Five-Year Review Report

Second Five-Year Review Report
for
Mosley Road Sanitary Landfill Superfund Site
Oklahoma City
Oklahoma County, Oklahoma

August 2005

PREPARED BY:

United States Environmental Protection Agency
Region 6
Dallas, Texas

Approved by:

Sam Coleman
Superfund Division Director
U.S. Environmental Protection Agency Region 6

Date: 9/15/05

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Five-Year Review

for the

Mosley Road Sanitary Landfill Superfund Site
CERCLIS ID# OKD980620868

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Five-Year Review Memorandum

Mosley Road Sanitary Landfill Superfund Site
CERCLIS ID# OKD980620868
Oklahoma County, Oklahoma City, Oklahoma

This U.S. Environmental Protection Agency (EPA) memorandum documents the performance, determinations, and approval of the Mosley Road Sanitary Landfill Superfund Site (MRSL) Second Five-Year Review Report prepared by EPA-R6.

Summary of Five Year Review Findings

All immediate threats at the Mosley Road Sanitary Landfill Superfund Site, Oklahoma County, Oklahoma City, Oklahoma (the site) have been addressed, and the remedy components determined by the Record of Decision have been constructed as designed. The remedial objectives are to contain the low-level groundwater contamination that exists within the site boundaries, implement institutional controls, preserve the current beneficial use of off-site groundwater as a potential source of drinking water, prevent degradations of the Garber-Wellington aquifer, restore groundwater to beneficial use through the natural attenuation process, prevent direct contact with and exposure to landfill contents, and prevent inhalation of and explosion of landfill gases. Data review, site inspections, and interviews with site-associated parties indicates that the remedial action is effective in protecting of human health and the environment. To-date, no statistically significant exceedances of baseline concentrations have occurred in the seventeen semiannual groundwater sampling events that have occurred since 1997. However, data review suggests that a trend of increasing concentrations of some metals (arsenic, barium, selenium, and manganese) is becoming evident in some wells. Nonetheless, this issue does not currently affect the short-term protectiveness of the remedy, but could affect the long-term protectiveness of the remedy.

The remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through monitored natural attenuation, which is expected to require about 25 years to achieve. In the interim, exposure pathways that could result in unacceptable risks are being controlled, and institutional controls are preventing exposure to, or the ingestion of, contaminated groundwater and restricting site reuse. All threats at the site have been addressed through isolation and capping of hazardous materials, the construction of a LGMS, installation of fencing and warning signs, and the implementation of institutional controls.

Long-term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to fully evaluate potential migration of metals down-gradient from the landfill towards the North Canadian River. Additional sampling and analysis will be completed

within the next year. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals.

Actions Needed

The recommended actions below address the issue concerning the metal exceedances of their established baseline values. While this issue is not currently significant enough to call into question the protectiveness of the remedy, continued monitoring data review will be needed to assess the future remedy protectiveness:

- Continue EPA review of Waste Management of Oklahoma's (WMO) periodic sampling and analysis results to ensure that monitored natural attenuation (MNA) is meeting the cleanup goals and objectives at the site.

- Evaluate groundwater analytical results and trends that could affect the remedy protectiveness determination of the next five-year review;

- Continue EPA review of WMO's operation and maintenance (O&M) records to seek out remedy optimization opportunities and possibly recommend more efficient monitoring, labor and oversight; and

- Work closely with WMO's groundwater monitoring contractor, so that they provide EPA and ODEQ with better groundwater monitoring and analytical reports, and ensure these contain executive summaries that clearly explain the fate and transport of the chemicals that could affect the long-term protectiveness at the site. Should these future analytical results and trends indicate that additional remedial action is required to address contamination at the site, the contingency remedy in the ROD may have to be adopted.

Determinations

I have determined that the remedy for the Mosley Road Sanitary Landfill Superfund Site, Oklahoma County, Oklahoma, is expected to be protective of human health and the environment upon completion, and in the interim, is protective because exposure pathways that could result in unacceptable risks are being controlled.

John R. Hepola, for

Samuel Coleman, P.E., Director
Superfund Division
U.S. Environmental Protection Agency Region 6

9/15/05

Date

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Table of Contents

List of Acronyms

ARARs	Applicable or relevant and appropriate requirements
C&D	Construction and demolition debris
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CUSUM	An intra-well statistical method used to compare semiannual monitoring data
EORDF	East Oak Recycling and Disposal Facility
EPA	U.S. Environmental Protection Agency
FS	Feasibility study
HRS	Hazard Ranking System
LGMS	Landfill Gas Management System
MCLs	Maximum contaminant levels
MRSL	Mosley Road Sanitary Landfill
mg/kg	milligram per kilogram
µg/L	microgram per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operations and Maintenance
OCCO	Oklahoma County Clerk Office
OCD	Oklahoma City Disposal, Inc.
ODEQ	Oklahoma Department of Environmental Quality
OSDH	Oklahoma State Department of Health
QC	Quality control
RA	Remedial Action
RD	Remedial Design
RI/FS	Remedial investigation/feasibility study
ROD	Record of Decision
RPM	Remedial Project Manager
SCA	SCA Services Inc.
SDWA	Safe Drinking Water Act
Tetra Tech	Tetra Tech EM Inc.
UAO	Unilateral Administrative Order
WMO	Waste Management of Oklahoma, Inc.

EXECUTIVE SUMMARY

The remedy for the Mosley Road Sanitary Landfill Superfund Site in Oklahoma City, Oklahoma included restoration of groundwater as a potential source of drinking water through monitored natural attenuation; implementation of a landfill gas monitoring system to prevent explosion and inhalation hazards; repairs and improvements of the cap built in 1988, addition of a vegetative soil layer to reduce erosion and infiltration; and implementation of institutional controls to prevent exposure to on-site contaminants. The site achieved construction completion with the signing of the Preliminary Close Out Report on September 8, 2004. The trigger for this second five-year review was the actual start of construction on August 24, 1995, and the first Five-Year Review report in September 2000.

The remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through monitored natural attenuation, which is expected to require about 25 years. In the interim, exposure pathways that could result in unacceptable risks are being controlled and institutional controls are preventing exposure to, or the ingestion of, contaminated groundwater and restricting site reuse. All threats at the site have been addressed through isolation and capping of hazardous materials, the construction of a landfill gas management system (LGMS), installation of fencing and warning signs, and the implementation of institutional controls.

Long-term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to fully evaluate potential migration of metals down-gradient from the landfill towards the North Canadian River. Additional sampling and analysis will be completed within the next year. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name *(from WasteLAN)*: Mosley Road Sanitary Landfill Superfund Site

EPA ID *(from WasteLAN)*: OKD980620868

Region: 6 | **State:** OK | **City/County:** Oklahoma City/Oklahoma

SITE STATUS

NPL status: Final X Deleted Other (specify) _____

Remediation status (choose all that apply): Under Construction Operating Complete X

Multiple OUs?* YES NO X | **Construction completion date:** 08 / 08 / 2004

Has site been put into reuse? YES NO X

REVIEW STATUS

Lead agency: EPA X State Tribe Other Federal Agency _____

Author name: Michael Torres

Author title: Remedial Project Manager | **Author affiliation:** EPA

Review period:** 01 / 12 / 2005 to 08 / 13 / 2005

Date(s) of site inspection: 03 / 29 / 2005

Type of review:
Statutory FYR
Post-SARA X Pre-SARA NPL-Removal only
Non-NPL Remedial Action Site NPL State/Tribe-lead
Regional Discretion

Review number: 1 (first) 2 (second) X 3 (third) Other (specify) _____

Triggering action:
Actual RA Onsite Construction at OU #____ Actual RA Start at OU# 1 XXX
Construction Completion Previous Five-Year Review Report XXX
Other (specify) _____

Triggering action date *(from WasteLAN)*: 11 / 06 / 1995

Due date *(five years after triggering action date)*: 09 / 29 / 2005

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, continued

Issues:

Some metal constituents (arsenic, barium, manganese, and selenium) in the groundwater are marginally exceeding their established baseline values, and this statistical variation could impact the future determination of whether the remedy is protective or not. EPA will continue to review Waste Management of Oklahoma, Inc.'s semiannual groundwater monitoring results of the MRSL site to evaluate the trends of those contaminants which could affect the remedy protectiveness determination of the next five-year review. Otherwise, there are no other technical or any administrative issues that will or could affect the remedy at the site.

Recommendations and Follow-up Actions:

- Continue review of Waste Management of Oklahoma's (WMOs) periodic sampling and analysis results to ensure that monitored natural attenuation (MNA) is meeting the cleanup goals and remedial action objectives at the site;
- Continue evaluation of WMOs groundwater monitoring results and statistical trends of the chemicals that are presently exceeding their established baseline values, and which could affect the remedy protectiveness determination of the next five-year review;
- Seek out remedy optimization opportunities by recommending more efficient systems operations, monitoring, labor, and project management oversight; and
- Work closely with WMOs groundwater monitoring contractor, so that they provide EPA and ODEQ with better groundwater monitoring and analytical reports, and ensure these contain executive summaries that clearly explain the fate and transport of the chemicals that could affect the long-term protectiveness at the site. Should these future analytical results and trends indicate that additional remedial action is required to address contamination at the site, the contingency remedy in the ROD may have to be adopted.

Protectiveness Statements(s):

The remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through monitored natural attenuation, which is

expected to require about 25 years to achieve. In the interim, exposure pathways that could result in unacceptable risks are being controlled and institutional controls are preventing exposure to, or the ingestion of, contaminated groundwater and restricting site reuse. All threats at the site have been addressed through isolation and capping of hazardous materials, the construction of a LGMS, installation of fencing and warning signs, and the implementation of institutional controls.

Long-term Protectiveness:

Long-term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to fully evaluate potential migration of metals down-gradient from the landfill towards the North Canadian River. Additional sampling and analysis will be completed within the next year. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals.

Mosley Road Sanitary Landfill Superfund Site
Oklahoma City, Oklahoma
Second Five-Year Review Report

I. INTRODUCTION

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and recommendations to address them.

The Agency is preparing this five-year review pursuant to CERCLA § 121 and the National Contingency Plan (NCP). CERCLA § 121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency (EPA) Region 6 conducted the second five-year review of the remedy implemented at the Mosley Road Sanitary Landfill Superfund Site (MRSL) located in Oklahoma City, Oklahoma. This review was conducted by the Remedial Project Manager (RPM) for the entire site from January 2005 through August 2005. This report documents the results of the review.

This is the second five-year review for the MRSL. The triggering action for this statutory review is the initiation of the remedial action on August 24, 1995 and the first Five-Year Review Report in September 2000. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

II. SITE CHRONOLOGY

Table 1 - Chronology of Site Events

Date	Event
June 1973	Permit to operate the Mosley Road Sanitary Landfill (MRSL) issued by Oklahoma State Department of Health (OSDH)
February 1976 to August 1976	MRSL authorized by OSDH to accept industrial hazardous wastes
February 6, 1987	MRSL site scored by U.S. Environmental Protection Agency (EPA) using the Hazard Ranking System
June 24, 1988	MRSL proposed to the National Priorities List (NPL)
January 12, 1989	EPA issued a General Notice Letter for MRSL
July 28, 1989	Waste Management of Oklahoma, Inc. (WMO) and Mobile Waste Control signed Administrative Order on Consent to begin a Remedial Investigation/Feasibility Study (RI/FS)
February 21, 1990	NPL inclusion date
August 1991	RI completed
November 1991	FS completed
June 29, 1992	Record of Decision (ROD) signed

January 28, 1994	Unilateral Administrative Order (UAO) issued
February 14, 1994	UAO becomes effective
March 8, 1994	Deed restriction place on MRSL
April 1, 1994	Deed restriction filed with office of the County Clerk of Oklahoma County
May 12, 1994	Deed notice filed with the office of the County Clerk of Oklahoma County
November 3, 1994	Remedial Design Work Plan and Groundwater Monitoring Work Plan approved by EPA
January 5, 1995	EPA approves use of construction and demolition debris as fill material
February 9, 1995	Installation of groundwater monitoring wells begins
February 25, 1995	Groundwater monitoring well installation completed
March 15, 1995	EPA approves landfill gas management system (LGMS) design
August 24, 1995	LGMS construction begins
November 6, 1995	EPA approves the Remedial Design and Remedial Action work plans
February 15, 1996	LGMS construction completed
February 21, 1996	Phase I cap improvements begins
May 24, 1996	Phase I cap improvements completed and beginning of Phase II improvements
February 26, 1998	WMO begins plugging and abandonment (P&A) of monitoring wells
July 21, 1998	WMO completes P&A activities

September 25, 2000	LGMS construction begins
September 27, 2000	first Five-Year Review completed
October 4, 2000	Landfill gas extraction well completed
November 27, 2001	WMO submits a modification for the Groundwater Monitoring Plan (GMP)
July 9, 2001	EPA approves the GMP modifications
November 2002	Construction and debris disposal completed
December 2003	Construction of clay soil cover completed
August 8, 2004	Preliminary Close-Out Report signed
March 29, 2005	EPA and State conduct interim Final Inspection
June 28, 2005	Interim Remedial Action Completion Report approved and signed by EPA

III. BACKGROUND

Physical Characteristics

The Mosley Road Sanitary Landfill Superfund Site property includes a 72-acre facility surrounded by predominantly undeveloped land between Oklahoma City and Midwest City, Oklahoma County, Oklahoma (See Figure 1). The site is bordered to the west by Mosley Road, which separates MRSL from the East Oak Recycling and Disposal Facility (EORDF), and is also owned and operated by Waste Management of Oklahoma, Inc. One-half mile further west of the MRSL is the North Canadian River, a major perennial stream that flows from the southwest to northeast. The MRSL is bordered to the east by the Burlington Northern rail line and Crutcho Creek, a perennial stream tributary to the North Canadian River. Other surface water bodies bounding the site include a shallow surface water body to the north that was formerly used as a source of daily cover for EORDF (South Swamp), and an inactive sand and gravel excavation area located southwest of the Site. In addition, a small (approximately ½ acre) sedimentation pond, referred to as the retention pond, is located in the northeastern corner of the site and collects surface runoff near the pond (See Figure 2).

Predominantly operated as an aboveground facility, the site is underlain with North Canadian River alluvium overlying the bedrock unit known as the Garber-Wellington sandstone. The alluvium is composed of unconsolidated sediments deposited by the North Canadian River. It is the uppermost of the two principal geologic units, contains the shallowest groundwater layer, and extends to a depth of about 50-feet below the ground surface. The underlying Garber-Wellington forms an aquifer that is used as a source of drinking water by the cities of Midwest City, Spencer, and Oklahoma City. The maximum thickness of the Garber-Wellington formation is reported to be 900 feet thick; however, the Remedial Investigation was designed to characterize hydrogeologic and geochemical conditions in the alluvium and the upper 30 feet of the Garber-Wellington formation only.

Land and Resource Use

The historic land use of the site has involved municipal and hazardous waste disposal activities since 1971. From at least 1975 until operations ceased in 1987, activities at the site included disposal and recycling activities. The facility has been inactive since 1987.

The current land use for the surrounding area is residential, commercial, and recreational (the adjacent North Canadian River). Although there have been some zoning changes over the years, it is anticipated that a mix of land uses similar to that described will continue into the future. In establishing remediation requirements for the site, EPA considered the theoretical possibility of continued commercial development around the site, such as the currently operating East Oak Disposal and Recycling Facility. The MRSL site is currently fenced and the on-site wastes are buried under 80 feet of municipal waste and debris. These are contained within the fenced area under an impermeable cap.

History of Contamination

The MRSL was originally owned by Floyd Swen, who operated the site under the name A-1 Sanitation Company from 1971 to 1975. From 1975 through 1984, the landfill was owned and operated by Oklahoma City Disposal Inc. (OCD), which at the time was a subsidiary of SCA Services Inc. (SCA). Originally permitted by the Oklahoma State Department of Health (OSDH) (now known as the Oklahoma Department of Environmental Quality [ODEQ]) to be operated as a sanitary landfill, OCD was authorized by OSDH to accept industrial hazardous wastes between February 20, 1976 and August 24, 1976, due to the temporary closure of the Royal Hardage Landfill in Criner, Oklahoma. During this 6 month time period, OCD accepted approximately 1.7 million gallons of predominantly liquid hazardous waste, which included industrial sludge, caustics, plating sludge, acid solutions, oil emulsions, alkaline solutions, solvents, paint sludge, toxaphene, and trichloroethylene. All of the hazardous waste was placed in three below-grade

unlined pits (referred to as the waste pits) that are now buried beneath municipal waste. In 1984, WMO accepted the stock of SCA, which thus transferred the ownership and operation and maintenance (O&M) of the MRSL to WMO. The landfill reached its permitted capacity and was closed in November 1987. A compacted clay cover was installed over the landfill in 1988, in accordance with existing State regulations governing landfill closure. Also in 1988, the MRSL site was proposed to the National Priorities List, pursuant to Section 105 of the CERCLA.

Initial Response

Prior to closing of the landfill, EPA conducted an investigation on February 6, 1987, to potentially score the MRSL site and using the Hazard Ranking System (HRS) MITRE® Model. Consequently, the site received a HRS score of 31. Thereafter, the site was proposed and added to the National Priorities List, pursuant to CERCLA Section 105 in 1988.

On January 12, 1989, a general notice letter was issued for the site by EPA Region 6. On March 24, 1989, EPA issued a Special Notice letter regarding Remedial Investigation/Feasibility Study (RI/FS) activities at the site. On July 28, 1989, WMO and Mobile Waste Controls signed an Administrative Order on Consent requiring the two companies to initiate the RI/FS activities at the MRSL site. The investigation activities of the RI/FS were initiated in January 1990. The RI was completed in August 1991 and the FS was completed in November 1991.

A Record of Decision (ROD) was prepared by EPA and signed on June 29, 1992. In January 1994, EPA issued a Unilateral Administrative Order, which became effective in February 1994. The Remedial Design was completed and approved by EPA in September 1995.

Basis for Taking Action

Contaminants

Hazardous substances that have been released at the site in each media include:

Alluvium wells

1,1-Dichlorethane
1,2-Dichlorethene
1,2-Dichloropropane
2-Chlorophenol
Arsenic (Total)
Barium (Total)
Manganese (Total)
Naphthalene
Pentachlorophenol
Phenol
Pyrene
Selenium (Total)

Benzene	Tetrachloroethene
Bis (2-ethylhexyl)phthalate	Trichloroethene
Chlorobenzene	Vinyl chloride

Garber-Wellington wells

1,1-Dichloroethane	*cis*-1,2-Dichloroethene
Arsenic (Total)	Manganese (Total)
Barium (Total)	*trans*- 1,2-Dichlorothene
Benzene	Vanadium (Total)
Chlorobenzene	Xylene (Total)

The nature and extent of contamination near the MRSL was evaluated by sampling various media during the RI. RI activities included field sampling and testing of surface and near-surface soils, waste pit soils, landfill leachate, groundwater, and sediments.

Waste pit soil and leachate samples were collected to: 1) determine what contaminant constituents were present in the waste pits, and 2) establish concentration baselines for those contaminants to aid in clarifying a source of any contamination found in the media sampled around the site. The waste pit soil exhibited elevated concentrations of inorganic chemicals representative of the industrial hazardous waste that was disposed in the waste pits. However, none of the other media sampled exhibited elevated concentrations of similar compounds, indicating that the inorganic compounds had not migrated out of the waste pits at concentrations. Similarly, analysis for organic compounds in the waste pit soils indicated that a distinct source of organic constituents was absent. In all instances, maximum concentrations of volatile organic compounds are less than 100 milligrams per kilogram (mg/kg) of soil.

During the RI, leachate was defined as water contained within the MRSL that would have come into contact with municipal refuse or waste pit soil. Since industrial hazardous wastes were reportedly disposed of as liquids, compounds contained within the wastes would have contributed directly to leachate or could have sorbed onto waste pit soil and then subsequently de-sorbed into leachate. Analytical comparisons conducted during the RI found that compounds in leachate samples were generally 10 to 100 times lower than the maximum concentrations detected in the waste pit soil samples. These data suggest minimal transport of contaminants for the waste pit soil to the leachate.

Because the waste pits are below grade, the primary exposure pathway is considered to be through groundwater migration. Organic compounds detected in the alluvial groundwater suggests that it is impacted by some contaminant migration, but probably from past pesticide

applications in the agricultural areas nearby the MRSL and the waste pits. This presumption is based on the fact that pesticide-related and other elevated organic concentrations were detected down-gradient of the landfill and the waste pits, and in the area immediately north of the landfill. However, no definable plume (which would point to a specific source) of organic contamination was observed. The concentrations of all volatile organic compounds in the alluvial groundwater were below Safe Drinking Water Act (SDWA) standards and above the maximum contaminant levels (MCLs), but with the exception of vinyl chloride and trichloroethylene.

There is a low-level impact to the Garber-Wellington groundwater caused by the downward recharge and from the overlying alluvial aquifer in the area immediately north of the landfill. Organic and inorganic analytical results suggest slightly elevated concentrations of some contaminants in the Garber-Wellington aquifer in this area. Hydraulic head data support the potential for enhanced vertical flow between the two aquifers north of the landfill. Benzene was the most prevalent contaminant detected in the Garber-Wellington; however, it occurred within EPA's acceptable risk range for carcinogenic and non-carcinogenic effects.

Based on a review of the information and data gathered during the RI, neither surface nor sediments were measurably impacted by discharges of contaminants transported by groundwater from the landfill or waste pits. Organic and inorganic analytical results for surface water indicate that this medium was impacted by discharges from sources located upstream of the landfill. Sediments were impacted by surface runoff from the landfill before the cap was built or other off-site sources, and probably by the historical application of pesticides in nearby agricultural fields.

IV. REMEDIAL ACTIONS

The following sections discuss the remedy selected, remedy implementation, and system operations.

Remedy Selection

The ROD for the Mosley Road Sanitary Landfill Superfund Site was signed on June 29, 1992. The site is being managed as one operable unit, at which both the source of contamination (the waste pits) and the contaminated groundwater present in the alluvial aquifer are being addressed. The Remedial Action Objectives (RAOs) were developed as a result of data collected during the Remedial Investigation to aid in the development and screening of remedial alternatives to be considered for the ROD. The RAOs for the MRSL are divided into the following two groups:

Management of Migration Response Objectives

- Contain the low-level groundwater contamination that exists under the landfill and within site boundaries;
- Preserve the current beneficial use of off-site groundwater as a potential source of drinking water;
- Halt degradation of the Garber-Wellington aquifer;
- Prevent water infiltration through the landfill that could increase contaminant transport into the groundwater; and
- Restore groundwater to beneficial use through monitored natural attenuation.

Source Control Response Objectives

- Prevent direct contact with, and exposure to landfill contents;
- Prevent inhalation of and explosion of landfill gas; and
- Implement institutional controls to prevent exposure to on-site contamination.

The major components for management of migration include:

- Implement institutional controls taking into account land use restriction, access restriction, and restrictions on the extraction and use of groundwater from on-site water wells;
- Use of monitored natural attenuation to achieve groundwater cleanup levels indicated in the ROD;
- Periodically, sample on-site water wells and those monitoring wells adjacent to the property, to prevent possible leachate migration into the groundwater; and
- Conduct Five-Year Review reports to assess site conditions, contaminant distributions, or other associated site hazards.

The major components for source control include:

- Implement a landfill gas monitoring system to prevent explosion and inhalation hazards, and

- Repair and improve the cap built in 1988 and add a vegetative soil layer to reduce erosion and infiltration.

EPA identified contingency measures in the ROD that may be adopted in the event that additional remedial action is required to address contamination at the site. These are:

- Install additional monitoring wells to determine if the natural attenuation remedy is failing based on the contingency measure criteria (see below). If the contingency measure criteria are exceeded, begin extracting the contaminated water to facilitate or accelerate cleanup of contamination;

- Submit a Remedial Action Plan describing a plan for extraction, treatment, or disposal of contaminated groundwater, in order to achieve the State and federal standards; and

- Begin extracting and treating the groundwater until contaminant concentrations are below the SDWA standards, or if SDWA standards do not exist, until concentrations are achieved which do not present an excess cancer risk greater than 1 in 1,000,000. Discharge treated groundwater to either a publicly owned treatment works or to surface waters in compliance with Applicable or Relevant and Appropriate Requirements (ARARs).

The contingency measure criteria are considered indicators that the selected remedy is not performing as required. They are intended to trigger the above-mentioned contingency measures beginning with confirmation groundwater sampling, and potentially resulting in implementation of active groundwater treatment remedies, if determined to be necessary by the EPA. These criteria are:

- A statistically significant increase in contamination in the wells established as part of the groundwater monitoring system. The statistical increase also will be evaluated in terms of the impact on cumulative risk to human health and the environment. For example, if a contaminant exhibits a statistically significant increase, but there is no net increase in risk due to factors such as decreases in previously detected contaminants or the fact that the new contaminant is not toxic at the concentrations detected, there will not necessarily be a presumption that active remediation is required. Exceptions to this presumption would

include, but not be limited to, situations such as that in which data indicates that risk is increased at other locations such as beyond the monitoring point or in the Garber-Wellington due to migration, or if the newly detected contaminant concentration indicates that an MCL may be exceeded beyond the point of compliance.

- The appearance in the Garber-Wellington aquifer of any contaminant or combination of contaminants that exceed a 1 in 100,000 excess cancer risk or that have a non-carcinogenic hazard indices greater than 1.0. There shall be a presumption that an increase in risk in the Garber-Wellington above 1 in 100,000 excess cancer cases is indicative that natural attenuation is not working to prevent further degradation of the Garber-Wellington aquifer by the more contaminated overlying alluvial aquifer. Active remediation of the alluvial aquifer or Garber-Wellington will be required unless demonstrated to the EPA to be impracticable.

- Any contamination that creates a risk greater than 1 in 10,000 excess cancer cases in either the alluvial or Garber-Wellington aquifer at the point of compliance or in off-site wells. There shall be a presumption in such cases that the remedy is not performing as required, and that active groundwater remediation will be required unless demonstrated to the EPA to be technically impracticable.

- The effectiveness of natural attenuation to reduce contamination in the alluvial aquifer will be evaluated after each five year review of the remedy. If natural attenuation is not working to reduce contaminant concentrations - including but not limited to concentrations of vinyl chloride or benzene - in the alluvial aquifer after the initial five year review, or subsequent five year reviews, the EPA may require implementation of active groundwater remediation measures. Such measures may include new technologies, not considered for the 1992 ROD, that are technically practicable. In the event such technologies are implemented at the Site, the EPA will make appropriate changes in the ROD.

Remedy Implementation

The remedial action for the MRSL site is being undertaken pursuant to the terms of a Unilateral Administrative Order (UAO) that was issued by the EPA on January 28, 1994, and became effective on February 14, 1994. The UAO required the implementation of the selected remedy as described in the 1992 ROD.

Institutional controls have been implemented by WMO in accordance with the requirements stipulated in the ROD. On April 1, 1994, WMO filed a covenant with the

Oklahoma County Clerk's Office (OCCO) identifying land use restrictions which would be binding on all current and future owners of the property. These restrictions prohibit domestic use of extracted water from onsite wells, installation of groundwater wells onsite for other than remedial purposes, and the use of property for residential or agricultural purposes. WMO also filed a deed notice on May 12, 1994 with the Register of Deeds of the OCCO. The deed notice informs prospective purchasers and users of the property that institutional controls including land use restrictions, access restrictions, and restrictions to groundwater use are being enforced.

Subsequent to construction of a 14-well groundwater monitoring network was completed on February 25, 1995, WMO initiated a quarterly groundwater and surface water monitoring program.

Construction of the landfill gas management system (LGMS) began on August 24, 1995 and was completed in February 1996. The LGMS included 43 gas extraction wells, gas collection headers, a lateral pipe network, extraction wells, pneumatic air lines, an air compressor, gas probes, and a blower/flare station.

Landfill cover remediation activities began on February 21, 1996, with Phase I of the cover remediation addressing almost 26 acres of the lower part of the landfill slope and the northeast disposal area. Phase I activities included: 1) ensuring a minimum 2-foot thick, clayey soil cover and a one-foot thick topsoil cover; 2) seeding and sprigging of the topsoil; 3) construction of an access road; and 4) construction of surface water drainage features. Phase I was completed on May 24, 1996. The remaining portion of the landfill (approximately 27 acres) received construction and demolition debris to raise existing grades and improve drainage. A new cover system consisting of two feet of re-compacted clay and one foot of top soil was constructed over the 27 acres after design elevations were reached.

The pre-final inspection conducted in August 2004 concluded that construction activities had been completed in accordance with the remedial design plan and specifications and did not result in the development of a punch list. The site achieved construction completion when the Preliminary Close Out Report was signed on September 8, 2004. EPA and the State have determined that all RA construction activities, including the implementation of institutional controls, were performed according to the ROD specifications. The final inspection was conducted by the EPA and the State on March 29, 2005.

System Operation/Operation and Maintenance

WMO is conducting long-term monitoring and maintenance activities according to the operation and maintenance (O&M) plan that was approved by EPA in June 1996. The primary activities associated with O&M include:

- Groundwater monitoring wells - Operate pumps and conduct groundwater sampling and water level measurements in accordance with procedures discussed in the Remedial Goal Verification Plan. Inspect wells for signs of damage, quarterly; check for silt intrusion, annually; and, take appropriate actions.

- Landfill gas management system - Continuously, operate gas extraction wells, condensate management system, and flare station. Quarterly, inspect extraction wells, flare station, gas collection headers, and probers; and, take corrective measures as appropriate.

- Landfill cover system - Conduct inspections for signs of erosion, settlement, desiccation, and other environmental stresses during quarterly inspections. Generally maintain and appropriately conduct repairs to the cover and irrigation system; and, routinely and appropriately mow the vegetative cover.

Monitoring plans required that: 1) groundwater be monitored quarterly for 8 consecutive quarters stating in March 1995, and semi-annually thereafter; 2) surface water and sediment samples from Crutcho Creek be collected annually; and 3) surface water samples from North Pond be collected on the same schedule as groundwater. Compliance with the monitoring plan schedules was verified to 1996, whereupon surface water sampling of Crutcho Creek was inadvertently discontinued, and sampling of the surface water from the North Pond was conducted on an annual basis. Communications with the WMOs Environmental Manager subsequent to these findings established that annual sampling efforts were renewed in Crutcho Creek in October 2000. WMO is now in compliance with the original monitoring plan.

O&M costs include periodic groundwater and LGMS monitoring activities. In addition, the first Five-Year Review report was performed in September 2000 and cost around $7,000. The estimated total cost of the selected remedy in the 1992 ROD was $304,242. The actual remediation cost amounted to approximately $3,851,500. Over the past four years, the annual O&M cost has averaged around $90,000.

V. Progress Since the Last Five-Year Review

Tetra Tech EM Inc. (Tetra Tech) conducted the first Five-Year Review (FYR) report for WMO in September 2000. The results of this FYR revealed some minor deficiencies, but primarily indicated that the remedy remained protective of human health and the environment. While contamination remains within site boundaries, there was no immediate risk posed because of the minor deficiencies that were revealed by Tetra Tech.

Tetra Tech found evidence of minor erosion or rutting that occurred on the north face of the landfill's capping system. Nonetheless, this did not affect the performance or integrity of the cover system. WMO repaired or re-graded the erosion gullies and continued hay seeding of the entire surface. Furthermore, the review also discovered that surface water sampling of the Crutcho Creek was not in compliance with the currently approved monitoring plan. WMO collected surface water samples from both the Crutcho Creek and the North Pond upon initiation of the next round of semiannual groundwater sampling events. Moreover, some monitoring wells required cap repairs. WMO addressed this matter; they repaired and properly capped the monitoring wells in question.

Since there were no findings that warranted a more aggressive approach to remediating the site, the EPA recommended that remedial action continue in accordance with currently approved plans. The deficiencies discovered during the first Five-Year Review were not sufficient to warrant a finding that the remedy was not being effective. Corrective actions for these minor discrepancies were undertaken by WMO, to ensure that any change that might jeopardize the protectiveness of the site was immediately mitigated.

VI. Five-Year Review Process

Administrative Components

WMO officials were notified of the initiation of this second Five-Year Review on February 1, 2005. The MRSL Five-Year Review team was led by Michael Torres of EPA, Remedial Project Manager (RPM) for the MRSL site, and included members of the Regional Technical Advisory staff with expertise in hydrology, biology, and risk assessment. Amy Johnson of the State assisted in the review. From March 1 to March 15, 2005, the review team established the review schedule whose components included:

- Community Involvement;
- Document Review;
- Data Review:

- Site Inspection;
- Local Interviews; and
- Five-Year Review Report Development and Review.

The schedule extended through May 31, 2005.

Community Involvement

Activities to involve the community in the five-year review process were initiated with a meeting in early January 2005 between the RPM and the Community Involvement Coordinator for the Mosley Road Sanitary Landfill Superfund Site. A notice was sent to *The Oklahoman* and *The Oklahoma City Herald* on March 3, 2005 that a five-year review was to be conducted and that there would be a public meeting on March 30, 2005. The notice was published in *The Oklahoma City Herald* on March 18, and March 25, 2005. A notice stating the same was sent to The City of Spencer Mayor Marsha Jefferson, Forrest Park Police Chief Jeff Tucker, The City of Oklahoma City Mayor Nick Cornett, The City of Oklahoma City Public Works Administration officials, State Representative Mike Shelton, and the residents of properties adjacent to the MRSL site. The letter invited the recipients to submit any comments to EPA, as well.

During the public meeting, local residents expressed concerns that the MRSL could contaminate their properties with the hazardous substances that remain at the site. The EPA RPM explained the site's remedial components and how these were designed and implemented to protect human health and the environment. Other residents expressed concerns about drinking water quality testing and the questionable integrity of their on-site drinking water wells. The EPA RPM suggested that residents take periodic water samples, to test for harmful bacteria or other water contaminants and report exceedances or concerns to County or State officials, if necessary. None of the attendees expressed concern over the protectiveness of the remedy at the MRSL.

A notice was sent to the above-mentioned local newspapers that announced that the second Five-Year Review report for the Mosley Road Sanitary Landfill Superfund Site was complete, and that the results of the review and the report were available to the public at the ODEQ office, the Midwest City Library, and the EPA Region 6 office.

Document Review

This five-year review consisted of a review of relevant documents including O&M records and monitoring data . Applicable groundwater cleanup standards as listed in the 1992 Record of Decision were also reviewed (See Attachment 2).

Data Review

Groundwater Monitoring

An intra-well statistical method was used to compare semiannual monitoring data with baseline groundwater quality data.[1] After seventeen semiannual monitoring events since the start of the groundwater monitoring program and as part of the remedial action activities, the analytical results and summary of the quality control (QC) notes indicate there are no statistically significant exceedances of the established baseline values or control limits in the wells that are screened in the Garber-Wellington Aquifer.

Within the alluvial aquifer, the analytical data show exceedances of the established baseline value or control limit for arsenic at alluvial well MW14R. Arsenic was detected at a concentration of 210 micrograms per liter (µg/L) during the First Semiannual Monitoring Event in 2004. This exceeds the established baseline value of 162 µg/L. This exceedance represents the fifth verified exceedance of the detected value above the control limit, as well as the sixth exceedance of the cumulative sum (CUSUM) value over the control chart limit.

A supplemental groundwater monitoring well sampling program was recommended by the EPA RPM; it was performed in early 2004 and the results of the analysis were reported to EPA in March 2004. Tetra Tech's report concluded that the elevated concentrations of arsenic in MW14R appear to be the result of a reducing environment caused by methane gas from the MRSL. The reducing environment leads to the dissolution of iron and manganese oxides. Arsenic that is adsorbed or co-precipitated with these oxides is released into the groundwater as the oxides dissolve. As the oxidizing conditions are re-established in the aquifer, precipitation of

[1]An intra-well statistical method is used to compare semiannual monitoring data with baseline ground water quality data. The baseline data were established for each well from the eight quarterly monitoring events conducted during 1995 and 1996. Intra-well comparisons are appropriate when there is a significant difference in the hydrogeologic conditions between the up-gradient and down-gradient monitoring zones or when there are too few wells to characterize the aquifer chemistry. By using an intra-well statistical method, the spatial variation component is eliminated from statistical consideration. The combined Shewhart-CUSUM control chart is a useful and reliable technique for intra-well comparisons because it will detect releases both in terms of the constituent concentration and cumulative increases.

iron oxides and natural sorption processes lower arsenic concentrations in down-gradient groundwater environments.

Also, the analytical data for alluvial well MW219, during the first semiannual event in 2004, showed the eighth verified exceedance of 870 µg/L for selenium. MW219 is a hydraulically up-gradient well; therefore, this well represents background conditions at the site. During the second semiannual monitoring event in 2004, MW219 was reported to be dry and a sample was not obtained from the well.

Furthermore, there was a fourth verified exceedance in alluvial well MW201 for barium (870 µg/L), but the graph indicates only the second consecutive verified exceedance above the control limit value of 828 µg/L. Additionally, in MW201, an exceedance of manganese was detected at 3,100 µg/L, slightly exceeding the established baseline value of 2,983 µg/L. The exceedance of the manganese will be statistically significant only if verified by the subsequent monitoring events.

Moreover, an initial exceedance of *Bis*-(2-ethylhexyl)phthalate in alluvial well MW204 (72.0 µg/L) was identified, but has not yet been verified in accordance with the statistical plan. *Bis*(2-ethylhexyl)pthalate is a common laboratory contaminant and this detection is likely an artifact of the sampling or analysis procedure. The exceedance will be statistically significant only if verified by the subsequent monitoring event.

EPA plans to continue monitoring and evaluating WMO's semiannual groundwater analysis to ensure that these reported exceedances do not become statistically significant enough to trigger the above-mentioned contingency measures, and that these results are natural environmental and chemical processes in the groundwater that occur during natural attenuation.

Site Inspection

Inspections at the site were conducted on August 10, 2004 and March 29, 2005 by the EPA and State RPMs. The purpose of these inspections was to assess the protectiveness of the remedy, including the presence of fencing to restrict access, the integrity of the cap and the condition of the LGMS. LGMS maintenance schedules were reviewed. Moreover, institutional controls were evaluated by reviewing WMO filed documents and by visiting The City of Oklahoma City Public Works Administration and other local officials to review information on the site.

No significant issues were identified at any time regarding the cap, the LGMS, or the fence. Examination of the site property revealed that a small section in the northwest entrance to

the site was not fenced; however, this side was overgrown with mature vegetation and trees which makes it difficult to erect a fence or trespass into the site.

The institutional controls that are in place include prohibitions on the use and disturbance of groundwater until cleanup levels are achieved, as well as prohibitions on excavation activities, disturbance of the cap, and any other activities or actions that might interfere with the implemented remedy. No activities were observed that would have violated the institutional controls. The cap and the surrounding area were undisturbed, and no uses of groundwater were observed. Furthermore, there was no evidence of flow restrictions in the LGMS.

Interviews

Interviews were conducted with various parties connected to the site. Peter L. Shultze, WMO Market Area Engineering Manager and his site O&M Manager, Don Fletcher, were interviewed on March 29, 2005. Forrest Park Chief of Police Jeff Tucker was interviewed on March 30, 2005. Ms. Constance Johnson, a nearby resident, and Mr. Scott Thompson of ODEQ, were interviewed on March 30, 2005, as well. Furthermore, State Representative Mike Shelton, and Mr. Jim Lewellyn with The City of Oklahoma City Public Works Administration, were interviewed on June 8, 2005. No significant problems regarding the site were identified during the interviews. However, Chief Tucker noted that occasional foul odors are present near the site after rainfall events. Chief Tucker was, however, confident that this odor issue was caused by muddy tire tracks left from landfill customer trucks leaving the facility. None of the interviewees were able to identify any health- or environmentally-related concerns regarding the site, and there had not been any emergency responses since the end of the MRSL remedial construction activities.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents, ARARs, risk assumptions, and the results of the site inspections indicates that the remedy is functioning as intended by the ROD. The capping of hazardous materials and on-site flaring of gases is achieving the remedial objectives to minimize the migration of contaminants to groundwater and surface water and prevent contact with, or ingestion of, contaminants within the landfill boundaries. The effective implementation of institutional controls is preventing exposure to, or ingestion of, contaminated groundwater as well as restricting future site uses.

Operation and maintenance of the cap and the LGMS is effective. O&M annual costs are consistent with original estimates and there are no indications of any difficulties with this component of the remedy.

There were no opportunities identified for system optimization during this review. The monitoring well network provides sufficient data to assess the progress of natural attenuation, and maintenance of the cap is sufficient to maintain its structural integrity. While four contaminants (arsenic, selenium, barium, and manganese) appear to be exceeding their established baseline values or normal control limits, presently there is no concern that these may be contaminating the Canadian River. The results of the 17 semiannual groundwater analytical results suggests that statistical exceedances of barium, selenium and manganese may be the result of natural environmental and physical-chemical processes in the groundwater that occur during the natural attenuation process. The results of the March 22, 2004 supplemental groundwater monitoring well sampling program also suggests that elevated concentration of arsenic appears to be the result of a reducing environment caused by methane gas from the MRSL. All of these exceedances will be statistically significant only if verified and evaluated by the subsequent monitoring events.

The institutional controls that are in place include prohibitions on the use and disturbance of groundwater until cleanup levels are achieved, and prohibitions on land reuse, excavation activities, disturbance of the cap, and any other activities or actions that might interfere with the implemented remedy. No activities were observed that will violate the institutional controls. The cap and the surrounding area were undisturbed, and no new use of groundwater were observed. The fence around the site is intact and in good repair.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considereds (TBCs)

As the remedial work has been completed, most ARARs for groundwater contamination cited in the ROD have been met. ARARs that still must be met at this time and that have been evaluated include: the Safe Drinking Water Act (SDWA) (40CFR 141.11-141.16) from which many of the groundwater cleanup levels were derived - [Maximum Contaminant Levels (MCLs), and MCL Goals (MCLGs)]; and ARARs related to post-closure monitoring. A list of ARARs is

included in Attachment 2. There have been no changes in these ARARs and no new standards or TBCs affecting the protectiveness of the remedy.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included both current exposures (older child trespasser, adult trespasser) and potential future exposures (young and older future child resident, future adult resident and future adult worker). There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. These assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No change to these assumptions, or the cleanup levels developed from them is warranted. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing as expected and it is expected that all groundwater cleanup levels will be met within approximately 25 years.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No ecological targets were identified during the baseline risk assessment and none were identified during the five-year reviews, and therefore monitoring of ecological targets is not necessary. No weather-related events have affected the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed, the site inspections, and the interviews, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. Most ARARs for groundwater contamination cited in the ROD have been met. There has been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues

- Groundwater monitoring data indicates that some metal constituents (arsenic, selenium, barium, and manganese) are exceeding their established baseline values or normal control limits. Subsequent monitoring events will verify whether these exceedances are statistically significant. This issue does not currently affect the protectiveness of the remedy component, but could affect the remedy protectiveness determination of the next five-year review.

IX. Recommendations and Follow-up Actions

- Continue EPA review of WMO's periodic sampling and analysis results to ensure that monitored natural attenuation (MNA) is meeting the cleanup goals and objectives at the site.

- Evaluate groundwater analytical results and trends that could affect the remedy protectiveness determination of the next five-year review;

- Continue EPA review of WMO's operation and maintenance (O&M) records to seek out remedy optimization opportunities and possibly recommend more efficient monitoring, labor and oversight; and

- Work closely with WMO's groundwater monitoring contractor, so that they provide EPA and ODEQ with better groundwater monitoring and analytical reports, and ensure these contain executive summaries that clearly explain the fate and transport of those chemicals that could affect the long-term protectiveness at the site. Should these future analytical results and statistical trends indicate that additional remedial action is required to address contamination at the site, a contingency measure in the ROD may have to be adopted.

X. Protectiveness Statement

The remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through monitored natural attenuation, which is expected to require about 25 years to achieve. In the interim, exposure pathways that could result in unacceptable risks are being controlled and institutional controls are preventing exposure to, or the ingestion of, contaminated groundwater and restricting site re-use. All threats at the site have

been addressed through isolation and capping of hazardous materials, the construction of a LGMS, installation of fencing and warning signs, and the implementation of institutional controls.

Long-term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to fully evaluate potential migration of metals down gradient from the landfill towards the North Canadian River. Additional sampling and analysis will be completed within the next year. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals.

XI. Next Review

The next five-year review for the Mosley Road Sanitary Landfill Superfund Site is required by September 2010, five years from the date of this review.

ATTACHMENT 1

List of Principal Documents Reviewed

A&M Engineering & Environmental Services, Inc. (A&M Engineering). "Final Cover Quality Assurance Testing Report" December 2003.

Earth Tech 2003a. "East Oak Recycling and Disposal Facility, Title V Minor Modification" July 2003.

Earth Tech 2003b. "Revised NAPS Collection and Control System Design Plan and Monitoring Plan for East Oak Recycling and Disposal Facility and Closed Mosley Road Landfill" July 2003.

U.S. Environmental Protection Agency (EPA). "Record of Decision, Mosley Road Sanitary Landfill, Oklahoma City, Oklahoma" June 1992.

EPA. "Close Out Procedures for National Priorities List Sites," Office of Emergency and Remedial Response. OSWER Directive 9320.2-09A-P. January 2000.

EPA. "Comprehensive Five-Year Review Guidance," OSWER Directive 9355.7-03B-P. June 2001.

Older Associates, Inc., 1991a. "Final Remedial Investigation Report" August 1991.

Older Associates, Inc., 1991b. "Draft Final Feasibility Study Report" November 1991.

RUST Environment and Infrastructure (Rust E&I), 1994a. "Construction Specifications for Mosley Road Sanitary Landfill"

Rust E&I, 1994b. "Landfill Gas Assessment Report for Mosley Road Sanitary Landfill Remedial Design Work Plan" November 1994.

Rust E&I, 1994c. "Remedial Sampling and Analysis Plan, Mosley Road Sanitary Landfill Remedial Design Work Plan" November 1994.

Rust E&I, 1995a. "Mosley Road Sanitary Landfill Construction Quality Assurance Plan" August 1995. Revised March 2003.

Rust E&I, 1995b. "East Oak RDF and Closed Mosley Road Landfill Gas Management System Collection and Control System Design Plan" August 1995.

Rust E&I, 1995c. "Mosley Road Sanitary Landfill Final Remedial Design" September 1995.

Rust E&I, 1995d. "Landfill Cover Design Plan, Mosley Sanitary Landfill" September 1995.

Rust E&I, 1995e. "Mosley Road Sanitary Landfill Remedial Action Work Plan" November 1995.

Rust E&I. "Mosley Road Sanitary Landfill Operation and Maintenance Plan, Volumes I, II, and III." June 1996.

Rust E&I, 1997a. "Construction Documentation Report Landfill Gas Management System" March 1997.

Rust E&I, 1997b. "Construction Quality Assurance Documentation Report for Phase I Landfill Cover Remediation" May 1997.

Tetra Tech EM Inc. (Tetra Tech). "Five-Year Review Report for the Mosley Road Sanitary Landfill" September 2000.

Tetra Tech. "Analytical Results and Statistical Evaluation for the Second Semiannual Monitoring Event in 2003 " December 2003.

Tetra Tech. "Analytical Results and Statistical Evaluation for the First Semiannual Monitoring Event in 2004 " December 2004.

Tetra Tech, "Supplemental Groundwater Monitoring Well Sampling Program " March 22, 2004.

Waste Energy Technology (WET). L.L.C. "Landfill Gas Management System Expansion," December 2000.

ATTACHMENT 2

ARAR REVIEW

The following requirements were identified as ARARs for the selected remedy in the ROD for the Site:

- National Historical Preservation Act, 16 U.S.C. 469 et seq and 36 CFR 65 and 36 CFR 800, pertaining to preservation of historical artifacts;
- Endangered Species Act, 16 U.S.C. 1531 et seq, and 50 CFR 200 and 402 and Fish and Wildlife Coordination Act, 16 U.S.C. 1531 et seq and 33 CFR 320 - 330, pertaining to the protection of endangered and threatened species;
- Oklahoma Underground Storage Tanks Act OS Title 17 and Oklahoma Underground Storage Tank Rules OS Title 17, pertaining to closure of underground storage tanks;
- Safe Drinking Water Act Maximum Contaminant Levels and Oklahoma Effluent Limitations and W for Water Quality Criteria for Ground Water, pertaining to remediation of ground water and discharge of treated ground water to surface water;
- RCRA Rules 40 CFR 24.310 and 40 CFR 264.117 and Oklahoma Solid Waste Management Act 63 OS 1981 and the Oklahoma Controlled Industrial Waste Disposal Act 63 OS 1981, pertaining to closure and post-closure of the landfill.

During the first FYR, Tetra Tech evaluated compliance with ARARs to determine whether any new requirements had been promulgated that may have affected protectiveness. The Oklahoma Solid Waste Management Act was amended in 1993 and 1994, but these amendments did not affect the MRSL remedial action, which was limited to repair of the existing cap installed and in accordance with the Oklahoma Solid Waste Management Act 63 OS 1981. RCRA closure and post-closure regulations had not changed since the ROD was signed in June 1992.

EPA reviewed federal and State regulations to determine whether any newly promulgated values were listed, with reference to those chemicals listed in Table 20 of the ROD and their associated MCLs and State water quality criteria. The following changes were reported:

- **Chlorobenze, Chromium, Cyanide, Endrin, Ethyl Benzene, Chlordane,**

Heptachlor, Methoxychlor, Trichloroethane, 1,2-Dichloropropane, Benzo(a)pyrene, and Cadmium – The MCLs for these were finalized at the values provided in Table 20;

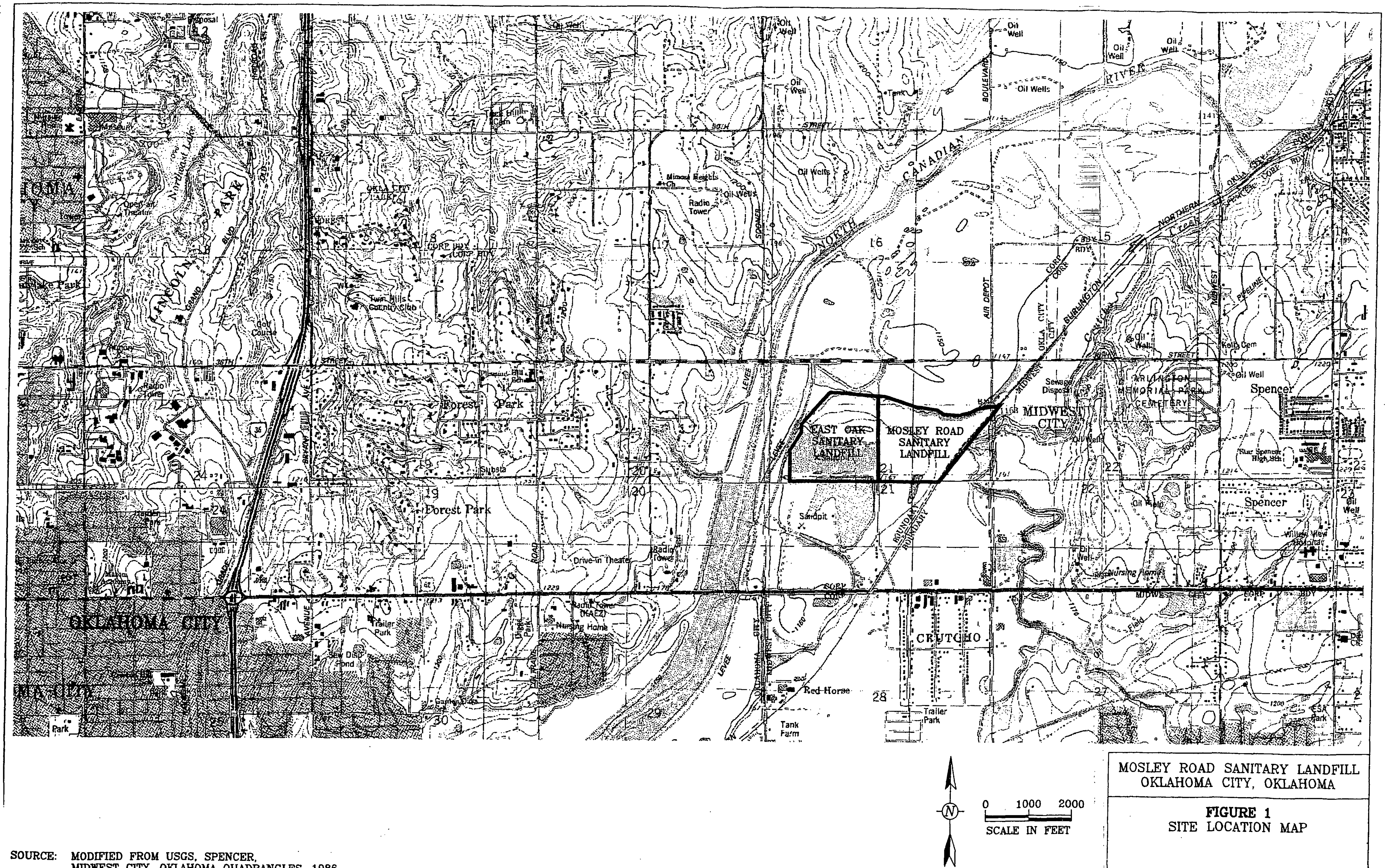
- **Chrysene** – Table 20 lists the proposed MCL value at 0.0002 mg/L. No final MCL yet exists;
- **Copper** – The value was 1.3 mg/L at the tap, during the first FYR;
- **Delta BHC** – Table 20 lists the MCL as 0.004 mg/L. The final MCL for lindane was valued at 0.0002 mg/L during the first FYR;
- **Indeno(1,2,3-cd)pyrene** – Table 20 lists the MCL value at 0.0004 mg/L;
- **Lead** – The value was 0.015 mg/L at the tap, during the first FYR;
- **Nickel** – Table 20 lists the proposed MCL value at 0.1 mg/L; however, EPA is reconsidering the limit on nickel (http://www.epa.gov/OGWDW/dwh/c-ioc/nickel.html);
- **Pentachlorophenol** - Table 20 lists the proposed MCL value at 0.2 mg/L; however, the final MCL was reported as 0.001 mg/L during the first FYR;
- **1,2-Dichloroethene** – While Table 20 lists two values, the final MCL was reported at 0.07 mg/L during the first FYR;
- **Alpha-BHC** – Table 20 lists the proposed MCL value at 0.004 mg/L. The final MCL for lindane was valued at 0.0002 mg/L during the first FYR;
- **Barium** – Table 20 lists two values, the final MCL was reported at 2.0 mg/L during the first FYR;
- **Benzo(a)anthracene and Benzo(b)fluoranthene** – Table 20 lists only proposed MCLs, however, there are no promulgated values for these chemicals;
- **Beryllium** – Table 20 lists the proposed MCL value as 0.001 mg/L; however, the final MCL was reported at 0.005 mg/L during the first FYR;

- **Beta-BHC** – Table 20 lists the proposed MCL value as 0.004 mg/L; however, the final MCL was reported as 0.0002 mg/L during the first FYR;

- **Bis(2-ethylhexyl)phthalate** – Table 20 lists the proposed MCL value as 0.004 mg/L. The final MCL was reported as 0.006 mg/L during the first FYR; and

- **Selenium** – Table 20 lists the MCL value as 0.01 mg/L; however, the MCL was reported at 0.05 mg/L during the first FYR.

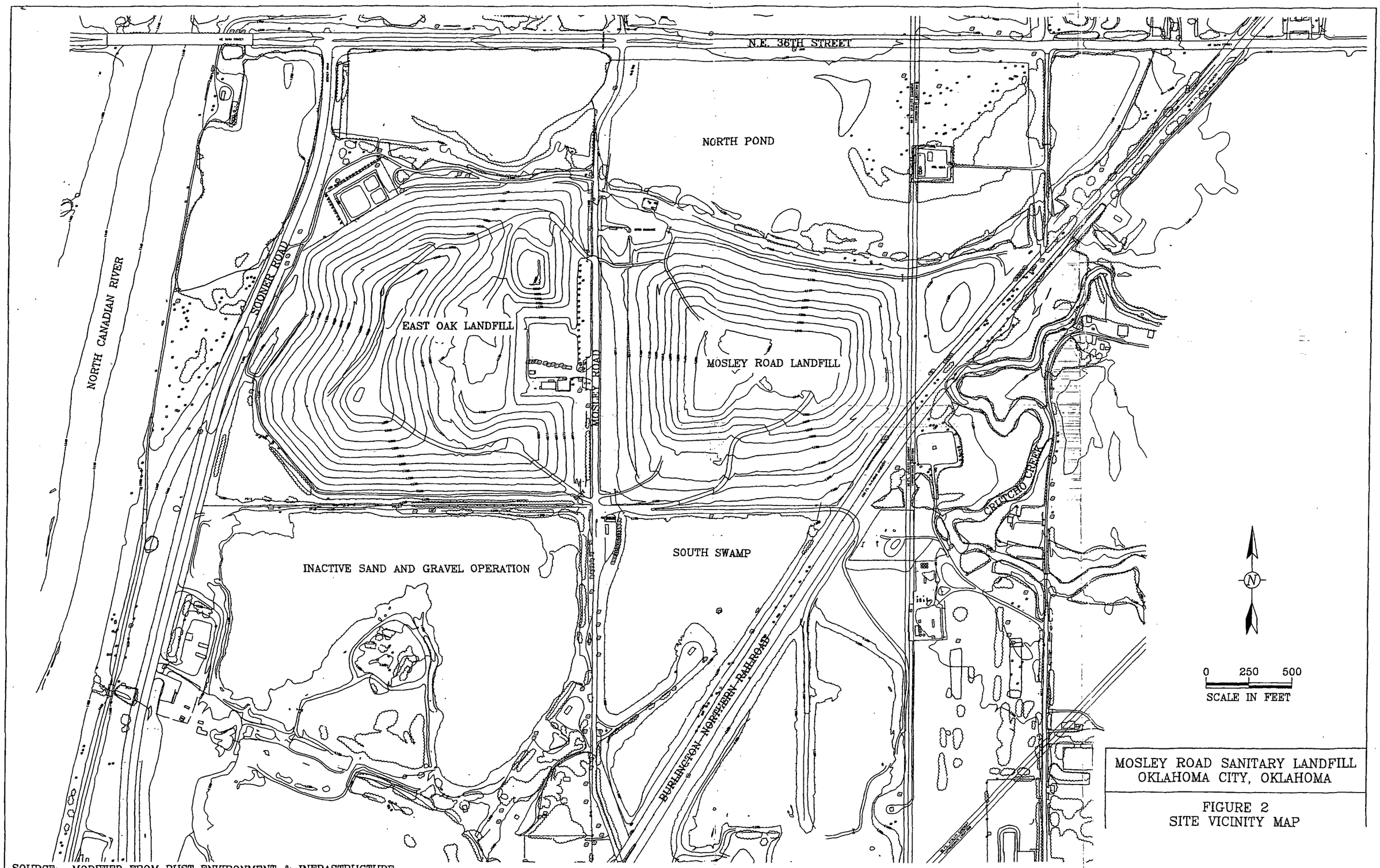
Pertaining to State regulations on water quality, the only change reported during the first FYR concerned phenolic compounds on ground water matters. While Table 20 lists the State water quality criteria for phenol as 0.3 mg/L, the State regulations did not list a MCL value for phenol.



MOSLEY ROAD SANITARY LANDFILL
OKLAHOMA CITY, OKLAHOMA

FIGURE 1
SITE LOCATION MAP

SOURCE: MODIFIED FROM USGS, SPENCER, MIDWEST CITY, OKLAHOMA QUADRANGLES, 1986.



SOURCE: MODIFIED FROM RUST ENVIRONMENT & INFRASTRUCTURE

MOSLEY ROAD SANITARY LANDFILL
OKLAHOMA CITY, OKLAHOMA

FIGURE 2
SITE VICINITY MAP