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LAND PROTECTION DIVISION
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May 24, 2019

Hillary Young, Chief Engineer
Oklahoma Department of Environmental Quality
Land Protection Division
707 N. Robinson Avenue
Oklahoma City, OK 73101

**RE: Response to Administrative Review of the Resource Conservation and Recovery Act
Part B Post-Closure and Corrective Action Permit Renewal Application
Oklahoma Hazardous Waste Permit Number OKD058078775-PC
HollyFrontier Tulsa Refining LLC, Tulsa West Refinery, Tulsa, Oklahoma**

Dear Ms. Young:

HollyFrontier Tulsa Refining LLC (HFTR), Tulsa West Refinery (the Refinery), submitted a Resource Conservation and Recovery Act (RCRA) Part B Post-Closure and Corrective Action Permit Renewal Application to the Oklahoma Department of Environmental Quality (ODEQ) on December 3, 2018 (2018 Renewal Application). The ODEQ provided Notice of Deficiency regarding administrative completeness to HFTR on March 25, 2019. This letter and attachments constitute HFTR's formal response to the received administrative review comments.

This transmittal letter includes the following attachments:

- Attachment 1 – HFTR's responses to the administrative review comments.
- Attachment 2 – A revised Figure 1-1 to address the administrative review comments.
- Attachment 3 – A revised Table 1-1 to address the administrative review comments.
- Attachment 4 – Replacement pages for the Section 1.1.3, Section 8.2, and Section 9.4 of the 2018 Renewal Application.

I encourage you or your staff to contact me directly at 918-594-6000 or Mr. Steve Moyer of my staff at 918-588-1197 with any questions or requests for additional information.

**HollyFrontier Tulsa Refining LLC
Tulsa West Refinery**
1700 South Union Avenue • Tulsa, Oklahoma 74107
<http://www.hollyfrontier.com>

Ms. Hillary Young
May 24, 2019
Page 2

Sincerely,



Skipp Kistler
Vice President and Refinery Manager

cc: Orphius Mohammad, ODEQ
Steve Moyer, HollyFrontier Tulsa Refining
Mike Holder, HollyFrontier Corporation
Arsin Sahba, HollyFrontier Corporation
Cat Smith, TRC
Sherry Constable, TRC

ATTACHMENT 1
RESPONSES TO ADMINISTRATIVE REVIEW COMMENTS

Responses to Administrative Review Comments

DEQ Administrative Review Comment ¹	HFTR Response	Modification Request Summary
<p>A topographic map shows the gates of the facility but the map is not as detailed as required for the facility. Please provide a topographic map showing Access Control (fences) as required by 40 CFR 264.280(b)(19)(viii).</p>	<p>Fencelines were added to Figure 1-1. A revised Figure 1-1 is provided in Attachment 2 to HFTR's administrative review comment response letter.</p>	<p>No modification requested – Figure 1-1 is required to be included in Renewal Application.</p>
<p>HFTRW submitted a Land Treatment Unit (LTU) evaluation work plan on November 7, 2018. HFTRW has not yet completed the LTU evaluation. Technical review on this item cannot commence until LTU sampling data as required by 40 CFR 264.280 is provided. HFTRW requests termination of Post Closure Care (PCC).</p>	<p>HFTR acknowledges that a decision regarding a reduced PCC period cannot be made until the necessary data is collected and negotiations are complete.</p> <p>HFTR responded to a data request from DEQ via email on April 19, 2019. Negotiations are ongoing regarding soil sample collection and data evaluation to support a demonstration to reduce the PCC period for the LTU.</p>	<p>See response to Comment 3(ii) below.</p>
<p>Permit Modification Request: HFTRW listed several modification requests in Table 1-1. In the fourth (4th) column of "Modification", HFTRW only added federal regulations related to permit modifications. The following permit modification requests are provided for further justifications.</p>	<p>HFTR's purpose in providing Table 1-1 in the Renewal Application was to identify the proposed major changes to the current RCRA Permit that are included in the Renewal Application, and to identify the associated modification class as based on the content of the modification request.</p> <p>HFTR recognizes that the terminology used in the column headings in Table 1-1 was not appropriately descriptive. HFTR has revised Table 1-1 in the Renewal Application as follows: Column 4 has been renamed "Mod. Class Applicable Regulatory Citation (40 CFR)" and Column 5 has been renamed "Description and Justification of the Modification Request".</p> <p>A revised Table 1-1 is provided in Attachment 3 to HFTR's administrative review comment response letter.</p>	<p>See response to Comments 3(i), 3(ii), and 3(iii) below.</p> <p>Note that for ease of reading, only federal regulations are listed in Table 1-1 since Title 252, Chapter 205 of the Michigan Administrative Code incorporates the Federal Regulations by reference.</p>

Responses to Administrative Review Comments (cont.)

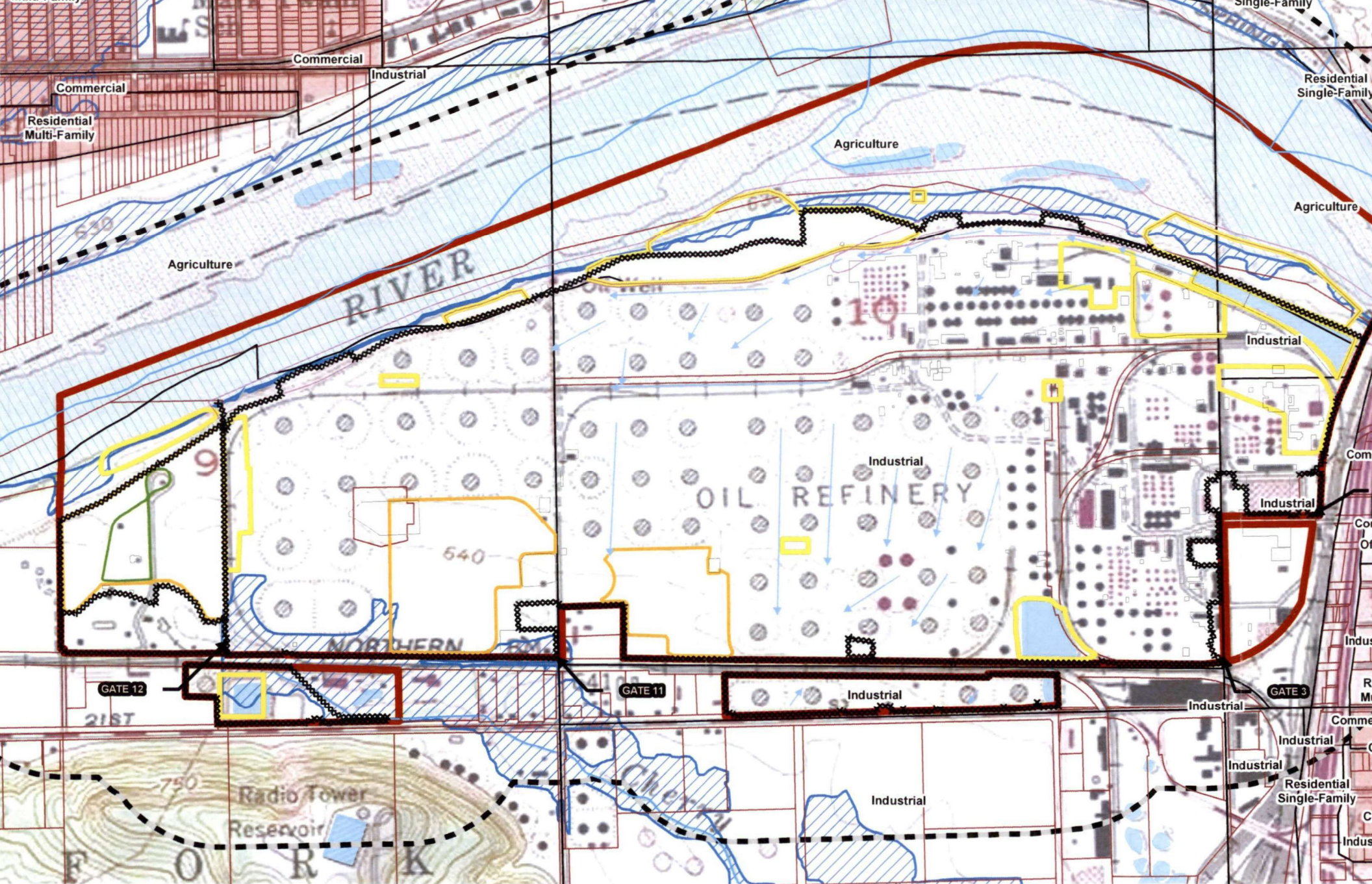
DEQ Administrative Review Comment¹	HFTR Response	Modification Request Summary
<p>Permit Modification Request: HFTRW listed several requests in Table 1-1. In the fourth (4th) column of "Modification", HFTRW only added federal regulations related to permit modifications. The following permit modification requests are provided for further justifications.</p>	<p>HFTR's purpose in providing Table 1-1 in the Renewal Application was to identify the proposed major changes to the current RCRA Permit that are included in the Renewal Application, and to identify the associated modification class as based on the content of the modification request.</p> <p>HFTR recognizes that the terminology used in the column headings in Table 1-1 was not appropriately descriptive. HFTR has revised Table 1-1 in the Renewal Application as follows: Column 4 has been renamed "Mod. Class Applicable Regulatory Citation (40 CFR)" and Column 5 has been renamed "Description and Justification of the Modification Request".</p> <p>A revised Table 1-1 is provided in Attachment 3 to HFTR's administrative review comment response letter.</p>	<p>See response to Comments 3(i), 3(ii), and 3(iii).</p> <p>Note that for ease of reading, only federal regulations are listed in Table 1-1 since Title 252, Chapter 205, of the Federal Code of Administrative Code incorporates the Federal Register by reference.</p>
<p>Water Monitoring Target Analyte List: On page 8-3, HFTRW stated, "the COCs were selected by analyzing the data and removing analytes that were not detected or were detected less than 10% frequency." Please provide justification of the value for the analyte list modification.</p>	<p>Of the 35 program COCs (the modified Skinner List) that have been detected in a groundwater sample from 2003 - 2018, only 9 have been detected at least 10% of the time. Focusing the target analyte list to those 9 COCs detected at a greater than 10% frequency since 2003 ensures that samples continue to be analyzed for those COCs that are regularly detected.</p> <p>Section 8.2 of the Renewal Application has been revised to provide additional justification for this request. Replacement pages for insertion into the RCRA Renewal Application submitted on December 3, 2018, are provided in Attachment 4 to HFTR's administrative review comment response letter.</p>	<p>The modification is requested to reduce the frequency of groundwater monitoring to specific, routine monitoring.</p> <p>The USEPA <i>Risk Assessment Guidance for Superfund</i> (December 1989), Section 5.9.3, states that "if a contaminant is detected may be artifacts in the data due to sampling problems, and therefore may not be related to the underlying practices." and "If, for example, a frequency of 10 percent is used, then at least 20 samples of the population (i.e., one detect in 20 samples equals a five percent detection)." The USEPA Region 8 <i>Superfund Site Remedial Action-03: Contaminants of Concern, Evaluation and Management of Contaminants of Concern for Human Health</i> references the use of detection frequency. Other USEPA guidance documents support the use of frequency for identifying COCs for analysis.</p> <p>HFTR has been conducting groundwater monitoring. Groundwater sampling conducted under the current permit. All monitoring POC wells are sampled on a semiannual basis. All monitoring wells and interior LTU wells are sampled quarterly. All monitoring wells have been sampled a minimum of 10 times per year. The sampling frequency is reasonable and consistent with the requirement of one detection in a minimum of 10 samples.</p>

ODEQ Administrative Review Comment ¹	HFTR Response	Modification Request Summary
<p>PCC Period of the LTUs to ten (10) years: In the comment, the application states, "40 CFR 270.42 Appendix A provides a reference to the PCC period. This reference is not a justification for the requested modification; instead it classifies the requested permit modification as a Permit Modification. Please provide the justification for the requested modification."</p>	<p>Pending completion of the proposed LTU soil sampling effort and groundwater data evaluation, and possible demonstration to support reducing the PCC period, HFTR requested to extend the PCC period concurrent with the ten (10) year period of the renewed Permit. Setting the PCC period to be concurrent with the Permit period allows for the re-evaluation of the appropriate remaining duration of the PCC period during preparation of the next RCRA Permit Renewal Application. In addition, this approach is discussed in EPA's latest guidance (R.O. 14886; December 15, 2016; "<i>Guidelines for Evaluating the Post-Closure Care Period for Hazardous Waste Disposal Facilities under Subtitle C of RCRA</i>") and the regulations at 40 CFR 264.117(a)(2)(i) which allow for a reduced PCC period after an appropriate demonstration has been made that a shortened PCC period is sufficient to protect human health and the environment (e.g., based on soil and groundwater sampling results).</p>	<p>HFTR proposes that the post-closure care period be concurrent with the renewed Permit. The post-closure care period for the ten (10) year period of the renewed Permit will be during preparation of the next Part B Permit Renewal Application. If there is a successful demonstration to cease operations, the PCC period will be shortened. The federal regulations at 40 CFR 264.117(a)(2)(i) allow for a shortened PCC period for a closed HWMU if the PCC period is sufficient to protect human health and the environment and groundwater data evaluation efforts provide sufficient information. The Unit (LTU) evaluation Work Plan dated January 2019 will gather information needed to make a determination on shortening the PCC period for the LTU is sufficient to protect the environment at this time.</p> <p>In the event that a demonstration that a reduced PCC period is sufficient to protect human health and the environment is successful prior to issuance of the renewed Permit term, HFTR will provide information to the Agency to use in reevaluating the PCC period. The continuation of PCC is ensured until such a demonstration demonstrates that a reduced PCC period is sufficient to protect the environment.</p>
<p>Notification Requirements for Solid Waste Management Unit (SWMU) at Water Treatment Plant): HFTRW stated in the comment that SWMU 10 is an operational unit but did not include notification requirements. As discussed in the meeting, DEQ understands that removal of notification requirements will streamline and expedite the operation and maintenance of SWMU 10. Please include the justification in the comment.</p>	<p>Section 9.4 of the Renewal Application has been revised to provide additional justification for this request. Replacement pages for insertion into the RCRA Renewal Application submitted on December 3, 2018, are provided in Attachment 4 to HFTR's administrative review comment response letter.</p>	<p>The wastewater treatment system (SWMU) at the Water Treatment Plant requires necessary maintenance must be completed with minimal interruption of operations. Removal of notification requirement will streamline and expedite the operation and maintenance necessary to effectively operate the active SWMU. In addition, HFTR will continue to follow OSHA regulations to ensure worker protection, proper handling of hazardous constituents, and proper management of waste during any work in this area to protect human health. HFTR will document any completed maintenance modifications within SWMU 10 in the Site Management Reports (SMRs) that are submitted to ODEQ.</p>

ATTACHMENT 2
REVISED FIGURE 1-1

**RCRA PART B APPLICATION
SECTION 1, FIGURES**

Remove Figure 1-1, and replace with attached Figure 1-1.



SOURCES:
 FLOODPLAINS (FEMA, 8/23/18); SURFACE WATERS AND STREAMS
 (NATIONAL HYDROGRAPHY DATASET, 2018);
 WINDROSE (IOWA ENVIRONMENTAL MESONET, 9/11/2018);
 PARCELS (TULSA COUNTY, 6/11/18);
 ZONING LANDUSE (CITY OF TULSA 11/13/17),
 USGS TOPOGRAPHIC BASEMAP 24K, SAND SPRINGS, OK (1984).

CITY OF TULSA ZONING
 COUNTY PARCELS
 100-YEAR-FLOOD-PLAIN
 ROADWAY
 SURFACE WATERBODIES



PROJECT	TU
TITLE	
DRAWN BY	
CHECKED	

ATTACHMENT 3
REVISED TABLE 1-1

**RCRA PART B APPLICATION
SECTION 1, TABLES**

**Remove Table 1-1, pages 1 through 3, and replace with attached Table 1-1,
pages 1 through 4.**

Table 1-1. Tabular Summary of Requested Modifications to the RCRA Post-Closure and Corrective Action Permit

Primary Reference	Change	Mod. Class	Mod. Class Applicable Regulatory Citation (40 CFR ¹)	Description and Justification the Modification Request
Section 1.3	Requesting reduction or termination of the Post-Closure Care (PCC) period for the LTUs.	3	40 CFR 270.42 Appendix I.E.3; Reduction in the post-closure care period.	HFTR has submitted an LTU work plan to the ODEQ to support a demonstration that the LTUs have completed their PCC period and PCC should be terminated per 40 CFR 264.117(a)(2)(i). HFTR understands that a decision regarding this request cannot be made until sampling and negotiations are complete. The federal regulations at 40 CFR 264.117(a)(2)(i) allow the Agency to shorten the PCC period for a closed HWMU if the reduced period is sufficient to protect human health and the environment.
Sections 3.1, 3.2, and 3.3; Appendices 3.1 and 3.2	Changing format and content of LTU, SWMU, and Arkansas River inspection forms.	1	40 CFR 270.42 Appendix I.A.1; Administrative and informational changes.	Changes reflect current inspection procedures and revised Arkansas river inspection requirements. Changes maintain compliance with regulatory requirements
Section 3.3	Changing frequency of inspections along the Arkansas River from every other week to weekly.	2	40 CFR 270.42 Appendix I.B.4; Changes in frequency or content of inspection schedules.	Changes reflect ODEQ requested revisions to Arkansas River inspections (ODEQ letter dated October 31, 2018)
Section 5.1	Request reduction of the post-closure care period to 10 years.	3	40 CFR 270.42 Appendix I.E.3; Reduction in the post-closure care period.	Proposing that the post-closure care period be set for the duration of the renewed Permit. The post-closure period will extend concurrent with the ten (10) year period of the renewed Permit and will be re-evaluated during preparation of the next Part B Permit Renewal Application unless there is a successful demonstration to cease PCC in that time. The federal regulations at 40 CFR 264.117(a)(2)(i) allow the Agency to shorten the PCC period for a closed HWMU if the reduced period is sufficient to protect human health and the environment.

¹ Federal hazardous waste regulations are incorporated into the Oklahoma State rules by Title 252, Chapter 205, Section 3-2 of the Oklahoma Administrative Code.

Table 1-1. Tabular Summary of Requested Modifications to the RCRA Post-Closure and Corrective Action Permit (cont.)

Primary Reference	Change	Mod. Class	Mod. Class Applicable Regulatory Citation (40 CFR)	Description and Justification of the Modification Request
Section 5.2.1; Figure 5-2; Appendix 5.1	Changing the boundaries of the Central LTU and the East LTU to exclude non-waste areas.	2	40 CFR 270.42 Appendix I.K.4; Other modifications of land treatment unit component specifications or standards required in the permit	Certain areas within the Central and East LTUs were included in error and did not receive land-applied wastes. Upon approval by ODEQ, HTFR will resurvey and revise the deed restrictions for the LTUs.
Section 5.4.3	Added procedures for routine utility and maintenance activities at the closed LTUs	2	40 CFR 270.42 Appendix I.K.4; Other modifications of land treatment unit component specifications or standards required in the permit.	Allows routine activities to be managed at the closed LTUs without permit modification to ODEQ and provides consistency with the approved procedures for HFTR East LTUs, per the ODEQ approved permit modification (approved June 11, 2018).
Section 8.2	Proposing sitewide risk assessment and development of new site-specific risk-based screening levels.	1*	40 CFR 270.42 Appendix I.C.3; Changes in statistical procedure for determining whether a statistically significant change in ground-water quality between upgradient and downgradient wells has occurred.	Provide the option for statistical comparison of groundwater constituent concentrations, based on approved RBSLs.

Table 1-1. Tabular Summary of Requested Modifications to the RCRA Post-Closure and Corrective Action Permit (cont.)

Primary Reference	Change	Mod. Class	Mod. Class Applicable Regulatory Citation (40 CFR)	Description and Justification of the Modification Request
Section 8.2	Reduce groundwater monitoring target analyte lists.	3	40 CFR 270.42 Appendix I.C.5.a; Changes in indicator parameters, hazardous constituents, or concentration limits.	<p>Reduce the indicator parameter list for groundwater to specific, routinely detected analytes. The USEPA <i>Risk Assessment Guidance for Superfund</i> (EPA/540/1-89/002, December 1989), Section 5.9.3, states that “Chemicals that are infrequently detected may be artifacts in the data due to sampling, analytical, or other problems, and therefore may not be related to site operations or disposal practices.” and “If, for example, a frequency of detection limit of five percent is used, then at least 20 samples of a medium would be needed (i.e., one detect in 20 samples equals a five percent frequency of detection).” The USEPA Region 8 Superfund Technical Guidance, No. RA-03: Contaminants of Concern (September 1994), Evaluating and Identifying Contaminants of Concern for Human Health, also references the use of detection frequency for selection of COCs. These guidance documents support the use of frequency of detection in identifying COCs for analysis.</p> <p>HFTR has been conducting groundwater sampling since 2003 including under the current permit since 2009 with the downgradient POC wells being sampled on a semiannual basis and the upgradient POC wells and interior LTU wells being sampled on an annual basis. The wells have been sampled a minimum of 10 times; therefore, a 10% detection frequency is reasonable and consistent with the guidance as it equates to one detection in a minimum of 10 samples.</p>

Table 1-1. Tabular Summary of Requested Modifications to the RCRA Post-Closure and Corrective Action Permit (cont.)

Primary Reference	Change	Mod. Class	Mod. Class Applicable Regulatory Citation (40 CFR)	Description and Justification of the Modification Request
Section 8.3.3; Table 8-3	Revise monitoring network for LTUs to reflect sitewide approach: renaming interior LTU wells from point of compliance wells to program gauging wells.	2	40 CFR 270.42 Appendix I.C.4; Changes point of compliance wells.	Move towards sitewide approach to groundwater monitoring.
Table 8-3	Modifying list of program gauging wells.	2	40 CFR 270.42 Appendix I.C.1.a; Changes in the number, location, depth, or design of upgradient or downgradient wells of permitted ground-water monitoring system.	Updated program gauging well list to remove obsolete, or damaged wells and reflect sitewide groundwater monitoring program.
Section 9.4	Request removal of notification requirements for SWMU 10 (WWTS)	1	40 CFR 270.42 Appendix I.A.1; Administrative and informational changes.	SWMU 10 previously required written notice to ODEQ prior to any excavations, repairs, expansions or other modifications of SWMU 10, and required providing a work plan for ODEQ approval prior to closure replacement or reconstruction of any in-ground or below-ground units within SWMU 10. Since the wastewater treatment system (SWMU 10) is an operating unit, maintenance activities, repairs, and modifications must be completed as quickly as possible to allow minimal interruption of operations. Removal of the notification requirements will streamline and expedite the operation and maintenance of the active wastewater treatment system (SWMU 10). HFTR will continue to follow current health and safety protocols to ensure worker protection, proper handling to prevent any release of hazardous constituents, and proper management of soil and other materials during any work in this area to protect human health and the environment. HFTR will document any completed maintenance activities, repairs, and modifications within SWMU 10 in the Semi-Annual Monitoring Reports (SMRs) that are submitted to ODEQ.

ATTACHMENT 4
REPLACEMENT PAGES FOR THE RENEWAL APPLICATION

**RCRA PART B APPLICATION
SECTION 1**

Remove pages 1-3 and 1-4, and replace with attached pages 1-3 and 1-4.

HFTR is requesting in this Renewal Application that the current 2009 Permit provisions of Section III.F.1 (*Specific Condition – Continued Requirements for Previously Identified SWMU and AOC, SWMU 10 – Wastewater Treatment System*) that require written notice to the ODEQ prior to any excavations, repairs, expansions or other modifications of SWMU 10, and providing a work plan for the ODEQ's approval prior to closure, replacement, or reconstruction of any in-ground or below-ground units within the WWTS, be removed from the permit. The WWTS (SWMU 10) is an operating unit and necessary maintenance must be completed as quickly as possible to allow minimal interruptions of operations. Removal of the notification requirements will streamline and expedite maintenance and modifications necessary to effectively operate the WWTS. The Refinery will continue to follow current health and safety protocols to ensure worker protection, proper handling to prevent any release of hazardous constituents and proper management of soil and other materials during any work in this area to protect human health and the environment. HFTR will document any completed maintenance activities, repairs, and modifications within SWMU 10 in the next scheduled semi-annual monitoring report.

1.2 Refinery Location Information

The Refinery is located at 1700 South Union Avenue in Tulsa, OK, west of interstate Highway 244 and south of the Arkansas River. The Refinery occupies portions of Section 9, 10, and 11 of Township 19 North, Range 12 East, in Tulsa County, OK. The Arkansas River forms the northern boundary of the Refinery. The location of the Refinery is shown on Figure 1-1.

1.2.1 Seismic Requirements

The Refinery is located in Tulsa County, OK, which is not listed in 40 CFR Part 264, Appendix VI. Therefore, 40 CFR 270.14(b)(11)(ii), relating to demonstration of compliance with location standards for siting of hazardous waste management facilities near active seismic faults, does not apply.

1.2.2 Flood Plain Requirements

The 100-year flood plain and base flood elevations, based on the December 2013 Letter of Map Revision to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM Map No. 40143C0220L), are identified in Figure 1-1. Portions of the Refinery are partially located within the 100-year flood plain of the Arkansas River and Cherry Creek. However, the LTUs are in PCC with no active waste management occurring, and only a small portion of the Central LTU is nominally within the 100-year floodplain. A flood control levee, constructed by the United States Army Corps of Engineers (USACE), is also located along the northern margin of the Refinery, parallel to the river. Therefore, the additional requirements for hazardous waste management facilities operating in the 100-year flood plain (40 CFR 270.14(b)(11)(iv)) are not applicable. The Central LTU has berms surrounding the former waste application areas that prevent run-on and run-off. Additionally, all three LTUs have not had hazardous waste applied

since 1998, are well vegetated which reduces run-off considerably, and therefore have a very low potential to impact other areas of the facility with residual hazardous constituents from run-off.

1.2.3 Topographic Map

Information related to the Refinery and surrounding areas within 1,000 feet of the Refinery fence line that is required to be included in the Renewal Application under 40 CFR 270.14(b)(19) is provided on a number of figures. The figures which provide each of the required information items are listed in Table 1-2.

1.2.4 Additional Information on the Topographic Map for Land Treatment Units

Additional mapping requirements for land disposal facilities specified in 40 CFR 270.14(c)(3) that apply to the closed LTUs are identified in Table 1-3.

1.3 Renewal Application Approach and Structure

Since the only permitted HWMUs are the three closed LTUs, the content of this Renewal Application is based upon 40 CFR 270.28 (Part B information for post-closure permits), and other applicable federal and state regulations in 40 CFR Parts 264 and 270, and OAC 252:205, respectively. For ease of reading in cases where the federal regulations have been incorporated by reference into the OAC, only the federal regulatory citation is referenced within the Renewal Application. Where application content is specified in the regulations but is not applicable to the Refinery (e.g., tanks, containers, incinerators) or to a PCC permit application, a statement to that effect is included in the ODEQ Completeness Checklists, which are provided after the Table of Contents in this Renewal Application package.

The Renewal Application was developed to be as straightforward as possible, while still providing the required and pertinent information for PCC and corrective action permit applications. Within the Renewal Application, the Refinery references various documents previously submitted by the Refinery to the ODEQ (e.g., semi-annual monitoring reports) as opposed to including copies as part of the application. Day-to-day details of the RCRA program and the RCRA Corrective Action Program (CAP) will be addressed via approved work plans and other reports. This convention is intended to minimize the bulk of this application and to eliminate duplication of information provided to the ODEQ. Streamlining this application and the subsequent Permit in this manner will minimize the need for, and complexity of, future Permit modifications, thereby lessening the Refinery's and the ODEQ's burden for managing the Permit and Permit Application without sacrificing compliance and environmental benefit.

The Part B Renewal Application is structured with an up-front introduction and background information section, which includes the required Refinery location information, followed by a series of stand-alone Plans relevant to PCC of the closed LTUs and to corrective action activities for the SWMUs, AOC, and groundwater at the Refinery. The following Sections are included in the Renewal Application:

**RCRA PART B APPLICATION
SECTION 8**

**Remove pages 8-1 through 8-14, and replace with attached
pages 8-1 through 8-14.**

8 GROUNDWATER MONITORING AND LNAPL MANAGEMENT PLAN

8.1 Introduction

This *Groundwater Monitoring and LNAPL Management Plan* (Plan) details the groundwater monitoring program and light non-aqueous phase liquid (LNAPL) recovery program at HollyFrontier Tulsa Refining LLC (HFTR), Tulsa West Refinery (the Refinery) located at 1700 South Union Street in Tulsa, Oklahoma. The Refinery currently operates under a Resource Conservation and Recovery Act (RCRA) Post-Closure and Corrective Action Permit (Permit No. 058078775-PC) issued by the Oklahoma Department of Environmental Quality (ODEQ) on June 1, 2009 (2009 Permit).

In accordance with Title 40 Part 270.14(c) of the Code of Federal Regulations (40 CFR 270.14(c)), HFTR is including this Plan as part of the RCRA Part B Permit Renewal Application (Renewal Application). This Plan describes programs in place at HFTR to promote the protection of groundwater in compliance with applicable Federal and State rules and regulations and to support remedial activity at the Refinery. The Plan replaces both the *Facility-Wide Groundwater Performance Monitoring Plan* and *Light Non-Aqueous Phase Liquid (LNAPL) Recovery Plan* that were previously submitted to the ODEQ in February 2003 and January 2007, respectively.

This Plan provides one integrated, Refinery-wide groundwater monitoring plan that details the performance monitoring necessary for compliance with applicable regulatory programs. The Plan includes the following items:

- Detailed plans describing the proposed groundwater monitoring program to be implemented, as required for the Refinery's RCRA-permitted Land Treatment Units (LTUs) and Solid Waste Management Units (SWMUs)¹;
- Location of groundwater monitoring wells and the point of compliance (POC) wells;
- Plans to contain the LNAPL plume within the Refinery boundaries and the process for LNAPL removal within the interior and upgradient areas of the Refinery;
- Description of the semi-annual report submittals to the ODEQ in which HFTR will document the implementation of this Plan;
- Proposed groundwater screening levels for the Refinery; and
- Summary of LNAPL recovery progress at the time of this Renewal Application submittal.

¹ The requirements of 40 CFR 270.14(c)(5) are addressed in the *Current Conditions Report and Comprehensive Site Conceptual Model*, prepared for Sunoco (R&M) by The Source Group, Inc and Atkins Benham, Inc. Environmental Division in July 2002 (SGI-ABI, 2002). The report provides a summary of the Refinery's SWMUs, Riverbank Area of Concern (AOC), corrective actions, and the hydrogeologic/contaminant conditions that were present at the time of submittal.

This Plan describes Refinery-wide groundwater monitoring that includes groundwater monitoring related to the SWMUs near the Arkansas River (the River) and groundwater monitoring for the three closed LTUs located within the interior of the Refinery.

As allowed under 40 CFR 264.90(f) (adopted by USEPA on October 22, 1998 and incorporated by reference by the ODEQ) and in adherence with applicable federal RCRA policy guidance (USEPA 2001) relevant to appropriate alternative groundwater monitoring priorities and requirements during overarching corrective actions at RCRA facilities, the ODEQ has directed HFTR to implement a Refinery-wide groundwater monitoring program, as opposed to maintaining a groundwater monitoring program in accordance with 40 CFR 264.91 through 264.100 specific to the LTUs.

According to 40 CFR 264.90(f), the standard groundwater monitoring requirements for regulated units provided in 40 CFR 264.91 through 264.100 may be replaced with alternative requirements when:

- The regulated unit is situated among solid waste management units (or areas of concern [AOCs]), a release has occurred, and both the regulated unit and one or more solid waste management unit(s) (or AOCs) are likely to have contributed to the release; and
- It is not necessary to apply the groundwater monitoring and corrective action requirements of Sections 264.91 through 264.100 because alternative requirements will protect human health and the environment.

Historical releases have impacted the groundwater beneath the Refinery. Groundwater impacts as a result of these releases preclude an accurate determination of the potential impacts from the regulated LTUs. As a result, LTU-specific monitoring does not provide any meaningful information. HFTR has committed to conduct groundwater monitoring across the entire refinery in accordance with this comprehensive Plan to assist in an overall cleanup of the Refinery and to institute remedial actions to protect human health and the environment.

This Plan also addresses LNAPL from refinery operations not associated with historical waste-management activities. Because LNAPL is present in the proximity of the LTUs and SWMUs, HFTR is committing to monitor the potential and anticipated effects of LNAPL plumes in the areas of LTUs and SWMUs. Although this Plan includes monitoring wells located upgradient and downgradient of the LTUs, the data generated from monitoring those wells will be used when evaluating other corrective action and LNAPL management activities.

Monitoring under this Plan will provide the necessary information for HFTR to evaluate current conditions and the effectiveness of ongoing remedial activities at the Refinery and will provide information for developing additional or modified corrective measures, if warranted, as environmental conditions change. This Plan will also result in data collection that can be used to

prioritize projects and resources in areas that require attention in order to provide the best protection of human health and the environment.

8.2 Interim Groundwater Conditions and Screening Levels

The 2009 Permit required a proposed method to develop the interim goals for contaminated groundwater and required this be submitted to the ODEQ within 180 days of permit issuance. Within 180 days of approval of the method, HFTR was required to develop the interim goals. HFTR submitted the *Work Plan for Development of Interim Groundwater Protection Goals* to the ODEQ on October 9, 2009 and it was approved on September 17, 2010. HFTR implemented the work plan in October of 2010. HFTR submitted the *Development of Interim Groundwater Protections Goals* (IGPG Report) on July 11, 2011, detailing efforts made by HFTR throughout the previous years to assess the interaction between the groundwater that discharges from beneath the Refinery to the River.

The ODEQ did not approve the protection goals proposed in the IGPG Report and recommended that at least three additional semi-annual sampling events be conducted at the Refinery for which groundwater samples collected from monitoring wells would be tied to near-shore surface water samples collected from the River. The intention was that this would provide a performance-based demonstration of the relationship between the concentrations of the constituents of concern (COCs) present in the Refinery's groundwater to the concentration of these COCs observed in the surface water within the River, and support calculation of Refinery-specific allowable concentrations of COCs in point of compliance wells which are located upgradient of potential points of exposure (POE).

The results of the three additional sampling events were reported in a document titled *Proposed Performance-Based Interim Groundwater Protection Goals* (Enviro Clean, 2014), in which HFTR presented the data to illustrate the relationship between Refinery groundwater concentrations and River surface water. The IGPG report also proposed numeric screening levels for COCs at downgradient point of compliance wells. Following submittal, the ODEQ communicated that operations at the Refinery were not impacting the River at that time, and that HFTR was to closely monitor the groundwater condition along the River to minimize any adverse impacts on the River. In correspondence dated March 16, 2016, the ODEQ requested that HFTR not use the screening levels in *Proposed Performance-Based Interim Groundwater Protection Goals*.

HFTR is now proposing steps to develop new screening levels. HFTR proposes performance of a Refinery-wide risk assessment from which risk-based screening levels (RBSLs) will be calculated. The selection of COCs is based on the Refinery's historical analytical dataset (2003 to 2018). HFTR is proposing that the following nine COCs be retained in the monitoring program: arsenic, barium, benzene, ethylbenzene, lead, methyl tertiary butyl ether (MTBE), toluene, total xylenes, and zinc. The COCs were selected by analyzing the historical dataset and removing analytes that were not detected or were detected at less than 10%

frequency. Following approval from the ODEQ of the RBSLs, HFTR will begin comparing COC analytical results to the approved RBSLs.

The selection of the nine COCs is based on detection at a less than 10% frequency in the available dataset collected from 2003 to 2018. Downgradient POC wells are sampled on a semi-annual basis, and the upgradient POC wells and interior LTU wells are sampled on an annual basis. The wells have been sampled a minimum of 10 times; therefore, a 10% detection frequency is reasonable and consistent with the USEPA's *Risk Assessment Guidance for Superfund* (EPA/540/1-89/002, December 1989) and USEPA Region 8's *Superfund Technical Guidance, No. RA-03: Contaminants of Concern, Evaluating and Identifying Contaminants of Concern for Human Health* (September 1994) guidance documents as the detection frequency equates to one detection in a minimum of 10 samples.

Since submittal of the 2009 Permit, sampling results have been submitted in eighteen (18) semi-annual monitoring reports (SMRs). The most recent semi-annual event in April 2018 (SMR submitted August 14, 2018) revealed detected concentrations of barium at POC wells, with the lowest concentration observed at well 364 (120 µg/L) and the highest concentration at well 504 (2,460 µg/L). There were no detections of ethylbenzene at any of the wells. During April 2018, the remaining seven COCs were observed at a range from below the laboratory analytical detection limit to:

- 43.1 µg/L arsenic (well 504),
- 2.91 µg/L lead (well 504),
- 55.8 µg/L zinc (well 504),
- 370 µg/L benzene (well 361A),
- 640 µg/L MTBE (well 442A),
- 7.2 µg/L toluene (well 448), and
- 13 µg/L total xylenes (well 448).

The concentrations of benzene, toluene, ethylbenzene, total xylenes and MTBE observed at POC wells for the April 2018 event are shown on Figure 8-4. The majority of the POC wells exhibited stable or decreasing concentration trends. The above analytical data summary is a snapshot of Refinery conditions at the time of this permit application. Data from future sampling events will be presented in SMRs.

8.3 Program Schedule and Procedures

8.3.1 Schedule

The proposed groundwater monitoring program will consist of well gauging, groundwater sampling, monitoring of LNAPL recovery systems, and a visual inspection of each

LTU and SWMU. HFTR will perform semi-annual groundwater monitoring in April and October of each year. Elements of the groundwater monitoring program include the following:

- Semi-annual sampling of downgradient POC boundary wells;
- Semi-annual gauging of wells for depth to groundwater and LNAPL;
- Annual sampling of POC upgradient wells;
- Semi-annual reporting of gauging data and sample results; and
- Semi-annual reporting of LNAPL recovery progress, and any modifications to the LNAPL recovery systems.

8.3.2 Field Documentation

Monitoring wells will be screened for pH, temperature, conductivity and dissolved oxygen using portable analysis equipment prior to sample collection. Field documentation will be recorded each day in a bound field logbook and well-associated field sampling form. Each page of the logbook will be signed by the person(s) making entries on that page and will be reviewed to ensure completeness.

8.3.3 Well Inspection and Maintenance

The HFTR well network consists of a combination of gauging wells and POC wells (collectively known as Program Wells). All Program Wells and their primary function are included in Table 8-3. HFTR is proposing to cease sampling of the interior LTU wells based on prior analytical results.

During each gauging and sampling event, Program Wells will be inspected for well integrity. The information will be recorded on the groundwater gauging form. Each inspection will include:

- Inspection of the condition of the protective well casing, outer steel casing, and well covers;
- Inspection of well locking lids;
- Inspection of the presence or absence and condition of padlocks; and
- Inspection of concrete pads for cracks and settling.

Personnel will ensure each well lid is locked upon completion of sampling. Well Network

The Program Wells will be gauged for total depth, redeveloped, and surveyed every five (5) years. The most-recent total depth measurement, survey, and redevelopment activities were conducted in 2018.

8.3.4 Well Gauging

During each semi-annual monitoring event, sampling personnel will complete fluid level gauging at all Program Wells, prior to conducting groundwater sampling. Wells will be gauged for depth to water and depth to product (if present). Table 8-3 provides a list of wells to be gauged for water table elevation and LNAPL. Total monitoring well depth is measured every five (5) years. Prior to gauging, each well cap will be removed to allow groundwater to equilibrate. Fluid level measurements will be collected using a decontaminated electronic water level meter with an accuracy of 0.01 feet. To ensure that the electronic water level is not contaminated or cross contaminated by materials and equipment used during the investigation, the meter is decontaminated between each well.

For wells with a measurable accumulation of LNAPL, additional data analysis will be conducted to calculate a water table elevation value corrected for the presence of LNAPL and an LNAPL thickness value that is corrected to approximate the formation thickness of LNAPL in the vicinity of the well as opposed to the apparent thickness measured in the well.

The gauging well network will provide comprehensive Refinery-wide groundwater and LNAPL elevation data, sufficient to evaluate groundwater flow conditions and apparent LNAPL thickness. If LNAPL is encountered in a well, the corrected water elevation will be incorporated into the water elevation maps. LNAPL thickness maps for each event are compared to previous data to evaluate trends in shape, thickness and movement of the LNAPL plume. HFTR may add or delete specific wells in this gauging network without a Permit modification, although such changes will be noted in the next SMR described in Section 8.5.

LNAPL Evaluation

For monitoring wells with a measured LNAPL thickness, additional evaluation is necessary to determine a corrected LNAPL thickness that approximates the LNAPL thickness observed in the porous media located immediately adjacent to the well.

To calculate a corrected LNAPL thickness, a product density is necessary for each well. In 2006, The Source Group, Inc. (SGI) sampled 161 Refinery wells, active at the time of sampling, to determine each well's specific gravity and viscosity (SGI, 2006). For wells that weren't analyzed, the closest well is used to identify a LNAPL density.

Consistent with the analyses presented in the *Current Conditions Report and Comprehensive Site Conceptual Model*, prepared by The Source Group, Inc and Atkins Benham, Inc. Environmental Division in July 2002 (Current Conditions Report [SGI-ABI, 2002]), the apparent LNAPL thickness can be multiplied by a conversion factor to achieve the corrected LNAPL thickness. The ratio of actual to apparent LNAPL thickness is a function of product density. As such, the wells in the 2006 gauging event were grouped by product density and assigned a conversion factor. The density groupings and corresponding conversion factors set in the Current Conditions Report are as follows:

Product Classification	Density	Conversion Factor
Light Product	0.74 gm/cm ³	0.308
Medium Product	0.83 gm/cm ³	0.219
Heavy Product	0.87 gm/cm ³	0.161

The above product classifications have been expanded to account for a range of densities, by using the midpoint between densities. The ranges are as follows:

- Light Product $\leq 0.785 \text{ gm/cm}^3$
- $0.785 \text{ gm/cm}^3 < \text{Medium Product} < 0.85 \text{ gm/cm}^3$
- Heavy Product $\geq 0.85 \text{ gm/cm}^3$

Gauging data will be corrected per the following equations:

- Measured LNAPL Thickness x Conversion Factor = Corrected LNAPL Thickness
- Depth-to-Water – (Measured Product Thickness x LNAPL Density) = Corrected Depth-to-Water

8.3.5 Groundwater Sampling

Groundwater will be sampled in accordance with HFTR's *Sampling and Analysis Plan and Quality Assurance Project Plan* (SAP-QAPP), which is presented in Appendix 8.1. Thirty-six (36) wells are included in the Refinery's sampling well network, presented in Table 8-2. Downgradient POC wells will be sampled on a semi-annual basis in April and October of each year. The upgradient wells will be sampled annually, concurrently with the downgradient wells during the April monitoring event. HFTR is proposing to sample all wells for the following nine COCs: arsenic, barium, benzene, ethylbenzene, lead, MTBE, toluene, total xylenes, and zinc. These analytes were chosen by utilizing the 10% frequency of detection criterion developed in concurrence with the ODEQ and based on groundwater monitoring data from 2003 to April 2018.

HFTR will not typically collect a groundwater sample from any monitoring well determined at the time of the monitoring event to contain any detectable LNAPL, including any hydrocarbon sheen or globules. In such cases, HFTR will report the occurrence, measured thickness, and corrected thickness of LNAPL in the well in the subsequent SMR. The report will also include an evaluation of the need to replace such wells in the monitoring network and may include a notice of this effect.

8.3.6 Sample Handling and Quality Assurance/Quality Control

Detailed sampling, gauging and quality assurance/quality control (QA/QC) procedures are included in the Refinery's SAP-QAPP (Appendix 8.1). The procedures are intended for use in the field. The SAP-QAPP will be updated periodically without modification to the Permit; as

such, in the future there may be minor changes to the groundwater sampling and analysis procedures, which will be noted in the routine SMRs, described in Section 8.5. Alternate, published, U.S. EPA-recommended methods may be used with prior approval from the ODEQ provided that the SAP-QAPP measurement quality objectives are met. Permit modification will not be required when using an update of a method appearing in the SAP-QAPP or an alternate method published by the U.S. EPA that has been approved for use. This provides the necessary flexibility to use the most recently updated sample preparation and/or analysis methods after new updates to SW-846 are promulgated, and/or when field methods are added or updated, while safeguarding data comparability.

8.4 Program Modifications

Changes to groundwater monitoring wells and monitoring parameters may occur as new data are evaluated, and as corrective measures advance or are completed. Changes to wells such as number of wells, new well location(s), or changes to depth or design are Class 2 permit modifications. The installation of replacement wells without changing location (less than 50 feet from original location), and without changes to design, or depth is a Class 1 modification. Wells can only be removed from the monitoring program following approval by the ODEQ. Well plugging and abandonment methods and certification shall be submitted to the ODEQ within 90 days from the date the wells are removed from the monitoring program. Changes in groundwater sampling or analysis procedures or monitoring schedule, with prior approval from the ODEQ, are Class 1 modifications.

8.5 LNAPL Recovery Activities

The following section outlines the LNAPL recovery program in place at HFTR. The *LNAPL Recovery Plan* was originally submitted to the ODEQ in November 2002 and was resubmitted in 2007. Since that time, no substantial changes to the previous recovery plan have been made; however, this document reflects current site conditions and practices.

The Refinery LNAPL recovery program consists of riverbank containment systems and interior recovery systems. The systems are shown on Figure 8-2. LNAPL recovery volumes are greatly affected by fluctuation of the groundwater levels beneath the Refinery. LNAPL recovery generally decreases during periods of high or fluctuating groundwater levels and increases during low or stable groundwater levels.

To maximize efficiency in LNAPL recovery, HFTR will continue to operate existing LNAPL recovery systems, and conduct enhancements if and where advisable. Optimization efforts may include:

- Installation of new recovery wells;
- Installation of skimmer pumps into existing wells;
- Rehabilitation of dual phase recovery wells; and

- Installation of new dual-phase recovery wells.

8.5.1 Arkansas River LNAPL Inspection

Section 3 (Inspection Plan) describes plans and procedures for routine inspection of the River's south bank. HFTR shall conduct weekly inspections for hydrocarbon sheening along the length of the riverbank property owned by HFTR to detect the presence of hydrocarbon discharge to the River. Inspections will be conducted during representative flow conditions². If hydrocarbon sheening is observed, HFTR will undertake actions as outlined in Section 3.3.

8.5.2 Riverbank LNAPL Containment Systems

There are currently eight Riverbank Areas (A through H) along the Refinery. Seven of the Riverbank Areas (A through G) have LNAPL containment systems. Lists of active riverbank recovery wells are provided in Tables 8-4 and 8-5.

Groundwater for all the riverbank containment systems is pumped through dedicated piping to various collection locations and then to the on-site Refinery wastewater treatment system (WWTS) for treatment and discharge to the River under the Refinery's Oklahoma Pollution Discharge Elimination Systems permit. Recovered LNAPL for all riverbank containment systems is collected in storage tanks and then undergoes the oil refining process.

Area A Containment System

The Area A Containment System (installed in 1995) is in the Northwest corner of the Refinery. The system combines a 1,100-foot-long slurry wall and five dual phase recovery wells (DEW-A1 through DEW-A5) located immediately upgradient of the slurry wall.

Area B Containment System

The Area B Containment System (installed in October 2005) is in the Northwest portion of the Refinery. The recovery wells consist of 2 sets of well pairs. One well in each pair is used for dual-phase recovery, and the other is utilized for additional LNAPL recovery. The four Area B wells are identified as wells 496/497 and 498/499.

Area C Containment System

The Area C Containment System (installed 1987-1988) is in the North-Central portion of the Refinery. The system consists of 5 dual phase recovery wells DEW-C1 through DEW-C5.

Area D Containment System

The Area D Containment System (installed in 2003) is in the North-Central portion of the Refinery. The system consists of a 210-foot long, steel sheet-piling cut-off wall installed immediately downgradient of 3 dual-phase recovery wells DEW-D1 through DEW-D3. The steel

² To ensure representative flow conditions during riverbank inspections, HFTR will record the River flow, water level, and wind direction/strength.

cut-off wall is V-shaped and is installed into the bedrock to facilitate LNAPL containment and recovery.

Area E Containment System

The Area E Containment System (installed in 1998) is in the Central-North East portion of the Refinery. The Area E Containment System consists of six (6) dual-phase extraction wells DEW-E3 through DEW-E5, 482, 514A and R12.

Area F Containment System

The Area F Containment System (installed in 2007) is located in the northeast portion of the Refinery. The Area F Containment System is comprised of three dual-phase recovery wells 483A, 484A and 515.

Area G Containment System

The area G Containment System (installed in 2007) is located in the northeast portion of the Refinery. The Area G Containment System is comprised of two dual-phase recovery wells 512A and 513A.

8.5.3 Interior LNAPL Recovery Systems

The interior recovery systems are generally located in the tank farm and process areas where mobile and recoverable LNAPL is potentially present. Interior extraction wells are summarized in Table 8-5. Recovery may be conducted at additional existing wells if/where conditions warrant. Performance of these systems is evaluated by the volume of LNAPL recovered. Systems are named based on proximity to fixed features in the Refinery. Changes in which wells are pumped, installation of new recovery wells/recovery systems, and description of design and operation are provided in the SMRs.

In general, LNAPL recovery at interior locations is achieved via skimming and in some cases with groundwater depression. LNAPL collected by the interior recovery operations is temporarily pumped into storage tanks and then undergoes the oil refining process.

8.6 LNAPL System Operation and Maintenance

The following section details the routine operation and maintenance (O&M) performed by HFTR to keep recovery and containment systems operational. In general, riverbank containment systems and interior recovery systems are inspected regularly as necessary to optimize system performance. This includes measurement of recovered LNAPL volumes, adjusting groundwater flow and LNAPL recovery rates and performing maintenance of critical mechanical and electrical system components. Recovered groundwater and LNAPL volumes for all systems are monitored and reported to the ODEQ in the SMRs.

8.6.1 Riverbank Containment Systems O&M

Operation of the riverbank containment systems requires extensive monitoring and maintenance to optimize performance. Adjustments are made in response to rapidly changing groundwater fluctuations and conditions along the Riverbank Area. HFTR will not request prior approval for system operations modifications such as field adjustments and maintenance activities. Replacement of equipment with equipment which is of a comparable or similar type, function or design is considered a Class 1 permit modification.

Prior to any other system modifications, including proposed (planned) system shutdown, HFTR will submit a written request to the ODEQ proposing the modification. The type and scale of the proposed system(s) modification may trigger a permit modification under CFR 270.42. The request(s) will include technical reasons for the proposed modification, as well as a schedule for implementation. Upon receiving approval from the ODEQ, HFTR will implement any such modification, pursuant to the schedule included in the request to the ODEQ.

A system or a portion of a system may be shut down if/where recovery is below a practical endpoint; if/where there have been no recent ongoing detections of petroleum hydrocarbon sheen in the River; if/where declining groundwater concentrations indicate it is appropriate; and if/where fluid level measurements indicate it is appropriate. A “shutdown” is considered to be the complete cessation of activities by one (1) or more of the riverbank containment systems. Shutdowns for unscheduled or unexpected maintenance, including replacement of equipment, shall not be considered an interruption of operation, provided the shutdown(s) are no longer than seventy-two (72) hours from discovery and last no longer than seventy-two (72) hours in any thirty (30) day period. Where shutdown is related to conditions beyond HFTR control; such as power failure, extreme weather, labor disruption, terrorist activity, *etc.*, there will be no violation of the Permit, and the system(s) should be made operational as soon as practical.

8.6.2 Interior Recovery Systems O&M

Interior Recovery systems will be operated and managed to optimize protection of the River and enhance LNAPL recovery. Additions, modifications, enhancements, deletions, and maintenance will be conducted at the discretion of HFTR provided the overall effectiveness of the system(s) is (are) not reduced. Prior approval from the ODEQ for these modifications will not be required; however, all changes will be communicated to the ODEQ in SMRs.

8.7 Semi-Annual Monitoring Report

Groundwater monitoring from each calendar year will be documented in SMRs. The report will include gauging data and groundwater analytical results from the April and October gauging events, and LNAPL containment and recovery efforts during the applicable six-month period.

At a minimum, the SMRs will include the following:

- Text describing sampling and analysis activities (focusing on deviation from this Plan and the SAP-QAPP), regulated units, LNAPL recovery activities, and groundwater and LNAPL monitoring data;
- Figures showing property location, property boundaries, location of sampling and gauging locations;
- Summary table of semi-annual groundwater and LNAPL gauging data during the reporting period, with corrected water table elevation for all wells containing LNAPL;
- Potentiometric surface maps depicting the groundwater gradient for each semi-annual monitoring event of the reporting period, including site features and the direction and magnitude of the hydraulic gradient;
- Summary of laboratory analytical data during the reporting period;
- Summary of LNAPL recovery system performance including:
 - LNAPL thickness isopleth maps for each semi-annual monitoring event during the reporting period;
 - Tabulation of the monthly and cumulative volume of LNAPL removed from extraction wells or containment systems during the reporting period;
 - Detail of each LNAPL recovery system including well numbers and information on wells; and
 - Evaluation of the Refinery's containment and interior recovery systems during the reporting period, any significant changes to the systems during the reporting period, and any proposed system modifications and improvements to optimize the riverbank and interior recovery systems for the next semi-annual period.
- Conclusions regarding:
 - The effectiveness of ongoing remedial efforts, including interim and final corrective measures;
 - Observed trends relative to the quality of groundwater POC wells; and
 - Observed trends relative to the subsurface distribution of LNAPL.
- Recommendations regarding:
 - Proposed changes to the COCs to be sampled and analyzed under this Plan;
 - Proposed changes to the numbers or locations of monitoring or gauging wells;

- Proposed modification of the sampling procedures, QA/QC, or other written details of this Plan; and
- Proposed investigations or corrective actions to investigate or mitigate potential releases.
- Complete laboratory data reports; and
- A list of references and appendices of supporting documents.

Laboratory analytical and well gauging data are due by electronic mail to the ODEQ 45 calendar days from the completion of the sampling event. The SMRs are due to the ODEQ on or before February 15 and August 15 of each calendar year.

8.8 Groundwater Corrective Action Plan

After comparing the groundwater results to the screening levels and evaluating groundwater data using statistical methods as outlined in the SAP-QAPP, if downgradient wells are observed to have concentrations exceeding the RBSLs for two consecutive semi-annual sampling periods, an assessment will be proposed. Within 90 days after submittal of the second consecutive report of an exceedance of RBSLs, a report will be submitted identifying proposed risk management plans, potential data needs/investigations planned, changes to the methods of comparison, validation or confirmation that should be made, and/or whether remedial measures should be undertaken.

Any changes, concerns, or substandard conditions observed during the groundwater monitoring assessment will be brought to the attention of the Refinery's Environmental Manager. The Environmental Manager will arrange to have any groundwater monitoring network deficiencies corrected as soon as practical by the Refinery maintenance staff, and the corrective actions will be noted in the following SMR.

8.9 References

- Enviro Clean, 2014. Proposed Performance-Based Interim Groundwater Protection Goals. Enviro Clean Services, LLC. July 31, 2014.
- Enviro Clean, 2017. Semi-Annual Monitoring Report, January Through July 2017. Enviro Clean Services, LLC. August 11, 2017.
- Enviro Clean, Feb. 2018. Semi-Annual Monitoring Report, July Through December 2017. Enviro Clean Services, LLC. February 13, 2018.
- Enviro Clean, Aug. 2018. Semi-Annual Monitoring Report, January Through June 2018. Enviro Clean Services, LLC. August 14, 2018.
- EPA, 2001. Environmental Protection Agency/530/R-01/015, Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action, Chapter 14, September 2001.

- ODEQ, 2009. Resource Conservation and Recovery Act Post-Closure and Corrective Action Permit for a Closed Hazardous Waste Management Facility No. OKD058078775-PC. Oklahoma Department of Environmental Quality. June 1, 2009.
- SAIC, 2011. Development of Interim Groundwater Protection Goals. SAIC Energy, Environment & Infrastructure, LLC. July 11, 2011
- SGL-ABI, 2002. Conditions Report and Comprehensive Site Conceptual Model. The Source Group, Inc. and Atkins Benham, Inc. Environmental Division, July 17, 2002.
- SGL-ABI, 2005. Assessment of Potential Impact of Groundwater Discharges on the Arkansas River. The Source Group, Inc. and Atkins Benham, Inc. July 28, 2005.
- SGL, 2006, LNAPL Reservoir Management Plan. The Source Group, Inc. March 29, 2006.
- Sunoco, 2003. Facility-Wide Groundwater Performance Monitoring Plan. Sunoco, Inc. (R&M). February 26, 2003.
- Sunoco, 2007. Light Non-Aqueous Phase Liquid (LNAPL) Recovery Plan. Sunoco, Inc. (R&M). January 2007.
- USEPA, 2015. Region 6 Corrective Action Strategy (CAS). U.S. EPA Region 6 Multimedia Planning and Permitting Division. February 2015.

**RCRA PART B APPLICATION
SECTION 9**

Remove pages 9-5 and 9-6, and replace with attached pages 9-5 and 9-6

membrane cap over the top of the fill to eliminate possible contamination of surface run-off, and placing rip-rap along the edge of the riverbank to reduce erosion. In addition, piezometers and monitoring wells were installed upgradient from the SWMU. The data from the piezometers and monitoring wells showed no current river impacts from the presence of the fill. These interim measures were completed in 1995 and approved by the USEPA.

9.3 Corrective Action in Groundwater

Portions of the groundwater beneath the Refinery have been contaminated with petroleum hydrocarbons, including light non-aqueous phase liquids (LNAPL). The Refinery's LNAPL recovery program can be found in Section 8 (Groundwater Monitoring and LNAPL Management Plan) of this Renewal Application. HFTR also implements a Refinery-wide groundwater monitoring program that satisfies regulatory requirements for groundwater monitoring for SWMUs. Details regarding the groundwater monitoring program are provided in Section 8 (Groundwater Monitoring and LNAPL Management Plan) of this Renewal Application. Additional corrective action and remediation information is provided in Table 9-2. HFTR is proposing to conduct a site-wide risk assessment to evaluate whether groundwater at the site presents a risk and whether additional work is warranted. A risk assessment work plan will be submitted for prior ODEQ approval.

9.4 Wastewater Treatment System

HFTR is requesting in this Renewal Application removal of the current Permit provisions of Section III.F.1 (*Specific Condition – Continued Requirements for Previously Identified SWMU and AOC, SWMU 10 – Wastewater Treatment System*) that require written notice to ODEQ prior to any excavations, repairs, expansions or other modifications of SWMU 10, and to provide a work plan for ODEQ approval prior to closure, replacement, or reconstruction of any in-ground or below-ground units within SWMU 10. The wastewater treatment system (SWMU 10) is an operating unit and necessary maintenance must be completed as quickly as possible to allow minimal interruptions of operations. Removal of the notification requirements will streamline and expedite maintenance and modifications necessary to effectively operate the active WWTS. In addition, the Refinery will continue to follow current health and safety protocols to ensure worker protection, proper handling to prevent any release of hazardous constituents, and proper management of soil and other materials during any work in this area to protect human health and the environment. HFTR will document any completed maintenance activities, repairs, and modifications within SWMU 10 in the SMRs that are submitted to ODEQ.

9.5 Land Treatment Units

The Refinery operated three RCRA-permitted LTUs – the Central LTU, the West LTU, and the East LTU. All three LTUs were closed and are currently in the post-closure care (PCC) period. The closed LTUs are also included in the Refinery's Corrective Action Program (CAP),

collectively as SWMU 16. No additional corrective action investigations are required for the LTUs. The Refinery is currently maintaining and monitoring the LTUs in accordance with the PCC plan, which is provided in Section 5 (Post-Closure Plan) of this Renewal Application.

9.6 Corrective Action in Soil

HTFR is proposing to conduct a site-wide risk assessment at SWMUs 4, 5, and 6 to evaluate whether the soils present risk and whether additional work is warranted. These are the three open SWMUs (excluding SWMU 10 that is currently active) as the remaining SWMUs have received NFA status or in the case of SWMU 16 are the LTUs that are in post-closure. A risk assessment work plan will be submitted for prior ODEQ approval.

9.7 References

The Source Group, Inc. and Atkins Benham, Inc. Environmental Division, 2002. Current Conditions Report and Comprehensive Site Conceptual Model. July 17, 2002.

The Benham Companies, LLC. AOC 1 Investigation Report. February 5, 2010.

Don Hensch, Sun Oil – Tulsa Refinery. Discussion Paper – SWMU #4. November 26, 2011.

Don Hensch, Sun Oil – Tulsa Refinery. Discussion Paper – Area D (aka SWMU 5). November 26, 2001.

Don Hensch, Sun Oil – Tulsa Refinery. Discussion Paper – SWMUs # 1, 2, 3, 6, 7, 8, 9, 11, 12, and 13. November 26, 2001.

Don Hensch, Sun Oil – Tulsa Refinery. Discussion Paper – SWMU #14 (Allison Property Landfill). November 26, 2001.

ODEQ 2009. Resource Conservation and Recovery Act Post-Closure and Corrective Action Permit for a Closed Hazardous Waste Management Facility No. 058078775-PC. Oklahoma Department of Environmental Quality. June 1, 2009.

ODEQ 2017. Response to DEQ September 19, 2016 correspondence regarding SWMU-2 Excavation and Rail Spur Construction. January 27, 2017.

Hull & Associates, Inc. Riverbank Areas B & H Interim Measure Summary Report. January 2014.