Groundwater

RECORD OF DECISION

November 2008

Former Okmulgee Refinery
Okmulgee, Oklahoma

Prepared by:

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RECORD OF DECISION
FORMER OKMULGEE REFINERY
NOVEMBER 2008

1.1 Site Name and Location

Former Okmulgee Refinery
Okmulgee, Okmulgee County, Oklahoma

1.2 Statement of Basis and Purpose

This decision document presents the selected remedial action for groundwater at the Former Okmulgee Refinery, in Okmulgee, Oklahoma (Site). Soil, surface water, sediment, and waste contamination were addressed as a separate operable unit in the April 2005 Record of Decision (ROD).

1.3 Description of the Selected Remedy

The Oklahoma Department of Environmental Quality believes the selected remedial action appropriately addresses the principal current and potential risks to human health and the environment. The Site has contaminated groundwater that will be remediated and/or monitored as part of the site wide remediation. The principal threat from the contaminated groundwater is associated with historical refining activities and includes volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and phase-separated hydrocarbons (PSH). The selected remedy described in this document addresses the principal threat at the Site by reducing or eliminating exposure to elevated levels of SVOCs, VOCs, and PSH.

The major components of the selected remedy are as follows:

- Prevent PSH from discharging into Okmulgee Creek,
- Prevent groundwater containing dissolved-phase constituents of concern (COC) at levels greater than applicable regulatory or risk-based threshold levels from discharging into Okmulgee Creek, and
- Manage the current off-site groundwater contaminant plumes and mitigate the potential for exposure until dissolved-phase COCs are reduced to acceptable levels.
- Establishment of institutional controls consisting of specified locations and recording appropriate deed restrictions

1.4 Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the extent practicable for this site.

Steven A. Thompson, Executive Director
Oklahoma Department of Environmental Quality

November 25, 2008
Date

DECISION SUMMARY

2.1 Site Name, Location, and Description

The Former Okmulgee Refinery (Site) is located west of U.S. Highway 75 on the north side of the City of Okmulgee, Oklahoma. The Site location and topographic features are shown in Figure 1. The Site occupies approximately 209 acres in portions of Section 31, Township 14 North, Range 13 East, and Section 6, Township 13 North, Range 13 East in Okmulgee County, Oklahoma.

The Site, under various owners, operated as a petroleum refinery and storage facility from 1906 to 1982. The Site produced gasoline, lube oils, and asphalt. A mixture of residential, commercial/industrial, and recreational areas currently bound the Site.

This Record of Decision (ROD) addresses the contaminated groundwater at the Site. ConocoPhillips Company is a former owner of the Site and will be conducting the remedial action. The Okmulgee Area Development Corporation (OADC) is the owner of the Site and will be managing the institutional controls for the Site after the remedial action is complete.

2.2 Site History and Enforcement Activities

OADC owns the Site property. Petroleum storage and refining activities began at the Site in approximately 1906, producing gasoline, lube oils, and asphalt. Various owners operated the Site from 1906 to 1930. Phillips Petroleum Company (ConocoPhillips) acquired the Site in 1930 and operated the refinery until 1966, at which time the refinery was sold to OKC Refining Company. In 1980, OKC Refining Company sold the refinery to Basin Refining Company who then operated the refinery through May 1981. Basin Refining Company filed for bankruptcy in June of 1981.

In 1981 and 1982, ownership of the Site was held by CKB & Associates, Inc., which leased the Site to OK Corporation of Dallas, Texas. The refinery was operated intermittently from June of 1981 to June of 1982 at which time it was permanently shut down. In June of 1997, Basin Refining Company issued a quitclaim deed for the property to the OADC. The OADC intends to develop the Site for future use as an industrial/commercial park. ConocoPhillips, in 1997, entered into a voluntary agreement entitled "Environmental Investigation, Remediation, and Settlement Agreement" with the Oklahoma Department of Environmental Quality (DEQ) and the OADC to investigate and remediate the environmental condition of the Site for use as an industrial/commercial park.

When Site remediation began in early 1998, the Site offered numerous challenges. In order to address these challenges, the following tasks were undertaken by ConocoPhillips Company, with work being completed in 2001.

- Clearing of the Site perimeter and construction of a fence around the Site
- Characterization/disposal of containerized chemicals

- Abatement and off-site disposal of over 8,000 cubic yards of asbestos
- Characterization and disposal of over 5,000 cubic yards of non-hazardous tank bottoms
- Off-site disposal of hazardous waste streams such as leaded gasoline tank bottoms, crude tank bottoms, mercury, PCBs, neutralized hydrofluoric acid, chromium, etc.
- On-site neutralization and subsequent off-site disposal of 300 gallons of 99%, anhydrous hydrofluoric acid
- Demolition of a 260 feet tall cat cracker and a 160 feet tall boiler house stack using explosives
- Demolition of over 100 on-site tanks, vessels, and buildings
- Removal of the majority of underground piping

An assessment of the environmental conditions at the Site began with the submittal of a Work Plan on August 2, 2000, to the DEQ. The Phase I Site Characterization field activities were conducted from August 9, 2000, through June 19, 2002, and addressed stream water, stream sediment, on-site surface water, impoundment waste/sediment, non-impoundment waste/soil, and groundwater. The initial Phase II Site Characterization field activities were conducted from March 31, 2003, through September 29, 2003. The objectives of the characterization were to more fully characterize the affected media and to delineate and quantify the volumes of waste, sediment and soil materials that are to be considered for remedial action. The reports indicate elevated concentrations of VOCs and SVOCs are present in the soils, sediments, and waste, and elevated concentrations of lead are present in one on-site surface impoundment (Pond 6). August 13, 2004, ConocoPhillips submitted the Remediation Plan on August 13, 2004, that outlined the recommended remedial actions for the residual refinery wastes, impacted sediments and soil. On April 14, 2005, the DEQ issued a Record of Decision approving the remedial approach for the Site.

During the site characterization it was determined that further groundwater investigation was needed to better define the extent of contamination. Therefore, the further groundwater investigation and remediation was split into another operable unit. The Off-Site Groundwater Investigation report and addendum was completed by October 18, 2005. The Groundwater Remediation Plan was finalized January 3, 2007. The investigations identified several areas requiring action. Chemicals of concern (COC) include phase-separated hydrocarbons, and elevated concentrations of VOCs and SVOCs. These are addressed in the following sections of this Record of Decision.

2.3 Community Participation

The involvement of local citizens in this project has been a major goal of DEQ, ConocoPhillips, and OADC. A number of public meetings have been held since the beginning of this investigation and remediation project in 1997. Radio interviews and newspaper articles have also kept the general public informed of project progress.

The Groundwater Proposed Plan was released to the public for review and comment at a public meeting held on July 15, 2008. A public notice was published in the local newspaper. The public comment period for the Groundwater Proposed Plan was open from July 1 to July 15, 2008. At the time of the public meeting, the Groundwater Proposed Plan was presented and

public comment requested. All significant information has been released through the public meeting process to allow concerned citizens to participate in the remedy selection. A transcript of the public meeting and the responses to comments received are included as part of this ROD in the Responsiveness Summary. The administrative record is available for review at Okmulgee Chamber of Commerce, 112 North Morton, Okmulgee, Oklahoma or Department of Environmental Quality, 707 N. Robinson, Oklahoma City, Oklahoma

2.4 Scope and Role of Operable Units

As with many sites of this nature, the problems at the Site are complex. As a result, there will be two operable units at this site.

- Operable Unit 1 (OU 1): Contamination of the on-site soils, waste, sediment, and surface water is addressed.
- Operable Unit 2 (OU 2): On and off-site groundwater contamination is addressed.

This decision document covers OU 2.

2.5 Site Characteristics

The physical characteristics of the Site include an approximately 28-acre repository. The repository contains the treated waste and contaminated soil from the site remediation under OU 1. Okmulgee Creek bisects the Site entering from the northeast and continues around the southwest of the Site and exiting along the south property boundary. The north side of Okmulgee Creek has been remediated and is currently being redeveloped as a commercial/industrial site. The perimeter of the south side of the site is surrounded with a security fence.

Site investigations began by reviewing historical process knowledge, historical maps, and aerial photographs. The investigations included non-intrusive screening methodologies such as electromagnetic terrain conductivity survey (EM) and rapid optical screening tool (ROST), followed by intrusive sampling methodologies to assess surface water, creek sediment, impoundment sediment, soils, wastes, and groundwater. The primary COCs in Site groundwater include SVOCs, VOCs and phase separated hydrocarbons (PSH). As a result of the Site Characterization the locations of contaminated groundwater containing COCs at levels greater than cleanup levels were defined and are presented on Figure 2.

2.6 Current and Potential Future Land Use and Resource Uses

Currently the land use for the Site is commercial/industrial. The future use for the property north of Okmulgee Creek will be industrial/commercial. The OADC has plans to create an industrial/commercial park on the Site north of Okmulgee Creek. However, an area known as the south end of Pond 1 will be restricted from future development. This area will be fenced to restrict access and institutional controls will be put in place to prevent future development.

The on-site repository occupies a 28-acre area of the south side of the property. The property will be fenced and use will be restricted from future development, although the area surrounding the repository (including ancillary structures) may be used for a repository maintenance area. A recordable notice of remediation and easement will be filed in the county clerk's office.

2.7 Summary of Site Risks

Human Health Risk

Exposure pathways and COCs were determined during the Phase 1 (The Benham Companies, 08/2002) and Phase 2 (The Benham Companies, 02/2004) Site Characterization reports. It was determined in the site characterization reports that human or other biota could come in contact with impacted groundwater. This Record of Decision addresses contaminants in groundwater and PSH floating on the groundwater. The soils, sediments, surface water, and waste contamination were addressed as a separate operable unit within the April 14, 2005, ROD as stated above.

The investigations revealed that PSH, SVOCs, and VOCs, were the principal contaminants. COC clean-up levels were determined based on frequency of detection, comparison with background levels, and screening benchmarks. Table 1 shows the clean-up levels for the principal COCs for the groundwater. All groundwater above these clean-up levels will be remediated.

PSH such as weathered oil, diesel, gasoline, and refined intermediates, float on top of the groundwater in various portions of the refinery. This material leaches various chemicals into groundwater and may subsequently impact the groundwater and/or surface water. The chemicals of concern are VOCs and SVOCs. Utilizing results from the characterization reports, along with published standards; Clean-up Levels were developed for groundwater at the Site that are protective of human health and the environment and take into consideration the exposure routes, receptors, and risk levels of concern. Clean-up Levels are specific contaminant concentrations (e.g., contaminate concentrations in groundwater) that are protective of human health and the environment (i.e., that achieve the remedial action objectives). The Clean-up Levels must comply with state and federal regulations called applicable or relevant and appropriate requirements (ARARs).

The Clean-up Levels derived for groundwater and remedies for PSH are intended to:

- Prevent PSH from discharging into Okmulgee Creek,
- Prevent groundwater containing dissolved-phase constituents of concern (COC) at levels greater than applicable regulatory or risk-based threshold levels from discharging into Okmulgee Creek, and
- Manage the current off-site groundwater contaminant plumes and mitigate the potential for exposure until dissolved-phase COCs are reduced to acceptable levels.

Development of Clean-up Levels for the affected media at the Site used a risk-based approach to derive appropriate groundwater concentrations. Clean-up levels for the affected media were calculated based on different exposures scenarios and land uses. The Clean-up Levels are presented in Table 1. Remedial decisions for the Site will be based on whether the chemical analysis of groundwater samples exceeds any of the final Clean-up Levels.

TABLE 1
Clean-up Levels for Groundwater
Parts Per Billion (µg/L)

Chemical of Concern	On-site	Off-site (MCLs)*
Benzene	927	5
Toluene	1,980,000	1000
Ethylbenzene	7,000	700
Xylene	100,000	10,000
Benzo(a)pyrene	6.98 (Pond 1 only)	**
Benzo(b)fluoranthene	69.8 (Pond 1 only)	**

* = If institutional controls are implemented off-site then levels revert to on-site values.
** = not applicable

Exposure Assessment
The purpose of the exposure pathway assessment was to estimate the nature and the magnitude of potential exposures associated with the Site and to identify exposure pathways that are complete. Potential exposure pathways that were evaluated include construction workers, industrial/commercial workers, trespassers, and off-site fence-line residents.

Clean-up Levels have been selected for the chemicals of concern found at the Site. The levels proposed for groundwater are protective for individuals in contact with incidental direct contact (ingestion and dermal) of surface water while using Okmulgee Creek for recreational purposes. Additional cleanup levels protective of groundwater as a potential drinking water source were selected for any areas where adequate institutional controls cannot be put into place to prevent the use of groundwater as drinking water.

It is DEQ's current judgment that the selected alternative identified in this ROD is necessary to protect human health and the environment from actual or threatened releases of hazardous substances into the environment.

2.8 Remedial Action Objectives

Human Health RAOs
Remedial Action Objectives (RAOs) are clean-up levels that are achieved by reducing or eliminating contamination or exposure routes. RAOs are media-specific and are provided in Table 1. The RAOs must also comply with other state and federal regulations called applicable or relevant and appropriate requirements (ARARs). RAOs and preliminary remediation goals are used during the evaluation of the remedial action alternatives. The groundwater RAOs specify the prevention of human health and ecological risks associated with the exposure to groundwater containing PSH, VOCs and SVOCs. Through active remediation, groundwater techniques the RAOs will be met.

2.9 Description of Alternatives

Ten potential remedies were considered in the Remediation Plan (The Benham Companies, Inc., January 2007). The DEQ's preferred remedy is listed in Table 2, Summary of Preferred Alternative. Institutional controls will consist of maintaining Site fencing at specified locations and establishing appropriate deed restrictions. The DEQ is required to file a deed notice of risk-based closures. Post-closure groundwater monitoring will be performed in the area surrounding the disposal cell. The Site has been divided into 5 distinct Work Areas (Figure 2). Table 2 depicts the COC by area with the preferred alternative.

Table 2. Summary of Preferred Alternative

Area of Concern	Chemicals of Concern	Remedies
Process Area	PSH and dissolved-phase constituents (VOCs and SVOCs)	Partial cap, hanging curtain or slurry wall, PSH recovery, and ICs.
Southeast Property Line Area	PSH and dissolved-phase constituents (VOCs and SVOCs)	Partial cap, PSH removal, MNA, and ICs
Tank 403 Area	Dissolved-phase constituents (VOCs and SVOCs), Contaminates in soils, and possible PSH	Excavation of benzene contaminated soils, treatment of residuals with a biodegradation enhancement additive, MNA, PSH removal as needed, and ICs
Tank 405 Area	Dissolved-phase constituents	MNA and ICs
Pond 1	SVOC contaminated material left in place	Monitoring of down-gradient groundwater, fencing and ICs

VOC = Volatile Organic Compounds
SVOC = Semi-Volatile Organic Compounds

The preferred remedial action alternatives were selected after consideration and evaluation of various alternative remedies, including but not limited to the following:

- No Action
- Institutional Controls
- Monitored Natural Attenuation (MNA)
- Hanging curtain wall and/or slurry wall
- Permeable drainage trenches with in-situ air sparge system
- Permeable drainage trenches with pump, treat, and discharge system
- Source removal of contaminated soil or PSH
- Air sparging/soil vapor extraction
- Air sparge curtain
- Monitoring of down-gradient groundwater

The alternatives selected for consideration were analyzed based on their feasibility for the existing Site conditions and overall cost. Other technologies may be considered as long as they meet the remedial goals outlined in this ROD. An explanation of the analysis for each alternative follows.

Alternative 1 – No Action

The No Action alternative would leave all contaminated groundwater in place. Because groundwater on-site exceeds levels that would be protective of human health, the no action alternative is not a viable alternative and was dismissed.

Alternative 2 – Institutional Controls

The future use of the developable portion of the Site is industrial/commercial; restricting access to the entire site is not feasible. Adequate Institutional controls such as deed notices can be put into place to prevent the use of groundwater as drinking water. Portions of the Site where institutional controls may be feasible include areas of impacted groundwater both on-site and off-site and a portion of the Pond 1 area. Therefore, institutional controls are carried forward in the preferred alternative.

Alternative 3 – MNA

MNA is the process of monitoring groundwater contaminants as they naturally degrade. This remedy is likely to be effective as a remedy or portion of the remedy at this site, but it has not yet been fully evaluated. Once an approved network of groundwater wells is installed, performance monitoring would be initiated. Groundwater will then be monitored quarterly for two (2) years and evaluated to determine if MNA is an appropriate remedy. Where source materials such as PSH are present, MNA is seldom selected as a sole remedy. MNA is generally accompanied by other remedies directly addressing source materials. MNA is carried forward as a preferred alternative, as a portion of the remedy, as it is anticipated that natural attenuation of the contaminants in groundwater can be successfully demonstrated. If MNA proves to be ineffective, alternative remedial efforts will be evaluated and an amendment to the plan completed.

Alternative 4 – Hanging curtain wall and/or slurry wall

Discharge of dissolved-phase COC, at levels greater than Clean-up Levels and PSH in groundwater, should be prevented from entering Okmulgee Creek. One option considered for preventing discharge was a hanging curtain wall or slurry wall. Curtain and slurry walls are placed vertically in the ground using a HDPE membrane or a cement-bentonite slurry to isolate and immobilize PSH and dissolved-phase COCs within the upper portions of the soil profile, but allow groundwater to underflow the impermeable barrier. This alternative has not been fully evaluated. A groundwater study will be performed ensure that this remedy will be effective. Barrier type technology does not remove the PSH source or groundwater contaminated above cleanup levels. PSH source removal and groundwater monitoring would also be needed. A hanging curtain wall and/or slurry wall, as a portion of the remedy, is carried forward as a preferred alternative. If the hanging curtain proves to be ineffective, additional or supplemental remedial options will be evaluated and an amendment to the plan completed.

Alternative 5 – Permeable Drainage Trenches with in-situ Air Sparge System

Dissolved-phase COC at levels greater than Clean-Up Levels could enter a permeable trench. Air injected into the trenches could aid in the natural degradation of dissolved-phase VOCs in groundwater. This approach may not be effective as a sole remedy but is retained as a possible supplement if the hanging curtain wall should prove ineffective.

Alternative 6 – Permeable Drainage Trenches with Pump, Treat, and Discharge
This technology collects PSH and contaminated groundwater and treats and discharges the groundwater. This would likely be an effective remedy but was eliminated due to cost.

Alternative 7 – Source Removal
This alternative addresses the benzene contaminated soils in the Tank 403 area and PSH in various portions of the site. Source removal of contaminated soil involves excavation of the soil to the top of groundwater saturation, followed by application of a biodegradation enhancement additive to the base of the excavation to accelerate degradation of residual hydrocarbons. Based upon the limited potential for exposure to the impacted groundwater, source removal of contaminated soil is carried forward in the preferred alternative. PSH on the groundwater is also a source for groundwater contamination. Removal of PSH is carried forward as a preferred alternative.

Alternative 8 – Air Sparging/Soil Vapor Extraction
The air sparging/soil vapor extraction alternative includes the installation of an air sparging system in the saturated zone and a soil vapor extraction system in the unsaturated zone of the impacted soil and groundwater of the Tank 403 Area. Air sparging injects air into the impacted groundwater to remove organic contaminants by volatilization and move them up into the unsaturated zone where the soil vapor extraction system removes the vapors. The introduction of air into the subsurface and extraction of the vapors would be difficult due to the low permeability of the clayey soils present. Therefore, air sparging/soil vapor extraction has been eliminated as a possible remedial action.

Alternative 9 – Air Sparge Curtain
The air sparge curtain alternative includes the installation of an air sparge curtain system along the property line between the on-site and off-site portions of the Tank 403 Area to treat hydrocarbon impacted groundwater. This alternative has been eliminated as a possible remedial action because introduction of air into the subsurface would be difficult due to the low permeability of the clayey soils.

Alternative 10 – Monitoring of Down-Gradient Groundwater
Upon completion of the planned remedial actions during the soils, waste, and sediments clean-up in the Pond 1 Area, approximately 30,000 cubic yards of refinery wastes will be left in-place in the south end of Pond 1. Although, groundwater samples did not indicate any exceedance of the RBRGLs, the groundwater down-gradient of Pond 1 will be monitored to ensure that the waste materials remaining in-place are not impacting the groundwater above ODEQ approved action levels.

2.10 Summary of Comparative Analysis of Alternatives

The Site-wide action alternatives were compared with eight evaluation criteria: Overall protection of human health and the environment; compliance with ARARs; implementability; long term effectiveness and permanence; reduction of toxicity mobility and volume through treatment; short term effectiveness; cost; and community acceptance. These criteria are defined below in Table 3.

Table 3
EVALUATION CRITERIA

Threshold Criteria

1. Overall Protection of Human Health and the Environment - How well does the alternative protect human health and the environment both during and after construction?
2. Compliance with Federal and State Environmental Standards - Does the alternative meet all applicable or relevant and appropriate state and federal standards and laws?

Balancing Criteria

3. Implementability - Is the alternative both technically and administratively feasible? Has the technology been used successfully on other similar sites?

4. Long Term Effectiveness and Permanence - How well does the alternative protect human health and the environment after completion of cleanup? What, if any, risks remain at the Site?

5. Reduction of Toxicity, Mobility, or Volume through Treatment - Does the alternative effectively treat the contamination to significantly reduce the toxicity, mobility, or volume of the hazardous substances?

6. Short Term Effectiveness - Are there potential adverse effects to either human health or the environment during construction or implementation of the alternative? How fast does the alternative reach the cleanup goals?

7. Cost - What are the estimated costs of the alternative?

Modifying Criteria

8. Community Acceptance - What are the community's comments or concerns about the preferred alternative? Does the community generally support or oppose the preferred alternative?

Note: These eight criteria are used to evaluate the remedial action alternatives. With the exception of the no action alternative, all alternatives must meet the first two "threshold" criteria. The next five criteria are used as "balancing" criteria for comparing alternatives and selecting a preferred alternative. After public comment, DEQ may alter its preference on the basis of the last "modifying" criteria.

2.11 Compliance with ARARs

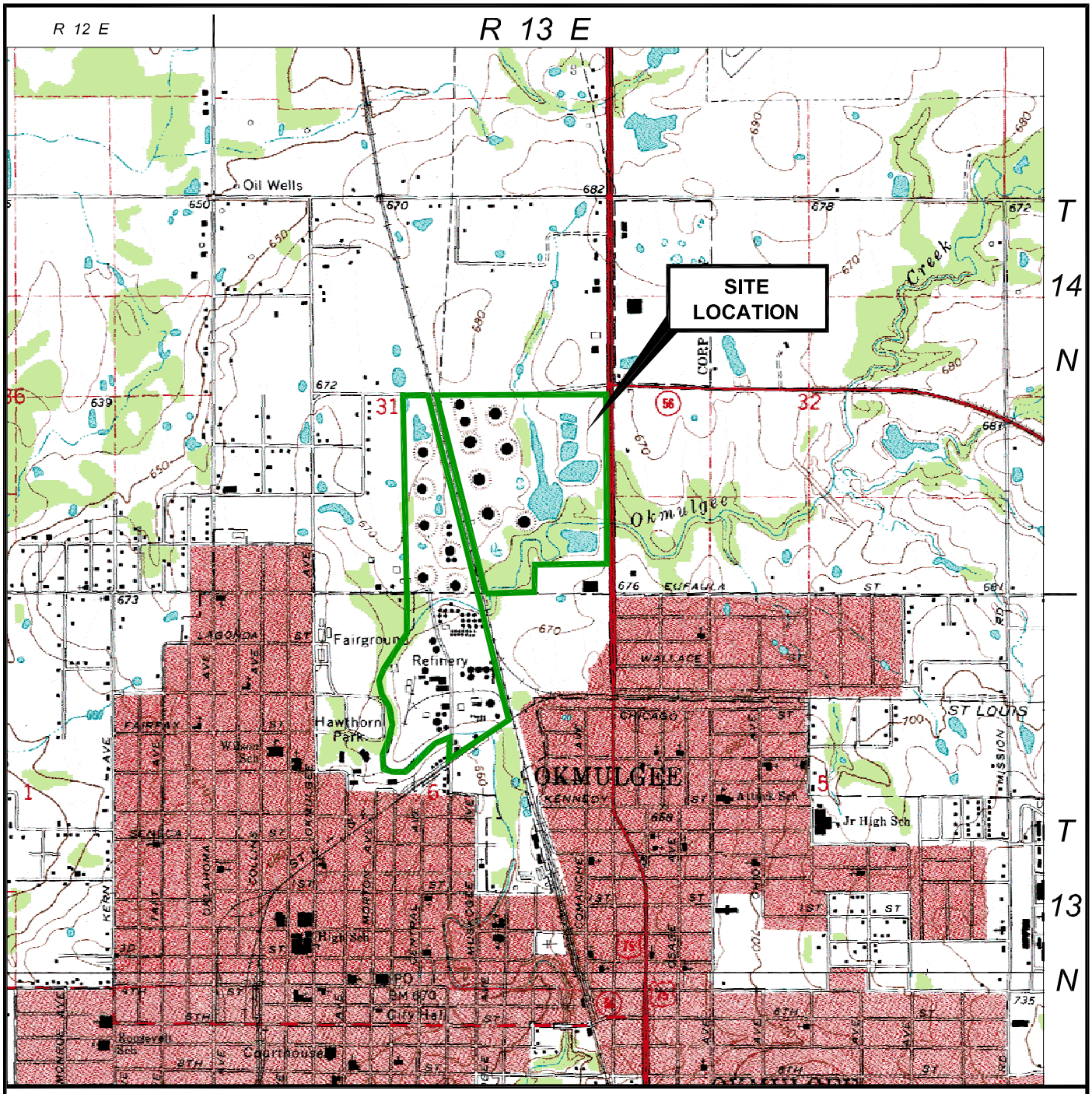
In general, selected remedies are expected to comply with ARARs unless waivers are granted. The selected remedy is expected to meet all chemical-specific, action-specific, and location-specific ARARs and does not include any waivers. A list of ARARs is provided in Table 4 below.

Chemical-specific ARARs provide health or risk based concentration limits for contaminants in various environmental media such as soil, sediment, and surface water. Location-specific ARARs establish restrictions on permissible concentrations of contaminants or establish criteria for conducting actions in sensitive locations such as flood plains, wetlands, streams, and areas of critical habitat. The action-specific ARARs are based on activities and technologies to be implemented. Examples include design, construction, and performance requirements related to conducting the response action.

Table 4: Applicable or Relevant and Appropriate Requirements

Standard, Requirement, Criteria or Limitation	**Citation**	**Application**
Standards applicable to Transporters of Hazardous Waste	40 CFR Part 263	Applicable to transport of hazardous waste.
Safe Drinking Water Act National Primary Drinking Water Regulations including Maximum Contaminant Levels	40 CFR Part 141	Relevant and appropriate. Off-site groundwater is contaminated above MCLs
Safe Drinking Water Act National Secondary Drinking Water Regulations	40 CFR Part 143	Relevant and appropriate as above. Off-site groundwater is contaminated.
Clean Air Act, National Ambient Air Quality Standards	40 CFR Part 50	Relevant and appropriate especially during construction activities.
Occupational Safety and Health (OSHA) Regulations	29 CFR 1910	Applicable. It is the responsibility of employers to conform to the requirements of OSHA.
State Rules and Regulations		
Oklahoma Environmental Quality Code	27A Oklahoma Statutes, Section 2-1-101 et seq.	Applicable. Soil contamination is a public nuisance.
Oklahoma Hazardous Waste Management Regulations	OAC 252:200	Applicable.
Oklahoma Air Pollution Control Regulations	OAC 252:100	Applicable if air concentrations are above the maximum allowable levels due to remedial action.
Oklahoma Hazardous Waste Management Regulations	OAC 252:205	See criteria for 40 CFR Parts 261, 264, and 265.

Oklahoma Water Quality Standards	OAC 785:45	Portions would be applicable and other portions would likely be relevant and appropriate requirements.
Oklahoma General Water Quality Rules	OAC 252:611	See general provisions and numerous non-numerical requirements.
Oklahoma Discharges-OPDES (NPDES)	OAC 252:606	Applicable to point source discharges.
Oklahoma Industrial Wastewater Systems	OAC 252:616	May be applicable or relevant and appropriate depending on whether water will be treated as part of the remedy.



SOURCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, OKMULGEE NORTH, OKLAHOMA - 1971 AND OKMULGEE SOUTH, OKLAHOMA - 1971

BENHAM
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FIGURE TITLE	*SITE LOCATION AND TOPOGRAPHIC FEATURES*
DOCUMENT TITLE	RECORD OF DECISION GROUNDWATER
CLIENT	CONOCOPHILLIPS COMPANY
LOCATION	FORMER OKMULGEE REFINERY OKMULGEE, OKLAHOMA

DATE	11/6/08
SCALE	AS SHOWN
DESIGNED BY	GHR
APPROVED BY	GHR
DRAWN BY	SKG
PROJECT NUMBER	4100509416
FIGURE NUMBER	1

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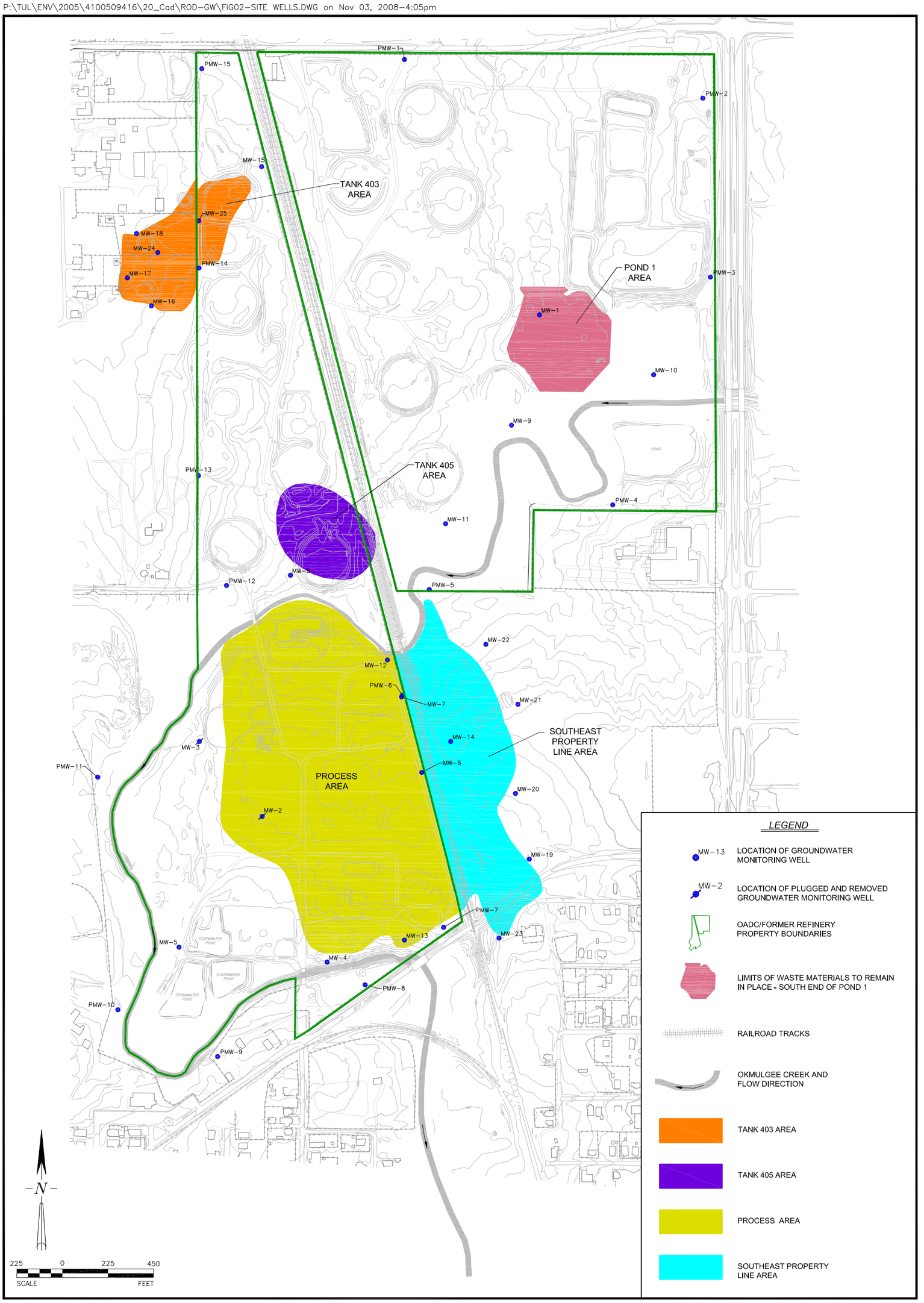

PROJECT NUMBER	410050941 6
FIGURE NUMBER	2

DATE	11/6/08
SCALE	1"=450'
DESIGNED BY	GHR/DB
APPROVED BY	GHR/BEM
DRAWN BY	SKG

FIGURE TITLE	***GROUNDWATER REMEDIATION AND MONITORING AREAS***
DOCUMENT TITLE	RECORD OF DECISION GROUNDWATER
CLIENT	CONOCOPHILLIPS COMPANY
LOCATION	FORMER OKMULGEE REFINERY OKMULGEE, OKLAHOMA

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Responsiveness Summary
for the Former Okmulgee Refinery Site
Record of Decision
November 2008

The responsiveness summary consists of the following two components: an overview of the public process and responses to verbal questions received at the public meeting. No letters or verbal comments were received after the public meeting during the public comment period. This document is provided to accompany the Record of Decision and reflects input resulting from the Proposed Plan and public comment processes.

Overview

The Proposed Plan and supporting documents were made available for public review and comment from July 1, 2008 to July 15, 2008. A public meeting was held in Okmulgee, Oklahoma, on July 15, 2008, with 11 people present including representatives of Oklahoma Department of Environmental Quality (DEQ), The Benham Company, ConocoPhillips, and the Okmulgee Area Development Corporation. The transcript from the public meeting has been added to the project files. No formal written comments were received.

Responses to Verbal Comments

Several verbal questions and comments were asked at the public meeting following the formal presentation component of the meeting.

Comment from citizen concerning the potential of groundwater to surface water contamination.

The representative from ConocoPhillips answered that there would be a monitoring well network that will be put in place to monitor if contaminated groundwater above the approved RBRGLs is approaching the creek. The DEQ representative stated that the proposed cut-off trench should stop contaminated groundwater flow from reaching the creek. Also, the surface soils are now clean therefore surface water runoff cannot contaminate the creek.

Citizen wanted to know what kind of groundwater monitoring network would be utilized including number of wells and how often they will be sampled.

There will be a total of 33 that will be monitored quarterly for a minimum of 2 years. The data will then be evaluated and a determination will be made based on the data as to whether or not monitored natural attenuation is an appropriate remedial strategy. If not, augmentation or other techniques could be utilized. The DEQ has a monitored natural attenuation policy that will be followed.

Citizen asked question about stream bank restoration activities along Okmulgee Creek south of Box Avenue and was concerned about sediment load to the creek.

It was explained that ConocoPhillips had just completed work in the area. Therefore, there had not been adequate time for the vegetation to reestablish. The growing season was just starting and if the vegetation did not reestablish quickly ConocoPhillips would take measures to minimize impacts to the creek from sediment.

Citizen asked what parameters are looked at for natural attenuation and if enhancements will be used.

ConocoPhillips representative stated that EPA and DEQ guidance will be followed in collecting the data and evaluating the data.

Citizen asked when the monitoring would begin.

ConocoPhillips representative explained that once the record of decision was completed then the plan would be implemented.