% to 100% of typical heater/boiler operation.

2. Collect data for “end of run" and "start of run", if appropriate.

3. A sensor validation analysis shall be conducted to make sure the system is collecting data properly.

4. Stack testing (by subcontractor) shall be performed to develop the actual emissions data for comparison to the collected parameter data.

5. CITGO shall then develop the mathematical models and install the model into the computer.

CITGO may install this PEMS in the State of Illinois. If Illinois has enacted requirements that are directly applicable to this PEMS, then those performance specifications shall be referenced as part of installation and operation.

Monitoring Protocol:

The monitoring protocol for the PEMS to be installed on the Heater 123B-2 shall be based on EPA's "Alternative Monitoring Protocol" for an Industrial Furnace. The elements of a protocol for a PEMS shall include:

1. Applicability

   a. Identify source name, location, and emission unit number(s);

   b. Identify the type of industry;

c. Identify the process of interest;

d. Identify the regulations that apply (*e.g.*, NSPS, NESHAP, SIP, and/or Consent Decree);

e. Identify the pollutant(s) subject to monitoring (information on major/area source determination); and

f. Provide expected dates of monitor compliance demonstration testing.

2. Source Description

a. Provide a simplified block flow diagram with parameter monitoring points and emission sampling points identified (*e.g.*, sampling ports in the stack); and

b. Provide a discussion of process or equipment operations that are known to significantly affect emissions or monitoring procedures (*e.g.*, batch operations, plant schedules, product changes).

3. Control Equipment Description

a. Provide a simplified block flow diagram with parameter monitoring points and emission sampling points identified (*e.g.*, sampling ports in the stack);

b. List monitored operating parameters and normal operating ranges; and

c. Provide a discussion of operating procedures that are known to significantly affect emissions (*e.g.*, catalytic bed replacement schedules, ESP rapping cycles, fabric filter cleaning cycles).

4. Monitoring System Design

a. Install, calibrate, operate, and maintain a continuous PEMS;

b. Provide a general description of the software and hardware components of the PEMS, including manufacturer, type of computer, name(s) of software product(s), monitoring technique (*e.g.*, method of emission correlation). Manufacturer literature and other similar information shall also be submitted, as appropriate;

c. List all elements used in the PEMS to be measured (*e.g.*, pollutant(s), other exhaust constituent(s) such as O_2 for correction purposes, process parameter(s), and/or emission control device parameter(s));

d. List all measurement or sampling locations (e.g., vent or stack location, process parameter measurement location, fuel sampling location, work stations);

e. Provide a simplified block flow diagram of the monitoring system overlaying process or control device diagram (could be included in Source Description and Control Equipment Description);

f. Provide a description of sensors and analytical devices (e.g., thermocouple for temperature, pressure diaphragm for flow rate);

g. Provide a description of the data acquisition and handling system operation including sample calculations (e.g., parameters to be recorded, frequency of measurement, data averaging time, reporting units, recording process); and

h. Provide checklists, data sheets, and report format as necessary for compliance determination (e.g., forms for record keeping).

5. Support Testing and Data for Protocol Design

a. Provide a description of field and/or laboratory testing conducted in developing the correlation (e.g., measurement interference check, parameter/emission correlation test plan, instrument range calibrations); and

b. Provide graphs showing the correlation and supporting data (e.g., correlation test results, predicted versus measured plots, sensitivity plots, computer modeling development data).

6. Initial Verification Test Procedures

a. Perform an initial relative accuracy test (RA test) to verify the performance of the PEMS over the permitted operating range. The PEMS must meet the relative accuracy requirement of the applicable Performance Specification in 40 CFR Part 60, Appendix B. The test shall utilize the test methods of 40 CFR Part 60, Appendix A.

b. Identify the most significant independently modifiable parameter affecting the emissions. Within the limits of safe unit operation, and typical of the anticipated range of operation, test the selected parameter for three RA test data sets at the low range, three at the normal operating range, and three at the high operating range of that parameter, for a total of nine RA test data sets. Each RA test data set should be between 21 and 60 minutes in duration.

c. Maintain a log or sampling report for each required stack test listing the emission rate in accordance with the applicable emission limitations.

d. Demonstrate the ability of the PEMS to detect excessive sensor failure modes that would adversely affect PEMS emission determination. These failure modes include gross sensor failure or sensor drift.

e. The owner or operator shall demonstrate the ability to detect sensor failures that would cause the PEMS emissions determination to drift significantly from the original PEMS value.

f. The owner or operator may use calculated sensor values based upon the mathematical relationships established with the other sensors used in the PEMS. The owner or operator shall establish and demonstrate the number and combination of calculated sensor values which would cause PEMS emission determination to drift significantly from the original PEMS value.

7. Quality Assurance Plan

a. Provide a list of the input parameters to the PEMS (e.g., transducers, sensors, gas chromatograph, periodic laboratory analysis), and a description of the sensor validation procedure (e.g., manual or automatic check);

b. Provide a description of routine control checks to be performed during operating periods (e.g., preventive maintenance schedule, daily manual or automatic sensor drift determinations, periodic instrument calibrations);

c. Provide minimum data availability requirements and procedures for supplying missing data (including specifications for equipment outages for QA/QC checks);

d. List corrective action triggers (e.g., response time deterioration limit on pressure sensor, use of statistical process control (SPC) determinations of problems, sensor validation alarms);

e. List trouble-shooting procedures and potential corrective actions;

f. Provide an inventory of replacement and repair supplies for the sensors;

g. Specify, for each input parameter to the PEMS, the drift criteria for excessive error (e.g., the drift limit of each input sensor that would cause the PEMS to exceed relative accuracy requirements);

h. Conduct quarterly electronic data accuracy assessment tests of the PEMS; and

i. Conduct semiannual RA tests of the PEMS. Annual RA tests may be conducted if the most recent RA test result is less than or equal to 7.5%.

Identify the most significant independently modifiable parameter affecting the emissions. Within the limits of safe unit operation and typical of the anticipated range of operation, test the selected parameter for three RA test data pairs at the low range, three at the normal operating range, and three at the high operating range of that parameter for a total of nine RA test data sets. Each RA test data set should be between 21 and 60 minutes in duration.

8. PEMS Tuning

   a. Perform tuning of the PEMS, provided that the fundamental mathematical relationships in the PEMS model are not changed; and

   b. Perform tuning of the PEMS in case of sensor recalibration or sensor replacement, provided that the fundamental mathematical relationships in the PEMS model are not changed.

EPA Review and Comment on the PEMS Monitoring Protocol:

EPA's review and comment on CITGO's PEMS Monitoring Protocol, and CITGO's response thereto, shall be undertaken in accordance with Paragraph 35 of the Consent Decree.

Review and Update of the PEMS Monitoring Protocol:

CITGO shall review and update its PEMS Monitoring Protocol in accordance with Paragraph 34.d of the Consent Decree.

Training on this PEMS

CITGO shall comply with the requirements in Paragraph 30 of the Consent Decree with regard to PEMS training.

PEMS Downtime Root Cause Analysis and Corrective Action:

CITGO shall comply with Paragraph 36 of the Consent Decree regarding PEMS downtime root cause analysis and corrective action.

United States et al. v. CITGO Petroleum Corporation and PDV Midwest Refining, L.L.C.
(N.D. Ill.)

APPENDIX F

FEBRUARY 26, 2009 AND SEPTEMBER 30, 2011
NOTICES AND FINDINGS OF VIOLATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

FEB 2 6 2009

AE-17J

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Claude Harmon, Manager
Health, Safety, Security & Environmental
Citgo Petroleum Corporation
135th Street & New Avenue
Lemont, Illinois 60439

Re: Finding of Violation and Notice of Violation

Dear Mr. Harmon:

This is to advise you that the U.S. Environmental Protection Agency has determined that Citgo Petroleum Corporation's facility in Lemont, Illinois (Citgo or facility) is in violation of the Clean Air Act (CAA) and associated state or local pollution control requirements. A list of the requirements violated is provided below. A Notice of Violation and Finding of Violation (NOV/FOV) for these violations is being issued and is enclosed for your review.

The CAA requires the development of Primary and Secondary National Ambient Air Quality Standards to protect public health and welfare. To attain and maintain these standards, each State is required to develop an implementation plan according to Section 7410, 42 U.S.C. § 7410. The Illinois State Implementation Plan (Illinois SIP) at IAC 218.441 prohibits the release of certain petroleum manufacturing waste gas streams to the environment unless they are appropriately controlled.

The CAA also requires that certain new sources comply with standards appropriate for the source's category. These New Source Performance Standards (NSPS) are required by Section 7411 of the CAA, 42 U.S.C. § 7411, with implementing regulations found at 40 CFR Part 60. The NSPS for Equipment Leaks of VOC in Petroleum Refineries, Subpart GGG, is found at 40 CFR § 60.590 and specifies control of equipment leaks.

The purpose of these requirements is to reduce emissions that can compromise public health and welfare. Specifically, these requirements ensure that volatile organic compounds and hazardous air pollutants are being controlled to reduce the potential harm to the human respiratory system and reduce the risk of cancer.

EPA finds that Citgo has violated the Illinois State Implementation Plan, its Title V Permit for facility 197090AAI issued on January 9, 2006, and the NSPS for Equipment Leaks of VOC in Petroleum Refineries at 40 CFR § 60.590. Since Citgo violated its Title V permit, it has also violated Title V of the CAA and its associated regulations which require compliance with the terms and conditions of Title V permits.

Section 113 of the CAA gives EPA several enforcement options to resolve these violations, including: issuing an administrative compliance order, issuing an administrative penalty order, bringing a judicial civil action, and bringing a judicial criminal action. The option we select, in part, depends on the efforts taken by Citgo to correct the alleged violations and the timeframe in which you can demonstrate and maintain continuous compliance with the requirements cited in the NOV/FOV.

We are offering you the opportunity to request a conference with us about the violations alleged in the NOV/FOV. A conference should be requested within 10 days following receipt of this notice. A conference should be held within 30 days following receipt of this notice. This conference will provide you a chance to present information on the identified violations, any efforts you have taken to comply and the steps you will take to prevent future violations. Please plan for your facility's technical and management personnel to take part in these discussions. You may have an attorney represent and accompany you at this conference.

The EPA contact in this matter is Brian Dickens. You may contact him at (312) 886-6073 if you wish to request a conference. EPA hopes that this NOV/FOV will encourage Citgo to comply with the requirements of the Clean Air Act.

Sincerely,

Cheryl L. Newton
Director
Air and Radiation Division

Enclosure

cc: Ray Pilapil
Illinois Environmental Protection Agency

United States Environmental Protection Agency
Region 5

IN THE MATTER OF:	)	
	)	
Citgo Petroleum Corporation	)	
Lemont, Illinois	)	**FINDING OF VIOLATION**
	)	
	)	**EPA-5-09-05-IL**
Proceedings Pursuant to	)	
the Clean Air Act,	)	
42 U.S.C. §§ 7401 et seq.	)	

NOTICE AND FINDING OF VIOLATION

Citgo Petroleum Corporation (you or Citgo) owns and operates a petroleum manufacturing facility at 135th Street and New Avenue in Lemont, Illinois. This facility is a petroleum refinery that includes five steam assisted flares.

EPA is sending this Notice and Finding of Violation (NOV/FOV) to you for not properly controlling emissions of organic material from three of your flares. The underlying statutory and regulatory requirements include provisions of the Clean Air Act (the Act or CAA), its implementing regulations and the Illinois Title V Permit Program.

Regulatory and Statutory Authority

The regulations and permit conditions relevant to this NOV/FOV are as follows:

1. The Illinois State Implementation Plan (Illinois SIP) at IAC 218.441 prohibits the release of petroleum manufacturing waste gas streams containing more than 100 ppm organic material unless the waste stream is reduced to less than 8 lb/hr or 10 ppm of organic material, or treated with a device that achieves a combustion efficiency of 85% or more. This provision is incorporated into Citgo's Title V permit for facility 197090AAI at section 5.3.9.

2. Equipment within the HF Alkylation Unit is subject to the leak detection and repair provisions of the New Source Performance Standards (NSPS) for Equipment Leaks of VOC in Petroleum Refineries, Subpart GGG, found at 40 C.F.R. § 60.590. The applicability of Subpart GGG is set forth in Citgo's Title V permit for facility 197090AAI at section 7.8.3 (e).

3. The NSPS provisions at Subpart GGG reference the Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry, Subpart VV, found at 40 C.F.R § 60.480.

4. The Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry at 40 C.F.R. § 60.482-10(e) state, "Owners or operators of control devices used to comply with the provisions of this subpart shall monitor these control devices [flares] to ensure they are operated and maintained in conformance with their designs". This requirement can be found in Citgo's Title V permit at section 7.8.8 (e)(i).

5. On March 7, 1995, EPA gave the Illinois Title V Clean Air Act Permit Program (CAAPP) interim approval as a 40 C.F.R. Part 70 permit program under the authority of Section 502 of the Act, 42 U.S.C. § 7661(a) (60 Fed. Reg. 12478). On December 4, 2001, EPA gave the Illinois Title V CAAPP final approval as a 40 C.F.R. Part 70 permit program (66 Fed. Reg. 62946). The regulation at 40 C.F.R. § 70.6(b)(1) specifies that all terms and conditions in a permit issued under a Part 70 program are enforceable by EPA under the Act. Citgo was issued Title V permit for source ID 197090AAI on August 10, 2000. The Title V permit was renewed on January 9, 2006.

Explanation of Violations

6. Citgo uses flares, including Flares 1, 4 and 5, to control emissions. Flare 5 receives waste gases and process leaks from the HF Alkylation unit. All three flares are steam-assisted, which means that steam is added to the waste, or vent gas stream to enhance combustion and prevent the formation of smoke. Steam is added in proportion to the amount of vent gas. It is common practice to measure the amount of steam as a ratio of the mass of steam per unit mass of vent gas (lb/lb).

7. In March 1997, the American Petroleum Institute (API) released a report entitled "Guide for Pressure-Relieving and Depressuring Systems." The document discusses proper practices for venting organic material. With respect to smoke suppression at steam-assisted flares, the authors of the document state, "the amount of steam required is primarily a function of the gas composition, flow rate and steam pressure and flare tip design and is normally in the range of 0.25 to 1.0. (lb/lb)"

8. In July 1983, EPA released report EPA 600/2-83-052, titled Flare Efficiency Study. This study, partially funded by EPA and the Chemical Manufacturers Association (CMA), included various tests to determine the combustion efficiency and hydrocarbon destruction efficiency of flares under a variety of operating conditions. Certain tests were conducted on a steam-assisted flare provided by John Zink Company. The tests performed included a wide range of steam flows and steam-to-vent gas ratios. The data collected showed decreasing combustion efficiencies when the steam-to-vent gas ratio was above 3.5. The tests showed the following efficiencies at the following steam-to-vent gas ratios:

Pounds of Steam to One Pound of Vent Gas	Combustion Efficiency (%)
3.45	99.7
5.67	82.18
6.86	68.95

The report concluded that excessive steam-to-vent gas ratios caused steam quenching of the flame during the tests which resulted in lower combustion efficiency.

9. EPA has identified other publicly available studies and EPA reports that evaluate how flare combustion efficiency is affected by steam addition. The conclusions of these studies support those of EPA 600/2-83-052.

10. On December 21, 2007, and February 18, 2008, Citgo provided information to EPA in response to an EPA information request, including design documents and operating data on Flares 1, 4, and 5 for the period from November 1, 2004 to December 4, 2007.

11. Citgo provided its Process Specification sheet for Flare 1 that sets forth the design vent gas flow rate and associated steam flow rate. Citgo also provided its Data Sheet for Flare 1 that specifies the design minimum steam addition rate for low vent gas flow conditions. According to the operating data that Citgo provided, during low vent gas flow conditions Citgo supplied steam in excess of the minimum steam addition rate set forth in the Data Sheet. In fact, Citgo set the minimum steam flow at a value more than twice the design minimum. By supplying excess steam, Citgo reduced the combustion efficiency of Flare 1 on various days in 2005, 2006, and 2007 below 85% and released a waste gas stream to the environment with an organic material concentration greater than 10 ppm and at a rate exceeding 8 lb/hr.

12. Citgo provided its Operations Manual for Flare 4 that sets forth the design vent gas flow rate and associated steam flow rate. It states in the Operations Manual for Flare 4 that, "Normal steam to hydrocarbon ratios are in the order of 0.2 to 0.4." According to the operating data that Citgo provided, Citgo supplied steam to the flare far in excess of the recommended ratio, and added more steam than was prescribed by the Operations Manual for particular hydrocarbon flow rates. This failure to adhere to the flare's design criteria on various days in 2004, 2005, 2006 and 2007 reduced the combustion efficiency of Flare 4 below 85% and released a waste gas stream to the environment with an organic concentration greater than 10 ppm and at a rate exceeding 8 lb/hr.

13. Citgo provided its Flare System Specification Sheet for Flare 5 that sets forth a minimum flow of steam through the steam ring and center steam injection point during standby or low vent gas flow conditions. The Flare System Specification Sheet for Flare 5 also sets out a maximum allowable design amount of steam. According to the operating data that Citgo provided, Citgo supplied much more steam than was required for low vent gas flow conditions and on at least two occasions supplied more steam than the maximum required under the highest flow conditions. This failure to adhere to the flare's design on various days in 2006 and 2007 reduced the combustion efficiency of Flare 5 below 85% and released a waste gas stream to the environment with an organic concentration greater than 10 ppm and at a rate exceeding 8 lb/hr.

Environmental Impact of Violations

14. These violations have caused or can cause excess emissions of volatile organic compounds (VOC) and/or hazardous air pollutants (HAP). VOC cause ground level ozone, which can irritate the human respiratory system and reduce lung function.

2/26/09
Date

Cheryl L. Newton, Director
Air and Radiation Division

CERTIFICATE OF MAILING

I, Loretta Shaffer, certify that I sent a Notice and Finding of Violation, No. EPA-5-09-05-IL, by Certified Mail, Return Receipt Requested, to:

Claude Harmon, Manager
Health, Safety, Security & Environmental
Citgo Petroleum Corporation
135th Street & New Avenue
Lemont, Illinois 60439

I also certify that I sent copies of the Finding of Violation and Notice of Violation by first class mail to:

Ray Pilapil, Manager
Compliance and Enforcement Section
Illinois Environmental Protection Agency
1012 North Grand Avenue East
Springfield, Illinois 62702

on the 27 day of Feb, 2009.

Loretta Shaffer, Secretary
AECAS (MN-OH)

CERTIFIED MAIL RECEIPT NUMBER: 7001 0320 0006 0186 0507

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 30 2011

REPLY TO THE ATTENTION OF

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Claude Harmon
Manager HSS&E
CITGO Petroleum Corporation
135th Street & New Avenue
Lemont, Illinois 60439

Dear Mr. Harmon:

The U.S. Environmental Protection Agency is issuing the enclosed Notice of Violation and Finding of Violation (NOV/FOV) to CITGO Petroleum Corporation's Lemont refinery at 135th Street & New Avenue, Lemont, Illinois (CITGO or refinery), under Section 113(a)(1) of the Clean Air Act (the Act), 42 U.S.C. § 7413(a)(1). We find that you are violating Prevention of Significant Deterioration regulations, non-attainment New Source Review requirements, the New Source Performance Standards for Petroleum Refineries, the National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks, Operating Permit requirements under Title V of the Act, the Illinois State Implementation Plan, and the Consent Decree entered January 26, 2005, at your refinery located in Lemont, Illinois.

Section 113 of the Act gives us several enforcement options to resolve these violations, including issuing an administrative compliance order, issuing an administrative penalty order, bringing a judicial civil action, and bringing a judicial criminal action.

We are offering you the opportunity to request a conference with us to discuss the violations identified in this NOV/FOV. A conference should be requested within 10 days following receipt of this notice. This conference will provide you a chance to present information on the identified violations, any efforts you have taken to comply, and the steps you will take to prevent future violations. Please plan for the refinery's technical and management personnel to take part in these discussions. You may have an attorney represent and accompany you at this conference.

The EPA contact in this matter is Mark Ackerman. You may call him at (312) 353-4145 to request a conference. EPA hopes that this notice will encourage CITGO's compliance with the requirements of the Act.

Sincerely yours,

Cheryl L. Newton
Director
Air and Radiation Division

cc: Ray Pilapil, Manager
Compliance and Enforcement Section
Illinois Environmental Protection Agency

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:	)	
	)	
CITGO Petroleum Corporation	)	**NOTICE OF VIOLATION and**
Lemont, Illinois	)	**FINDING OF VIOLATION**
	)	
	)	**EPA-5-11-IL-10**
Proceedings Pursuant to	)	
the Clean Air Act	)	
42 U.S.C.§ § 7401 et seq	)	

NOTICE AND FINDING OF VIOLATION

CITGO Petroleum Corporation (you or CITGO) owns and operates a petroleum refinery at 135th Street & New Avenue, Lemont, Illinois (CITGO or refinery). The refinery consists of a number of pieces of equipment that generate air pollution and are subject to provisions of the Clean Air Act. This includes a fluidized catalytic cracking unit, sulfur recovery plant, heaters, process tanks and other related equipment.

The U.S. Environmental Protection Agency (EPA) is sending this Notice of Violation and Finding of Violation (NOV/FOV or Notice) to notify you of several items. We find that you constructed major modifications causing significant net emissions increases in carbon monoxide (CO), nitrogen oxides (NO_x), particulate matter (PM), PM less than 10 microns (PM_{10}), PM less than 2.5 microns ($PM_{2.5}$), and sulfuric acid mist at a major stationary source in an area that was designated as nonattainment for $PM_{2.5}$, and attainment or unclassifiable for CO, NO_x, PM, PM_{10} and sulfuric acid mist at the time of the modifications, without first obtaining a construction permit meeting the non-attainment New Source Review requirements in the Illinois State Implementation Plan, 40 C.F.R. Part 51, Appendix S, and the Prevention of Significant Deterioration requirements. We find that you failed to properly operate emissions units in accordance with various provisions in the New Source Performance Standards. We find that you exceeded carbon monoxide emission limits in your Title V operating permit. We find that you failed to control the purged liquid from your benzene sampling process in accordance with the National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks.

Section 113 of the Act provides you with the opportunity to request a conference with us to discuss the violations alleged in the NOV/FOV. This conference will provide you a chance to present information on the identified violations, any efforts you have taken to comply, and the steps you will take to prevent future violations. Please plan for the facility's technical and management personnel to take part in these discussions. You may have an attorney represent and accompany you at this conference.

I. Statutory and Regulatory Background

1. The Clean Air Act (the 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)(1).

A. The National Ambient Air Quality Standards

2. Section 108(a) of the Act, 42 U.S.C. § 7408(a), requires the Administrator of EPA to identify and prepare air quality criteria for each air pollutant, emissions of which may endanger public health or welfare, and the presence of which results from numerous or diverse mobile or stationary sources. For each such "criteria" pollutant, Section 109 of the Act, 42 U.S.C. § 7409, requires EPA to promulgate national ambient air quality standards (NAAQS) requisite to protect the public health and welfare.

3. Pursuant to Sections 108 and 109 of the Act, 42 U.S.C. §§ 7408 and 7409, EPA has identified CO, NO_X, PM, PM_{10}, and $PM_{2.5}$, among others, as criteria pollutants, and has promulgated NAAQS for these pollutants. 40 C.F.R. §§ 50.6, 50.7, 50.8, 50.9, 50.10, and 50.11.

4. Under Section 107(d) of the Act, 42 U.S.C. § 7407(d), each state is required to designate those areas within its boundaries where the air quality is better or worse than the NAAQS for each criteria pollutant, or where the air quality cannot be classified due to insufficient data. An area that meets the NAAQS for a particular pollutant is termed an "attainment" area with respect to such pollutant. An area that does not meet the NAAQS for a particular pollutant is termed a "nonattainment" area with respect to such pollutant.

5. An area that cannot be classified as either "attainment" or "nonattainment" with respect to a particular pollutant due to insufficient data is termed "unclassifiable" with respect to such pollutant.

6. At all times relevant to this Notice, Lemont, Illinois, located in Will County, the area in which CITGO is located, has been classified as nonattainment for $PM_{2.5}$ (*see*, 70 Fed. Reg. 944 (January 5, 2005), 74 Fed. Reg. 58688 (November 13, 2009), 74 Fed. Reg. 62243 (November 27, 2009)); and has been classified as attainment or unclassifiable for CO, NO_X, PM and PM_{10}.

B. The Prevention of Significant Deterioration Program

7. Part C of Title I of the Act, 42 U.S.C. §§ 7470-7492, sets forth requirements for the prevention of significant deterioration of air quality in those areas designated as either attainment or unclassifiable for purposes of meeting the NAAQS standards. These requirements are designed to protect public health and welfare, to assure that economic growth will occur in a manner consistent with the preservation of existing clean air resources, and to assure that any decision to permit increased air pollution is made only after careful evaluation of all the consequences of such a decision and after public participation in the decision making process. 42 U.S.C. § 7470. These provisions are referred to herein as the "PSD program."

8. Section 165(a) of the Act, 42 U.S.C. § 7475(a), prohibits, among other things, a "major emitting facility" from constructing a "major modification" in any area which is attaining the NAAQS, unless it has obtained a pre-construction permit issued under the PSD regulations that applies "Best Available Control Technology" (BACT) to control emissions from the proposed modified emissions unit, and has conducted an analysis to determine the air quality impacts of the modification. *See also*, 40 C.F.R. § 52.21(a)(2)(iii).

9. Section 169(1) of the Act, 42 U.S.C. § 7479(1), designates petroleum refineries which emit or have the potential to emit 100 tons per year (tpy) or more of any pollutant to be a "major emitting facility." *See also* 40 C.F.R. § 52.21(b)(1)(i)(a).

10. Section 169(2)(C) of the Act, 42 U.S.C. § 7479(2)(C), defines "construction" to include "modification" (as defined in Section 111(a) of the Act). "Modification" is defined in Section 111(a) of the Act, 42 U.S.C. § 7411(a), to be "any physical change in, or change in the method of operation of, a stationary source which increases the amount of any air pollutant emitted by such source or which results in the emission of any air pollutant not previously emitted." *See also* 40 C.F.R. § 52.21(b)(1)(i)(a).

11. Sections 110(a) and 161 of the Act, 42 U.S.C. §§ 7410(a) and 7471, require each state to adopt a SIP that contains emission limitations and such other measures as may be necessary to prevent significant deterioration of air quality in areas designated as attainment or unclassifiable. The Administrator promulgated regulations at 40 C.F.R. § 51.166 setting forth state implementation plan (SIP) approval requirements for the prevention of significant deterioration of air quality.

12. A state may comply with Sections 110(a) and 161 of the Act, 42 U.S.C. §§ 7410(a) and 7471, by having its own PSD regulations, which must be at least as stringent as those set forth at 40 C.F.R. § 51.166, approved by EPA as part of its SIP. If a state does not have a PSD program that has been approved by EPA and incorporated into its SIP, the federal PSD regulations set forth at 40 C.F.R. § 52.21 may be incorporated by reference into the SIP. 40 C.F.R. § 52.21(a).

13. On August 7, 1980, EPA disapproved Illinois' proposed PSD program and then incorporated by reference the PSD regulations of 40 C.F.R. § 52.21, except paragraph 40 C.F.R. § 52.21(a)(1), into the Illinois SIP. 40 C.F.R. § 52.738 (45 Fed. Reg. 52676, 52741). On January 29, 1981, EPA delegated to the Illinois Environmental Protection Agency (IEPA) the full authority to implement and enforce the federal PSD program. 46 Fed. Reg. 9584. On December 31, 2002, EPA published revisions to the PSD and non-attainment new source review (NSR) regulations in 40 C.F.R. Parts 51 and 52. 67 Fed. Reg. 80186. These revisions are referred to as "NSR Reform." On December 24, 2003, EPA issued a final rule incorporating the newly promulgated PSD provisions of NSR Reform into the Illinois SIP. 68 Fed. Reg. 74489. The NSR Reform provisions at 40 C.F.R. § 52.21 were incorporated into and were part of the Illinois SIP at the time of the major modifications alleged in this Notice.

14. The PSD regulations set forth in 40 C.F.R. § 52.21 apply to any "major stationary source" that intends to construct a "major modification" in an attainment or unclassifiable area. 40 C.F.R. § 52.21(i)(2).

15. 40 C.F.R. § 52.21(b)(1)(i)(a) defines "major stationary source" as any stationary source which emits, or has the potential to emit, 100 tons per year or more of any air pollutant subject to regulation under the Act if the stationary source belongs to one of the listed source categories. Petroleum Refining is a listed source category.

16. 40 C.F.R. § 52.21(b)(2)(i) defines "major modification" as any physical change or change in the method of operation of a major stationary source that would result in a significant net emission increase of any pollutant subject to regulation under the Act.

17. 40 C.F.R. § 52.21(b)(3)(i) defines "net emissions increase" as the amount by which the sum of the following exceeds zero: (*a*) the increase in emissions from a particular physical change or change in the method of operation at a stationary source as calculated pursuant to paragraph (a)(2)(iv) of this section; and (*b*) any other increases and decreases in actual emissions at the major stationary source that are contemporaneous with the particular change and are otherwise creditable.

18. Under the PSD regulations, a "significant" net emissions increase means an increase in the rate of emissions that would equal or exceed any of the following rates for the following pollutants: 100 tpy of CO, 40 tpy of NO_X, 25 tpy of PM, 15 tpy of PM_{10}, and 7 tpy of sulfuric acid mist. 40 C.F.R. § 52.21(b)(23)(i).

19. The PSD regulations define "actual emissions" as the average rate, in tpy, at which the unit "actually emitted the pollutant during a two-year period which precedes the particular date" and which is representative of normal operation. 40 C.F.R. § 52.21(b)(21)(i)-(ii). In addition, for any emissions unit that "has not begun normal operations on the particular date, actual emissions shall equal the potential to emit of the unit on that date." 40 C.F.R. § 52.21(b)(21)(iv).

20. 40 C.F.R § 52.21(a)(2)(iv) provides that the requirements of the PSD program will be applied in accordance with the principles set out in paragraphs (a)(2)(iv)(*a*) through (*f*).

21. 40 C.F.R § 52.21(a)(2)(iv)(*b*) provides that the procedure for calculating (before beginning actual construction) whether a significant emissions increase will occur depends upon the type of emissions units being modified, according to paragraphs (a)(2)(iv)(*c*) through (*f*) of this section. Emission units can be either existing or new. 67 Fed. Reg. 80186, at 80198.

22. 40 C.F.R § 52.21(a)(2)(iv)(*c*) requires an actual-to-projected-actual applicability test for projects that only involve existing emissions units.

23. 40 C.F.R § 52.21(a)(2)(iv)(*d*) requires an actual-to-potential test for projects that only involve construction of a new emissions unit(s).

24. 40 C.F.R § 52.21(a)(2)(iv)(*f*) requires a hybrid test for projects that involve existing and new emissions units.

25. Under 40 C.F.R § 52.21(a)(2)(iv)(*f*), using the hybrid test, a significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the emissions increases for each emissions unit, using the method specified in paragraphs (a)(2)(iv)(*c*) through (*d*) of this section as applicable with respect to each emissions unit, for each type of emissions unit equals or exceeds the significant amount for that pollutant.

26. 40 C.F.R § 52.21(a)(2)(iii) prohibits the actual construction of a major stationary source or modification without a permit which states that the major stationary source or modification will meet the requirements of 40 C.F.R. § 52.21(j) through (r).

27. Under the PSD regulations, "construction" means "any physical change or change in the method of operation (including fabrication, erection, installation, demolition, or modification of an emissions unit)" that "would result in a change in emissions." 40 C.F.R. § 52.21(b)(8); *see also* 42 U.S.C. § 7479(2)(C) ("construction" includes the "modification" (as defined in Section 111(a) of the Act, 42 U.S.C. § 7411(a)) of any source or facility).

28. A major stationary source subject to the requirements of paragraphs (j) through (r) must, among other things, perform an analysis of source impacts, perform air quality modeling and analysis, apply BACT, and allow for meaningful public participation in the process. 40 C.F.R. § 52.21(j)-(r).

29. 40 C.F.R. § 52.21(b)(12) defines BACT as an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.

30. No major stationary source to which the requirements of paragraphs (j) through (r) of 40 C.F.R. § 52.21 apply shall begin actual construction of a major modification without a permit that states that the stationary source or modification will meet those requirements (a PSD permit). 40 C.F.R. § 52.21(i)(1).

31. Any owner or operator of a source or modification subject to 40 C.F.R. § 52.21 who constructs or operates a source not in accordance with a PSD application or commences construction without applying for and receiving approval thereunder shall be subject to an enforcement action. 40 C.F.R. § 52.21(r)(1).

32. 40 C.F.R. § 52.23 states, among other things, that failure to comply with any provision of 40 C.F.R. Part 52, or with any approved regulatory provision of a SIP, shall render the person or governmental entity so failing to comply in violation of a requirement of an

applicable implementation plan and subject to enforcement action under Section 113 of the Act.

C. The NonAttainment New Source Review Program

33. Part D of Title I of the Act, 42 U.S.C. §§ 7501-7515, sets forth provisions for New Source Review (NSR) requirements for areas designated as being in nonattainment with the NAAQS standards. These provisions are referred to herein as the "Nonattainment NSR" program. The Nonattainment NSR program is intended to reduce emissions of air pollutants in areas that have not attained NAAQS so that the areas make progress towards meeting the NAAQS.

34. Section 173(a) of the Act, 42 U.S.C. 7503(a), provides, among other things, that construction and operating permits may be issued if, among other things, sufficient offsetting emission reductions have been obtained to reduce existing emissions to the point where reasonable further progress towards meeting the national ambient air quality standards is maintained, and the pollution controls to be employed will reduce emissions to the "lowest achievable emission rate" (LAER).

35. Pursuant to Sections 110 and 172(c)(5) of the Act, 42 U.S.C. §§ 7410 and 7502(c)(5), each state is required to adopt Nonattainment NSR SIP rules that include provisions to require permits that conform to the requirements of Section 173 of the Act, 42 U.S.C. § 7503, for the construction and operation of modified major stationary sources within nonattainment areas. Section 173 of the Act, in turn, sets forth a series of minimum requirements for the issuance of permits for major modifications to major stationary sources within nonattainment areas. EPA promulgated regulations at 40 C.F.R. § 51.165 to implement Nonattainment NSR permit program requirements under Sections 172(c)(5) and 173 of the Act. 51 Fed. Reg. 40669 (November 7, 1986), and subsequent amendments.

Illinois New Source Review

36. On December 17, 1992, EPA approved the Illinois non-attainment NSR SIP rules, 35 Illinois Administrative Code (IAC) Part 203. 57 Fed. Reg. 59928. Illinois submitted and EPA approved revisions to this rule on September 27, 1995 (60 Fed. Reg. 49780) and May 13, 2003 (68 Fed. Reg. 25504).

37. 35 IAC § 203.207(a) defines "major modification" as a physical change, or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any pollutant for which the area is designated a nonattainment area.

38. 35 IAC § 203.203 provides that a construction permit is required prior to actual construction of a major new source or major modification, and that the application for the permit must meet the requirements of Part 203, including Subpart C, "Requirements for Major Stationary Sources in Nonattainment Areas"

39. 35 IAC Part 203, Subpart C, at § 203.301(a), defines "lowest achievable emission rate" as, in pertinent part, "the most stringent emission limitation which is achieved in practice by such a class or category of stationary source."

40. 35 IAC Part 203, Subpart C, at § 203.302(a), provides that the owner or operator of a new major source or major modification shall provide emission offsets equal to or geater than the allowable emissions from the source, or the net increase in emissions from the modification, sufficient to allow the Agency to determine that the source or modification will not interfere with reasonable further progress.

41. 35 IAC § 203.103 defines "actual construction" as initiation of physical on-site construction activities on an emissions unit which are of a permanent nature. Such activities include, but are not limited to, installation of building supports and foundations, laying of underground pipework, and erection of permanent storage structures.

42. 35 IAC § 203.201 states that in any nonattainment area, no person shall cause or allow the construction of a new major stationary source or major modification that is major for the pollutant for which the area is designated a nonattainment area, except as in compliance with 35 IAC Part 203 for that pollutant.

40 C.F.R. Part 51, Appendix S

43. On May 16, 2008, EPA promulgated regulations implementing the NSR Program for Particulate Matter Less Than 2.5 Micrometers. 73 Fed. Reg. 28321. The preamble to the final rule provides that because the $PM_{2.5}$ nonattainment designations became effective on April 5, 2005 (*see* 70 Fed. Reg. 944 (January 5, 2005)), states were required to issue major Nonattainment NSR permits that address the requirements of Section 173 of the Act as required for $PM_{2.5}$ as of the effective date of these regulations, July 15, 2008. The preamble also provides that after July 15, 2008, states are not permitted to implement a Nonattainment NSR program for $PM_{2.5}$ using PM_{10} as a surrogate for the $PM_{2.5}$ Nonattainment NSR requirements. Further, until EPA approves changes to a state's SIP-approved Nonattainment NSR program to reflect the new requirements under 40 C.F.R. § 51.165, states are to implement a transitional $PM_{2.5}$ Nonattainment NSR program under 40 C.F.R. Part 51, Appendix S (as amended by the May 16, 2008 rulemaking). 73 Fed. Reg. at 28342. On January 21, 2011, the IEPA submitted to EPA a "Planned Revision to Illinois' New Source Review Rules to Address $PM_{2.5}$." As of the date of this Notice, EPA has not published in the Federal Register any notice pertaining to EPA's review or approval of IEPA's planned revisions to its Nonattainment NSR program to address $PM_{2.5}$.

44. 40 C.F.R. § 52.24(k) provides that for an area designated as nonattainment after July 1, 1979, the Emission Offset Interpretative Ruling, 40 CFR Part 51, Appendix S (Appendix S) shall govern permits to construct and operate applied for during the period between the date of designation as nonattainment and the date the NSR permit program meeting the requirements of Part D is approved.

45. On March 8, 2007, EPA finalized revisions to Appendix S to conform the nonattainment permitting rules that apply during the SIP development period following nonattainment designations. The revisions to Appendix S conform the permitting rules to, among other things, the NSR reform provisions. 72 Fed. Reg. 10367.

46. Appendix S at II.A.3 defines "potential to emit" as the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design only if the limitation or the effect it would have on emissions is federally enforceable.

47. Appendix S at II.A.4(i)(b)(1) defines "major stationary source" as any stationary source which emits, or has the potential to emit, 100 tons per year or more of any pollutant subject to regulation under the Act.

48. Appendix S at II.A.5(i) defines "major modification" as any physical change in or change in the method of operation of a major stationary source that would result in: (a) a significant emissions increase of a regulated NSR pollutant and (b) a significant net emissions increase of that pollutant from the major stationary source.

49. Appendix S at II.A.6(i) defines "net emissions increase," with respect to any regulated NSR pollutant emitted by a major stationary source, as the amount by which the sum of the following exceeds zero: (a) the increase in emissions from a particular physical change or change in the method of operation at a stationary source as calculated pursuant to paragraph IV.J of Appendix S; and (b) any other increases and decreases in actual emissions at the major stationary source that are contemporaneous with the particular change and are otherwise creditable.

50. Appendix S at II.A.10(i) defines "significant" as, in reference to a net emissions increase or the potential of a source to emit the following pollutant, a rate of emissions that would equal or exceed the following rate:

$PM_{2.5}$: 10 tpy of direct $PM_{2.5}$ emissions; 40 tpy of sulfur dioxide emissions.

51. Appendix S at IV.I.1 requires that to determine whether a project constitutes a major modification, the reviewing authority shall apply the principles set out in paragraphs IV.I.1(i) through (v).

52. Appendix S at IV.I.1(ii) provides that the procedure for calculating (before beginning actual construction) whether a significant emissions increase (i.e., the first step of the process) will occur depends upon the type of emissions units being modified, according to paragraphs IV.I.1(iii) through (v).

53. Appendix S at II.A.7 defines "emissions unit" as any part of a stationary source that emits or would have the potential to emit any regulated NSR pollutant. There are two types of emissions units: (a) a new emissions unit is any emissions unit which is (or will be)

newly constructed and which has existed for less than 2 years from the date such emissions unit first operated; (b) an existing emissions unit is any emissions unit that does not meet the definition of a new emissions unit.

54. Appendix S at IV.I.1(iii) requires an actual-to-projected-actual applicability test for projects that only involve existing emissions units.

55. Appendix S at IV.I.1(iv) requires an actual-to-potential test for projects that only involve construction of a new emissions unit(s).

56. Appendix S at IV.I.1(v) requires a hybrid test for projects that involve existing and new emissions units.

57. Under Appendix S at IV.I.1(v), using the hybrid test, a significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the emissions increases for each emissions unit, using the method specified in paragraphs IV.I.1(iii) through (iv) of Appendix S as applicable with respect to each emissions unit, for each type of emissions unit equals or exceeds the significant amount for that pollutant (as defined in paragraph II.A.10 of Appendix S).

58. Appendix S at IV.A specifies that if the reviewing authority finds that the major stationary source or major modification would be constructed in an area designated in 40 CFR 81.300 *et seq.* as nonattainment for a pollutant for which the stationary source or modification is major, approval may be granted only if the following conditions are met:

Condition 1. The new source is required to meet an emission limitation which specifies the LAER for each emission unit.

Condition 2. The applicant must certify that all existing major sources owned or operated by the applicant (or any entity controlling, controlled by, or under common control with the applicant) in the same State as the proposed source are in compliance with all applicable emission limitations and standards under the Act (or are in compliance with an expeditious schedule which is Federally enforceable or contained in a court decree).

Condition 3. Emission reductions (offsets) from existing sources in the area of the proposed source (whether or not under the same ownership) are required such that there will be reasonable progress toward attainment of the applicable NAAQS.

Condition 4. The emission offsets will provide a positive net air quality benefit in the affected area.

59. Appendix S at II.A.18 defines "lowest achievable emission rate" as, for any source, the more stringent rate of emissions based on the following: (i) the most stringent emissions limitation which is contained in the implementation plan of any State for such class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or (ii) the most stringent

emissions limitation which is achieved in practice by such class or category of stationary source. This limitation, when applied to a modification, means the lowest achievable emissions rate for the new or modified emissions units within the stationary source. In no event shall the application of this term permit a proposed new or modified stationary source to emit any pollutant in excess of the amount allowable under applicable new source standards of performance.

60. Appendix S at IV.D requires that the owner or operator of a new or modified major stationary source may comply with any offset requirement in effect under Appendix S for increased emissions of any air pollutant only by obtaining emissions reductions of such air pollutant from the same source or other sources in the same nonattainment area.

D. New Source Performance Standards

General Provisions

61. EPA promulgated the General Provisions of the New Source Performance Standards on December 23, 1971. *See* 36 Fed. Reg. 24877. The General Provisions are codified at 40 C.F.R. § 60.1 *et seq.*

62. 40 C.F.R. 60.11(d) states: "At 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."

63. 40 C.F.R. § 60.13 provides that "[a]ll continuous monitoring systems required under applicable subparts shall be subject to the provisions of this section . . .." Subsection 60.13(e) provides that "except for system breakdowns, repairs, calibration checks, and zero and span adjustments . . . all continuous monitoring systems shall be in continuous operation . . .." The requirements of 40 C.F.R. § 60.13 apply to, among other subparts, the continuous monitoring system requirements set forth in 40 C.F.R. Part 40, Subpart J.

Subpart J: Petroleum Refineries

64. EPA promulgated New Source Performance Standards for Petroleum Refineries (NSPS Subpart J) on March 15, 1978. *See* 43 Fed. Reg. 10868. NSPS Subpart J is codified at 40 C.F.R. §§ 60.100 – 60.109.

65. 40 C.F.R. § 60.101(g) provides that "*[f]uel gas combustion device* means any equipment, such as process heaters, boilers and flares used to combust fuel gas . . .."

66. 40 C.F.R. § 60.102(a)(1) provides that no owner or operator of any fluid catalytic cracking unit (FCCU) catalyst regenerator subject to the requirements of this subpart shall discharge from the FCCU catalyst regenerator "particulate matter in excess of 1.0 kg/Mg (2.0 lb/ton) of coke burn-off in the catalyst regenerator."

67. 40 C.F.R. § 60.105(a)(1) and (4) requires that "continuous monitoring systems shall be installed, calibrated, maintained, and operated by the owner or operator subject to the

provisions of this subpart as follows . . . an instrument for continuously monitoring and recording the concentration (dry basis) of H_2S in fuel gases before being burned in any fuel gas combustion device."

68. 40 C.F.R. § 60.105(a)(1) and (5) requires that "continuous monitoring systems shall be installed, calibrated, maintained, and operated by the owner or operator subject to the provisions of this subpart as follows . . . [f]or Claus sulfur recovery plants with oxidation control systems or reduction control systems followed by incineration subject to § 60.104(a)(2)(i), an instrument for continuously monitoring and recording the concentration (dry basis, zero percent excess air) of SO_2 emissions into the atmosphere."

E. National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks

69. EPA promulgated National Emission Standards for Organic Hazardous Air Pollutants (HON) for Equipment Leaks on April 22, 1994. *See* 59 Fed. Reg. 19568. The HON for equipment leaks is codified at 40 C.F.R. Part 63, Subpart H, § 63.160 *et seq.*

70. 40 C.F.R. § 63.166(b) requires that each sampling connection system be equipped with a closed-purge, closed-loop, or closed-vent system to collect and recycle purged liquid back into a process, capture and transport it to a control device, or collect, store, and transfer it to a waste management unit, a treatment, storage or disposal facility, or a facility that manages municipal or industrial solid waste.

F. Title V Requirements

71. Section 502(a) of the CAA, 42 U.S.C. § 7661a(a), provides that no source may operate without a Title V permit after the effective date of any permit program approved or promulgated under Title V of the Act. EPA first promulgated regulations governing state operating permit programs on July 21, 1992. *See* 57 Fed. Reg. 32295; 40 C.F.R. Part 70.

72. EPA promulgated interim approval of the Illinois Title V program on March 7, 1995. *See* 60 Fed. Reg. 12478. EPA promulgated full approval of the Illinois Title V program on November 30, 2001. *See* 40 C.F.R. Part 70, Appendix A. Illinois' Title V program became effective on this date. *See* 66 Fed. Reg. 62946.

73. The Illinois regulations governing the Title V permitting program are codified at 415 Illinois Compiled Statutes (ILCS) 5/39.5, and are federally enforceable pursuant to Section 113(a)(3).

74. Section 503 of the CAA, 42 U.S.C. § 7661b, sets forth the requirement to submit a timely, accurate, and complete application for a permit, including information required to be submitted with the application.

75. Section 504(a) of the CAA, 42 U.S.C. § 7661c(a), requires that each Title V permit include enforceable emission limitations and standards, a schedule of compliance, and other conditions necessary to assure compliance with applicable requirements, including those contained in a SIP.

76. 40 C.F.R. § 70.1(b) provides that: "All sources subject to these regulations shall have a permit to operate that assures compliance by the source with all applicable requirements." *See also* 415 ILCS 5/39.5.7.a.

77. 40 C.F.R § 70.2 defines "applicable requirement" to include "(1) Any standard or other requirement provided for in the applicable implementation plan approved or promulgated by EPA through rulemaking under title I of the Act that implements the relevant requirements of the Act, including revisions to that plan promulgated in part 52 of this chapter . . .." *See also* 415 ILCS 5/39.5.1.

78. 40 C.F.R. § 70.7(b) provides that no source subject to 40 C.F.R. Part 70 requirements may operate without a Title V permit as specified in the Act. *See also* 415 ILCS 5/39.5.6.b

79. 40 C.F.R. § 70.5(a) and (c) require timely and complete permit applications for Title V permits with required information that must be submitted and 40 C.F.R. § 70.6 specifies required permit content. *See also* 415 ILCS 5/39.5.5, 39.5.6, and 39.5.7.

80. 40 C.F.R. § 70.5(b) provides that: "Any applicant who fails to submit any relevant facts or who has submitted incorrect information in a permit application shall, upon becoming aware of such failure or incorrect submittal, promptly submit such supplementary facts or corrected information. In addition, an applicant shall provide additional information as necessary to address any requirements that become applicable to the source after the date it filed a complete application but prior to release of a draft permit." *See also* 415 ILCS 39.5.5.i.

II. Consent Decree and Permitting Background

A. Consent Decree Requirements

81. On October 6, 2004, CITGO, EPA and the states of Illinois, Louisiana, Georgia and New Jersey, entered into a Consent Decree (CD), Civil Action Number H-04-3883 in the Southern District of Texas, to resolve alleged violations of the Act.

Fluidized Catalytic Cracking Unit (FCCU)

82. Paragraph 44 of the CD provides that "CITGO will install and commence operation of a WGS [wet gas scrubber] designed to achieve an emission limit of 0.5 pounds of PM per 1000 pounds of coke burn (lb/klb coke burn) on a 3-hour average basis . . ." by no later than December 31, 2007, for the Lemont refinery FCCU.

83. Paragraph 46 of the CD provides that in accordance with NSPS regulations at 40 CFR, Part 60, Subpart J, "CITGO shall comply with an emission limit of 1.0 pounds of PM per 1000 pounds of coke burned on a 3-hour average basis . . ." by no later than December 31, 2007. *See* 40 C.F.R. § 60.102(a)(1).

84. Paragraph 51 of the CD provides that the Lemont refinery FCCU regenerator shall be an "affected facility," as that term is used in 40 C.F.R. Part 60, Subparts A and J, and comply with the requirements of NSPS Subparts A and J for PM by December 31, 2007.

Heaters and Boilers

85. Paragraph 64 a. of the CD provides that "Upon the Date of Entry, each heater and boiler that combusts refinery fuel gas at the Covered Refineries shall be an affected facility, as that term is used in 40 C.F.R. Part 60, Subparts A and J, and shall be subject to, and comply with the requirements of NSPS Subparts A and J for fuel gas combustion devices, except for those heaters and boilers listed in Appendix E, each of which shall be an affected facility and shall be subject to and comply with the requirements of NSPS Subparts A and J for fuel gas combustion devices by the dates listed in Appendix E."

86. Appendix E of the CD states that the NSPS applicability and compliance date for Units 114, 115, 116 and 125 at the refinery is July 2005.

Sulfur Recovery Plant (SRP) and Tailgas Units (TGUs)

87. Paragraph 67 b. of the CD provides that "[e]ffective no later than 90 days after installation of one or more TGU(s) to control the emissions from the Lemont Claus trains 119 A and B, as required under Paragraph 69, the SRP [sulfur recovery plant] at the Lemont Refinery shall be an "affected facility" under NSPS, 40 C.F.R. Part 60, Subparts A and J."

88. Paragraph 67 c. of the CD provides that "[n]otwithstanding Paragraph 67(b), above, effective on the Date of Entry of the Consent Decree until such time as the SRP at the Lemont Refinery is an "affected facility," the Lemont Claus Trains 121 C and D ('Lemont Claus Trains') shall be treated under this Consent Decree as an SRP that is an 'affected facility' that must comply with all provisions applicable to such an affected facility under 40 C.F.R. Part 60, Subparts A and J."

89. Paragraph 69 a. of the CD provides that "CITGO shall install one or more TGU(s) to control the emissions from the Lemont Claus Trains 119A and B by no later than December 31, 2008. . . . that will ensure compliance with SRP NSPS requirements by no later than December 31, 2008."

90. Paragraph 68 b. of the CD provides that "CITGO shall monitor all emission points (stacks) to the atmosphere for tail gas emissions and shall monitor and report emissions from each of these SRPs as required by 40 C.F.R. §§ 60.7(c), 60.13, and 60.105(a)(5), (6), or (7). During the life of this Consent Decree, CITGO shall conduct emissions monitoring from these SRPs with CEMS at all of the emission points, unless an SO_2 alternative monitoring procedure has been approved by EPA, per 40 C.F.R. § 60.13(i), for any of the emission points."

91. Paragraph 71 of the CD provides that "CITGO shall continue to route or re-route all sulfur pit emissions at the Lemont . . . refinery so that they are eliminated, controlled, or included and monitored as part of the SRP's emissions subject to the NSPS Subpart J

limit for SO_2, 40 C.F.R. § 60.104(a)(2), by no later than the earlier of (i) the first turnaround of the applicable Claus train that occurs on or after October 31, 2004; or (ii) March 30, 2007, provided, however, that if the Lemont Claus Trains 119A and/or 119B elect to route such emissions to the TGU required under Paragraph 69.a, then by the date of such TGU installation."

Netting Credit Requirements

92. Paragraph 136 of the CD prohibits the generation or use of any emission reductions as netting reductions or emissions offsets in any PSD, major non-attainment or synthetic minor NSR permit, except as provided in Paragraph 137 of the CD.

93. Paragraph 137 of the CD provides that "[n]otwithstanding the general prohibition set forth at Paragraph 136, CITGO may use up to 300 tpy of NO_X, 300 tpy of SO_2 and 20 tpy of PM from the CD Emission Reductions as credits or offsets in any PSD, major nonattainment and/or synthetic minor NSR permit or permit proceeding occurring after the Date of Lodging of the Consent Decree, provided that the new or modified emissions unit: (1) is being constructed or modified for purposes of compliance with Tier 2 gasoline or low sulfur diesel requirements; and (2) has a federally-enforceable, non-Title V Permit, with the following limits, as applicable: . . . (i) For heaters and boilers, a limit of 0.020 lbs NO_X per million Btu or less on a 3-hour rolling average basis . . .."

B. Construction and Title V Permits

Construction Permit Number 01030085

94. IEPA issued Construction Permit Number 01030085 to CITGO on August 21, 2002.

95. IEPA issued Construction Permit Number 01030085 to CITGO for the purposes of modifying and/or constructing the necessary units to allow it to produce lower sulfur gasoline by 2004, as required by the U.S. EPA Tier 2 sulfur gasoline requirements.

96. Permit Condition Number 1.1.6.e requires emission rates from the SRP not to exceed 57.33 tons CO per month and 573.32 tons CO per year.

97. Permit Condition Number 1.1.6.f requires that compliance with the emission limits in 1.1.6.e, shall be determined using a 12-month rolling average on a monthly basis.

Title V Permit Number 96030079

98. IEPA issued Title V Permit Number 96030079 to CITGO on January 9, 2006.

99. Permit Condition Number 7.5.6.a requires emission rates from the SRP not to exceed 57.33 tons CO per month and 573.32 tons CO per year.

100. Permit Condition Number 7.5.6.b requires that compliance with the emission limits in 7.5.6.a, shall be determined using a 12-month rolling average on a monthly basis.

101. Permit Condition Number 7.5.6.c states that the emissions in 7.5.6.a "were established in Permit 01030085 pursuant to 35 IAC Part 203 and 40 CFR 52.21. These limits ensure that the construction and/or modification addressed in the aforementioned permit does not constitute a new major source or major modification pursuant to Title 1 of the CAA, specifically 35 IAC Part 203 and 40 CFR 52.21 [T1]."

III. Factual Background

A. General Provisions

102. CITGO owns and operates a petroleum refinery at 135th Street & New Avenue, Lemont, Illinois. The refinery consists of a number of pieces of equipment that generate air pollution and are subject to provisions of the Clean Air Act. This includes a fluidized catalytic cracking unit, sulfur recovery plant, heaters, process tanks and other related equipment.

103. The CITGO refinery is a petroleum refinery included within the source categories listed at 40 C.F.R. § 52.21(b)(1)(i)(a).

104. CITGO has the potential to emit several regulated NSR pollutants in excess of 100 tpy. Therefore, the CITGO refinery is a major stationary source under the Act.

B. ULSD Project

105. During or about 2010, CITGO made physical and operation changes to certain process units at the refinery to enable the refinery to produce lower sulfur diesel (ULSD Project). The changes included the construction of two new heaters 590H-1 and 590H-2. The physical and operational changes to the process units arising from the ULSD Project resulted in significant net emissions increases of 234.88 tpy NO_X, 26.62 tpy of PM_{10}, and 31.33 tpy of $PM_{2.5}$.

106. By permit application 07090059, CITGO applied for a construction permit to construct the ULSD Project. CITGO used 300 tpy NO_X, 300 tpy SO_2, 20 tpy PM_{10} and 20 tpy of $PM_{2.5}$ emissions reductions allegedly generated under the CD for purposes of netting in their ULSD permit application number 07090059. The net emissions change in CITGO's netting analysis with the inclusion of the CD-related emission reductions was -65.12 tpy NO_X, -457.83 tpy SO_2 and +6.62 tpy PM_{10} under the PSD program, and -446.20 tpy NO_X and +11.33 tpy $PM_{2.5}$ under Nnonattainment NSR.

107. The CITGO CD requires that, for CD emissions reductions to be used as credits or offsets in permitting, a federally enforceable, non-Title V permit must contain limits for heaters and boilers of 0.020 pounds of NO_X per million British thermal unit (lb/MMBtu) or less on a three-hour rolling average basis.

108. John Zink, the heater vendor, provided guaranteed emissions of NO_X to be 0.035 lb/MMBtu for both 590H-1 and 590H-2 based on firing CITGO Lemont's refinery fuel gas.

109. CITGO's permit issued April 21, 2010, presents limits of 0.040 lb NO_X/MMBtu for both heaters 590H-1 and 590H-2.

110. Heaters 590H-1 and 590H-2 do not meet the NOx emission limit of 0.020 pounds of NOx per MMBTU as specified in the CD. Because the heaters do not meet the emission limit requirements of the CD, CITGO was prohibited from using the 300 tpy of NO_X, 300 tpy of SO_2 and 20 tpy of PM reduction credits for purposes of netting in their ULSD permit application.

C. FCCU Wet Electrostatic Precipitator

111. Paragraph 44 of the CD required CITGO to install a wet gas scrubber (WGS) control device on the FCCU designed to achieve an emission limit of 0.5 pounds of PM per 1000 pounds of coke burned (lb/klb coke burn) on a 3-hour average. In 2006, CITGO installed a WGS with a wet electrostatic precipitator (WESP) on the FCCU.

112. CITGO conducted an emissions test at the WESP outlet associated with the FCCU regenerator, while operating the WESP on March 12, 2008. The results of this test showed PM emissions to be 0.10 lb/klb coke burn on a 3-hour average and SO_3 emissions to be 3.41 pounds per hour (lb/hr).

113. Beginning November 11, 2008, until the 2010 fall turnaround (TAR) was completed on October 17, 2010, the WESP was shut down due to a then unknown failure. CITGO continued to operate the FCCU while the WESP was shut down.

114. The PM emission limit in place at the time the WESP was shut down, and currently in place until an EPA established limit is provided per paragraph 46 of the CD, is the NSPS 1.0 pounds of PM per 1000 pounds of coke burned on a 3-hour average.

115. CITGO conducted an emissions test at the WESP outlet associated with the FCCU regenerator, with the WESP out of service on April 29, 2009. The results of this test showed PM emissions to be 0.44 lb/klb coke burn on a 3-hour average and SO_3 emissions to be 13.93 lb/hr.

116. CITGO conducted an emissions test at the WESP outlet associated with the FCCU regenerator, with the WESP out of service on June 30, and July 1, 2010. The results of this test showed PM emissions to be 1.18 lb/klb coke burn on a 3-hour average.

117. During the fall 2010 TAR, CITGO repaired and restarted the WESP.

D. Sulfur Recovery Plant

Exceedance of CO Emission Limit

118. During or about 2002 - 2005, CITGO made physical and operational changes to certain process units at the refinery to enable the refinery to comply with lower sulfur gasoline requirements established by the U.S. EPA (Tier 2 Project).

119. IEPA approved CITGO's construction permit application number 01030085 granting CITGO permission to modify and/or construct the necessary process units to allow it to produce lower sulfur gasoline by 2004, as required by the U.S. EPA Tier 2 gasoline requirements.

120. Construction permit condition 1.1.6.e requires emission rates from the SRP not to exceed 57.33 tons of CO per month and 573.32 tons of CO per year. IEPA established the limits to ensure that the Tier 2 Project would not trigger New Source Review.

121. Construction Permit condition 1.1.6.f requires that compliance with the emission limits in 1.1.6.e be determined using a 12-month rolling average on a monthly basis.

122. CITGO's Title V Permit number 96030079 at condition 7.5.6.a limits the carbon monoxide (CO) emissions from the SRP to 57.33 tons of CO per month and 573.32 tpy.

123. Title V permit condition 7.5.6.c states that the emission limits in 7.5.6.a "were established in Permit 01030085 pursuant to 35 IAC Part 203 and 40 CFR 52.21 . . . [to] ensure that the construction and/or modification addressed in the aforementioned permit does not constitute a new major source or major modification pursuant to Title I of the CAA . . .."

124. CITGO, as self reported in their annual emission report, exceeded both their monthly and annual CO emission rates in 2005, 2006, 2007, and 2008. The table below shows the monthly average emissions of CO and the total annual CO emissions from the SRP that includes trains A, B, C, and D combined.

Year	Total Emission Rate (ton/month)	Total Emission rate (ton/year)
2008	68.38	820.62
2007	68.42	821.09
2006	58.89	706.74
2005	65.18	782.19

Sulfur Pit Emissions

125. EPA conducted an inspection of the Lemont refinery to assess compliance with the Act and the CD on June 7-11, 2010.

126. During a facility tour on June 8, 2010, EPA observed a yellow residue surrounding the top of the air intake piping on SRP train D. This indicates venting of the sulfur pit through the air intake to the atmosphere.

127. Pursuant to paragraphs 67 and 69 of the CD, the SRP became an affected facility under NSPS Subparts A and J by December 31, 2008. Trains C and D of the SRP have been treated by the CD as an affected facility under NSPS Subparts A and J since the date of entry of the CD, October 6, 2004.

E. CEMS Downtime

128. CITGO's Units 121C and 121D are sulfur recovery trains and have been treated by the CD as an affected facility under NSPS Subparts A and J since the date of entry of the CD, October 6, 2004.

129. CITGO's Units 114, 115, 116, and 125 are the Crude Unit #2, the light distillate hydrotreater, the naphtha desulfurizer, and the diesel distillate hydrotreater, respectively. All of these units are fuel gas combustion devices and have been affected facilities under NSPS Subparts A and J since July 2005.

130. The table below summarizes the CEMS downtime for CITGO's Units 121C, 121D, 114, 115, 116, and 125 from 2005-2009.

Unit(s)	Time Period	% CEMS Downtime	Pollutant
121C	2005-2009	4.96	SO_2
121D	2005-2009	4.49	SO_2
114/116 FG	3rd Quarter 2005-2009	5.96	H_2S
115/125 FG	3rd Quarter 2005-2009	5.87	H_2S

F. Hazardous Organic NESHAP – 40 C.F.R. Part 63, Subpart H, Benzene Purge

131. CITGO's Title V Permit at condition 7.8.3.d., provides that refinery unit 122, the UDEX unit, is subject to the equipment leak requirements of the HON rule, 40 C.F.R. Part 63, Subpart H.

132. During the June 2010 inspection, EPA observed a CITGO employee take a benzene sample. Some liquid was purged into a separate container before the sample was taken.

133. Pursuant to CITGO's benzene purge handling procedures, the purged liquid is taken to the laboratory with the sample to be tested, and both the purged liquid and the sample eventually get transferred to a separate container. When this container is full it is delivered to a 90-day storage area, where a vacuum truck is used to empty the container and transfer the material into the refinery slop oil system.

134. On February 24, 2011, EPA observed the vacuum truck loading the benzene-containing waste from the container. Photoionization detectors (PIDs) indicated that benzene was being emitted from the vacuum truck's vacuum pump exhaust.

135. THE PID test demonstrates that as the benzene-containing waste is loaded into the vacuum truck, some of the benzene is vaporizing and escaping out of the vacuum truck's vacuum pump exhaust, thus causing the benzene emission observed using the PIDs.

136. The presence of benzene in the vacuum truck's vacuum pump exhaust is credible evidence that some of the benzene sample's purged liquid is escaping to the atmosphere.

IV. Violations

A. New Source Review

ULSD Project

137. The physical and operational changes made to process units under the ULSD Project, as described in Paragraphs 108 - 113, resulted in significant net emissions increases, as defined at 40 C.F.R. §§ 52.21(b)(3)(i) and (b)(23)(i); 35 IAC §§ 203.206(b)(3) and Part 51, Appendix S at II.A.6(i) and II.A.10(i), of NO_X, PM_{10} and $PM_{2.5}$, which constitute a major modification of a major stationary source under the provisions referenced above.

138. CITGO failed to obtain a PSD/non-attainment NSR permit for the physical and operational changes made to process units under the ULSD Project, as required by Sections 165(a) and 173(a) of the Act, 40 C.F.R. §§ 52.21 and 51.165, 40 C.F.R. Part 51, Appendix S, IV.A., and the Illinois SIP, including 35 IAC § 203.201.

139. CITGO violated, and continues to violate, Sections 165(a) and 173(a) of the Act, 40 C.F.R. §§ 52.21 and 51.165, 40 C.F.R. Part 51, Appendix S, IV.A., and the Illinois SIP, including 35 IAC § 203.201, by constructing a major modification at the refinery that resulted in a significant net emissions increase of NOx, PM_{10}, and $PM_{2.5}$ without applying for or obtaining a PSD/non-attainment NSR permit, operating the modified facility without installing BACT and LAER for the control of such pollutants prior to commencing construction of such activities, and continues to operate the refinery without BACT/LAER and obtaining Federally enforceable emission offsets as great or greater as the new or modified source's emissions. CITGO violated and continues to violate these provisions by failing to install the appropriate emission control equipment in accordance with BACT and LAER analyses, certifying that all other major sources that it owns or operates within Illinois are in compliance with the Act, and demonstrating that the benefits of the proposed source or modification significantly outweigh the environmental and social costs imposed as a result of its construction or modification.

FCCU Wet Electrostatic Precipitator

140. The physical and operational changes made to the FCCU WESP, as described in Paragraphs 114 - 120, resulted in significant net emissions increases, as defined at 40

C.F.R. §§ 52.21(b)(3)(i) and (b)(23)(i), of PM, PM_{10} and sulfuric acid mist, which constitute a major modification of a major stationary source.

141. CITGO failed to obtain a PSD permit for the physical and operational changes made to the FCCU WESP, as required by Section 165(a) of the Act, 42 U.S.C. § 7475(a), 40 C.F.R. § 52.21(i)(1) and the Illinois SIP.

142. CITGO violated Section 165(a) of the Act, 42 U.S.C. § 7475(a), 40 C.F.R. § 52.21(i)(1) and the Illinois SIP by changing the method of operation of a major stationary source that resulted in a significant emissions increase of PM, PM_{10} and sulfuric acid mist without applying for or obtaining a PSD permit, and operating the modified facility without installing BACT, going through PSD review, and installing appropriate emission control equipment in accordance with a BACT analysis.

Sulfur Recovery Plant – Exceedance of CO Emissions

143. The physical and operational changes made to the SRP, as described in Paragraph 121 - 127, resulted in significant net emissions increases, as defined at 40 C.F.R. §§ 52.21(b)(3)(i) and (b)(23)(i), of CO, which constitute a major modification of a major stationary source.

144. CITGO failed to obtain a PSD permit for the physical and operational changes made to process unit as required by 40 C.F.R. § 52.21(i)(1) and the Illinois SIP.

145. CITGO violated Section 165(a) of the Act, 42 U.S.C. § 7475(a), 40 C.F.R. § 52.21(i)(1) and the Illinois SIP by constructing a major modification at the refinery that resulted in a significant emissions increase of CO without applying for or obtaining a PSD permit, and operating the modified facility without installing BACT, or going through PSD review, and installing appropriate emission control equipment in accordance with a BACT analysis.

B. New Source Performance Standards

FCCU Wet Electrostatic Precipitator

146. As described in Paragraphs 114 - 120, from November 11, 2008 through September 14, 2010, CITGO failed to operate the WESP "air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions," pursuant to 40 CFR § 60.11(d).

147. As described in Paragraphs 114 - 120, beginning on June 30, 2010, CITGO failed to comply with 1.0 lb PM/klb coke burn on a 3-hour average, in violation of NSPS Subpart J, 40 C.F.R. § 60.102(a)(1).

CEMS Downtime

148. As described in Paragraphs 131 - 133, CITGO failed to continuously operate the CEMS on Unit 121C, Unit 121D, Unit 114/116, and Unit 115/125 in violation of 40 C.F.R. §§ 60.13(e), 60.105(a)(1), (4) and(5).

C. NESHAP for Equipment Leaks - Benzene Purge

149. As described in Paragraphs 134 - 139, CITGO failed to control the emissions of the benzene sample's purged liquid from the vacuum truck's vacuum pump exhaust in violation of 40 C.F.R. Part 63, Subpart H, § 63.166(b).

D. Consent Decree

ULSD Project

150. As described in Paragraphs 105 - 113, CITGO used netting credits for NO_X, SO_2 and PM generated from projects conducted or controls required by the CD without having a federally-enforceable NO_X limit of 0.020 lb/MMBtu on the heaters being modified, in violation of paragraphs 136 and 137 of the CD.

FCCU Wet Electrostatic Precipitator

151. As described in Paragraphs 113 - 120, beginning on June 30, 2010, CITGO failed to comply with 1.0 lb PM/klb coke burn on a 3-hour average at the FCCU, in violation of paragraph 46 of the CD.

Sulfur Recovery Plant-Sulfur Pit Emissions

152. As described in Paragraphs 128 - 130, CITGO failed to route or re-route all sulfur pit emissions at the Lemont refinery to eliminate, control, or include and monitor them as part of the SRP's emissions, in violation of paragraph 71 of the CD.

CEMS Downtime

153. As described in Paragraphs 131 - 133, CITGO failed to continuously operate the CEMS on Units 121C, 121D, 114, 115, 116, and 125 in violation of paragraphs 64(a), 67(b), 67(c), and 68(b) of the CD.

E. Title V

ULSD Project

154. Since August 2010, CITGO has failed to submit a timely and complete Title V permit application for the Lemont refinery with information pertaining to the modification described in Paragraphs 103 - 108 and with information concerning all applicable requirements, including, but not limited to, the requirement to apply, install and operate BACT for NO_X and PM_{10} and LAER with offsets for $PM_{2.5}$ and also failed to supplement

or correct the Title V permit applications in violation of Sections 502, 503 and 504 of the Act, 42 U.S.C. §§ 7661a, 7661b and 7661c; the regulations at 40 C.F.R. Part 70, including, but not limited to, 40 C.F.R. §§ 70.1(b), 70.5(a), (b) and (c), and 70.6 and 70.7(b); and the Illinois Title V provisions at 415 ILCS 5/39.5.

FCCU Wet Electrostatic Precipitator

155. Since November 11, 2008, CITGO has failed to submit a timely and complete Title V permit application for the Lemont refinery with information pertaining to the modification described in Paragraphs 109 - 115 and with information concerning all applicable requirements, including, but not limited to, the requirement to apply, install and operate BACT for PM, and SO_3 and also failed to supplement or correct the Title V permit applications in violation of Sections 502, 503 and 504 of the Act, 42 U.S.C. §§ 7661a,7661b and 7661c; the regulations at 40 C.F.R. Part 70, including, but not limited to, 40 C.F.R. §§ 70.1(b), 70.5(a), (b) and (c), and 70.6 and 70.7(b); and the Illinois Title V provisions at 415 ILCS 5/39.5.

Sulfur Recovery Plant-Exceedance of CO Emissions

156. Since January 2006, CITGO has failed to submit a timely and complete Title V permit application for the Lemont refinery with information pertaining to the modification described in Paragraphs 116 - 122 and with information concerning all applicable requirements, including, but not limited to, the requirement to apply, install and operate BACT for CO and also failed to supplement or correct the Title V permit applications in violation of Sections 502, 503 and 504 of the Act, 42 U.S.C. §§ 7661a,7661b and 7661c; the regulations at 40 C.F.R. Part 70, including, but not limited to, 40 C.F.R. §§ 70.1(b), 70.5(a), (b) and (c), and 70.6 and 70.7(b); and the Illinois Title V provisions at 415 ILCS 5/39.5.

157. From 2005 to 2009, CITGO exceeded both the monthly and yearly CO emission rates at the SRU, in violation of Permit Condition 7.5.6 of Permits 96030079 and 01030085.

F. Enforcement Provisions

158. Sections 113(a)(1) and (3) of the Act, 42 U.S.C. § 7413(a)(1) and (3), provide that the Administrator may bring a civil action in accordance with Section 113(b) of the Act, 42 U.S.C. § 7413(b), whenever, on the basis of any information available to the Administrator, the Administrator finds that any person has violated or is in violation of any requirement or prohibition of, *inter alia*, the PSD requirements of Part C of Title I of the Act, 42 U.S.C. §§ 7470-7492, and regulations thereunder, including 40 C.F.R. § 52.21; Part D of Title I of the Act, §§ 7501-7515, and regulations thereunder, including 40 C.F.R. Part 51, § 51.165 and App. S; Section 111 of the Act, and regulations thereunder, including 40 C.F.R. Part 60, and Subparts A and J; Section 112 of the Act, and regulations thereunder, including 40 C.F.R. Part 63, Subpart H; Title V of the Act, 42 U.S.C. §§ 7661-7661f, or any regulation or permit issued thereunder; and the PSD and NA NSR provisions of the Illinois SIP. *See also* 40 C.F.R. § 52.23.

159. Section 113(b) of the Act, 42 U.S.C. § 7413(b), authorizes the Administrator to initiate a judicial enforcement action for a permanent or temporary injunction, and/or for a civil penalty of up to $25,000 per day for each violation occurring on or before January 30, 1997; up to $27,500 per day for each such violation occurring on or after January 31, 1997 and up to and including March 15, 2004; up to $32,500 per day for each such violation occurring on or after March 16, 2004 through January 12, 2009; and up to $37,500 per day for each such violation occurring on or after January 13, 2009, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990, 28 U.S.C. § 2461, as amended by 31 U.S.C. § 3701, 40 C.F.R. § 19.4, and 74 Fed. Reg. 626 (Jan. 7, 2009) against any person whenever such person has violated, or is in violation of, *inter alia,* the requirements or prohibitions described in the preceding paragraph.

160. Section 167 of the Act, 42 U.S.C. § 7477, authorizes the Administrator to initiate an action for injunctive relief, as necessary to prevent the construction, modification or operation of a major emitting facility which does not conform to the PSD requirements in Part C of the Act.

161. Section 167 of the Act, 42 U.S.C. § 7477, authorizes the Administrator to initiate an action for injunctive relief, as necessary to prevent the construction, modification or operation of a major emitting facility which does not conform to the non-attainment NSR requirements in Part D of the Act.

9/30/11

Date

Cheryl L. Newton
Director
Air and Radiation Division

CERTIFICATE OF MAILING

I, Tracy Jamison, certify that I sent a Notice and Finding of Violation, No. EPA-5-11-IL-10, by Certified Mail, Return Receipt Requested, to:

Claude Harmon
Manager HSS&E
CITGO Petroleum Corporation
135th Street and New Avenue
Lemont, Illinois 60439

I also certify that I sent copies of the Notice of Violation and Finding of Violation by first-class mail to:

Ray Pilapil, Manager
Compliance and Systems Management Section
Illinois Environmental Protection Agency
1021 North Grand Avenue
Springfield, Illinois 62702

On the 30 day of September 2011.

CERTIFIED MAIL RECEIPT NUMBER: 7009 1680 0000 7673 8613

Tracy Jamison,
Office Automation Assistant
AECAB, PAS