***United States, et al. v. WRB Refining LP, et al.* (S.D. Ill.)**
Consent Decree

APPENDIX A

FLARING MINIMIZATION AND EFFICIENCY

WHEREAS WRB/P66 has completed and is implementing a Flare Management Plan ("FMP") pursuant to 40 CFR Part 60, Subpart Ja, "Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007";

WHEREAS all Covered Flares (as defined in this Appendix) are currently subject to Subpart Ja and will be subject to 40 C.F.R. Part 63, Subpart CC ("Subpart CC");

WHEREAS because the HP-2 Flare has an appropriate volatile organic compound ("VOC") limit in a federally-enforceable construction permit and because WRB/P66 has agreed to subject the HP-2 Flare to the requirements of Subpart CC pursuant to Paragraph A25, the HP-2 Flare is not a "Covered Flare" under this Appendix A;

WHEREAS WRB/P66 completed a capital project in 2015 to install a chiller system at the propylene loading operation and thereby reduced Waste Gas routed to the North Property Flare;

WHEREAS WRB/P66 completed a capital project in 2015 to install a pressure control system on the Benzene Extraction Unit water still vessel thereby reducing Waste Gas purging to the Alkylation Flare;

WHEREAS WRB/P66 has installed and is operating Flare Gas Recovery Systems identified in Paragraph A10;

Part A: Complying with Not-Yet-Effective New Subpart CC Requirements

A1. Complying with the Not-Yet-Effective, December 1, 2015 Provisions of 40 C.F.R. Part 63, Subpart CC.

a. Throughout this Appendix, WRB/P66 is required to implement and comply with numerous provisions of Subpart CC that EPA promulgated as final agency action on December 1, 2015. 80 Fed. Reg. 75,178 (Dec. 1, 2015). The effective date of those provisions, however, has not yet occurred. Therefore, except as set forth in the following sentence, for purposes of complying with the Subpart CC provisions referenced in this Appendix A, WRB/P66 shall comply with the referenced provision as it was promulgated on December 1, 2015, even if that provision is stayed, vacated, or withdrawn before its effective date. However, to the extent that, from the Date of Lodging of this Consent Decree until its termination, final, effective revisions to the referenced provisions are adopted that are different from the terms and conditions as published in the Federal Register on December 1, 2015, WRB/P66 shall comply with the final, effective regulations by no later than the relevant effective date.

b. If EPA provides publicly-available guidance clarifying how a particular provision of a referenced requirement of Subpart CC should be implemented or will be enforced, EPA will rely on that guidance in interpreting this Appendix A.

Part B: Definitions

A2. 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. "Available for Operation" shall mean, with respect to a Compressor within a Flare Gas Recovery System, that a 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 a 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.

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

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

e. "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.

f. "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.

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

- Alkylation
- Aromatics North
- Aromatics South
- Coker North
- Distilling East
- Low Sulfur Gasoline
- North Property
- Distilling West Flare

h. "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.

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

j. "Flare Gas Recovery System" or "FGRS" shall mean a system of one or more compressors, piping, and associated Flare Seal 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.

k. "Flare Seal" shall mean any sealing device (*i.e.*, liquid seal, rupture pin or disk, or other similar device) that is 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.

l. "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.

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

n. "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, WRB/P66 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.

o. "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, WRB/P66 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.

p. "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 fifteen-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 fifteen-minute block average) exceeds the capacity of the operating Compressor(s).

q. "Non-Recoverable Gases" shall mean the following specific gases that are not recoverable by a Flare Gas Recovery System:

i. Supplemental and Purge Gas introduced between a Flare Seal and a Flare tip;

ii. Hydrogen vented from a pressure swing absorber, steam methane reformer (hydrogen plant), or catalytic reformer;

iii. Hydrogen that must bypass an FGRS in order to reestablish hydrogen balance in the event that hydrogen demand declines or stops rapidly;

iv. Excess fuel gas and excess gases generated during the process of Shutdown, in turnaround, or during the process of Startup, caused by a gas imbalance that cannot be consumed by fuel gas consumers in the refinery because there is not a sufficient demand for the gas, provided that, when the excess gas is routed around an FGRS, no natural gas in excess of that needed in order to maintain adequate gas pressure to

prevent burners from pressure tripping is being supplied to the fuel gas mix drum;

v. Nitrogen vented from purges of process units that are in the process of Shutdown, are in turnaround, or are in the process of Startup; and

vi. Nitrogen vented from purges of operating process units that are in a partial refinery turnaround scenario that causes the specific gravity of the fuel gas at the exit of the mix drum to fall below 0.45.

r. "Operating Design Capacity" shall mean the design capacity, in kscfh, of each flare gas recovery Compressor listed in Paragraph A10.

s. "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.

t. "Potentially Recoverable Gas" shall mean Flare Sweep Gas, Flare Supplemental Gas (unless introduced after a Flare Seal), and/or Waste Gas directed to a Covered Flare's or group of Covered Flares' FGRS and that does not meet the definition of "Non-Recoverable Gases."

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

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

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

x. "Steam-Assisted Flare" shall mean a Flare that utilizes steam piped to a Flare tip to assist in combustion. The Steam-Assisted Flares at the Wood River Refinery are the following:

- Alkylation
- Aromatics North
- Aromatics South
- Coker North
- Distilling East
- Low Sulfur Gasoline
- North Property

y. "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 Flare Sweep Gas and Flare Purge Gas that is necessary to perform the functions of Flare Sweep Gas and Flare 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 Flare 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 Appendix A depicts the meaning of "Waste Gas," together with its relation to other gases associated with Flares.

A3. For purposes of this Appendix A, the following terms shall have the definitions set forth in 40 C.F.R. § 63.641:

- Assist Air
- Assist Steam
- Center Steam (illustrated in App. A1.1)
- Combustion Zone
- Combustion Zone Gas
- Flare
- Flare Purge Gas
- Flare Sweep Gas
- Flare Supplemental Gas
- Flare Vent Gas
- Lower Steam (illustrated in App. A1.1)
- Net Heating Value
- Perimeter Assist Air
- Pilot Gas
- Premix Assist Air
- Total Steam
- Upper Steam (illustrated in App. A1.1)

Part C: Flaring Limitations and Minimization

A4. Limitation on Flaring at the Wood River Refinery: Initial Limit.

a. On and after the following dates, WRB/P66 shall comply with the following limitation on flaring from all Covered Flares. Any Portable Flare that accepts Waste Gases normally routed to a Covered Flare shall also be subject to Parts C and D of Appendix A to this Decree.

i. Refinery-Wide 365-day Rolling Average. By no later than January 1, 2018, WRB/P66 shall comply with the following Refinery-wide, limit: 1,674,767 scfd of Waste Gas on a

365-day rolling average basis, rolled daily. Consistent with A.4(a)(ii) and assuming the Wood River Refinery is In Operation every calendar day of 2018, the first complete 365-day average compliance period shall end on December 31, 2018.

ii. The 365-day rolling average period shall include the prior 365 days during which any Covered Flare was In Operation for any portion of the day.

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 A4.a.i was calculated using the equation set forth in Subparagraph A5.a. Appendix A2.1 sets forth the actual calculation. The "*Wood River Refinery 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 WRB/P66 submitted to the Energy Information Agency ("EIA") for the 2016 report year. The value reported was 336,000 barrels per calendar day. A copy of that Form is included in Appendix A2.1. The "*Wood River Refinery Complexity*" and "*Industry Avg Complexity*" were calculated pursuant to the methodology set forth in Appendix A1.14.

A5. Limitation on Flaring at the Wood River Refinery: Requesting an Increase in the Limit.

a. WRB/P66 Request. Once per calendar year commencing no sooner than January 1, 2020, WRB/P66 may submit a request to EPA to increase the limitation on flaring set forth in Subparagraph A4.a.i. In any such request, WRB/P66 shall propose a new limit (hereafter referred to as "New Limit Based on Projections") based upon the following equation:

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

Nothing in this Paragraph or Consent Decree shall be construed to relieve WRB/P66 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 Wood River Refinery.

b. For purposes of Subparagraph A5.a, the following shall apply:

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

ii. The *Wood River Refinery 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 2016 (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. *Wood River Refinery Complexity* shall be calculated in accordance with Equation 1 of Appendix A1.14. WRB/P66 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 A5.a on the basis of consistency with that Subparagraph. If EPA does not act on WRB/P66's request within 90 days of submission, WRB/P66 may invoke the accelerated dispute resolution provisions of Subsection XII.B of the 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 WRB/P66's favor or the date(s) specified in the modification permit(s).

e. In the event that WRB/P66 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 A5.a in a manner that affects the limit(s) calculation(s), WRB/P66 shall, within 15 days of amending, modifying, or withdrawing its air permit application(s), revise or withdraw its request under Subparagraph A5.a. To the extent

that WRB/P66 revises, rather than withdraws, its request under Subparagraph A5.a, the 90-day deadline under Subparagraph A5.c for EPA's response to the revised request shall commence upon the date of EPA's receipt of WRB/P66'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, WRB/P66 shall determine whether the projected "*Wood River Refinery Crude Capacity*" or the projected capacities for new or modified units that WRB/P66 relied upon pursuant to Subparagraphs A5.b.ii and/or b.iii, respectively, were or are different from the actual capacities that WRB/P66 has or will report to the EIA or the Oil & Gas Journal after the Startup of the permitted modification. If there are differences, WRB/P66 shall re-calculate the flaring limitation using the actual capacities that WRB/P66 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 WRB/P66 calculates under Subparagraph A5.f.i is greater than the New Limit Based on Projections that WRB/P66 calculated under Subparagraph A5.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 WRB/P66 calculates under Subparagraph A5.f.i is less than the New Limit Based on Projections that WRB/P66 calculated under Subparagraph A5.a, then by no later than 30 days after the Startup of the permitted modifications, WRB/P66 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, WRB/P66 shall consult with EPA about the New Limit Based on Actuals and secure EPA's approval.

iv. Stipulated Penalties. If Subparagraph A5.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 A5.f.iii*(2)* shall apply and form the basis for determining compliance for purposes of the stipulated penalty provisions of Subparagraph 111.a of the main body of the Consent Decree. 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 WRB/P66 or a dispute is resolved that sets forth a revised limitation.

g. For purposes of including this Paragraph A5 in a permit that will survive termination under Paragraph 85.b of the Consent Decree, WRB/P66 shall not have to include any provision of this Paragraph A5 that relates to submitting the request to increase the limit to EPA or having EPA approve the increase. The air permitting agency of the State of Illinois is the agency authorized to respond to a WRB/P66 application to increase the limit in accordance with the formula in Paragraph A5.a after the Consent Decree is terminated and the limit exists in a non-Title V, federally enforceable permit.

A6. Limitations on Flaring at WRB/P66: 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 A4.a.i, and any revised limitation on flaring developed pursuant to Paragraph A5, the following shall apply:

a. To the extent that WRB/P66 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 WRB/P66 does not include in a computation, WRB/P66 shall submit the following information in the semi-annual report due under Part J 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.

A7. Monitoring Systems Requirements for Implementation of Part C of this Appendix A. No later than the Date of Lodging, for each Covered Flare, WRB/P66 shall install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the volumetric flow rate of Flare Vent Gas (which includes Waste, Sweep, Purge, and any Flare Supplemental Gas used) in the header or headers that feed each Covered Flare. Different flow monitoring methods may be used to measure different gaseous streams that make up the Flare Vent Gas provided that the flow rates of all gas streams that contribute to the Flare Vent Gas are determined.

A8. Waste Gas Mapping for Alkylation and North Property Flares. By no later than one year after the Date of Entry, using instrumentation, isotopic tracing, and/or engineering calculations, WRB/P66 shall identify and estimate the flow from each process unit header (sometimes referred to as a "subheader") to the main header(s) servicing the Alkylation and North Property Flares. Using that information and all other available information, WRB/P66 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 Alkylation and North Property Flares and/or process unit header(s) are not required to be included in the mapping. WRB/P66 will evaluate the results of the Waste Gas Mapping together with the FMP, in order to determine any additional possible reductions and/or opportunities to reuse gases otherwise routed to the Alkylation and/or North Property Flares as Flare Vent Gas.

A9. Determining Whether a Liquid Flare Seal is Receiving Potentially Recoverable Gas Flow. For a Covered Flare that has a liquid Flare Seal, if all of the following conditions are met, then the Covered Flare is not receiving Potentially Recoverable Gas flow:

a. For the liquid Flare Seal associated with the Covered Flare, the pressure difference between the inlet pressure and the outlet pressure is less than the liquid seal pressure as set by the static head of liquid between the opening of the dip tube in the drum and the level-setting weir in the drum;

b. For the liquid seal drum associated with the respective Covered Flare, the liquid level in the drum is at the level of the weir for a horizontal drum or at the overflow pipe for a vertical drum; and

c. Downstream of the liquid Flare Seal, there is no flow of Flare Supplemental Gas directed to the Covered Flare.

Part D: Flare Gas Recovery Systems

A10. Flare Gas Recovery Systems: Capacity. WRB/P66 shall continue to operate the following existing FGRSs:

Compressor /FGRS ID	Covered Flares	No. of Compressors	Operating Design Capacity (kscfh at suction)
C-69031 C-69300 C-69301 C-69302 C-69303	Aromatics South Aromatics North	5	1 at 167 (C-69031) 4 at 58.3 ea (401 total)
C-35400 C-35401	Coker North	2	58.3 ea (117 total)
C-17720 C-17721 C-17722 C-17723	Distilling West	4	104 ea (416 total)
C-7733 C-81075	Distilling East Low Sulfur Gasoline North Property	2	104 ea (208 total)

A11. Flare Minimization Project. By no later than June 30, 2019, WRB/P66 shall complete a project to install the equipment necessary to tie-in the flare headers of the Alkylation, Distilling East, and North Property Flares to enable Compressors C-7733 and C-81075 to be utilized, when capacity exists, for gas that otherwise would be directed to the Alkylation Flare. The project shall include the installation of control valves and a new natural gas purge supply and flow meter; the replacement of the motor of C-81075 with a higher horsepower unit; and the modification, as necessary, of various additional piping and seal vessel(s) to enable the Alkylation, Distilling East, and North Property Flares to effectively operate as a combined system.

A12. Flare Gas Recovery Systems: Operation.

a. General. WRB/P66 shall operate each FGRS identified in Paragraph A10 in a manner to minimize Waste Gas to the respective Covered Flares while ensuring safe refinery operations. WRB/P66 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 FGRSs identified in Paragraph A10, WRB/P66 shall comply with the following requirements when Potentially Recoverable Gas is being generated:

i. Distilling East/Low Sulfur Gasoline/North Property (two Compressor system): WRB/P66 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 this 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.

ii. Coker North (two Compressor system): WRB/P66 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.

iii. Distilling West Flare Gas Recovery System (four Compressor system): WRB/P66 shall have three Compressors Available for Operation and/or in operation 95% of the time and two Compressors Available for Operation and/or in operation at all times. The following periods may be included in the amount of time that WRB/P66 shall have three Compressors Available for Operation and/or in operation "95% of the time" and two Compressors Available for Operation and/or in operation "at all times": Periods in which the four Distilling West Compressors are shut down due to the routine-maintenance, consolidated shutdowns of the Distilling West Coker unit and the Distilling West Crude units (at which time there is no place to send the gas recovered by the Compressors).

iv. Aromatics North/Aromatics South Flare Gas Recovery System (five Compressor system): WRB/P66 shall have four Compressors Available for Operation and/or in operation 95% of the time and three Compressors Available for Operation and/or in operation at all times. When the Aromatics South Flare Gas Recovery Compressor (C-69031) is shut down for planned maintenance, all other Compressors shall be Available for Operation. WRB/P66 shall use best efforts to maximize the availability of the Aromatics South Flare Gas Recovery Compressor (C-69031).

c. "At all times" Requirement. The following periods may be included in the amount of time that a Compressor is Available for Operation when determining compliance with the requirement to have two Compressors (for the Distilling West FGRS) and three Compressors (for the Aromatic North/Aromatics South FGRS) Available for Operation

and/or in operation "at all times": Periods in which the two (for the Distilling West FGRS) or the three (for the Aromatics North/Aromatics South) Compressors are shut down (including the subsequent restart) due to operating conditions (such as high temperatures or large quantities of entrained liquid in the Vent Gas) outside the design operating range of the FGRSs, including the associated knock out drum(s), such that the outage is necessary for safety and/or to preserve the mechanical integrity of the FGRS. By no later than 45 days after any such period of unplanned outage, WRB/P66 shall investigate the root cause and all contributing causes of the outage and shall implement, as expeditiously as practicable, corrective action, if any, to prevent a recurrence of the cause(s). In the reports due under Section VIII of this Decree, WRB/P66 shall describe each outage that occurred under the conditions identified in this Subparagraph, including the date, duration, cause(s), corrective action, and the status of the implementation of corrective action.

d. Period to be Used for Computing Percentage of Time. For purposes of calculating compliance with the 90%, 95%, and 98% of time that all Compressors must be Available for Operation and/or in operation, as required by Subparagraph A12.b, the period to be used shall be an 8760-hour rolling sum, rolled hourly, using all prior 8760 hours except for the following:

i. Hours when 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 were generated during all or part of the hour; and

ii. Hours when no Potentially Recoverable Gas was generated during an entire hour.

Part E: Flare Combustion Efficiency

A13. Subject Flares. The Alkylation and North Property Flares shall be subject to Parts E and F of Appendix A to this Decree. Any Portable Flare that accepts Waste Gas normally routed to the Alkylation or North Property Flares shall also comply with all requirements of Parts E and F of Appendix A to this Decree by no later than the date that the Portable Flare begins to receive Waste Gas in lieu of the Alkylation or North Property Flares.

A14. General Emission Standards Applicable to Alkylation Flare and North Property Flare. For the Alkylation and North Property Flares, by no later than the Date of Lodging, WRB/P66 shall comply with the requirements set forth in this Paragraph at all times when the Alkylation and/or North Property Flare is In Operation.

a. Operation during Flare Vent Gas Venting. WRB/P66 shall operate the Alkylation and North Property Flares at all times when Flare Vent Gas may be vented to it.

b. Pilot Flame Presence. WRB/P66 shall comply with the requirements of 40 C.F.R. § 63.670(b).

c. Visible Emissions Limitations. WRB/P66 shall comply with the requirements of 40 C.F.R. § 63.670(c).

d. Flare Tip Velocity. WRB/P66 shall comply with the requirements of 40 C.F.R. § 63.670(d).

e. Monitoring According to Applicable Provisions. WRB/P66 shall comply with all applicable Subparts of 40 C.F.R. Parts 60, 61, and 63 which state how a particular Flare must be monitored.

f. Good Air Pollution Control Practices. At all times, including during periods of Startup, Shutdown, and/or Malfunction, WRB/P66 shall implement good air pollution control practices to minimize emissions from the Alkylation and North Property Flares; provided however, that WRB/P66 shall not be in violation of this requirement for any practice that this Consent Decree requires WRB/P66 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.

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 Paragraph.

A15. Combustion Zone Net Heating Value Standard. By no later than the Date of Lodging, at any time that Flare Supplemental Gas, Flare Sweep Gas, and/or Waste Gas is routed to the Alkylation and/or the North Property Flares for at least 15 minutes, WRB/P66 shall operate the Flare to maintain the NHV_{cz} at or above 270 BTU/scf. WRB/P66 shall monitor and calculate NHV_{cz} using the averaging period in and the requirements of 40 C.F.R. § 63.670(m), "*Calculation methods for determining combustion zone net heating value.*"

A16. Recordkeeping: Timing and Substance. For the Alkylation and North Property Flares, WRB/P66 shall comply with the following recordkeeping requirements:

a. By no later than the Date of Lodging, WRB/P66 shall calculate and record each of the following parameters:

i. Volumetric flow rates of all gas streams that contribute to the Flare Vent Gas volumetric flow rate (in scfm) (in 15-minute block averages and in accordance with any applicable calculation requirements of 40 C.F.R. § 63.670(i));

ii. Assist Steam volumetric flow rate (in scfm) (in 15-minute block averages and in accordance with any applicable calculation requirements of 40 C.F.R. § 63.670(i));

iii. NHV_{vg} (in BTU/scf) (in 15-minute block averages in accordance with 40 C.F.R. § 63.670(l));

iv. NHV_{cz} (in BTU/scf) (in 15-minute block averages in accordance with 40 C.F.R. § 63.670(m)).

b. By no later than the Date of Lodging, for compliance with the standards in Paragraphs A14 and A15, at any time that WRB/P66 deviates from those standards, WRB/P66 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 WRB/P66 took.

Part F: Instrumentation and Monitoring Systems for Combustion Efficiency

A17. Flare Data and Monitoring Systems and Protocol Report ("Flare Data and Monitoring Systems and Protocol Report"). For the Alkylation and North Property Flares, by no later than July 31, 2019, WRB/P66 shall submit a report (which may be included in the semi-annual report due under Section VIII of the Consent Decree), 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; and

b. A detailed description of each instrument and piece of monitoring equipment, including the specific model and manufacturer, that WRB/P66 has installed or will install in compliance with Paragraphs A6, A18, and A19 of this Appendix (Paragraphs 8–9 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).

A18. Flare Vent Gas and Assist Steam Monitoring Systems for the Alkylation and North Property Flares.

a. For the Alkylation and North Property Flares, by no later than the Date of Lodging (except as set forth in Subparagraph A18.b), WRB/P66 shall comply with the requirements of 40 C.F.R. § 63.670(i).

b. For the Assist Steam monitoring systems, WRB/P66 may postpone, until January 30, 2019, compliance with the flow measurement accuracy specifications, including temperature and pressure compensation, found at 40 C.F.R. §§ 63.670(i) and 63.671(a)(1) and Table 13 of Subpart CC. For the period between the Date of Lodging

and January 30, 2019, WRB/P66 shall ensure an accuracy level as high as reasonably possible for the Assist Steam monitoring systems.

A19. Steam Control Equipment. For the Alkylation and North Property Flares, by no later than the Date of Lodging, WRB/P66 shall install steam control equipment, including, as necessary, main and trim control valves and piping, that enables WRB/P66 to control Assist Steam flow in a manner sufficient to ensure compliance with this Appendix A.

A20. Video Camera. By no later than the Date of Lodging, WRB/P66 shall install a video camera capable of recording, in digital format, the flame of and any Visible Emissions from, the Alkylation and North Property Flares.

A21. Flare Vent Gas Compositional Monitoring or Direct Monitoring of Net Heating Value of Flare Vent Gas.

a. For the Alkylation and North Property Flares, by no later than the Date of Lodging (except as set forth in Subparagraph A21.b), WRB/P66 shall comply with the requirements of 40 C.F.R. § 63.670(j).

b. For Flare Vent Gas compositional monitoring, WRB/P66 may postpone, until January 30, 2019, compliance with the Vent Gas composition accuracy, sample conditioning, and individual component calibration/speciation specification found at 40 C.F.R. §§ 63.670(j), 63.671(a)(1), 63.671(e), and Table 13 of Subpart CC. For the period between December 31, 2017, and January 30, 2019, WRB/P66 shall ensure an accuracy level as high as reasonably possible for the Flare Vent Gas compositional monitoring.

A22. Instrumentation and Monitoring Systems: Specifications, Calibration, Quality Control, and Maintenance.

a. By the deadlines set forth in Paragraphs A18 and A21, the instrumentation and monitoring systems required therein shall 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 and the Continuous Parameter Monitoring System ("CPMS") requirements of 40 C.F.R. § 63.671(a).

b. WRB/P66 shall operate, maintain, and calibrate each instrumentation and monitoring system identified in Paragraphs A18 and A21 according to a CPMS monitoring plan that contains the information listed in 40 C.F.R. § 63.671(b)(1) through (5).

c. For each instrumentation and monitoring system identified in Paragraphs A18 and A21, WRB/P66 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).

d. All monitoring systems that fall under the monitoring method in 40 C.F.R. § 63.670(j)(1) must also meet the requirements of 40 C.F.R. § 63.671(e)(1) through (3).

A23. Instrumentation and Monitoring Systems: Recording and Averaging Times. The instrumentation and monitoring systems identified in Paragraphs A18, A20, and A21 shall be able to produce and record data measurements and calculations for each parameter at the intervals specified in 40 C.F.R. §§ 63.671(a)(3) and 63.670(h)(2).

Instrumentation and Monitoring System	Recording and Averaging Times
Flare Vent Gas (including Waste, Flare Sweep, Flare Purge, and Flare Supplemental) and Assist Steam Flow Monitoring Systems	40 C.F.R. § 63.671(a)(3)
Flare Vent Gas Compositional Monitoring	
Flare Vent Gas Net Heating Value Analyzer	
Video Camera	40 C.F.R. § 63.670(h)(2)

Nothing in this Paragraph is intended to prohibit WRB/P66 from setting up process control logic that uses different averaging times from those referred to in this table provided that the recording and averaging times referred to in this table are available and used for determining compliance with this Consent Decree.

A24. 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), WRB/P66 shall operate each of the instruments and monitoring systems required in Paragraphs A18, A20, and A21 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.

Part G: Compliance with 40 C.F.R. Part 63, Subpart CC for Flares Other than the Alkylation and North Property Flares

A25. On or before January 30, 2019, WRB/P66 shall comply with the requirements of 40 C.F.R Part 63, Subpart CC, at the Aromatics North, Aromatics South, Coker North, Distilling East, Low Sulfur Gasoline, Distilling West, and HP2 Flares.

Part H: Upgrade of Steam-Assisted Flares for Cold Weather Events

A26. By no later than December 31, 2018, WRB/P66 shall evaluate each Steam-Assisted Flare for sufficient steam trap capacity to each Steam-Assisted Flare stack and upgrade as necessary to prevent ice blockage in the flare's header during cold weather events.

Part I: Recordkeeping

A27. WRB/P66 shall keep all records to document compliance with the requirements of this Appendix in accordance with Section XIII (Information Collection and Retention) of this Consent Decree. All records will be retained until one year after termination of this Consent Decree, except for data recorded by any video camera required pursuant to Paragraph A20, which will be retained for one year from the date of recording. Upon request by EPA, WRB/P66 shall make all such documents available to EPA.

Part J: Reporting

A28. Compliance Status Reports. In the reports due under Section VIII (Recordkeeping and Reporting) of this Consent Decree, WRB/P66 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. A description of the evaluation undertaken pursuant to Paragraph A26 and the upgrades made (if any) (this description is required only in the first compliance status report due under the Consent Decree);

d. Monitoring equipment/instrument downtime; exceedances of emission standards; and compliance with compressor availability requirements; as described in Paragraph A29;

e. For the semi-annual report due on August 30 of each year, annual emissions data, as described in Paragraph A30;

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

g. Any additional matters that WRB/P66 believes should be brought to the attention of EPA.

A29. Monitoring Instrument/Equipment Downtime; Failure to Meet Emission Standards; Compliance with Compressor Availability Requirements. On and after the date of applicability of any standard, in the reports due under Section VIII (Recordkeeping and Reporting) WRB/P66 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 A18, A20, and A21 expressed as both an absolute number and a percentage of time the Covered Flare 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 A15 was not applicable because Flare Supplemental, Flare Sweep, and/or Waste Gas was/were not being vented to the Flare for at least 15 minutes; for purposes of Subparagraph A29.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 that the Alkylation and/or the North Property Flare was receiving Flare Supplemental, Flare Sweep, and/or Waste Gas for at least 15 minutes, of a failure to meet the emission standard in Paragraph A15; 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 A6.b, the information required in Subparagraph A6.c;

   ii. An identification of each calendar day in which the limitation on flaring set forth in Paragraph A4 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. Sufficient information to document compliance with the Compressor availability requirements of Subparagraph A12.b. For any period of non-compliance, WRB/P66 shall identify the date, cause, and corrective action taken.

A30. Emissions Data. In the semi-annual report that is submitted on July 31 of each year, WRB/P66 shall provide, for each Covered Flare, 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, and methane.

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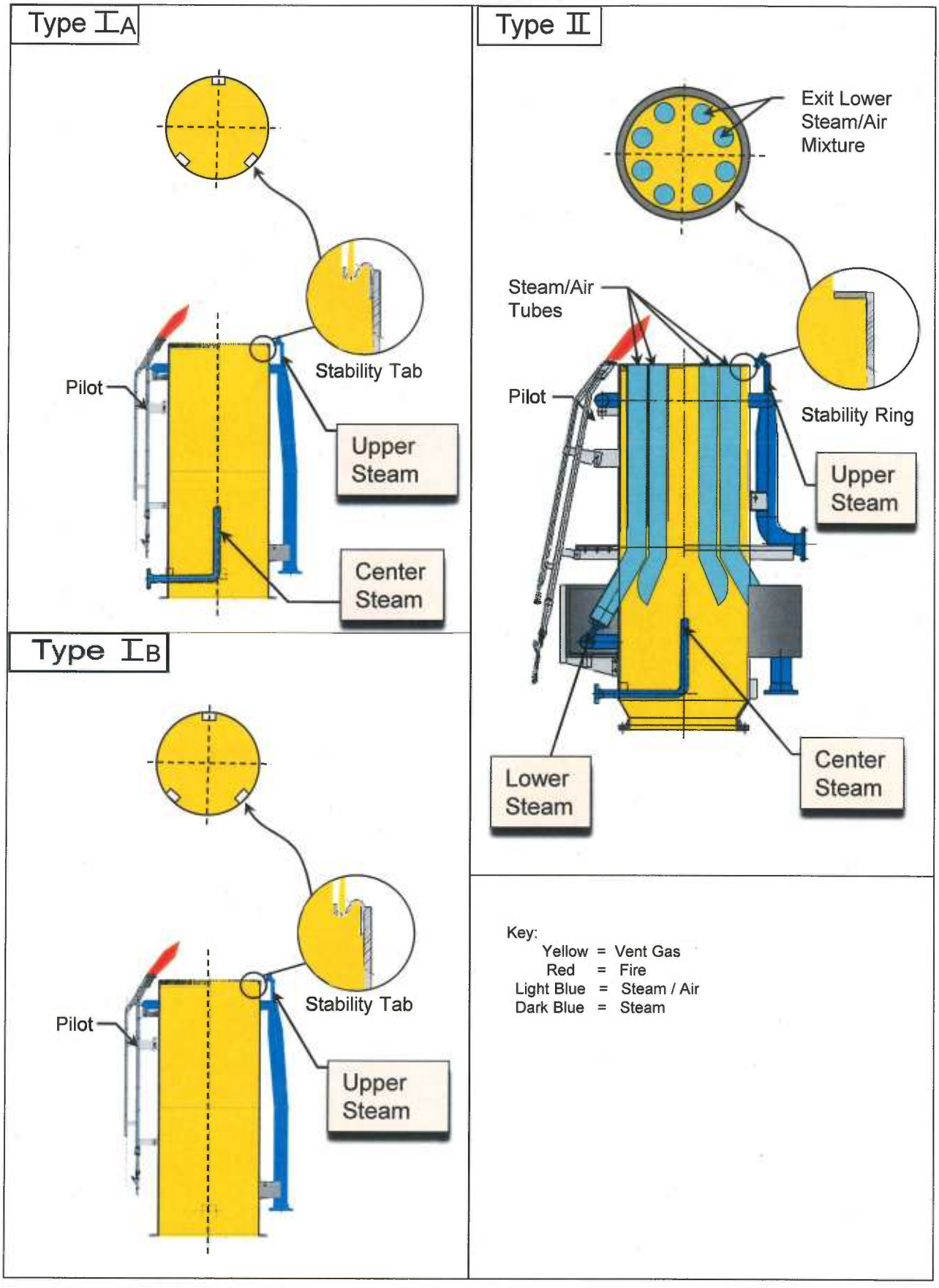
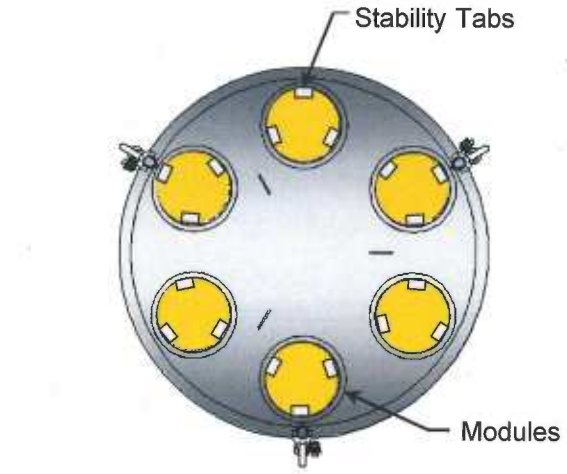
APPENDIX A1.1

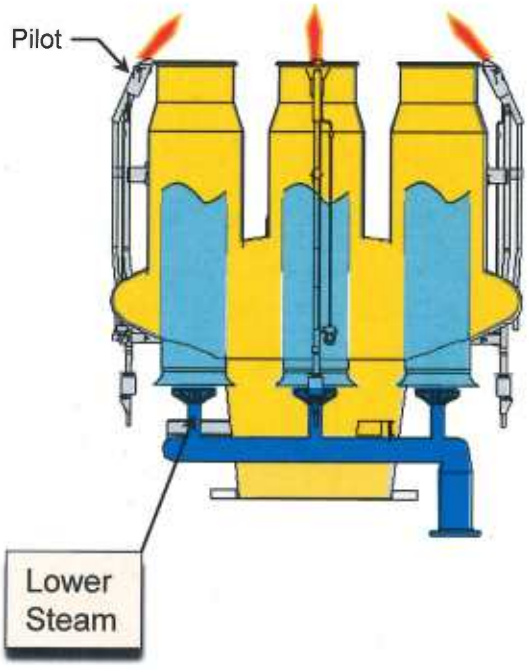
Appendix A1.1



Appendix A1.1

Type III





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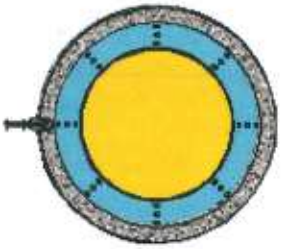

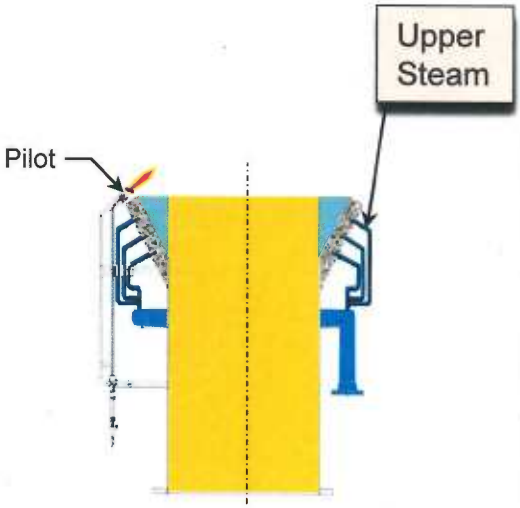

Key:

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

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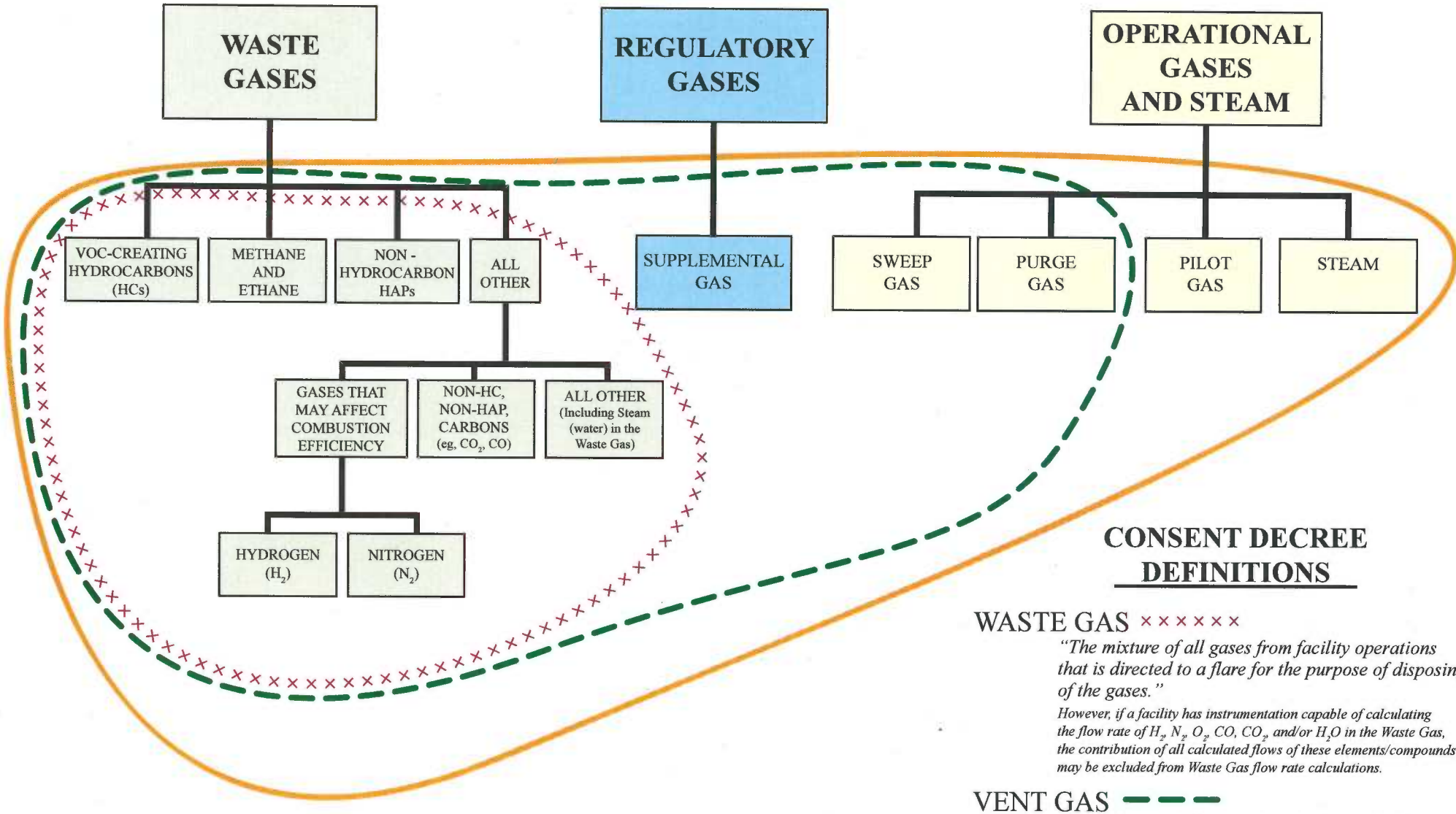
APPENDIX A1.7

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."

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APPENDIX A1.8

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

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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

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APPENDIX A1.11

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.

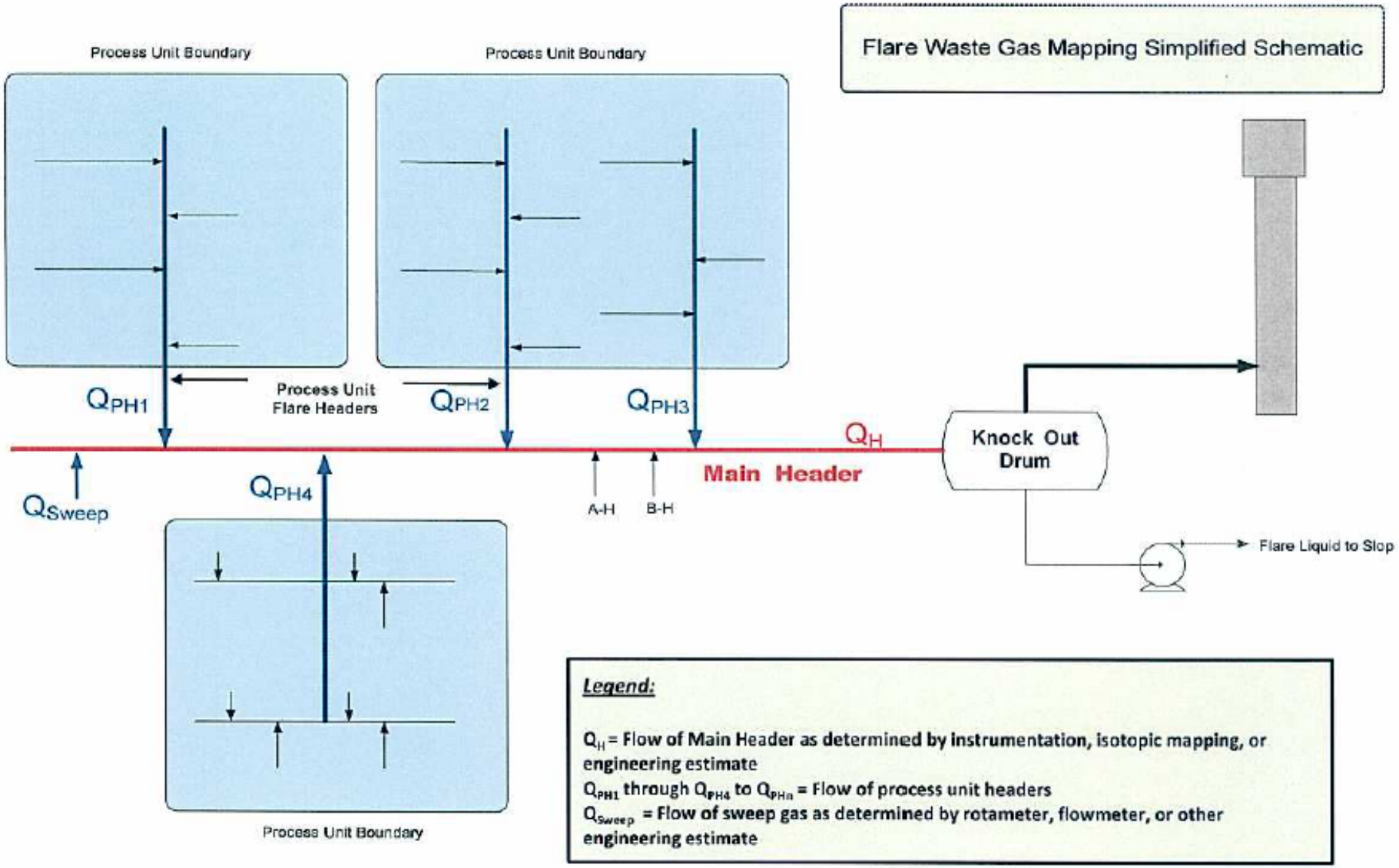
Flare Waste Gas Mapping Simplified Schematic
Process Unit Boundary
Process Unit Boundary
Process Unit Flare Headers
QPH1
QPH2
QPH3
QH
Main Header
Knock Out Drum
QSweep
QPH4
A-H
B-H
Flare Liquid to Slop
Process Unit Boundary
Legend:
QH = Flow of Main Header as determined by instrumentation, isotopic mapping, 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

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APPENDIX A1.13

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 Wood River 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]

United States, et al. v. WRB Refining LP, et al. (S.D. Ill)
Consent Decree

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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. If the O&GJ Refining Survey for the year prior to the year of the Applicable EIA Annual Refinery Publication does not have the capacity for a specific process, then the "Applicable O&GJ Refining Survey" shall mean the most recent survey that did include that information.

> *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 October 2016, the most recent Annual EIA Refinery Publication *(i.e.*, the one from June of 2016) is found at http://www.eia.gov/petroleum/refinerycapacity. A printout of this publication is Attachment 1 to this Appendix A1.14.

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"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.

"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:

[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 2016. 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 2016 will be used.

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		(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.

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, 2016, is 3,385,049 barrels per calendar day. See Attachment 1 at page 2 (blue 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 2016 is 9,073,285 barrels per stream day. See id. at page 1 (green highlight). This figure would be converted to 8,619,621 barrels per calendar day (9,073,285 x .95).

[3] Total Operable US Atmospheric Crude Oil Distillation Capacity (total $ICAP_{DIST}$) as of January 1, 2016, is 18,317,036 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

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	2011	2012	2013	2014	2015	2016	View History
Number of Operable Refineries								
Total Number of Operable Refineries	☐	148	144	143	142	140	141	1982-2016
Operating	☐	137	134	139	139	137	139	1982-2016
Idle	☐	11	10	4	3	3	2	1982-2016
Atmospheric Crude Oil Distillation Capacity								
Operable (Barrels per Calendar Day)	☐	17,736,370	17,322,178	17,823,659	17,924,630	17,967,088	18,317,036	1982-2016
Operating	☐	16,937,024	16,744,291	16,775,658	17,730,200	17,767,588	18,165,136	1982-2016
Idle	☐	799,346	577,887	1,048,001	194,430	199,500	151,900	1982-2016
Operable (Barrels per Stream Day)	☐	18,953,189	18,560,350	18,971,643	19,064,210	19,134,102	19,507,602	1982-2016
Operating	☐	18,109,882	17,945,443	17,863,443	18,853,210	18,916,102	19,345,102	1982-2016
Idle	☐	843,307	614,907	1,108,200	211,000	218,000	162,500	1982-2016
Downstream Charge Capacity (Barrels per Stream Day)								
Vacuum Distillation	☐	8,650,243	8,679,643	8,938,093	8,987,443	8,979,485	9,073,285	1982-2016
Thermal Cracking	☐	2,672,376	2,763,356	2,877,456	2,958,556	2,974,508	2,983,265	1982-2016
Total Coking	☐	2,645,776	2,736,756	2,850,856	2,931,956	2,947,908	2,956,665	1987-2016
Delayed Coking	☐	2,486,876	2,577,856	2,691,956	2,773,056	2,789,008	2,797,765	1987-2016
Fluid Coking	☐	158,900	158,900	158,900	158,900	158,900	158,900	1987-2016
Visbreaking	☐	16,000	16,000	16,000	16,000	16,000	16,000	1987-2016
Other (Including Gas Oil)	☐	10,600	10,600	10,600	10,600	10,600	10,600	1987-2016
Catalytic Cracking - Fresh Feed	☐	6,219,721	6,032,512	6,089,366	6,031,866	6,012,478	6,052,183	1982-2016
Catalytic Cracking - Recycle Feed	☐	95,640	84,890	84,390	75,890	75,890	75,690	1982-2016
Catalytic Hydro-Cracking	☐	1,855,600	1,879,600	2,080,700	2,208,231	2,305,400	2,317,600	1982-2016
Distillate	☐	540,100	596,500	621,300	686,131	687,000	687,400	2004-2016
Gas Oil	☐	1,170,500	1,161,100	1,337,400	1,400,100	1,491,400	1,503,200	2004-2016
Residual	☐	145,000	122,000	122,000	122,000	127,000	127,000	2004-2016
Catalytic Reforming	☐	3,720,613	3,641,813	3,758,347	3,759,323	3,740,763	3,743,063	1982-2016
Low Pressure	☐	2,390,950	2,347,850	2,486,550	2,541,250	2,615,750	2,658,740	1987-2016
High Pressure	☐	1,329,663	1,293,963	1,271,797	1,218,073	1,125,013	1,084,323	1987-2016
Catalytic Hydrotreating/Desulfurization	☐	16,682,897	16,565,262	16,860,186	17,094,540	17,323,829	17,482,804	1982-2016
Naphtha/Reformer Feed	☐	4,441,323	4,360,593	4,522,347	4,564,683	4,595,573	4,614,073	1987-2016
Gasoline	☐	2,578,782	2,519,082	2,582,182	2,639,235	2,727,384	2,773,434	2004-2016
Heavy Gas Oil	☐	2,809,298	2,877,138	2,895,938	2,949,638	2,972,438	2,971,838	1987-2016
Distillate Fuel Oil	☐	6,113,846	6,063,001	6,237,071	6,348,036	6,420,486	6,508,211	1987-2016
Kerosene/Jet Fuel	☐	1,484,850	1,489,750	1,544,850	1,539,250	1,563,850	1,570,850	2004-2016
Diesel Fuel	☐	3,917,611	3,981,411	4,108,581	4,251,931	4,297,181	4,375,906	2004-2016
Other Distillate	☐	711,385	591,840	583,640	556,855	559,455	561,455	2004-2016
Residual Fuel Oil/Other	☐	739,648	745,448	622,648	592,948	607,948	615,248	1987-2016
Residual Fuel Oil								

		241,000	246,000	246,000	246,000	246,000	246,000	2004-2016
Other		498,648	499,448	376,648	346,948	361,948	369,248	2004-2016
Fuels Solvent Deasphalting		382,750	374,550	367,550	369,550	370,050	370,550	1987-2016
Downstream Charge Capacity (Barrels per Calendar Day)								
Catalytic Reforming		3,346,457	3,246,874	3,405,017	3,419,407	3,392,641	3,385,049	2010-2016
Total Coking		2,396,787	2,499,293	2,596,369	2,686,917	2,686,299	2,650,839	1987-2016
Catalytic Cracking - Fresh Feed		5,794,214	5,611,191	5,681,643	5,616,015	5,583,169	5,596,552	1987-2016
Catalytic Hydro-Cracking		1,687,745	1,706,540	1,887,024	2,034,689	2,123,431	2,121,715	1987-2016

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: 06/22/2016
Next Release Date: 06/30/2017

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	2011	2012	2013	2014	2015	2016	View History
Alkylate		1,262,443	1,246,875	1,269,361	1,266,352	1,267,246	1,286,012	1982-2016
Aromatics		297,311	296,911	317,511	296,511	316,411	323,275	1982-2016
Asphalt & Road Oil		828,003	795,687	740,587	743,987	709,987	732,587	1982-2016
Isomers		703,042	687,860	736,913	738,580	757,286	755,245	1982-2016
Isobutane		213,449	191,467	191,760	192,960	189,346	192,085	1982-2016
Isopentane & Isohexane		487,993	494,793	544,953	545,420	567,740	562,960	1982-2016
Isooctane		1,600	1,600	200	200	200	200	2009-2016
Lubricants		242,840	242,340	240,740	240,240	265,340	273,140	1982-2016
Marketable Petroleum Coke		778,114	823,090	867,139	882,931	887,478	889,491	1982-2016
Hydrogen (Million Cu. Ft. per Day)		3,082	3,215	3,047	3,094	3,102	2,997	1982-2016
Sulfur (Short Tons per Day)		35,483	36,663	39,478	41,375	41,266	41,343	1987-2016

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: 06/22/2016
Next Release Date: 06/30/2017

APPENDIX A1.14

ATTACHMENT 2

Independent Statistics & Analysis
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 2016

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: 5546800119

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

Company Name: WRB Refing LP
Doing Business As:
Site Name: Wood River Refinery
Terminal Control Number (TCN):

Physical Address (e.g., Street Address, Building Number, Floor, Suite):
900 S. Central
City Roxana **State:** IL **Zip:** 62084 -

Mailing Address of Contact (e.g., PO Box, RR): If the physical and mailing addresses are the same, only complete the physical address.
PO Box 76
City Roxana **State:** IL **Zip:** 62084 -

Contact Name: Larry Barringer
Phone No.: (618) 255-2942 **Ext:**
Fax No.: (618) 255-3771
Email address: larry.l.barringer@p66.com

PART 2. SUBMISSION/RESUBMISSION INFORMATION

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

A completed form must be received by February 16th 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)

Ultra-low Sulfur Diesel Hydrotreater stream day capacity increased approximately 1000 BPD.

Independent Statistics & Analysis
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 2016

EIA ID NUMBER: 5546800119 **RESUBMISSION:**

PART 3. FUEL, ELECTRICITY, AND STEAM PURCHASED & CONSUMED AT THE REFINERY DURING 2015

Item	Code	Quantity Used As Fuel or Feedstock	Item	Code	Quantity Used as Fuel
Natural Gas (million standard cubic feet):			Coal (thousand short tons)	109	
Fuel	105	13220	Purchased Electricity (million kWh)	114	1380
Hydrogen Feedstock	107	8499	Purchased Steam (million pounds)	113	

PART 4. REFINERY RECEIPTS OF CRUDE OIL BY METHOD OF TRANSPORTATION DURING 2015 (Thousand Barrels)

Source	Code	Pipelines	Tankers	Barges	Tank Cars	Trucks	Total[1]
Domestic	010	41913					41913
Foreign	020	65746					65746

[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 2015.

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
2016: Operating	399	314000	330000
Idle	400	22000	23000
Total Operable	401	336000	353000
2017: Operable	501		353000

[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 2016.

Independent Statistics & Analysis
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 2016

EIA ID NUMBER: 5546800119 **RESUBMISSION:**

PART 6. DOWNSTREAM CHARGE CAPACITY AS OF JANUARY 1

Downstream Charge Capacity	Code	2016 Barrels per Calendar Day	2016 Barrels per Stream Day	2017 Barrels per Stream Day
Vacuum Distillation	402		196500	196500
Thermal Cracking:				
Visbreaking	403		0	0
Fluid Coking (incl. Flexicoking)	404	0	0	0
Delayed Coking	405	75000	83000	83000
Other (incl. Gas Oil)	406		0	0
Catalytic Cracking:				
Fresh Feed	407	91000	101000	101000
Recycled	408		0	0
Catalytic Hydrocracking:				
Distillate	439	0	0	0
Gas Oil	440	49000	54000	54000
Residual	441	0	0	0
Desulfurization (including Catalytic Hydrotreating):				
Naphtha/Reformer Feed	426		84300	84300
Gasoline	420		74000	74000
Kerosene and Jet	421		53250	53250
Diesel Fuel	422		56300	56300
Other Distillate	423		0	0
Residual	424		0	0
Heavy Gas Oil	413		0	0
Other	425		0	0
Catalytic Reforming:				
Low Pressure	430	72000	79700	79700
High Pressure	431	0	0	0
Fuels Solvent Deasphalting	432		0	0

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

Production Capacity	Code	2016 Barrels per Stream Day	2017 Barrels per Stream Day
Alkylates	415	21800	21800
Aromatics	437	4500	4500
Asphalt and Road Oil	931	23000	23000
Isobutane (C4)	644	0	0
Isopentane (C5), Isohexane (C6)	438	0	0
Isooctane (C8)	635	0	0
Lubricants	854	0	0
Petroleum Coke - Marketable	021	27900	27900
Hydrogen (million cubic ft. per day)	091	190	190
Sulfur (short tons per day)	435	1008	1008

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								Production capacity, b/cd								
			Vacuum distillation	Coking	Thermal operations	Catalytic cracking	Catalytic reforming	Catalytic hydrocracking	Catalytic hydrotreating	Alkylation	Pol./Dim.	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 (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	328,984	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	1,194,673	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	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**

United States, et al. v. WRB Refining LP, et al. (S.D. Ill)
Consent Decree

APPENDIX A2.1

APPENDIX A2.1
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*
Wood River, Roxana, IL	EIA/O&GJ (b/cd)[1]	336,000	11.13	11.16	0.997	1,674,767

Notes:

[1] Data in barrels per calendar day (b/cd) are shown on the next page. US capacities as of 1/1/2016 as taken from US EIA report "U.S. Number and Capacity of Petroleum Refineries" (published 6/22/2016) were used preferentially. See Attachment 1 to this Appendix A2.1, along with the corresponding Wood River Refinery capacities as of 1/1/2016 submitted by Wood River Refinery on Form EIA-820 Annual Refinery Report Parts 5, 6, and 7. See Attachment 2 to this Appendix A2.1. 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 Wood River Refinery. See Attachment 3 of this Appendix A2.1. 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 A2.1
Methodology for Calculating Refinery Flaring Limitation

Process	*Nelson Complexity Factor*	*Wood River Refinery Capacity as of 1/1/2016*		*U.S. Capacity as of 1/1/2016*	
		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	336,000	Part 5, Wood River Refinery's 2016 EIA-820, b/cd	18,317,036	EIA Website 2016 Data – No. and Cap., b/cd
Vacuum Distillation	1.30	186,675	Part 6, Wood River Refinery's 2016 EIA-820, b/sd*0.95	8,619,621	EIA Website 2016 Data – No. and Cap., b/sd*0.95
Coking	7.50	75,000	Part 6, Wood River Refinery's 2016 EIA-820, b/cd	2,650,839	EIA Website 2016 Data – No. and Cap., b/cd
Catalytic Cracking - Fresh Feed	6.00	91,000	Part 6, Wood River Refinery's 2016 EIA-820, b/cd	5,596,552	EIA Website 2016 Data – No. and Cap., b/cd
Catalytic Cracking - Recycle Feed	6.00	0	Part 6, Wood River Refinery's 2016 EIA-820, b/sd*0.9	68,121	EIA Website 2016 Data – No. and Cap., b/sd*0.9
Reforming	5.00	72,000	Part 6, Wood River Refinery's 2016 EIA-820, b/cd	3,385,049	EIA Website 2016 Data – No. and Cap., b/cd
Hydrocracking[4]	8.00	49,000	Part 6, Wood River Refinery's 2016 EIA-820, b/cd	2,121,715	EIA Website 2016 Data – No. and Cap., b/cd
Hydrotreating	2.50	241,065	Part 6, Wood River Refinery's 2016 EIA-820, b/sd*0.9	15,734,524	EIA Website 2016 Data – No. and Cap., b/sd*0.9
Alkylates	10.00	19,620	Part 7, Wood River Refinery's 2016 EIA-820, b/sd*0.9	1,157,411	EIA Website 2016 Data – Prod. Cap., bb/sd*0.9
Hydrogen (mmcfd)	1000	171	Part 7, Wood River Refinery's 2016 EIA-820, b/sd*0.9	2,697	EIA Website 2016 Data – Prod. Cap., bb/sd*0.9
Sulfur (short tons/day)	240.00	907	Part 7, Wood River Refinery's 2016 EIA-820, b/sd*0.9	37,209	EIA Website 2016 Data – Prod. Cap., bb/sd*0.9
Thermal Processes (Visbreaking)[4]	2.75	0	Part 6, Refinery's 2016 EIA-820, b/sd*0.9	14,400	EIA Website 2016 Data – No. and Cap., b/sd*0.9
Polymerization[4]	10.00	0	O&GJ (12/1/2014), "Worldwide Refining", p. 49, b/cd	69,770	O&GJ (12/1/2014), WW Refining - Capacities b/cd
Aromatics	20.00	4,050	Part 7, Wood River Refinery's 2016 EIA-820, b/sd*0.9	290,948	EIA Website 2016 Data – Prod. Cap., bb/sd*0.9
Isomerization[4]	3.00	0	Part 7, Wood River Refinery's 2016 EIA-820, b/sd*0.9	679,500	EIA Website 2016 Data – Prod. Cap., bb/sd*0.9
Oxygenates[4]	10.00	0	O&GJ (12/1/2014), "Worldwide Refining", p. 49, b/cd	29,650	O&GJ (12/1/2014), WW Refining - Capacities b/cd
Lubes[4]	60.00	0	Part 7, Wood River Refinery's 2016 EIA-820, b/sd*0.9	245,826	EIA Website 2016 Data – Prod. Cap., bb/sd*0.9
Asphalt	1.50	20,700	Part 7, Wood River Refinery's 2016 EIA-820, b/sd*0.9	659,328	EIA Website 2016 Data – Prod. Cap., bb/sd*0.9
Complexity		**11.13**		**11.16**	

Notes:

[1] Capacities in barrels per calendar day (b/cd) are shown. US capacities as of 1/1/2016 from US EIA reports "U.S. Number and Capacity of Petroleum Refineries" and "Production Capacity of Operable Petroleum Refineries" (published 6/22/2016 and available at www.eia.gov) were used preferentially, along with the corresponding Wood River Refinery charge capacities as of 1/1/2016 submitted by Wood River 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 Wood River 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 A2.1.
"Worldwide Refining". WRB Refining LLC - Wood River Refinery data on p. 49. See also Attachment 4 of this Appendix A2.1

[3] Part 5, 6, or 7, Wood River Refinery 2016 EIA-820 = U.S. Energy Information Administration Form EIA-820 submitted by Wood River Refinery. See Attachment 2 of this Appendix A2.1.

[4] Process not at Wood River Refinery in 2016

[5] EIA Website 2016 Data – No. and Cap. = U.S. Energy Information Administration Website (www.eia.gov), "Number and Capacity of Petroleum Refineries" for the Year 2016. See Attachment 1 of this Appendix A2.1

[6] EIA Website 2016 Data – Prod. Cap. = U.S. Energy Information Administration "Production Capacity of Operable Petroleum Refineries" for the year 2016. See Attachment 1 of this Appendix A2.1

APPENDIX A2.1

ATTACHMENT 1

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	2011	2012	2013	2014	2015	2016	View History
Number of Operable Refineries								
Total Number of Operable Refineries	☐	148	144	143	142	140	141	1982-2016
Operating	☐	137	134	139	139	137	139	1982-2016
Idle	☐	11	10	4	3	3	2	1982-2016
Atmospheric Crude Oil Distillation Capacity								
Operable (Barrels per Calendar Day)	☐	17,736,370	17,322,178	17,823,659	17,924,630	17,967,088	18,317,036	1982-2016
Operating	☐	16,937,024	16,744,291	16,775,658	17,730,200	17,767,588	18,165,136	1982-2016
Idle	☐	799,346	577,887	1,048,001	194,430	199,500	151,900	1982-2016
Operable (Barrels per Stream Day)	☐	18,953,189	18,560,350	18,971,643	19,064,210	19,134,102	19,507,602	1982-2016
Operating	☐	18,109,882	17,945,443	17,863,443	18,853,210	18,916,102	19,345,102	1982-2016
Idle	☐	843,307	614,907	1,108,200	211,000	218,000	162,500	1982-2016
Downstream Charge Capacity (Barrels per Stream Day)								
Vacuum Distillation	☐	8,650,243	8,679,643	8,938,093	8,987,443	8,979,485	9,073,285	1982-2016
Thermal Cracking	☐	2,672,376	2,763,356	2,877,456	2,958,556	2,974,508	2,983,265	1982-2016
Total Coking	☐	2,645,776	2,736,756	2,850,856	2,931,956	2,947,908	2,956,665	1987-2016
Delayed Coking	☐	2,486,876	2,577,856	2,691,956	2,773,056	2,789,008	2,797,765	1987-2016
Fluid Coking	☐	158,900	158,900	158,900	158,900	158,900	158,900	1987-2016
Visbreaking	☐	16,000	16,000	16,000	16,000	16,000	16,000	1987-2016
Other (Including Gas Oil)	☐	10,600	10,600	10,600	10,600	10,600	10,600	1987-2016
Catalytic Cracking - Fresh Feed	☐	6,219,721	6,032,512	6,089,366	6,031,866	6,012,478	6,052,183	1982-2016
Catalytic Cracking - Recycle Feed	☐	95,640	84,890	84,390	75,890	75,890	75,690	1982-2016
Catalytic Hydro-Cracking	☐	1,855,600	1,879,600	2,080,700	2,208,231	2,305,400	2,317,600	1982-2016
Distillate	☐	540,100	596,500	621,300	686,131	687,000	687,400	2004-2016
Gas Oil	☐	1,170,500	1,161,100	1,337,400	1,400,100	1,491,400	1,503,200	2004-2016
Residual	☐	145,000	122,000	122,000	122,000	127,000	127,000	2004-2016
Catalytic Reforming	☐	3,720,613	3,641,813	3,758,347	3,759,323	3,740,763	3,743,063	1982-2016
Low Pressure	☐	2,390,950	2,347,850	2,486,550	2,541,250	2,615,750	2,658,740	1987-2016
High Pressure	☐	1,329,663	1,293,963	1,271,797	1,218,073	1,125,013	1,084,323	1987-2016
Catalytic Hydrotreating/Desulfurization	☐	16,682,897	16,565,262	16,860,186	17,094,540	17,323,829	17,482,804	1982-2016
Naphtha/Reformer Feed	☐	4,441,323	4,360,593	4,522,347	4,564,683	4,595,573	4,614,073	1987-2016
Gasoline	☐	2,578,782	2,519,082	2,582,182	2,639,235	2,727,384	2,773,434	2004-2016
Heavy Gas Oil	☐	2,809,298	2,877,138	2,895,938	2,949,638	2,972,438	2,971,838	1987-2016
Distillate Fuel Oil	☐	6,113,846	6,063,001	6,237,071	6,348,036	6,420,486	6,508,211	1987-2016
Kerosene/Jet Fuel	☐	1,484,850	1,489,750	1,544,850	1,539,250	1,563,850	1,570,850	2004-2016
Diesel Fuel	☐	3,917,611	3,981,411	4,108,581	4,251,931	4,297,181	4,375,906	2004-2016
Other Distillate	☐	711,385	591,840	583,640	556,855	559,455	561,455	2004-2016
Residual Fuel Oil/Other	☐	739,648	745,448	622,648	592,948	607,948	615,248	1987-2016
Residual Fuel Oil								

	☐	241,000	246,000	246,000	246,000	246,000	246,000	2004-2016
Other	☐	498,648	499,448	376,648	346,948	361,948	369,248	2004-2016
Fuels Solvent Deasphalting	☐	382,750	374,550	367,550	369,550	370,050	370,550	1987-2016
Downstream Charge Capacity (Barrels per Calendar Day)								
Catalytic Reforming	☐	3,346,457	3,246,874	3,405,017	3,419,407	3,392,641	3,385,049	2010-2016
Total Coking	☐	2,396,787	2,499,293	2,596,369	2,686,917	2,686,299	2,650,839	1987-2016
Catalytic Cracking - Fresh Feed	☐	5,794,214	5,611,191	5,681,643	5,616,015	5,583,169	5,596,552	1987-2016
Catalytic Hydro-Cracking	☐	1,687,745	1,706,540	1,887,024	2,034,689	2,123,431	2,121,715	1987-2016

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: 06/22/2016
Next Release Date: 06/30/2017

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	2011	2012	2013	2014	2015	2016	View History
Alkylate		1,262,443	1,246,875	1,269,361	1,266,352	1,267,246	1,286,012	1982-2016
Aromatics		297,311	296,911	317,511	296,511	316,411	323,275	1982-2016
Asphalt & Road Oil		828,003	795,687	740,587	743,987	709,987	732,587	1982-2016
Isomers		703,042	687,860	736,913	738,580	757,286	755,245	1982-2016
Isobutane		213,449	191,467	191,760	192,960	189,346	192,085	1982-2016
Isopentane & Isohexane		487,993	494,793	544,953	545,420	567,740	562,960	1982-2016
Isooctane		1,600	1,600	200	200	200	200	2009-2016
Lubricants		242,840	242,340	240,740	240,240	265,340	273,140	1982-2016
Marketable Petroleum Coke		778,114	823,090	867,139	882,931	887,478	889,491	1982-2016
Hydrogen (Million Cu. Ft. per Day)		3,082	3,215	3,047	3,094	3,102	2,997	1982-2016
Sulfur (Short Tons per Day)		35,483	36,663	39,478	41,375	41,266	41,343	1987-2016

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: 06/22/2016
Next Release Date: 06/30/2017

APPENDIX A2.1

ATTACHMENT 2

Independent Statistics & Analysis
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 2016

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: 5546800119

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

Company Name: WRB Refing LP
Doing Business As:
Site Name: Wood River Refinery
Terminal Control Number (TCN):

Physical Address (e.g., Street Address, Building Number, Floor, Suite):
900 S. Central
City Roxana **State:** IL **Zip:** 62084 -

Mailing Address of Contact (e.g., PO Box, RR): If the physical and mailing addresses are the same, only complete the physical address.
PO Box 76
City Roxana **State:** IL **Zip:** 62084 -

Contact Name: Larry Barringer
Phone No.: (618) 255-2942 **Ext:**
Fax No.: (618) 255-3771
Email address: larry.l.barringer@p66.com

PART 2. SUBMISSION/RESUBMISSION INFORMATION

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

A completed form must be received by February 16th 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)

Ultra-low Sulfur Diesel Hydrotreater stream day capacity increased approximately 1000 BPD.

Independent Statistics & Analysis
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 2016

EIA ID NUMBER: 5546800119 **RESUBMISSION:**

PART 3. FUEL, ELECTRICITY, AND STEAM PURCHASED & CONSUMED AT THE REFINERY DURING 2015

Item	Code	Quantity Used As Fuel or Feedstock	Item	Code	Quantity Used as Fuel
Natural Gas (million standard cubic feet):			Coal (thousand short tons)	109	
Fuel	105	13220	Purchased Electricity (million kWh)	114	1380
Hydrogen Feedstock	107	8499	Purchased Steam (million pounds)	113	

PART 4. REFINERY RECEIPTS OF CRUDE OIL BY METHOD OF TRANSPORTATION DURING 2015 (Thousand Barrels)

Source	Code	Pipelines	Tankers	Barges	Tank Cars	Trucks	Total[1]
Domestic	010	41913					41913
Foreign	020	65746					65746

[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 2015.

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
2016: Operating	399	314000	330000
Idle	400	22000	23000
Total Operable	401	336000	353000
2017: Operable	501		353000

[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 2016.

Independent Statistics & Analysis
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 2016

EIA ID NUMBER: 5546800119 **RESUBMISSION:**

PART 6. DOWNSTREAM CHARGE CAPACITY AS OF JANUARY 1

Downstream Charge Capacity	Code	2016 Barrels per Calendar Day	2016 Barrels per Stream Day	2017 Barrels per Stream Day
Vacuum Distillation	402		196500	196500
Thermal Cracking:				
Visbreaking	403		0	0
Fluid Coking (incl. Flexicoking)	404	0	0	0
Delayed Coking	405	75000	83000	83000
Other (incl. Gas Oil)	406		0	0
Catalytic Cracking:				
Fresh Feed	407	91000	101000	101000
Recycled	408		0	0
Catalytic Hydrocracking:				
Distillate	439	0	0	0
Gas Oil	440	49000	54000	54000
Residual	441	0	0	0
Desulfurization (including Catalytic Hydrotreating):				
Naphtha/Reformer Feed	426		84300	84300
Gasoline	420		74000	74000
Kerosene and Jet	421		53250	53250
Diesel Fuel	422		56300	56300
Other Distillate	423		0	0
Residual	424		0	0
Heavy Gas Oil	413		0	0
Other	425		0	0
Catalytic Reforming:				
Low Pressure	430	72000	79700	79700
High Pressure	431	0	0	0
Fuels Solvent Deasphalting	432		0	0

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

Production Capacity	Code	2016 Barrels per Stream Day	2017 Barrels per Stream Day
Alkylates	415	21800	21800
Aromatics	437	4500	4500
Asphalt and Road Oil	931	23000	23000
Isobutane (C4)	644	0	0
Isopentane (C5), Isohexane (C6)	438	0	0
Isooctane (C8)	635	0	0
Lubricants	854	0	0
Petroleum Coke - Marketable	021	27900	27900
Hydrogen (million cubic ft. per day)	091	190	190
Sulfur (short tons per day)	435	1008	1008

APPENDIX A2.1

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: Pol./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	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 (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	328,984	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	1,194,673	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	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 A2.1

ATTACHMENT 4

WORLDWIDE REFINING Company and refinery location	Charge capacity, b/cd								Production capacity, b/cd									
	Crude	Vacuum distillation	Coking	Thermal operations	Catalytic cracking	Catalytic reforming	Catalytic hydrocracking	Catalytic hydrotreating	Alkylation	Pol./Dim.	Aromatics	Isomerization	Lubes	Oxygenates	Hydrogen (MMcfd)	Coke (t/d)	Sulfur (t/d)	Asphalt
								[12]39,400										
WRB Refining LLC—Wood River	314,000	187,000	[2]75,000	—	[1]91,000	[2]72,000	[c 1]49,000	[1]76,000	[1]20,000	—	[1]4,100	—	—	—	[1]171.0	5,100	825	21,000
								[2]18,000										
								[4]48,000										
								[5]49,000										
								[12]49,000										
Total	931,000	447,650	195,100	—	297,600	226,580	78,000	773,110	78,800	—	13,230	15,200	—	—	175.5	11,846	1,924	35,500
INDIANA																		
BP PLC*—Whiting	406,600	245,575	[2]91,800	—	[1]148,500	[2]57,600	—	[1]61,200	[1]27,900	—	—	[3]23,400	—		[1]30.0	6,000	1,684	26,550
								[2]24,300										
								[3]9,900										
								[4]40,500										
								[5]107,100										
								[8]166,500										
Countrymark Cooperative Inc.—Mount Vernon	27,000	11,000	—	—	[1]7,850	[3]6,500	—	[2]10,000	[2]2,000	—	—	[3]2,200	—	—	—	—	8	3,300
								[5]11,000										
Total	433,600	256,575	91,800	–	156,350	64,100	–	430,500	29,900	–	–	25,600	–	–	30.0	6,000	1,692	29,850
KANSAS																		
Coffeyville Resources LLC—Coffeyville	115,000	46,000	[2]25,000	—	[1]36,000	[3]26,000	—	[1]36,000	[2]10,000	—	—	[3]8,500	—	—	[4]36	1,150	146	—
								[4]9,000										
								[5]57,000										
								[12]22,000										
HollyFrontier Corp.*—El Dorado	133,000	60,800	[2]17,100	—	[1]37,800	[1]27,900	—	[1]22,950	[2]12,600	—	[1]1,980	[3]13,500	—	—	[1]39.0	1,100	285	—
								[2]20,700							[4]22.0			
								[4]10,800										
								[5]49,500										
								[8]45,000										
National Cooperative Refining Assoc.—McPherson	85,000	35,400	[2]20,800	—	[1]22,700	[3]22,700	[c 4]36,400	[1]25,500	[2]7,600	—	—	[1]2,600	—	—	[1]35.9	819	123	—
								[2]10,400				[3]10,400			[4]78.4			
								[5]40,800										
Total	333,000	142,200	62,900	–	96,500	76,600	36,400	349,650	30,200	–	1,980	35,000	–	–	211.3	3,069	554	–
KENTUCKY																		
Marathon Petroleum Co. LP—Catlettsburg	242,000	115,900	—	—	[1]98,800	[3]49,900	—	[1]50,800	[2]20,000	—	[1]3,100	[3]17,100			[a 1]32.3	—	386	33,600
								[4]29,500			[4]7,100							
								[5]73,600										
								[8]101,700										
								[13]2,900										

***United States et al. v. WRB Refining LP, et al.*, (S.D. Ill.)**
Consent Decree

APPENDIX B

LEAD HAZARD REDUCTION SUPPLEMENTAL ENVIRONMENTAL PROJECT

APPENDIX B

LEAD HAZARD REDUCTION SUPPLEMENTAL ENVIRONMENTAL PROJECT

1. WRB/P66 shall implement a Lead Hazard Reduction Supplemental Environmental Project ("SEP") in accordance with the criteria, terms, and procedures specified in this Appendix B and in Section VII of the Consent Decree. This SEP is designed to reduce children's exposure to lead-based paint hazards.

2. Types of Structures Covered. The following types of structures are eligible for lead-based paint abatement under this SEP: (i) owner-occupied, low-income residences where children reside and where the owner is unable to afford lead-based paint abatement work; and (ii) "child-occupied facilities" within the meaning of 40 C.F.R. § 745.83.

> A "child-occupied facility," within the meaning of 40 C.F.R. § 745.83, means a building, or portion of a building, constructed prior to 1978, visited regularly by the same child, under 6 years of age, on at least two different days within any week (Sunday through Saturday period), provided that each day's visit lasts at least 3 hours and the combined weekly visits last at least 6 hours, and the combined annual visits last at least 60 hours. Child-occupied facilities may include, but are not limited to, day care centers, preschools and kindergarten classrooms. Child-occupied facilities may be located in target housing or in public or commercial buildings. With respect to common areas in public or commercial buildings that contain child-occupied facilities, the child-occupied facility encompasses only those common areas that are routinely used by children under age 6, such as restrooms and cafeterias. Common areas that children under age 6 only pass through, such as hallways, stairways, and garages are not included. In addition, with respect to exteriors of public or commercial buildings that contain child-occupied facilities, the child-occupied facility encompasses only the exterior sides of the building that are immediately adjacent to the child-occupied facility or the common areas routinely used by children under age 6.

2. Location of Structures. Structures eligible for lead-based paint abatement under this SEP shall be located within Madison and St. Clair Counties.

3. Targeting of Structures. WRB/P66 shall consult with the Illinois Department of Public Health (IDPH) and local public health agencies to identify structures for lead-based paint abatement work under this SEP.

4. Prioritization. Prioritization shall be given, in this order, to: (1) structures identified by IDPH and local public health agencies; (2) structures located in census tracts that show a higher rate of elevated blood lead levels in children under age 6 than the statewide average, with tracts showing the highest levels given priority; (3) structures where pregnant women or children under age 6 reside or "visit regularly" (within the meaning set forth in the first sentence of the definition, above, of "child-occupied facility").

APPENDIX B

5. Types of Abatement Work. The types of lead-based paint abatement work eligible for funding under this SEP may include, but are not limited to, the following: window replacement (including using energy efficient windows that meet EPA Energy Star criteria) and removal of PCB-containing caulk; the removal of lead-based paint and dust; the permanent enclosure or encapsulation of lead-based paint; and the replacement of lead-based painted surfaces or fixtures.

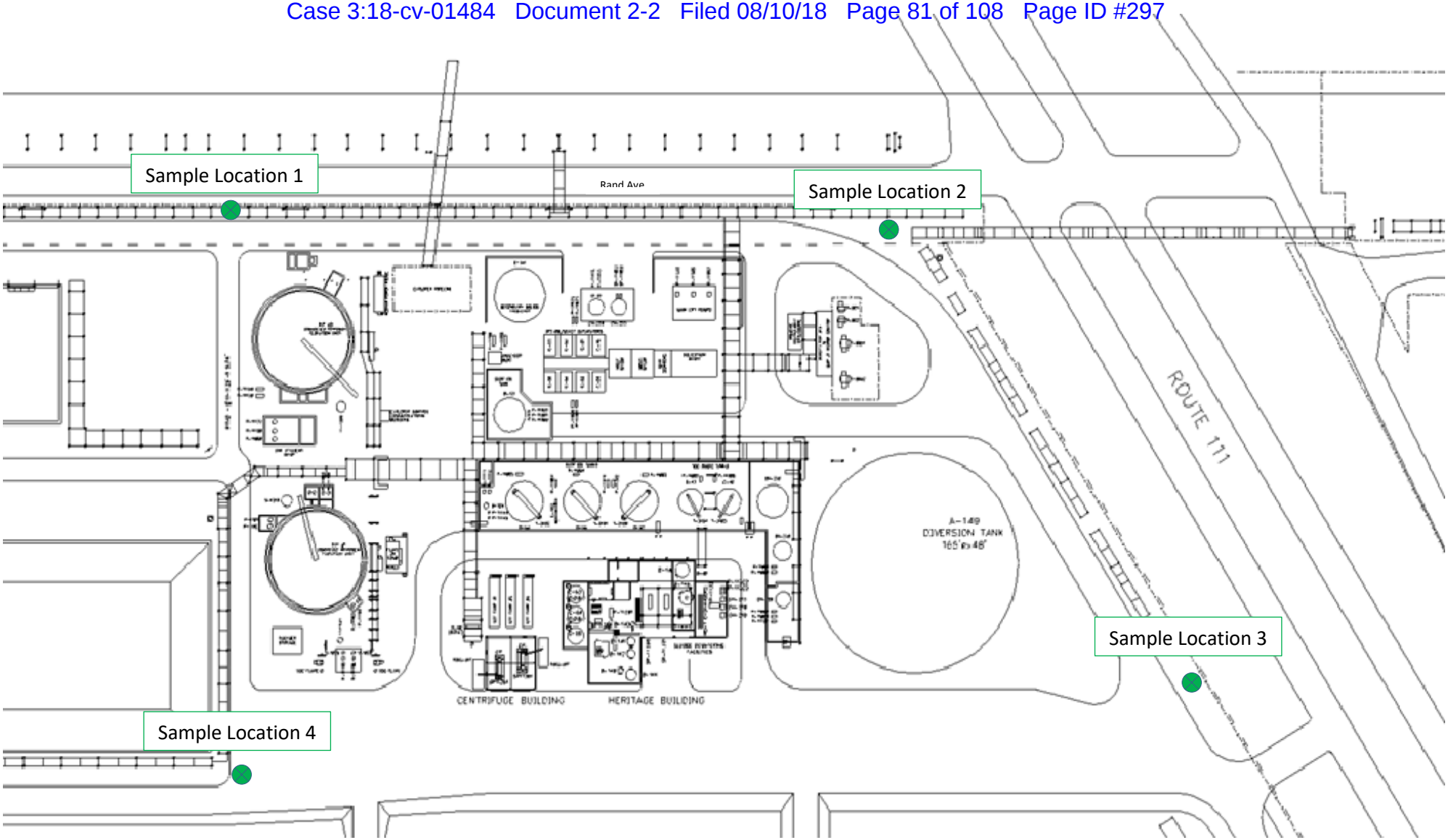
6. Use of Outside Assistance. WRB/P66 may use nonprofit organizations, contractors, and/or consultants in planning and implementing this SEP; however, WRB/P66 is responsible for the satisfactory completion of this SEP in accordance with this Consent Decree.

7. Qualifications of Contractors and/or Consultants and Work Practice and Notification Requirements. WRB/P66 shall ensure that the individuals or entity(ies) performing the work under this SEP have experience in conducting lead-based paint abatement work. WRB/P66 also shall ensure that all work performed pursuant to this SEP is conducted in accordance with all applicable federal and state work practice and notification requirements including, but not limited to, the rules promulgated by IDPH for lead poisoning prevention (including licensing) and the United States Department of Housing and Urban Development's Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing.

United States, et al. v. WRB Refining LP, et al. (S.D. Ill)
Consent Decree

APPENDIX C

MAP OF FENCE LINE MONITORING LOCATIONS


Sample Location 1
Sample Location 2
Sample Location 3
Sample Location 4
Rand Ave
ROUTE 111
A-149
DIVERSION TANK
CENTRIFUGE BUILDING
HERITAGE BUILDING

United States, et al. v. WRB Refining LP, et al. (S.D. Ill)
Consent Decree

APPENDIX D

JUNE 30, 2014 AND SEPTEMBER 29, 2014
NOTICES AND FINDINGS OF VIOLATIONS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JUN 30 2014

REPLY TO THE ATTENTION OF:

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mike D. Bechtol
Director, Environmental
Wood River Refinery
900 S. Central Ave.
Roxana, Illinois 62084

Re: Notice of Violation and Finding of Violation
WRB Refining LP
Wood River Refinery
Roxana, Illinois

Dear Mr. Bechtol:

The U.S. Environmental Protection Agency is issuing the enclosed Notice of Violation and Finding of Violation (NOV/FOV) to WRB Refining LP's Wood River Refinery ("facility" or "you") under Section 113(a)(1) of the Clean Air Act, 42 U.S.C. § 7413(a)(1). We find that you have violated the Clean Air Act ("the Act") and certain associated federal and state pollution control regulations.

Section 113 of the Act gives us several enforcement options. The options include issuing an administrative compliance order, issuing an administrative penalty order and bringing a judicial civil or criminal action.

Section 113 of the Act also 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. In addition, in order to make the conference more productive, we encourage you to submit to us information responsive to the NOV/FOV prior to the conference date.

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.

The EPA contact in this matter is Gregory Gehrig. You may call him at (312) 886-4434 to request a conference. You should make the request within 10 calendar days following receipt of this letter. We should hold any conference within 30 calendar days following receipt of this letter.

Sincerely,

George T. Czerniak
Director
Air and Radiation Division

Enclosure

cc: Eric Jones, Illinois Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:	)	
	)	
WRB Refining LP	)	**NOTICE OF VIOLATION and**
Wood River Refinery	)	**FINDING OF VIOLATION**
Roxana, Illinois	)	**EPA-5-14-IL-04**
	)	
	)	
Proceedings Pursuant to	)	
the Clean Air Act	)	
42 U.S.C. §§ 7401 et seq.	)	

NOTICE AND FINDING OF VIOLATION

WRB Refining LP owns and operates a petroleum refinery located at 900 S. Central Ave. in Roxana, Illinois, known as the Wood River Refinery (facility or refinery). WRB Refining LP is a limited partnership jointly owned by Phillips 66 and Cenovus Energy Inc. Phillips 66 is the operator and managing partner of WRB Refining LP.

The U.S. Environmental Protection Agency is sending this Notice of Violation and Finding of Violation (NOV/FOV or Notice) to notify the refinery that we have found violations of the Clean Air Act (CAA or Act) and associated federal and state regulations at 10 of the 12 flares used at the facility to control air pollution emissions generated from refinery operations. In the operation of these 10 flares, the refinery has violated certain General Provisions of both the New Source Performance Standards, 40 C.F.R. Part 60 (NSPS), and the National Emission Standards for Hazardous Air Pollutants for Source Categories, 40 C.F.R. Part 63 (NESHAPs), as well as the NSPS for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry, 40 C.F.R. Part 60, Subparts VV and VVa. WRB has also emitted pollutants at these flares in excess of emissions allowed under the Illinois State Implementation Plan (SIP).

I. Statutory and Regulatory Background

This NOV/FOV is based on the following statutory and regulatory provisions:

Clean Air Act

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

Section 111 of the Act, New Source Performance Standards

2. Section 111(b) of the Act, 42 U.S.C. § 7411(b), requires EPA to publish a list of categories of stationary sources and, within a year after the inclusion of a category of stationary sources in the list, to publish proposed regulations establishing Federal standards of performance for new sources within the source category.

3. Section 111(f) of the Act, 42 U.S.C. § 7411(f), requires the promulgation of standards of performance for new stationary sources.

4. Section 111(e) of the Act, 42 U.S.C. § 7411(e), prohibits the operation of a new source in violation of any applicable standard of performance.

NSPS General Provisions, 40 C.F.R. Part 60, Subpart A

5. EPA proposed General Provisions to the New Source Performance Standards (NSPS Subpart A) on August 17, 1971. *See* 36 Fed. Reg. 15704. EPA promulgated NSPS Subpart A on December 23, 1971. *See* 36 Fed. Reg. 24877. The subpart has been subsequently amended. NSPS Subpart A is codified at 40 C.F.R. §§ 60.1 – 60.19.

6. NSPS Subpart A at 40 C.F.R. § 60.11(d) requires that "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."

7. NSPS Subpart A at 40 C.F.R. § 60.18(c)(3)(ii) requires that flare owner/operators only combust gases that meet certain heat content specifications. For steam assisted and air assisted flares, the minimum heat content for the gases being combusted is 300 BTU/scf. For non-assisted flares, the minimum heat content for the gases being combusted is 200 BTU/scf.

NSPS for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry (SOCMI), 40 C.F.R. Part 60, Subpart VV

8. On October 18, 1983, EPA promulgated the Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for which Construction, Reconstruction, or Modification Commenced After January 5, 1981, and on or Before November 7, 2006 (NSPS Subpart VV). *See* 48 Fed. Reg. 48335. NSPS Subpart VV has been subsequently amended. The subpart is codified at 40 C.F.R. §§ 60.480 – 60.489.

9. NSPS Subpart VV at 40 C.F.R. § 60.482-10(d) provides that flares used to comply with Subpart VV must comply with 40 C.F.R. § 60.18 of Part 60, Subpart A, General Provisions.

10. NSPS Subpart VV at 40 C.F.R. § 60.482-10(e) provides that owners of control devices, including flares, that are used to comply with the requirements of Subpart VV, "shall monitor these control devices to ensure that they are operated and maintained in conformance with their designs."

NSPS for Equipment Leaks of VOC in SOCMI for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006, 40 C.F.R. Part 60, Subpart VVa

11. On November 16, 2007, EPA promulgated the Standards of Performance for Equipment Leaks of VOC in the SOCMI for which Construction, Reconstruction, or Modification Commenced After November 7, 2006 (NSPS Subpart VVa). *See* 72 Fed. Reg. 64883. NSPS Subpart VVa has been subsequently amended. The subpart is codified at 40 C.F.R. §§ 60.480a - 60.489a.

12. NSPS Subpart VVa at 40 C.F.R. § 60.482-10a(d) provides that flares used to comply with Subpart VVa must comply with 40 C.F.R. § 60.18 of Part 60, Subpart A, General Provisions.

13. NSPS Subpart VVa at 40 C.F.R. § 60.482-10a(e) provides that owners of control devices, including flares, that are used to comply with the requirements of Subpart VVa, "shall monitor these control devices to ensure that they are operated and maintained in conformance with their designs."

NSPS for Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006, 40 C.F.R. Part 60, Subpart GGGa

14. On November 16, 2007, EPA promulgated the final standards of performance for equipment leaks of volatile organic compounds (VOC) in the petroleum refining industry for which construction, reconstruction, or modification commenced after November 7, 2006 (NSPS Subpart GGGa). *See* 72 Fed. Reg. 64883. Subpart GGGa has been subsequently amended. The subpart is codified at 40 C.F.R. §§ 60.590a – 60.593a.

15. Pursuant to 40 C.F.R. § 60.592a(a), each owner or operator subject to Subpart GGGa must comply with 40 C.F.R. Part 60, Subpart VVa, at §§ 60.482-1a to 60.482-10a. Section 60.482-10a(d) requires compliance with Part 60, Subpart A, § 60.18, which sets forth requirements for flares, including exit velocity, net heating value of gas being flared, operation with no visible emissions, and monitoring to ensure compliance with design. Further, because Subpart GGGa is a NSPS subpart, the general provisions of Subpart A apply to sources subject to Subpart GGGa. Therefore, 40 C.F.R. § 60.11(d), the provision that requires compliance with good air pollution control practices for minimizing emissions, applies to sources subject to Subpart GGGa.

Section 112 of the Act, National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories

16. Section 112(b) of the Act, 42 U.S.C. § 7412(b) lists 188 Hazardous Air Pollutants (HAPs) that cause adverse health or environmental effects.

17. Section 112(d)(1) of the Act, 42 U.S.C. § 7412(d), requires EPA to promulgate regulations establishing emissions standards for each category or subcategory of major and area sources of HAPs that are listed for regulation pursuant to subsection (c) of Section 112.

18. Section 112(d)(2) of the Act requires that emission standards promulgated under Section 112(d)(1) require "the maximum degree of reduction in emissions of the hazardous air pollutants . . . that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable for new or existing sources in the category or subcategory to which such emission standard applies . . ." (hereinafter, "MACT").

NESHAP for Source Categories, General Provisions, 40 C.F.R. Part 63, Subpart A

19. On March 16, 1994, U.S. EPA promulgated the General Provisions to Part 63 at 40 C.F.R. Part 63, Subpart A, §§ 63.1 - 63.16. *See* 59 Fed. Reg. 12408. The provisions have been subsequently amended.

20. 40 C.F.R. § 63.1(a)(4)(i) provides that each standard in 40 C.F.R. Part 63 "must identify explicitly whether each provision in this subpart A is or is not included in such relevant standard."

21. 40 C.F.R. § 63.6(e)(1)(i) requires that "[a]t all times, including periods of startup, shutdown, and malfunction, the owner or operator must operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions."

22. 40 C.F.R. § 63.11(b)(6)(ii) requires that flare owner/operators only combust gases that meet certain heat content specifications. For steam assisted and air assisted flares, the minimum heat content for the gases being combusted is 300 BTU/scf. For non-assisted flares, the minimum heat content for the gases being combusted is 200 BTU/scf.

NESHAP for Petroleum Refineries, 40 C.F.R. 63, Subpart CC

23. EPA promulgated National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries (the Refinery MACT) on August 18, 1995. *See* 60 Fed. Reg. 43244. The subpart has been subsequently amended. The Refinery MACT is codified at 40 C.F.R. §§ 63.640 - 63.656.

24. 40 C.F.R. § 63.640(c) provides that for "the purpose of this subpart, the affected source shall comprise all emission points, in combination," listed at 40 C.F.R. § 63.640(c)(1) through (c)(7). These emission points include miscellaneous process vents and all equipment leaks.

25. 40 C.F.R. § 63.648(a) provides that "[e]ach owner or operator of an existing source subject to the provisions of this subpart shall comply with the provisions of 40 C.F.R. Part 60, Subpart VV . . .."

26. Table 6 to the Refinery MACT, titled "General Provisions Applicability to Subpart CC," specifically provides that Sections 63.6(e) and 63.11(b) (among others) of the General Provisions apply to affected sources under the Refinery MACT (except for "Group 2 emission points").

Illinois State Implementation Plan (Illinois SIP)

27. The Illinois SIP at Illinois Administrative Code (IAC) §§ 219.301 and 219.302 prohibit the release of volatile organic material (VOM) waste gas streams containing more than 8 pounds per hour (lb/hr) organic material unless the waste stream is reduced to less than 10 parts per million (ppm) of VOM, or treated with a device that achieves a combustion efficiency of 85% or more. 17 Ill. Reg. 16918, September 27, 1993.

II. Flare Efficiency Studies

28. In July 1983, the EPA released report "EPA 600/2-83-052," titled *Flare Efficiency Study* (1983 Flare Study). This study, partially funded by EPA and the Chemical Manufacturers Association, 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 (S/VG) 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.

The 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. In particular, several recent studies have been conducted with the use of passive Fourier transform infrared spectroscopy that verify the conclusion reached in EPA 600/2-83-052.

29. For air assisted flares, EPA, technical, and flare manufacturer documents require that an appropriate amount of air be mixed with the vent gases. As the vent gas flow increases, the air supplied for combustion and mixing must also increase. However, excess air can extinguish combustion. Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources (aka AP-42; Fifth Edition, January 1995, EPA) states in Chapter 13.5, 'The degree of combustion depends largely on the rate and extent of fuel-air mixing.'

III. Factual Allegations

30. WRB Refining LP (WRB) owns and operates the refinery. WRB is a limited partnership jointly owned by Phillips 66 and Cenovus Energy Inc. Phillips 66 is a Delaware corporation located in Houston, Texas. Cenovus Energy Inc. is a Canadian corporation located in Calgary, Canada. Phillips 66 is the operator and managing partner of WRB. The refinery operates 12 flares at the facility for the purpose of controlling air pollution emissions generated from refinery operations.

31. By letters dated August 9, 2013, September 13 and June 13, 2014, WRB provided information and documentation to EPA in response to EPA's May 3, 2013 information request. The information included a list of its flares identifying applicable regulations, flare operating documents and data for the period from January 2006 to May 2013. Although specifically requested in the May 3, 2013 information request, WRB only produced flare manufacturers' operating manuals for 3 of the 12 flares (Coker North Flare, Hydrogen Plant 2 Flare and North Property Flare). The flares and certain applicable regulations, as provided by WRB, are set forth below:

Flare	Applicable Regulation		
	NSPS GGGa	NESHAP CC	35 IAC 219.301/302
a. Alkylation Flare	X	X	X
b. Aromatics North Flare	X	X	X
c. Aromatics South Flare	X	X	X
d. Coker North Flare	X	X	X
e. Distilling Flare	X	X	X
f. Distilling West Flare	X	X	X
g. Hydrogen Plant 1 Flare			X
h. Hydrogen Plant 2 Flare	X	X	X
i. Low Sulfur Gasoline (LSG) Flare	X	X	X
j. North Property (NP) Flare	X	X	X
k. VOC Flare and Spare			X

32. WRB produced data that indicate that the refinery supplied excess steam to its flares. The refinery reduced the combustion efficiency of the following flares on a consistent basis 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. Information provided by the 1983 Flare Study indicates this prohibited condition occurs when the S/VG ratio exceeds 5.67. PFTIR testing at refineries shows that this efficiency occurs at even lower S/VG ratios. WRB operated its flares with the S/VG ratio exceeding 5.67 for the period of July 1, 2009 through May 9, 2013 as shown below:

a.	Alkylation Flare	6,267 hours
b.	Aromatics North Flare	18 hours
c.	Aromatics South Flare	46 hours
d.	Coker North Flare	72 hours
e.	Distilling Flare	34 hours
f.	Hydrogen Plant 2 Flare	14,151 hours
g.	LSG Flare	31,844 hours
h.	NP Flare	8,144 hours

33. WRB produced data that indicate the NHV values for its flares during the operating period of July 1, 2009 through May 9, 2013. At various times during that period the NHV values were below the requirement for steam-assisted or air-assisted flares of 300 BTU/scf as specified in 40 C.F.R. § 60.18(c)(3)(ii) and 40 C.F.R. § 63.11(b)(6)(ii). The refinery operated its flares below the required NHV value of 300 BTU/scf for the period of July 1, 2009 through May 9, 2013 as shown below:

a.	Alkylation Flare	237 hours
b.	Aromatics North Flare	2 hours
c.	Aromatics South Flare	21 hours
d.	Coker North Flare	25 hours
e.	Hydrogen Plant 2 Flare	258 hours

34. WRB produced data that indicate that the refinery failed to vary the addition of air to match the variations in vent gas flow at the Distilling West Flare from July 1, 2009 to May 9, 2013.

IV. Alleged Violations

NSPS

35. The refinery's failure to possess and implement flare specific or generally available documents that prescribe or recommend the amount of steam or air to add to the flare is a failure to meet the requirement to use good air pollution control practices to minimize emissions as required by 40 C.F.R. § 60.11(d). As described in Paragraphs 6, 15, 28, 29, 31, 32, and 34, these violations occurred at the following flares:

a. Alkylation Flare
b. Aromatics North Flare

c. Aromatics South Flare
d. Coker North Flare (manual produced but combustion efficiency below 85%)
e. Distilling Flare
f. Distilling West Flare
g. Hydrogen Plant 2 Flare (manual produced but combustion efficiency below 85%)
h. LSG Flare
i. NP Flare (manual produced but combustion efficiency below 85%)

36. The refinery's failure to possess and implement flare specific or generally available documents that prescribe or recommend the amount of steam or air to add to the flare is a failure to meet the requirement to monitor the control devices to ensure that they are operated and maintained in conformance with their designs as required by 40 C.F.R. § 60.482 - 10a(e). As described in Paragraphs 13, 15, and 31, these violations occurred at the following flares:

a. Alkylation Flare
b. Aromatics North Flare
c. Aromatics South Flare
d. Distilling Flare
e. Distilling West Flare
f. LSG Flare

37. The refinery's failure to operate certain flares at or above specified net heating values is a failure to meet the requirements of 40 C.F.R. § 60.18(c)(3)(ii). As described in Paragraphs 7 and 33, these violations occurred at the following flares:

a. Alkylation Flare
b. Aromatics North Flare
c. Aromatics South Flare
d. Coker North Flare
e. Hydrogen Plant 2 Flare

NESHAP for Source Categories

38. The refinery's failure to possess and implement flare specific or generally available documents that prescribe or recommend the amount of steam or air to add to the flare is a failure to meet the requirement to use good air pollution control practices to minimize emissions as required by 40 C.F.R. § 63.6(e)(1)(i). As described in Paragraphs 21, 26, 28, 29, 31, 32, and 34, these violations occurred at the following flares:

a. Alkylation Flare
b. Aromatics North Flare
c. Aromatics South Flare
d. Coker North Flare (manual produced but combustion efficiency below 85%)
e. Distilling Flare
f. Distilling West Flare
g. Hydrogen Plant 2 Flare (manual produced but combustion efficiency below 85%)
h. LSG Flare

i. NP Flare (manual produced but combustion efficiency below 85%)

39. The refinery's failure to operate certain flares at or above specified net heating values is a failure to meet the requirements of 40 C.F.R. § 63.11(b)(6)(ii). As described in Paragraphs 22, 26, 31, and 33, these violations occurred at the following flares:

a. Alkylation Flare
b. Aromatics North Flare
c. Aromatics South Flare
d. Coker North Flare
e. Hydrogen Plant 2 Flare

Illinois SIP Provisions

40. The refinery's failure to operate certain flares at a combustion efficiency at or above 85% is a failure to meet the requirements of the Illinois SIP at IAC §§ 219.301 and 219.302. As described in Paragraphs 27, 28, 29, 31, 32, and 34, these violations occurred at the following flares:

a. Alkylation Flare
b. Aromatics North Flare
c. Aromatics South Flare
d. Coker North Flare
e. Distilling Flare
f. Hydrogen Plant 2 Flare
g. LSG Flare
h. NP Flare

V. Environmental Impact of Violations

41. The above-described 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.

VI. Enforcement Provisions

42. 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 Title I of the Act, *inter alia*, the NSPS requirements of Section 111 of the Act, 42 U.S.C. § 7411, and any regulation issued thereunder; the NESHAP requirements of Section 112 of the Act, 42 U.S.C. § 7412, and any regulation issued thereunder; or the provisions of the Illinois SIP.

6/30/14
Date

George T. Czerniak
Director
Air and Radiation Division

CERTIFICATE OF MAILING

I, Loretta Shaffer, certify that I sent a Notice and Finding of Violation, No. EPA-5-14-IL-04, by Certified Mail, Return Receipt Requested, to:

Mike D. Bechtol
Director, Environmental
Wood River Refinery
900 S. Central Ave.
Roxana, Illinois 62084

I also certify that I sent copies of the Notice of Violation and Finding of Violation by first-class mail to:

Eric Jones, Manager
Bureau of Air, Compliance and Enforcement Section
Illinois Environmental Protection Agency
P.O. Box 19506
Springfield, Illinois 62794

On the 2 day of July 2014.

Loretta Shaffer
Program Technician
AECAB, PAS

CERTIFIED MAIL RECEIPT NUMBER: 7001 0320 0006 0185 9914

Standard bcc's: Official File w/Attachment(s)
Originating Organization Reading File w/Attachment(s)

Other bcc's:

C:\Users\ggehrig\Desktop\Working files\Cases\WRB (fka Conoco) Wood River Refinery - Roxana, IL non CBI\NOV-FOV\Wood River Refinery NOV-FOV 6.30.14 v2.docx

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 29 2014

REPLY TO THE ATTENTION OF:

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Brian Wulf
Director, Environmental
Wood River Refinery
900 South Central Avenue
Roxana, Illinois 62084

Dear Mr. Wulf:

The U.S. Environmental Protection Agency is issuing the enclosed Finding of Violation (FOV) to WRB Refining LP's Wood River refinery at 900 South Central Avenue, Roxana, Illinois (you or the refinery). EPA has determined that the refinery is in violation of the National Emission Standard for Benzene Waste Operations. Violations of the National Emission Standard for Benzene Waste Operations constitute violations of Section 112 of the Act.

Section 113 of the Clean Air Act gives us several enforcement options. These options include issuing an administrative compliance order, issuing an administrative penalty order and bringing a judicial civil or criminal action.

We are offering you an opportunity to confer with us about the violations alleged in the FOV. The conference will give you an opportunity to present information on the specific findings of violation, any efforts you have taken to comply and the steps you will take to prevent future violations. In addition, in order to make the conference more productive, we encourage you to submit to us information responsive to the FOV prior to the conference date.

Please plan for the refinery's technical and management personnel to attend the conference to discuss compliance measures and commitments. You may have an attorney represent you at this conference.

The EPA contacts in this matter are Virginia Galinsky, Environmental Engineer, and Mary McAuliffe, Associate Regional Counsel. You may call them at (312) 353-2089 and (312) 886-6237, respectively, if you wish to request a conference. You should make the request for a conference within 10 calendar days following receipt of this letter. We should hold any conference within 30 calendar days following receipt of this letter.

Sincerely,

George T. Czerniak
Director
Air and Radiation Division

cc: Eric Jones, Illinois Environmental Protection Agency
Donna H. Carvalho, Phillips 66

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:	)	
	)	
WRB Refining, LP	)	**FINDING OF VIOLATION**
Wood River Refinery	)	
Roxana, Illinois	)	
	)	**EPA-5-14-IL-25**
Proceedings Pursuant to	)	
the Clean Air Act	)	
42 U.S.C.§ § 7401 *et seq.*	)	

FINDING OF VIOLATION

WRB Refining LP owns and operates a petroleum refinery at 900 South Central Avenue, Roxana, Illinois, known as the Wood River Refinery (facility or refinery). WRB Refining LP is a limited partnership jointly owned by Phillips 66 and Cenovus Energy Inc. Phillips 66 is the operator and managing partner of WRB Refining LP. Operations at the refinery include a wastewater treatment plant and process sewers that contain benzene waste.

The U.S. Environmental Protection Agency is sending this Finding of Violation (FOV or Notice) to notify the refinery that we have found violations of the National Emission Standard for Benzene Waste Operations.

Clean Air Act

1. Section 112(b) of the Act, 42 U.S.C. § 7412(b) lists 188 Hazardous Air Pollutants (HAPs) that cause adverse health or environmental effects.

2. Section 112(d) of the Act, 42 U.S.C. § 7412(d), requires EPA to promulgate regulations establishing emissions standards for each category or subcategory of major and area sources of HAPs that are listed for regulation pursuant to Section 112(c), 42 U.S.C. § 7412(c).

NESHAP General Provisions

3. 40 C.F.R. § 61.05(c) requires that "[n]inety days after the effective date of any standard, no owner or operator shall operate any existing source subject to that standard in violation of the standard, except under a waiver granted by the Administrator under this part or under an exemption granted by the President under section 112(c)(2) of the Act."

4. 40 C.F.R. § 61.12(a) provides that "[c]ompliance with numerical emission limits shall be determined in accordance with emission tests established in § 61.13 or as otherwise specified in an individual subpart."

5. 40 C.F.R. § 61.12(b) provides that "[c]ompliance with design, equipment, work practice or operational standards shall be determined as specified in an individual subpart."

6. 40 C.F.R. § 61.12(c) requires that "[t]he owner or operator of each stationary source shall maintain and operate the source, including associated equipment for air pollution control, in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, review of operating and maintenance procedures, and inspection of the source."

Benzene Waste NESHAP

7. Under Section 112(d) of the Act, 42 U.S.C. § 7412(d), EPA promulgated the National Emission Standard for Benzene Waste Operations (Benzene Waste NESHAP) on March 7, 1990. See 55 Fed. Reg. 8346.

8. The Benzene Waste NESHAP, as amended, became effective on January 7, 1993, and is codified at 40 C.F.R. Part 61, Subpart FF

9. 40 C.F.R. § 61.340(a) provides that "[t]he provisions of this subpart apply to owners and operators of chemical manufacturing plants, coke by-product recovery plants, and petroleum refineries."

10. 40 C.F.R. § 61.341 defines "cover" as "a device or system which is placed on or over a waste placed in a waste management unit so that the entire waste surface area is enclosed and sealed to minimize air emissions. A cover may have openings necessary for operation, inspection, and maintenance of the waste management unit such as access hatches, sampling ports, and gauge wells provided that each opening is closed and sealed when not in use. Example of covers include a fixed roof installed on a tank, a lid installed on a container, and an air-supported enclosure installed over a waste management unit."

11. 40 C.F.R. § 61.341 defines "fixed roof" as "a cover that is mounted on a waste management unit in a stationary manner and that does not move with fluctuations in liquid level."

12. 40 C.F.R. § 61.341 defines "individual drain system" as "the system used to convey waste from a process unit, product storage tank, or waste management unit to a waste management unit. The term includes all process drains and common junction boxes, together with their associated sewer lines and other junction boxes, down to the receiving waste management unit."

13. 40 C.F.R. § 61.341 defines "no detectable emissions" as "less than 500 parts per million by volume (ppmv) above background levels, as measured by a detection instrument reading in accordance with the procedures specified in § 61.355(h) of this subpart."

14. 40 C.F.R. § 61.341 defines "oil-water separator" as "a waste management unit, generally a tank or surface impoundment, used to separate oil from water. An oil-water

separator consists of not only the separation unit but also the forebay and other separator basins, skimmers, weirs, grit chambers, sludge hoppers, and bar screens that are located directly after the individual drain system and prior to additional treatment units such as an air flotation unit, clarifier, or biological treatment unit. Examples of an oil-water separator include an API separator, parallel-plate interceptor, and corrugated-plate interceptor with the associated ancillary equipment."

15. 40 C.F.R. § 61.341 defines "tank" as "a stationary waste management unit that is designed to contain an accumulation of waste and is constructed primarily of nonearthen materials (e.g., wood, concrete, steel, plastic) which provide structural support."

16. 40 C.F.R. § 61.341 defines "waste management unit" as "a piece of equipment, structure, or transport mechanism used in handling, storage, treatment, or disposal of waste. Examples of a waste management unit include a tank, surface impoundment, container, oil-water separator, individual drain system. . ."

17. 40 C.F.R. § 61.342(a) provides that "…[t]he total annual benzene quantity from facility waste is the sum of the annual benzene quantity for each waste stream at the facility that has a flow-weighted annual average water content greater than 10 percent or that is mixed with water, or other wastes, at any time and the mixture has an annual average water content greater than 10 percent. The benzene quantity in a waste stream is to be counted only once without multiple counting if other waste streams are mixed with or generated from the original waste stream…"

18. 40 C.F.R. § 61.342(a)(3) provides that "[b]enzene in wastes generated by remediation activities conducted at the facility, such as the excavation of contaminated soil, pumping and treatment of groundwater, and the recovery of product from soil or groundwater, are not included in the calculation of total annual benzene quantity for that facility. If the facility's total annual benzene quantity is 10 Mg/yr (11 ton/yr) or more, wastes generated by remediation activities are subject to the requirements of paragraphs (c) through (h) of this section. If the facility is managing remediation waste generated offsite, the benzene in this waste shall be included in the calculation of total annual benzene quantity in facility waste, if the waste streams have an annual average water content greater than 10 percent, or if they are mixed with water or other wastes at any time and the mixture has an annual average water content greater than 10 percent."

19. 40 C.F.R. § 61.342(c) requires that "[e]ach owner or operator of a facility at which the total annual benzene quantity from facility waste is equal to or greater than 10 Mg/yr (11 ton/yr) as determined in paragraph (a) of this section shall manage and treat the facility waste as follows: (1) For each waste stream that contains benzene, including (but not limited to) organic waste streams that contain less than 10 percent water and aqueous waste streams, even if the wastes are not discharged to an individual drain system, the owner or operator shall: (i) Remove or destroy the benzene contained in the waste using a treatment process or wastewater treatment system that complies with the standards specified in § 61.348 of this subpart. (ii) Comply with the standards specified in §§ 61.343 through 61.347 of this subpart for each waste management unit that receives or manages the waste stream prior to and during treatment of the waste stream in accordance with paragraph (c)(1)(i) of this section. (iii) Each

waste management unit used to manage or treat waste streams that will be recycled to a process shall comply with the standards specified in §§ 61.343 through 61.347. Once the waste stream is recycled to a process, including to a tank used for the storage of production process feed, product, or product intermediates, unless this tank is used primarily for the storage of wastes, the material is no longer subject to paragraph (c) of this section."

20. 40 C.F.R. § 61.342(e) requires that "[a]s an alternative to the requirements specified in paragraphs (c) and (d) of this section, an owner or operator of a facility at which the total annual benzene quantity from facility waste is equal to or greater than 10 Mg/yr (11 ton/yr) as determined in paragraph (a) of this section may elect to manage and treat the facility waste as follows:

> (1) The owner or operator shall manage and treat facility waste with a flow-weighted annual average water content of less than 10 percent in accordance with the requirements of paragraph (c)(1) of this section; and
>
> (2) The owner or operator shall manage and treat facility waste (including remediation and process unit turnaround waste) with a flow-weighted annual average water content of 10 percent or greater, on a volume basis as total water, and each waste stream that is mixed with water or wastes at any time such that the resulting mixture has an annual water content greater than 10 percent, in accordance with the following:
>
> > (i) The benzene quantity for the wastes described in paragraph (e)(2) of this section must be equal to or less than 6.0 Mg/yr (6.6 ton/yr), as determined in § 61.355(k). Wastes as described in paragraph (e)(2) of this section that are transferred offsite shall be included in the determination of benzene quantity as provided in § 61.355(k). The provisions of paragraph (f) of this section shall not apply to any owner or operator who elects to comply with the provisions of paragraph (e) of this section.
> >
> > (ii) The determination of benzene quantity for each waste stream defined in paragraph (e)(2) of this section shall be made in accordance with § 61.355(k)."

21. 40 C.F.R. § 61.343(a) requires that "[e]xcept as provided in paragraph (b) of this section and in § 61.351, the owner or operator must meet the standards in paragraph (a)(1) or (2) of this section for each tank in which the waste stream is placed in accordance with § 61.342 (c)(1)(ii). The standards in this section apply to the treatment and storage of the waste stream in a tank, including dewatering."

22. 40 C.F.R. § 61.343(a)(1) requires that "[t]he owner or operator shall install, operate, and maintain a fixed-roof and closed-vent system that routes all organic vapors vented from the tank to a control device."

23. 40 C.F.R. § 61.343(a)(1)(i) requires that "[t]he fixed-roof shall meet the following requirements: (A) The cover and all openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart."

24. 40 C.F.R. § 61.346(a) requires that "[e]xcept as provided in paragraph (b) of this section, the owner or operator shall meet the following standards for each individual drain system in which waste is placed in accordance with § 61.342(c)(1)(ii) of this subpart: (1) The owner or operator shall install, operate, and maintain on each drain system opening a cover and closed-vent system that routes all organic vapors vented from the drain system to a control device."

25. 40 C.F.R. § 61.346(a)(1)(i) requires that "[t]he cover shall meet the following requirements: (A) The cover and all openings (e.g., access hatches, sampling ports) shall be designed to operate with no detactable [*sic*] emissions as indicated by an instrument reading of less than 500 ppmv above background, initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart. (B) Each opening shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that waste is in the drain system except when it is necessary to use the opening for waste sampling or removal, or for equipment inspection, maintenance, or repair."

26. 40 C.F.R. § 61.347(a) requires that "[e]xcept as provided in § 61.352 of this subpart, the owner or operator shall meet the following standards for each oil-water separator in which waste is placed in accordance with § 61.342(c)(1)(ii) of this subpart: (1) The owner or operator shall install, operate, and maintain a fixed-roof and closed-vent system that routes all organic vapors vented from the oil-water separator to a control device."

27. 40 C.F.R. § 61.347(a)(1)(i)(A) requires that the fixed roof shall meet the following requirements: "[t]he cover and all openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart."

28. 40 C.F.R. § 61.347(a)(1)(i)(B) requires that "[e]ach opening shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that waste is in the oil-water separator except when it is necessary to use the opening for waste sampling or removal, or for equipment inspection, maintenance, or repair."

29. 40 C.F.R. § 61.348(a)(1) requires that the owner or operator shall treat the waste stream by designing, installing, operating, and maintaining a treatment process that either "(i) Removes benzene from the waste stream to a level less than 10 parts per million by weight (ppmw) on a flow-weighted annual average basis, (ii) Removes benzene from the waste stream by 99 percent or more on a mass basis, or (iii) Destroys benzene in the waste stream by incinerating the waste in a combustion unit that achieves a destruction efficiency of 99 percent or greater for benzene."

30. 40 C.F.R. § 61.348(a)(2) requires that "[e]ach treatment process complying with paragraphs (a)(1)(i) or (a)(1)(ii) of this section shall be designed and operated in accordance with the appropriate waste management unit standards specified in §§ 61.343 through 61.347 of this subpart. For example, if a treatment process is a tank, then the owner or operator shall comply with § 61.343 of this subpart."

31. 40 C.F.R. § 61.348(e) requires that "[e]xcept as specified in paragraph (e)(3) of this section, if the treatment process or wastewater treatment system unit has any openings (e.g., access doors, hatches, etc.), all such openings shall be sealed (e.g., gasketed, latched, etc.) and kept closed at all times when waste is being treated, except during inspection and maintenance."

32. 40 C.F.R. § 61.351(a) provides that "[a]s an alternative to the standards for tanks specified in § 61.343 of this subpart, an owner or operator may elect to comply with one of the following:... (2) An external floating roof meeting the requirements of 40 CFR 60.112b (a)(2)..." (See paragraph 35, below.)

33. 40 C.F.R. § 61.355(h) requires that "[a]n owner or operator shall test equipment for compliance with no detectable emissions as required in §§ 61.343 through 61.347, and §61.349 of this subpart in accordance with the following requirements: (1) Monitoring shall comply with Method 21 from appendix A of 40 CFR part 60...(6) The instrument probe shall be traversed around all potential leak interfaces as close as possible to the interface as described in Method 21..."

34. 40 C.F.R. § 61.355(k) requires that "[a]n owner or operator shall determine the benzene quantity for the purposes of the calculation required by § 61.342(e)(2) by the following procedure: (1) For each waste stream that is not controlled for air emissions in accordance with § 61.343. 61.344, 61.345, 61.346, 61.347, or 61.348(a), as applicable to the waste management unit that manages the waste, the benzene quantity shall be determined as specified in paragraph (a) of this section, except that paragraph (b)(4) of this section shall not apply, i.e., the waste quantity for process unit turnaround waste is not annualized but shall be included in the determination of benzene quantity for the year in which the waste is generated for the purposes of the calculation required by § 61.342(e)(2)."

NSPS Subpart Kb

35. 40 C.F.R. § 60.112b(a)(2)(ii) requires that an on an external floating roof tank, "...[a]utomatic bleeder vents are to be closed at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports...Automatic bleeder vents and rim space vents are to be gasketed..."

Factual Background

36. WRB Refining LP (WRB) owns and operates the refinery at 900 South Central Avenue, Roxana, Illinois. WRB is a limited partnership jointly owned by Phillips 66 and Cenovus Energy Inc. Phillips 66 is a Delaware corporation located in Houston, Texas. Cenovus Energy Inc. is a Canadian corporation located in Calgary, Canada. Phillips 66 is the operator and managing partner of WRB. The refinery includes several units that the refinery has identified as being subject to the Benzene Waste NESHAP, including the Lower Lift Station, Upper Lift Station, Tank B121, Tank A149, dissolved nitrogen flotation tanks (DNFs) and corrugated plate interceptors (CPIs). The refinery has also identified Tank A149 as subject to NSPS Subpart Kb.

37. The refinery generates more than 10 megagrams per year (Mg/yr) of total annual benzene. The refinery has chosen to comply with the compliance option outlined at 40 C.F.R. § 61.342(e).

38. The Lower Lift Station is an "individual drain system" as defined in the Benzene Waste NESHAP.

39. The Upper Lift Station 1st and 2nd stage neutralization basins are tanks as defined in the Benzene Waste NESHAP.

40. Each CPI is an "oil-water separator" as defined in the Benzene Waste NESHAP.

41. Tank A149, Tank B121 and the DNFs are each a "tank" as defined in the Benzene Waste NESHAP.

42. From June 16 – 19, 2014, EPA conducted an on-site inspection at the refinery. During this inspection, EPA used a FLIR camera as a screening tool to identify leaks. When EPA observed a leak, the refinery's Benzene Waste NESHAP contractor, Guardian, performed Method 21 on the identified area to determine whether the component was leaking above 500 ppmv.

43. During the inspection, EPA and Guardian identified the following covers and openings in covers that had instrument readings over 500 ppmv (components are identified using the refinery's Benzene Waste NESHAP component IDs):

Component ID	**Component Description**	**Unit**	**Date of Inspection**	**Method 21 Reading (ppmv)**
a. B10055	East wooden cover	Lower Lift Station	6/17/2014	266,119
b. B10040	West wooden cover	Lower Lift Station	6/17/2014	266,119
c. B10042	West wooden cover	Lower Lift Station	6/17/2014	39,151
d. B10288	Hatch	Upper Lift Station – 1st Stage Neutral. Basin	6/17/2014	4,208
e. B10319	Hatch	Upper Lift Station – 2nd Stage Neutral. Basin	6/17/2014	21,709
f. B10393	Hatch	CPI #51	6/17/2014	18,619
g. B10394	Hatch	CPI #51	6/17/2014	611
h. B10477	Hatch	CPI #53	6/17/2014	1,082
i. B10478	Hatch	CPI #53	6/17/2014	21,345
j. B13963	Pinhole opening	CPI #56	6/17/2014	35,000
k. B10416	Cover	CPI #50	6/17/2014	3,107
l. B10353	Hatch	CPI #48	6/17/2014	507
m. B10904	Conservation Vent	Tank B121	6/19/2014	4,371
n. B10478	Hatch	CPI #53	6/19/2014	2,301

44. On June 17, 2014, EPA observed Tank A149 using the FLIR camera. The camera showed hydrocarbon emissions from each of the three bleeder vents located on the roof of Tank A149.

45. The refinery's July 9, 2014 follow-up inspection identified that each of the 3 bleeder vents had deteriorated gaskets.

46. On June 19, 2014, EPA observed DNF #1 using the FLIR camera. The camera showed hydrocarbon emissions from 17 seams on the roof of DNF #1. None of these seams could be monitored that day using Method 21 because these seams were located too far from the walkway on top of DNF #1.

47. During EPA's inspection, DNF #2 was down for unplanned maintenance, and could not be monitored. A refinery representative informed EPA that the refinery does not monitor the seams on the roof of DNF #1 or #2 as part of its Method 21 monitoring for the Benzene Waste NESHAP.

48. Under 40 C.F.R. § 61.355(k), because the Lower Lift Station (individual drain system), Upper Lift Station (tank), each CPI, each DNF (tank), Tank A149 and Tank B121 (tank) were not controlled for air emissions in accordance with §§ 61.343, 61.346 and 61.347, as described in Paragraphs 43 and 47, the refinery must determine the benzene quantity for each waste steam from each waste management unit according to 40 C.F.R. § 61.355(a).

49. When the waste streams flowing through the Lower Lift Station, Upper Lift Station, CPIs, DNFs, Tank A149 and Tank B121 are counted in the calculation under 40 C.F.R. § 61.355(k), the refinery's uncontrolled benzene quantity is greater than its compliance limit of 6 megagrams (Mg).

Violations

50. The refinery's failure to design the cover and all openings of the individual drain system to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as identified in Paragraph 43.a – 43.c, is a violation of 40 C.F.R. § 61.346(a)(1)(i).

51. The refinery's failure to design the cover and all openings of each tank to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as identified in Paragraphs 43.d, 43.e, and 43.m, is a violation of 40 C.F.R. § 61.343(a)(1)(i).

52. The refinery's failure to design the cover and all openings of each of the oil-water separators to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as identified in Paragraphs 43.f – 43.l and 43.n, is a violation of 40 C.F.R. § 61.347(a)(1)(i)(A).

53. The refinery's failure to seal all openings in the wastewater treatment system, as identified in Paragraph 43.j, is a violation of 40 C.F.R. § 61.348(e).

54. The refinery's failure to maintain the gaskets on the bleeder vents of Tank A149 is a violation of 40 C.F.R. §§ 60.112b(a)(2)(ii) and 61.351(a)(2).

55. The refinery's failure to monitor each of the seams on the DNF covers is a violation of 40 C.F.R. § 61.343(a)(1)(i).

56. The refinery's failure to have an uncontrolled benzene quantity less than 6 Mg is a violation of 40 C.F.R. § 61.342(e)(2).

9/29/19
Date

George T. Czerniak
Director
Air and Radiation Division

CERTIFICATE OF MAILING

I, Loretta Shaffer, certify that I sent a Finding of Violation, No. EPA-5-14-IL-25, by Certified Mail, Return Receipt Requested, to:

Brian Wulf
Director, Environmental
Wood River Refinery
900 South Central Avenue
Roxana, IL 62084

I also certify that I sent a copy of the Finding of Violation by first-class mail to:

Eric Jones, Manager
Compliance Unit
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62702

Donna Carvalho
Senior Counsel
Legal
8115 Pinnacle
3010 Briarpark Drive
Houston, TX 77042

On the 1 day of October 2014.

CERTIFIED MAIL RECEIPT NUMBER: Loretta Shaffer

7009 1680 0000 7672 9178

Loretta Shaffer, Administrative Program Assistant
Planning and Administration Section