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EPA Superfund
Record of Decision Amendment

OLD MIDLAND PRODUCTS
EPA ID: ARD980745665
YELL COUNTY, ARKANSAS
April 2006

Superfund Record of Decision Amendment

Old Midland Products
Yell County, Arkansas

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United States Environmental Protection Agency
Region 6

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirement
ADEQ	Arkansas Department of Environmental Quality
bgs	Below Ground Surface
BNA	Base-Neutral-Acid Compounds (or semi-volatile organic compounds)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminants of Concern
CWA	Clean Water Act
DNAPL	Dense Non Aqueous Phase Liquids
EPA	Environmental Protection Agency
GWTP	Ground Water Treatment Plant
IC	Institutional Controls
LNAPL	Light Non-Aqueous Phase Liquids
MCL	Maximum Contaminant Level
µg/L	Microgram per Liter
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MNA	Monitored Natural Attenuation
ηg/L	nanograms/Liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NAPL	Non-Aqueous Phase Liquids
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
ppb	Parts-Per-Billion
ppm	Parts-Per-Million
PCP	Pentachlorophenol
PNA	Polynuclear Aromatics
PRP	Potentially Response Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SDWA	Safe Drinking Water Act
SARA	Superfund Amendments and Reauthorization Act
TCDD	Tetra Chloro Dibenzo Dioxin
TI	Technical Impracticability
TBC	To Be Considered
TSD	Hazardous Waste Treatment, Storage, or Disposal
µg/L	Micrograms per Liter
WWTP	Waste Water Treatment Plant

OLD MIDLAND PRODUCTS SUPERFUND SITE
RECORD OF DECISION
AMENDMENT NO. 1

PART 1: DECLARATION

A. SITE NAME AND LOCATION

Old Midland Products
EPA ID No. ARD980745665
Yell County, Arkansas

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents an amendment to the U.S. Environmental Protection Agency's (EPA) previously selected remedial action for the contaminated ground water at the Old Midland Products Superfund Site (Site) in Yell County, Arkansas. The previously selected remedy was documented in the Record of Decision (ROD) for the Site, dated March 24, 1988. This new remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record, which has been developed in accordance with Section 113(k) of CERCLA, 42 U.S.C. § 9631(k), and which is available for review at the Two Rivers School District, Office of School Superintendent, 307 W. Hill Street, Ola, Arkansas, at the Arkansas Department of Environmental Quality (ADEQ) offices in Little Rock, Arkansas, and at the United States Environmental Protection Agency (EPA) Region 6 offices in Dallas, Texas. The Administrative Record Index (Appendix B) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The State of Arkansas, through the ADEQ (lead agency for the Site), concurs with the amended selected remedy.

C. ASSESSMENT OF THE SITE

The response action selected in this Amended ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

D. DESCRIPTION OF THE SELECTED REMEDY

This Amended ROD modifies the previously selected remedy for contaminated ground water at the Site. The revision affects both the ground water cleanup criteria and the cleanup technologies selected in the initial ROD, which was dated March 24, 1988. This Amended ROD does not affect the remedy selected in the 1988 ROD for source control, which addressed soils, sediment, and sludges.

The 1988 ROD specified extraction and treatment as the ground water remedy. The treatment process included oil and water separation followed by water treatment with carbon absorption. The objective of the 1988 ROD was to remediate the contaminated ground water to a level of no more than 0.2 milligrams/Liter (mg/L) of pentachlorophenol (PCP) and 28 nanograms/Liter (ηg/L) of polynuclear aromatics (PNA).

The amended remedy for ground water consists of:

- Institutional Controls (IC) to prevent exposure to the contaminated ground water at the Site for as long as contaminants remain at levels above the drinking water standards.
- Waiver of federal and state drinking water standards for a limited portion of the Site on the basis of technical impracticability (TI).
- Retain and "moth ball" the existing pump-and-treat remediation system.
- Long-term monitoring of Site ground water on a regular basis to evaluate changes in site conditions over time.
- A review of the Site every five years to ensure that the remedy remains protective of human health and the environment.

E. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with or meets the requirements for a waiver of Federal and State requirements that are legally applicable or relevant and appropriate for the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. The remedy does not satisfy the statutory preference for treatment as a principal element of the remedy because the presence of non-aqueous phase liquids (NAPLs) in

the ground water, a fractured aquifer, and unsuccessful past ground water restoration efforts demonstrate that restoration of the aquifer is not technically feasible from an engineering perspective.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review pursuant to Section 121(c) of CERCLA, 42 U.S.C. 9621(c) will be conducted at least every five years after the last review for this Site, which was completed on March 5, 2001, to insure that the remedy continues to provide adequate protection of human health and the environment.

F. SPECIAL FINDINGS

Issuance of this Amended ROD embodies specific determinations made by the Regional Administrator or his designee pursuant to CERCLA. EPA determined that it was technically impracticable to restore ground water beneath a limited area of the Site to drinking water quality within a reasonable time frame. Therefore, EPA waived the attainment of chemical-specific ARARs for this area of the Site. These chemical-specific ARARs are being met now throughout the rest of the Site, and therefore will provide sufficient basis for EPA to make a statutory finding of compliance for the chemical-specific ARARs presented in this Amended ROD for the rest of the Site.

G. DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Amended ROD. Additional information can be found in the Administrative Record file for the Site.

- Contaminants of concern (COC) and their respective concentrations.
- Baseline risk represented by the COCs.
- Cleanup levels established for the COCs and the basis for these levels.
- How source materials constituting principal threats are addressed.
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the baseline risk assessment and ROD.

- Potential land and ground water use that will be available at the Site as a result of the Selected Remedy.
- Estimated capital, annual operating and maintenance (O&M), and total present worth costs; discount rate, and the number of years over which the remedy cost estimates are projected.
- Key factor(s) that led to selecting the remedy.

H. AUTHORIZING SIGNATURE

Pamela Phillips, Acting

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

6/9/06
Date

OLD MIDLAND PRODUCTS SUPERFUND SITE
RECORD OF DECISION
AMENDMENT NO. 1

CONCURRENCE SIGNATURES

M. Gary Miller, P.E.
Remedial Project Manager — 4/4/06 Date

Gus Chavarria, Chief
Arkansas/Texas Project Management Section — April 5, 06 Date

John Hepola, Chief
Arkansas/Texas Branch — 4/12/06 Date

Amy Salinas
Office of Regional Counsel — 4/18/06 Date

Mark Peycke, Chief
Superfund Branch, Office of Regional Counsel — 04/28/06 Date

Claudia Hubbard
Writer Editor, Superfund Division — 5/2/06 Date

Pamela Phillips, Deputy Director
Superfund Division — 5/2/06 Date

PART 2: DECISION SUMMARY

I. SITE NAME, LOCATION, AND DESCRIPTION

This Amended ROD is for ground water at the Old Midland Products Site. The Site, which consists of 37.75 acres, is located in Yell County, Arkansas as shown on Figure 1, about one-half mile east of the City of Ola, which has a population of approximately 1,200. The Site is bordered by Highway 10 to the south and extends north to Old Highway 10. A right-of-way for the Little Rock and Western Railway passes through the northern portion of the Site. Ola Mountain rises up to an elevation of 450 feet just south of the Site, which is on a flat area with a uniform gentle slope (2-3%) toward the north-northwest.

The area immediately surrounding the Site has a mixed use consisting of residential, farming, and transportation. According to the 2000 Census, approximately 1900 people live within a four-mile radius of the Site. Also, there are two private water wells located within one-quarter mile of the Site. Runoff from the Site converges in a clearly defined drainage channel located approximately in the center of the northern portion of the Site. The channel passes through a culvert under the railroad tracks and then northwesterly under Old Highway 10 and on to Keeland Creek. Keeland Creek subsequently flows through the Petit Jean River State Wildlife Management Area and then into the Arkansas River about 25 miles from the Site.

A sawmill facility and wood preserving chemical plant operated on the Site from 1969 until 1979. The wood treating process included the use of creosote and PCP to preserve the wood from bacterial and insect degradation.

The United States Environmental Protection Agency (EPA) Site identification Number is ARD980745665. The lead agency for this Site is the ADEQ.

II. BASIS FOR THE AMENDED ROD

On March 24, 1988, EPA, with concurrence from the State of Arkansas, and in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC §§ 9601 et seq., issued the ROD for the Old Midland Products Site. The 1988 ROD selected the remedial action for the Site and established the target cleanup goals for soil, sediments, sludges, and ground water. Specifically, the 1988 ROD required the remediation of two site components:

- *Source Control*: The source areas include soils, lagoon water, and sludges, and drainageway sediments contaminated with PCP.

- *Ground Water*: The ground water is contaminated with PCP and PNA.

This Amended ROD addresses changes to the ground water component of the original 1988 ROD. Under the 1988 ROD, the remedial action objective for the ground water was to reduce contamination to levels that are protective of public health risks from exposure to PCP and PNA contaminated ground water. This objective was to be achieved using a ground water extraction system and an above ground treatment system (i.e., "pump-and-treat"). This Amended ROD changes the remedial action approach from pump-and-treat to monitored natural attenuation with a TI waiver for ground water in a portion of the Site. Institutional controls are also included as a component of this Amended ROD to provide additional risk reduction by controlling exposure to Site ground water.

Amendment of the 1988 ROD is necessary because the continuing presence of high contaminant levels in ground water indicates that the remediation goal of restoring the aquifer to drinking water standards cannot be achieved with the existing system. High contaminant levels remain in spite of recovering more than 12 million gallons of ground water, which is more than 20 times greater than the contaminated plume volume of 450,000 gallons estimated in the 1988 ROD. Further, both light non-aqueous phase liquids (LNAPL) and dense non-aqueous phase liquids (DNAPL) are still present in several of the monitoring and recovery wells. Several factors contribute to this large volume of contaminated ground water recovered. First, the LNAPL and DNAPL, in addition to having a low solubility in water, also tends to strongly adsorb onto soils and slowly dissolve into the ground water. Therefore, LNAPL and DNAPL can remain for many decades while acting as continuing sources for ground water contamination. Second, the aquifer is fractured as described below. This fracturing contributes to the slow dissolution of contaminants in the ground water since contaminants typically slowly diffuse from the less permeable matrix soils into the more permeable fractures where most of the ground water flow occurs.

This Amended ROD and the documents which form the basis for the Amendment are part of the Administrative Record, which is available at the following information repositories:

Local Repository

Two Rivers School District
510 West Main Street
Plainview, Arkansas 72857
Attn: Mr. Earl Jamison, Superintendent
(479) 272-3113

ADEQ Repository

Arkansas Department of Environmental Quality (ADEQ); Records Management Section
State Police Headquarters; One Arkansas State Police Plaza
Near the intersection of Interstate 30 and Geyer Springs Road
Little Rock, Arkansas 72209
(501) 682-0007

EPA Region 6 Repository

U.S. Environmental Protection Agency
12th Floor Library
1445 Ross Avenue
Dallas, Texas 75202-2733
(800) 887-6063
Please register on 7th floor Visitors Center

III. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Old Midland Products is known to have been in operation from 1969 to 1979 as a wood preserving plant. However, EPA aerial photos indicate that the sawmill may have been in operation as early as 1960. Former Site facilities included several buildings used to house two sawmills, a wood preserving treatment plant, waste/product storage lagoons, and water treatment settling lagoons. Operations included treating wood with creosote and PCP to preserve the wood from bacterial and insect damage. The treated wood was allowed to dry in open areas to the east and west of the former lagoons and treatment building. Effluent from the treatment process containing PCP and PNAs was discharged into the former lagoons using a moveable discharge pipe. Pond overflows have occurred with drainage to the intermittent stream west of the lagoons. Contaminated sediments have migrated to and within the on-site intermittent stream. In addition, operation of the lagoons resulted in contamination of the shallow ground water on-site with an organic liquid phase and an associated dissolved organic phase.

The EPA proposed the Site to the National Priorities List (NPL) on October 15, 1984, 49 Fed. Reg. 40320 (Oct. 15, 1984). The Site was finalized on the NPL effective July 10, 1986, 51 Fed. Reg. 31054 (June 10, 1986).

The Site remedy included excavation of contaminated soil, sediment, and sludge with on-site incineration (i.e., source control), and extraction and treatment of the contaminated ground water. Soils, sediments, and sludges with greater than one part-per-million (ppm) of PCP were

excavated and incinerated. The 1988 ROD stated that the PCP cleanup level is sufficiently stringent so that coexisting PNA contaminants will be destroyed to concentrations well below those that present any significant threat to the public health or environment. The source control remedial action began in 1991 with the decontamination and/or demolition of the existing man-made facility structures and process equipment. Non-incinerable items were sent to a hazardous waste disposal landfill in Louisiana. The incinerator and its ancillary facilities were constructed on-site adjacent to the excavation area. Following trial burns to determine the appropriate operating parameters, excavation and incineration of contaminated soils, sludges, and sediments began in June 1992. The production burn ended in May 1993 with a total of 120,000 tons of material processed.

The contaminated soil, sediment, and sludge were excavated to a depth at which confirmatory sampling showed the PCP concentration was less than one part-per-million of PCP, or until ground water was reached. The areas where soil excavation reached the depth of ground water were either directly beneath or immediately adjacent to the former lagoons. The final excavation depths ranged between 0.7-feet and 22.5-feet below ground surface (bgs). The contaminated surface water was treated in the ground water treatment plant (GWTP) described below and discharged on-site.

Dismantling of the incineration facility continued through August 1993 concurrently with the backfill and final grading operations. Site clean-up, including site seeding, was conducted in October and November 1993. The ash resulting from incineration of the contaminated soil was backfilled at the Site and covered with a minimum of 6-inches of clay and three-inches of topsoil. Free phase pockets of contaminants remain within the uppermost aquifer at depths from 20 to 40-feet below the land surface and act as a continuing source of dissolved contamination in ground water.

The maximum allowable concentrations for hazardous constituents in the ash following incineration are shown below. Analytical testing confirmed that the incineration ash met these ash criteria.

- Pentachlorophenol (PCP): 1.0 ppm.
- Dioxins and Furans as Tetra Chloro Dibenzo Dioxin (TCDD): 1.0 part-per-billion (ppb).
- Naphthalene: 1.0 ppm.
- Phenanthrene: 0.3 ppm.
- Acenaphthene: 0.3 ppm.
- Acenaphthylene: 0.3 ppm.
- Fluorene: 0.3 ppm.

- Chrysene: 0.3 ppm.
- Pyrene: 0.3 ppm.
- Benzene: 0.1 ppm.
- Ethylbenzene: 0.1 ppm.
- Toluene: 0.1 ppm.
- Xylene (Total): 0.1 ppm.
- Total Base-Neutral-Acid Compounds (BNA): 10.0 ppm.
- Total Polynuclear Aromatics (PNA): 10.0 ppm.

Prior to backfilling the ash on-site in the deepest excavations, a one-foot layer of gravel fill material and six-inches of sub-base material (to prevent migration of the ash material into the gravel layer) was placed on the underlying weathered shale. The purpose of the gravel fill was to enhance ground water flow to the recovery wells. Five recovery wells, including RW-2, RW-3, RW-6, RW-7, and RW-8, and one monitoring well, MW-16s, penetrated the gravel fill layer. An oily sheen and creosote odor was observed during the drilling of these wells after reaching the water saturated zone.

The ground water recovery wells were installed in 1993 and began operation in January 1994. Figure 2 shows the location of the Site wells. The ground water recovery system includes 8 extraction wells that together recover approximately 10-gallons per minute and a small amount of free product in addition to dissolved phase PCP and PNAs. The wells were installed in below grade prefabricated steel-lined vaults, which are constructed of reinforced concrete. The wells include stainless steel risers and screens. The pump system at each recovery well vault consists of a pump, controller, control line, air supply line, liquid discharge line, and meter. All extraction pumps are connected to cables allowing them to be set at various depths. A dual containment pipeline system was constructed to carry recovered ground water and oils to the GWTP. The main recovery line header extends approximately 430-feet from the vicinity of the recovery wells to the GWTP.

The GWTP includes an oil/water separator for removing light oils, pumps, bag filters, granular activated carbon filters, effluent holding tanks, and a control system. The dual containment pipe from the recovery wells delivers ground water to the oil/water separator. Because the system was designed to remove light non-aqueous phase liquids (LNAPL), but only DNAPL is recovered at the Site, the oil/water separator functions more as a settling tank and as an influent/equalization tank. When the oil/water separator is full, the plant pumps turn on, sending the stored water through the treatment plant. The influent pumps send the raw water to the bag filters for solids removal. The water is then processed through two granular activated carbon filters for dissolved organics removal and then sent to the effluent holding tank. The ultimate water disposal is to the on-site drainageway.

In January 1999, after approximately five years of operation, the Site was shut down, and in July 1999 a monitoring program began to determine if significant rebounding of PCPs and PNAs would occur in the wells. As a result of contamination rebound in the recovery wells, the system was restarted in September 2000 and continues operating today.

History of CERCLA Enforcement Activities

The enforcement goal for the EPA is to have those parties responsible for contamination at a site pay for the cleanup of the site. In the 1988 ROD, it was noted that at least one Potential Responsible Party (PRP) was identified and that EPA was searching for additional parties. However, in 1999, EPA determined that there are no viable PRPs for the Site.

IV. COMMUNITY PARTICIPATION

This Amended ROD meets the criteria for community involvement specified in Sections 300.435(c)(2)(ii)(A) through(H) of the NCP.

On June 14, 2005, EPA published a Proposed Plan to amend the 1988 ROD. The Proposed Plan called for institutional controls to prevent exposure to contaminated ground water, designation of a small portion of the site as a TI zone where state and federal ground water standards would be waived, long-term monitoring, and five-year reviews. The amended cleanup plan was recommended because EPA believed it offered the best balance among the nine criteria required to be reviewed under the NCP, including the protection of human health and the environment. EPA held a formal public meeting on June 30, 2005. The public comment period ran from June 14 to July 13, 2005. All comments received on the June 2005 Proposed Plan are summarized and responded to in the Responsiveness Summary, which is included as Part 3 of this Amended ROD. In addition, comments received during the public information meeting are summarized in the Responsiveness Summary.

Pursuant to Section 300.825(c) of the NCP, EPA updated the Administrative Record in January 2006 to add the documents which EPA relied on to form the basis for the decision to modify the response action for ground water at the Site. See Appendix B for the Administrative Record Index.

V. DESCRIPTION OF THE CHANGES TO THE 1988 REMEDY

The remedy selected by the 1988 ROD included the following four remedial action objectives (RAOs):

- Thermal destruction of contaminants in surface soils.
- Thermal destruction of contaminants in sediments.
- Thermal destruction of contaminants in sludges.
- Cleanup of surface water and ground water to levels that are protective of human health and the environment.

The 1988 ROD included the following cleanup levels:

• Source control:	1 ppm for PCP (including soils, sediments, and sludges)
• Surface water and ground water:	0.2 mg/L for PCP. 28 ηg/L for PNA.

The ground water cleanup level for PCP was based on the Recommended Maximum Contaminant Level (RMCL) that was in effect in 1988. For PNA, the cleanup level was based on the 10^{-5} cancer risk level and Arkansas Surface Water Rules.

A ground water remedy comparison between the original 1988 ROD and the Amended ROD is provided in Table 1 below. The 1988 ROD provided for restoration of ground water with a pump-and-treat remedy. The original RAO to restore the ground water for use as drinking water for PCP and PNAs using a pump-and-treat remedy is technically impracticable (TI) to meet for the reasons discussed in Section X below. Likewise, no other remediation technologies could reliably or logically attain Site cleanup levels for the same reasons (one such remediation technology, chemical oxidation, is discussed under Remedy Alternative 4 below). Therefore, this Amended ROD changes the RAO to restore the ground water to minimization of migration (i.e., containment) and to waive the requirement for restoration to drinking water standards with a TI Waiver.

The TI Waiver will apply to the TI Zone, which consists of the LNAPL and DNAPL source area and the area enclosed by the down gradient sentinel monitoring wells. The ground water within the TI Zone will not be restored under this remedy. Figure 3 below shows the location of the TI Zone. The final north and northwestern extent (i.e., down gradient boundary) of the TI Zone placement will be based on the actual location of the sentinel monitoring wells, which will be determined during the Remedial Design.

Table 1
Comparison Between 1988 ROD and 2006 Amended ROD
Ground Water Components

1988 ROD	2006 Amended ROD
No Institutional Controls	Permanent Institutional Controls
Pump-and-Treat Ground Water Recovery System	Monitored Natural Attenuation
	TI Waiver
	Moth-Ball Water Treatment Plant
Network of Monitoring Wells	Existing Network Augmented with 6 Additional Monitoring Wells
Continue Monitoring of the Nearby Domestic Drinking Water Wells.	Continue Monitoring of the Nearby Domestic Drinking Water Wells.
Five-Year Reviews	Five-Year Reviews
PCP Cleanup Level: 0.2 mg/L (or 200 µg/L)	PCP Cleanup Level: 1 µg/L
PNA Cleanup Level: 28 ηg/L (or 0.028 µg/L)	See Table 2 Below

Table 2
PNA Cleanup Goals

Contaminant	Cleanup Level (µg/L)	2005 Maximum Ground Water Concentration (µg/L)	Basis for Cleanup Goal
Acenaphthene	370	36,000	Non-carcinogen; risk-based HQ=1
Acenaphthylene	940	3.2	Non-carcinogen; risk-based HQ=1
Anthracene	1,800	12,000	Non-carcinogen; risk-based HQ=1
Benzo(a)anthracene	0.2	180	Carcinogen; use the benzo(a)pyrene MCL
Benzo(b)fluoranthene	0.2	90	Carcinogen; use the benzo(a)pyrene MCL
Benzo(k)fluoranthene	0.92	92	Carcinogen; risk-based @ 10^{-6}
Benzo(a)pyrene	0.2	9.2	MCL (carcinogen)
Benzo(g,h,i)perylene	470	82	Non-carcinogen; risk-based: HQ=1
Chrysene	9.2	5,400	Carcinogen; risk-based @ 10^{-6}
Fluoranthene	1,500	34,000	Non-carcinogen; risk-based: HQ=1
Fluorene	240	27,000	Non-carcinogen; risk-based: HQ=1
Indeno(1,2,3-cd)pyrene	0.2	56	Carcinogen; use the benzo(a)pyrene MCL
Naphthalene	6.2	28,000	Non-carcinogen; risk-based: HQ=1
Phenanthrene	470	72,000	Non-carcinogen; risk-based: HQ=1
Pyrene	180	23,000	Non-carcinogen; risk-based: HQ=1

All of the Cleanup Goals apply to areas outside of the TI Zone. The above table also shows the maximum Site contaminant levels measured during two sampling events conducted in 2005 for comparison. All of these maximum contaminant concentrations are from wells located within the TI Zone. Where indicated, the Cleanup Goals are based on the Maximum Contaminant Level (MCL). As shown in Table 1 above, the current MCL for PCP is one microgram per liter (µg/L), which is reduced from the cleanup level specified in the 1988 ROD of 0.2 mg/L (equivalent to 200 µg/L).

Only one of the PNA chemicals, benzo(a)pyrene, a carcinogen, has an MCL established, which is 0.2 µg/L. This concentration is also used as the PRG for most of the other carcinogenic PNAs that do not have MCLs established, but which are less potent carcinogens than benzo(a)pyrene. The final two remaining carcinogenic PNAs without MCLs (i.e., chrysene and benzo(k)fluoranthene) have cleanup goals that are risk-based (i.e., one-in-1,000,000 cancer risk). These cleanup goals were set at the low end of the acceptable risk range so that the cumulative effect of all cancer causing contaminants will still be in the acceptable risk range (i.e., 10^{-4} to 10^{-6}).

The non-carcinogenic PNAs do not have MCLs established, so their cleanup goals are risk-based. These risk-based Cleanup Goals were calculated using a hazard quotient of one for all non-carcinogenic PNAs and are valid only if a single non-carcinogenic contaminant is present. If more than one non-carcinogenic contaminant is detected in a sentinel monitoring well, then a combined hazard index will be calculated based on the measured concentrations. The cleanup goal for multiple non-carcinogenic contaminants will be a combined hazard index of one.

VI. SITE CHARACTERISTICS

Hydrogeology

The upper forty feet of soil/rock at the Site contain, in order of descending depth, silty clay, a layer of iron nodules, and a layer of weathered shale. Below these layers an unweathered or slightly weathered (but fractured) shale goes down thousands of feet. Thickness of the on-site silty clay ranges from 4-feet to 15-feet and generally increases to the northwest. Beneath the silty clay is a layer of iron nodules that are present throughout most of the Site. Thickness of the iron nodule layer ranges from ½-foot to 1½-feet. The base of the nodules is the contact with the weathered shale.

The upper water bearing unit at the Site is within fracture and joint openings of the weathered shale and, to a limited extent, the unweathered shale. This aquifer exists below the silty clay layer that acts as an aquitard (i.e., resists ground water movement) that confines the aquifer. The

silty clay confines the aquifer to an extent that some of the monitoring wells are capable of flowing to the surface. The upper section of the aquifer is named the Weathered Shale, which varies in thickness between 10 and 25-feet. It is highly fractured and has a low strength. The upper section was weathered resulting in the chemical and physical breakdown of the rock. The top of the Weathered Shale slopes to the north-northwest.

The lower aquifer section is the Unweathered Shale, which is directly below the Weathered Shale. The depth to the top of the Unweathered Shale varies between 18 and 37-feet bgs. The Unweathered Shale also has fracturing, although somewhat less than the Weathered Shale, and has a higher strength than the Weathered Shale. The Unweathered Shale fracturing ("slickensides") is the result of geologic processes (uplifting of the Atoka Formation) and not of weathering processes. Slickensides have a polished surface that results from friction along a slippage plane. The fractures close with depth and generally do not extend beyond a depth of approximately 150-feet bgs. The top of the Unweathered Shale follows a similar pattern as that of the Weathered Shale, and the ground surface, all sloping toward the northwest. The Weathered and Unweathered Shale layers are a single water bearing zone.

Ground water in the area flows through fractures, faults, bedding planes and weathered zones, and occasionally exhibits artesian conditions in the southwest portion of the Site. The shallowest water producing interval occurs in the Weathered Shale at depths of 15 to 20-feet bgs in a zone 3 to 5-feet thick. Measured hydraulic conductivities for the shallow Weathered Shale aquifer, within the upper 20-feet of soil and rock, range from $5x10^{-6}$ to $6x10^{-4}$ cm/sec with a log-average hydraulic conductivity of $2x10^{-4}$ cm/sec. The Weathered Shale has a transmissivity in the range of 130 to 690 gpd/ft and a storativity in the range of 0.006 to 0.01. The hydraulic gradient has a magnitude of 0.02 to 0.034 (foot/foot) and the ground water flow velocities range from 14 to 48-feet per year. The hydraulic conductivity values for the deeper Unweathered Shale aquifer, within depths of 20-feet to 40-feet, are $7x10^{-6}$ to $1x10^{-4}$ cm/sec with a log-average hydraulic conductivity of $2x10^{-5}$ cm/sec. In general, ground water movement follows the general slope of the area water table to the north and northwest. However, the contaminant plume flows across this slope in the area of recovery wells RW-1 and RW-2 (see Figure 2), apparently following a fold, fault or channel, then is redirected to follow the general water table of the area. During the Remedial Investigation (ADPCE, 1987b), five local water supply wells were identified within 1500-feet of the Site. The well depths range from 80-feet to almost 300-feet. The closest well is located approximately 450-feet west-northwest of the lagoons at a depth of 80-feet.

Site Contaminants

The Remedial Investigation, conducted in 1986 and 1987, found that PCP was the most widespread contaminant at the Site, followed by PNAs (ADPCE, 1987b). Prior to the remedial

actions conducted between 1991 and 1993, PCP was present in the surface and deeper soils, drainageway sediments, surface water, ground water, lagoon sediments, and lagoon fluids. The initial maximum PCP soil concentration was 790 milligrams per kilogram (mg/kg), and the maximum concentration in the lagoon sediments was 5,900 mg/kg. PCP in ground water was found at concentrations reaching as high as 12,000 mg/L within the non-aqueous phase liquids. The maximum initial concentration of a PNA compound in soil was 14,000 mg/kg of phenanthrene. The maximum initial concentration of a PNA compound in ground water was 5,100 mg/L of fluoranthene. Prior to remediation, soil contamination was present in a 4.3 acre the area around the former lagoons and treatment building, and extended down to the aquifer. Drainageway sediments were formerly contaminated at concentrations from 1 to 10 mg/kg PCP from near the northwest perimeter of the lagoon area downstream to south of Old Highway 10, an estimated distance of 1,680 feet. No significant contamination was observed in offsite drainageway sediments. Since completion of the source control remedial action in 1993, only the ground water contamination currently remains.

Dioxins and furans are present in commercial grade PCP as manufacturing impurities. The forms present at the Site are almost entirely the hepta and octa forms, which are much less toxic than the tetra, penta, and hexa forms. The concentrations of dioxins and furans were significant only in former lagoon concentrated sludges, which were incinerated as a part of the source control remedial action. Trace levels of aromatic hydrocarbons were also found, although of limited spatial extent and at concentrations that presented no significant health or environmental threats. The PNA compounds present in ground water include a variety of both noncarcinogenic and carcinogenic compounds.

The area of ground water contamination determined during the 1987 Remedial Investigation was just over one-half acre. The vertical extent of the ground water contamination was found to extend from the top of the aquifer to a maximum depth of about 40-feet bgs, where sampling and analysis showed no detectable contaminants. Prior to initiation of the ground water recovery program, the estimated volume of contaminated ground water was 450,000 gallons. A plume of lighter-than-water non-aqueous phase liquid, or LNAPL, was initially present in the ground water, and still remains. The Remedial Investigation reported that movement of the non-aqueous phase was likely the primary means of horizontal migration of contaminants. Horizontal migration of the non-aqueous phase is expected to generally follow the ground water gradient to the north-northwest, although local structural influences may alter the direction of movement. Migration of dissolved phase contaminants is very limited due to the low-water solubilities of the contaminants and the tendency of the contaminants to be attenuated by the soil and shale.

The presence of DNAPL at the Site was suspected but not encountered during the Remedial Investigation. However, since operation of the recovery system began, a separate, dense oil

phase has been observed in the bottoms of four of the Weathered Shale (shallow aquifer at a depth of 20-feet) monitoring wells (i.e., MW-3s, MW-17s, MW-19s, and MW-20s). Additionally, a dense oil phase is present in the bottoms of three of the Unweathered Shale (deeper aquifer section at a depth of 35-feet) monitoring wells (i.e., MW-3d, MW-19d, and MW-20d). The presence of this DNAPL in the monitoring wells indicates that a separate, mobile DNAPL material is present in the aquifer. However, only a small quantity (exact amount unknown) of DNAPL has been recovered by the recovery system.

The ground water flow velocity was estimated to be between 14 to 48-feet per year in the absence of ground water recovery operations. The rate of contaminant migration is expected to be less than the ground water flow velocity as a result of contaminant adsorption and retention by the aquifer matrix materials. The contaminant migration velocity was estimated based on Site conditions at the time of the Remedial Investigation. At that time, the extent of ground water contamination was about 200-feet from Lagoon 3. The lagoon active source life was estimated to be between 16 and 21-years, which was based on the construction of the former lagoons between 1966 and 1971. The estimated rate of the contaminant migration, again in the absence of ground water recovery operations, was therefore between 10 and 13-feet per year. As discussed in Section X below, the ground water plume did not migrate during the initial five years of operating the pump-and-treat recovery system, or during the following 20-month recovery system shutdown ending in September 2000.

VII. CURRENT AND POTENTIAL LAND AND RESOURCE USES

The Remedial Investigation Report describes the area immediately surrounding the Site as a mixture of residential, farming, forestry, and transportation activities. Adjacent to the east side of the site is a small unoccupied parcel of semi-open pastureland surrounded by a wooded area. Railroad tracks cross through the upper one-third of the Site and run in a generally east to west direction. The northeastern portion of the Site (north of the railroad tracks) is bound by a large open and cleared pasture. Old Highway 10, the approximate northern extent of the Site, is bordered by one residential house, a large open field and a small creek, which also runs through the Site from south to north. Immediately to the west and bordering the Site is a residential home and a small area of farmland. State Highway 10, the approximate southern extent of the Site, is bordered by a wooded area. To the far southwest of the Site and bordering the woods is a residential house with several other homes located even further to the west. The City of Ola is one-half mile to the west of the Site. The Petit Jean Wildlife Management Area is located approximately three-quarters of a mile to the north, which is down gradient, but is not affected by contamination from the Site. These land uses in the vicinity of the Site are not anticipated to change in the future.

Ground water in the vicinity of the Site is currently used as a drinking water source. This use is expected to continue. The Remedial Investigation Report stated that a total of five water wells are present within a 1,500-foot radius around the Site. Two of these wells are approximately downgradient from the Site. One of these downgradient wells is located approximately 450 feet west-northwest of the former on-site lagoons. It is 80-feet deep and currently used for domestic purposes. The other downgradient well used for domestic purposes is 160-feet deep and is located about 1200-feet northwest of the Site. Both of these wells are sampled twice per year during the regular ground water sampling events. Neither of these wells has ever contained any Site contaminants.

In the past, the Two Rivers School District, the current land owner, has expressed an interest in using the eastern portion of the Site for recreational facilities. Recently there has been some discussions between the School District and ADEQ and EPA regarding reuse of this part of the Site. However, any future development will be limited by the presence of the Waste Water Treatment Plant and the well heads in the central and western part of the Site.

VIII. SUMMARY OF SITE RISKS

An endangerment assessment was included in the 1988 Remedial Investigation Report. The objective of the endangerment assessment was to identify possible risks to human health and the environment due to exposure to hazardous materials present in the environmental media at the Site. It established the Site baseline condition and was an assessment of the risks represented by those baseline conditions assuming no future action. The endangerment assessment identified four exposure scenarios as posing current or potential future risks to human health or the environment. Of these four, three were associated with the soils, sediments, and lagoons, and one with ingestion of ground water from the Site aquifer:

- Chronic dermal contact and ingestion of surface soils;
- Exposure of aquatic organisms in the intermittent stream to Site contaminants;
- Inhalation of air emissions from the Site; and
- Potential ingestion of contaminated ground water.

Following the completion of the source control remedial act, only one potential exposure scenario remains. It is the potential ingestion of contaminated ground water at the Site.

The MCL for PCP, one of the chemicals of concern at the Site, is 1 µg/L. As shown on Table 3 below, the maximum concentration of PCP in Site ground water is 910 µg/L based on samples collected in 2005. An MCL is the maximum permissible level of a contaminant in water delivered to any user of a public system. The concentration of PCP in ground water at the Site is

therefore considerably above this level. Another Site chemical of concern, benzo(a) pyrene, has an MCL of 0.2 µg/L. In 2005, the maximum concentration of benzo(a) pyrene in Site ground water was 9.2 µg/L, again above the MCL as shown in Table 3 below. None of the other Site chemicals of concern have MCLs established, however, a number of them exceed the risk-based cleanup goals as described below.

IX. REMEDIAL ACTION OBJECTIVES

This Amended ROD only addresses ground water. The RAOs identify Site-specific contaminants, media of concern, potential exposure pathways, and remediation goals. The remediation goals are derived from either risk assessment findings or previously established concentration limits that protect human health and the environment and comply with applicable or relevant and appropriate requirements (ARARs). The RAOs for ground water at the Site were developed based on sampling data, assessment of risk, and a review of the ARARs. The revised RAOs for the ground water are:

- Prevent or minimize future migration of ground water contamination at concentrations above the cleanup goals.

- Prevent use of ground water as drinking water for as long as contaminant concentrations remain above the cleanup goals.

X. TECHNICAL IMPRACTICABILITY DETERMINATION

Restoration of contaminated ground water to its beneficial uses is one of the primary objectives of the Superfund program. The NCP states that "EPA expects to return usable ground waters to their beneficial uses wherever practicable, within a time frame that is reasonable given the particular circumstances of the site" (Section 300.430(a)(1)(iii)(F) of the NCP). Generally, restoration cleanup levels in the Superfund program are established by ARARs such as the use of federal or state standards for drinking water quality. Further, under CERCLA, an alternative selected to address contamination at a site must achieve the ARARs identified for the action, or provide the basis for waiving the ARARs.

ARARs may be waived for any of six reasons, including where compliance with the requirement is technically impracticable from an engineering perspective (see Section 121(d)(4) of CERCLA and Section 300.430(f)(1)(ii)(C) of the NCP). The primary considerations for determining the technical impracticability (TI) of achieving ARARs are engineering feasibility and reliability (see NCP Preamble, 55 Fed. Reg. 8748; March 8, 1990). EPA's Guidance for Evaluating the

Technical Impracticability of Ground-Water Restoration (OSWER Dir. 9234.2-25, September 1993; Interim Final) specifies the following components as necessary for a TI evaluation:

- Specific ARARs or media standard for which TI determinations are sought;
- Spatial area over which the TI decision will apply;
- Conceptual model that describes site geology, hydrogeology, ground water contamination sources, fate and transport;
- An evaluation of the restoration potential, including predictive analyses of the time frames to attain required cleanup levels and a demonstration that no other remedial technologies could be capable of achieving ground water restoration; and
- Cost estimates of the proposed remedy options.

Following a TI evaluation, EPA's goal of restoring contaminated ground water within a reasonable time frame will be modified where restoration is found to be technically impracticable. In such cases, EPA will select an alternative remedial strategy that is technically practicable, protective of human health and the environment, and satisfies the requirements of CERCLA and the NCP.

Where ground water ARARs are waived at a Superfund site due to technical impracticability, EPA's general expectations are to prevent further migration of the contaminated ground water plume, prevent exposure to the contaminated ground water, and evaluate further risk reduction measures as appropriate. See Section 300.430(a)(1)(iii)(F) of the NCP. These expectations should be evaluated along with the nine remedy selection criteria provided in the NCP. The results of the TI Evaluation for Old Midland are provided below.

ARARs

The 1988 ROD determined that the aquifer beneath the Site is a Class II aquifer, i.e., ground water that potentially could be a source for drinking water. Thus, Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act, are ARARs. The MCLs for which a technical impracticability waiver will apply are presented in the Table 3 below.

Table 3
TI Waivers for MCLs

Contaminant of Concern	2005 Maximum Ground Water Concentration (µg/L)	MCL (µg/L)	1988 ROD Cleanup Level (µg/L)
Pentachlorophenol	910	1	200[1]
Benzo(a)pyrene	9.2	0.2	no ROD standard[2]

[1] The 1988 ROD cleanup level was based on the then existing MCLG because there was no MCL established. Subsequently, an MCL was established.
[2] The 1988 ROD established a cleanup level for all PNAs combined, but not for any individual one. The combined PNA cleanup level was 0.028 µg/L.

Spatial Extent of the Technical Impracticability Zone

This section describes the horizontal and vertical extent over which the TI decision would apply, or the TI Zone. The TI Zone includes the portion of ground water known to contain contaminants above federal MCLs that would require substantial time frames to remediate using currently available technologies. The TI Zone consists of the DNAPL source area and the area enclosed by the down gradient sentinel monitoring wells. The extent of the down gradient TI Zone, and location of sentinel monitoring wells, was established to incorporate the estimated steady state, or furthest, extent of plume migration as described below in the Fate and Transport section. The ground water within the TI Zone will not be restored under this amended ground water remedy. Figure 3 below shows the preliminary location of the TI Zone. The final TI Zone placement will be based on the actual location of the sentinel monitoring wells, which will be determined during the Remedial Design and reported in a remedial action report following completion of construction activities. Vertically, the TI Zone extends to 40-feet bgs. The TI Zone includes areas where chemicals are or may be present in ground water at concentrations above the Amended ROD cleanup levels and current MCLs. Overall, analytical results from monitoring wells MW-8, MW-9, MW-10, MW-16, and MW-18, located either within or along the boundary of the TI Zone, show that concentrations of the site contaminants are below the Amended ROD cleanup goals and current MCLs.

Conceptual Model

The conceptual model serves as a foundation for evaluating the restoration potential of the site and, thereby assessing the technical impracticability as well. It includes the site geology and hydrogeology, nature and extent of contaminants of concern in ground water, fate and transport processes, and current or potential receptors. This conceptual model has been developed through review of reports of previous investigations. The source control remedial action involved the excavation of a significant portion of the site's overburden, and, in some places, exposure of the aquifer.

- Site Geology and Hydrogeology: A summary of the geology and hydrogeology for the overburden and bedrock at the site is provided in the Site Characteristics section above.

- Source of Contamination: Effluent from the Site treatment process, including PCP and PNAs, was stored in onsite lagoons and were released into the environment. Over time, these constituents leached through the soil and into the ground water. The remedial action included excavation and on-site incineration of the contaminated soil and extraction and treatment of the contaminated ground water. Following these remedial actions, free phase pockets of these constituents remained between 20 and 40-feet bgs and act as continuing sources of dissolved contamination in ground water. While the Remedial Investigation,1988 ROD, and Remedial Action Reports describe the free phase as an LNAPL, oil removed during operation of the pump-and-treat system and the report in semi-annual updates of oil detected in the bottom of some recovery and monitoring wells indicate the presence of DNAPL.

- Fate and Transport Processes: A plume of lighter-than-water non-aqueous phase liquid is present in the ground water and has resulted in contamination of the ground water to a depth of 40-feet bgs. According to the RI Report, movement of the non-aqueous phase is the primary means of horizontal migration of contaminants. Migration of dissolved phase contaminants in ground water is limited because the contaminants have low-water solubilities and tend to be attenuated by the aquifer rock. Horizontal migration of the non-aqueous phase is expected to generally follow the ground water gradient to the north-northwest, although, locally, structural influences may alter the direction of movement.

  The RI Report determined, in 1987, that the ground water plume had moved about 200 feet, assuming its source was the center of former Lagoon 3. The lagoons

were constructed between 1966 and 1971, which indicates that there was an active source life between 21 and 16 years. As a result, the rate of past plume migration is estimated to be between 10 and 13-feet per year. This estimate is less, as is expected based on contaminant attenuation, than the rate of ground water migration, which was estimated to range from 14 to 48-feet per year. As discussed below in the "Evaluation of the Restoration Potential" section, the area of ground water contamination has not expanded from the area of the recovery wells since 1994 when the recovery system was started, including the 20-month shutdown of the ground water recovery system between 1999 and 2000.

In 2005, a computer model study (Lee, 2005) using the BIOSCREEN analytical model was performed to estimate the future movement of the ground water contaminant plume without the containment provided by the operation of the ground water pump-and-treat system. This study, which is included in the Administrative Record, estimated the future movement of PCP and naphthalene. Naphthalene was chosen to represent the PNA chemicals because it is present in high concentrations and it is one of the most soluble and mobile PNA chemicals. Other PNA chemicals would not migrate as far or as fast as naphthalene would. Using conservative assumptions, the model results predict that neither PCP or naphthalene would ever migrate more than 500-feet downgradient from the source area, and that both would stabilize at 1 µg/L, which is the MCL for PCP, and less the risk based naphthalene cleanup level of 6.2 µg/L.

The variables used in the BIOSCREEN model are shown below. A discussion of the basis for the factors used is included in the model study report (Lee, 2005). The PCP and naphthalene concentrations used were obtained from the 2003 and 2004 sample results from recovery well RW-1, which has the highest contaminant concentrations of all the recovery and monitoring wells, and has recovered the largest mass of contaminants.

(a) Aquifer Thickness: 40-feet
(b) Porosity: 15 %
(c) Hydraulic Conductivity: 2.0×10^{-4} centimeter/second
(d) Hydraulic Gradient: 0.034 feet/feet
(e) Ground Water Velocity: 30 feet/year
(f) Fraction Organic Carbon: 1.4×10^{-5} (dimension less)
(g) Bulk Density: 1.8 kilogram/liter
(h) Maximum Concentration: PCP - 1,400 µg/L
Naphthalene - 6,300 µg/L

(i) Retardation Factor: PCP - 6.3 (dimension less)
Naphthalene - 1.2 (dimension less)

(j) First Order Decay Coef.: PCP - 0.092/year (7.5 year half-life)
Naphthalene - 0.58/year (1.2 year half-life)

(k) Partition Coefficient: PCP - 31,623 L/kg
Naphthalene - 1,000 L/kg

Evaluation of the Restoration Potential

The purpose of this section is to evaluate the ground water restoration potential by assessing the performance of ground water remedial action ongoing at the Site, and to evaluate additional technologies to determine if any could realistically attain drinking water standards for the Site within a reasonable time frame.

Ground water remediation began in 1994 and continues today. About 10 gallons-per-minute are pumped from the recovery wells and treated at the Site's waste water treatment plant. In 1999, a review of the Site's performance (5-Year Review, 2001) determined that the area of ground water contamination had not expanded from the area around the recovery wells since 1994, when the recovery system started operations. During this five-year period, the average PCP concentration in the recovery wells had a slight downward trend, from 1.2 mg/L to 0.9 mg/L. But, the PNA concentration trended upward during this same period, from an average of about 5 mg/L to 20 mg/L. After approximately five years of operation, in July 1999, the ground water recovery system was shut down and a monitoring program begun to determine whether significant increases of PCP and PNA concentrations would occur in the recovery wells. No change in concentration was found in monitoring wells, but the recovery wells experienced significant increases of contamination during the shut down. However, no migration of the ground water contaminant plume was detected during the 20-months that the recovery system was shut down. As a result of the contamination rebound in the recovery wells, the recovery system was restarted in September 2000 and continues operating today. To date, the area of ground water contamination has not increased.

Currently, over 12,000,000 gallons of ground water have been recovered. This volume is more than twenty times the original estimate of the volume of contaminated ground water, which was 450,000 gallons. However, the current levels of contamination, as shown in Table 2 above, are still much higher than the cleanup levels identified in the 1988 ROD. For example, a maximum of 6,276 µg/L of total PNA is present in ground water (from recovery well RW-1). This is more than five orders of magnitude above the current PNA cleanup level specified in the 1988 ROD. Creosote is a complex mixture that may contain as many as 150 to 200 chemicals, including PNAs. It is a highly insoluble DNAPL that is sometimes mixed with oil to act as a carrier. Oil

and DNAPL materials are still present in several of the monitoring and recovery wells at the Site. The DNAPL, in addition to having a low solubility in water, also tends to strongly adsorb onto soils and slowly dissolve into the ground water. Therefore, DNAPL can remain indefinitely while acting as a continuing source for ground water contamination.

The presence of fracturing in the aquifer at the Site also tends to limit the effectiveness of the pump-and-treat remedy. Ground water typically flows much easier through fractures than through the surrounding native rock. The recovery wells typically pull ground water from fractures and bypass the surrounding rock and residual contaminants that have adsorbed there. However, these residual contaminants will slowly dissolve and diffuse into the fractures to be carried to the recovery wells. This acts as a continuing source of contamination and explains why the recovered ground water is still contaminated, even though the recovered volume is much larger than the original estimate of the contaminated ground water volume.

The presence of natural fractures in the aquifer, the continued presence of oily phases in the wells, as well as high levels of contaminants in spite of the large volume of ground water that has been recovered all demonstrate that the current remedy of ground water recovery will not be able to achieve 1988 ROD cleanup levels within the foreseeable future.

Alternative Remediation Technologies

Other remediation technologies are evaluated here to assess whether they could be capable of achieving ground water restoration at the Site. In June 2001, the U.S. Army Corps of Engineers and EPA completed an evaluation and optimization report ("Report of the Remediation System Evaluation" or RSE Report) for the pump-and-treat remedy for the Site. The RSE Report proposed that chemical oxidation, steam injection, or in-situ bioremediation be considered to maximize the removal of contaminants for a cost of implementation not exceeding $1,000,000. The RSE Report noted that the benefit these technologies is that, with a significant reduction in the amount of free phase contamination, the probability is reduced for the remaining contamination to migrate off-site. The downside to these technologies is the risk due to handling of chemicals, and the possibility of increased subsurface pressure that can lead to increased mobility of the contaminants.

- *Chemical Oxidation*: Chemical oxidation typically involves reduction/oxidation (redox) reactions that convert contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, or inert. Redox reactions involve the transfer of electrons from one compound to another. Specifically, one reactant is oxidized (loses electrons) and one is reduced (gains electrons). The chemical oxidation process involves flooding of the source area with chemical oxidants,

such as potassium permanganate, hydrogen peroxide, or Fenton's reagent (hydrogen peroxide and catalyst) to produce the direct oxidation of the contaminants present at the Site. Low permeability or complex media, such as the fractured bedrock at the Site, will impede the ability of the oxidant injection systems to bring the oxidant into contact with the contaminants. The addition of buffers may also be required to ensure the treatment area remains within the optimal pH for oxidation to occur. The concentration of other oxidant-consuming substances, such as natural organic matter, reduced minerals, carbonate, and other free radical scavengers may compete with contaminants for oxidants, resulting in a need for high concentrations of oxidants or multiple applications. Chemical oxidation should reduce the mass of contaminants in the source area, but is not expected to be effective enough to result in sufficient mass reduction to meet the drinking water ARARs. It is limited by the fracturing in the Site aquifer, which impacts its ability to effectively contact and treat the contaminants.

- *Steam Injection*: This remediation technology consists of injecting steam into the subsurface to mobilize and/or vaporize DNAPL and its dissolved constituents. Ground water will be extracted after steam injection and treated in the treatment plant. The application of steam to viscous NAPL will enhance its mobility by decreasing viscosity and may also result in increased solubility. Volatile NAPL components may also volatilize and condense in advance of a steam flood resulting in increased NAPL saturation and relative permeability. This technology has been demonstrated to accelerate DNAPL removal rates at a creosote contaminated utility pole yard in Visalia, California. However, even with this technology, aqueous phase organics are still above site remediation standards as set forth in the site's 1988 ROD. Pump-and-treat operations would continue at this site after completion of steam injection to maintain hydraulic containment as natural attenuation processes (including biological degradation) are monitored.

  Steam injection has some significant drawbacks, however. DNAPLs such as creosote have the ability to form pools, and there is a potential for steam injection to result in downward mobilization of any DNAPL pools to deeper in the aquifer as steam flushing reduces the viscosity. The use of stem injection may therefor result in the contamination of deeper aquifer zones that are not currently contaminated. Steam injection performance is also limited by the fracturing in the Site aquifer, which impacts the ability to effectively contact and treat the contaminants.

- *In-Situ Bioremediation*: In-situ bioremediation is a technology that involves the subsurface biodegradation of contaminants by microorganisms. Application of this technology to ground water remediation typically involves injection of substrates, nutrients, microorganisms, and other amendments to support the growth of subsurface microorganisms. Bioremediation of NAPL is limited due to the following: (1) NAPLs present a highly hostile environment to the survival of most microbes, (2) the basic requirements for microbial proliferation (nutrients, terminal electron acceptor, pH, moisture, osmotic potential, etc.) are difficult if not impossible to deliver or maintain in the NAPL zone. Correspondingly, bioremediation may be limited to the periphery of the NAPL zone in ground water. As with the other remediation technologies, the performance of in-situ bioremediation would be limited by the aquifer fracturing, which impacts the ability to effectively contact and treat the contaminants.

Therefore, neither the current nor alternative remediation technologies could reliably or logically attain Site cleanup levels for the reasons outlined above.

Cost Estimates

The cost estimate of the amended remedy is described in Section XII below.

XI. DESCRIPTION OF ALTERNATIVES

The 1988 ROD selected remedies to address both the contamination sources and ground water. The source control actions included the cleaning, demolition, and off-site disposal, or incineration, of existing plant structures, and excavation and treatment by incineration of the soils, sludges, and sediments contaminated with PNAs and PCP. The clean ash was replaced at the Site and covered with a 6-inch clay cap and 3-inches of topsoil. The ground water action included pumping, treatment by carbon adsorption, and discharge of the treated ground water. This amended remedy only addresses the ground water portion of the original remedy. The ground water alternatives considered are described below.

Alternative 1: No Action

Regulations governing the Superfund program generally require that the "No Action" alternative be evaluated. The No Action alternative is used by the EPA to establish a baseline against which the effectiveness of all other remedial alternatives is judged. Under this alternative, the EPA would take no further action at the Site to prevent exposure to ground water contamination. No attempts will be made to monitor or control ground water contaminant migration from the Site.

Since ground water contaminants exist at levels above the MCLs and above risk-based levels, the No Action Alternative will not be protective of human health or the environment.

Alternative 2: Monitored Natural Attenuation, Technical Impracticability Waiver, and Institutional Controls

Monitored Natural Attenuation (MNA) is defined as "biodegradation, dispersion, dilution, and adsorption" of contaminants in ground water. MNA differs from the No-Action Alternative because natural attenuation has a monitoring component and is expected to attain cleanup levels outside of the TI Zone. The ground water monitoring program will monitor the long-term effect of the remedial activities. Institutional controls (ICs) will also be implemented with MNA to ensure that contaminated ground water is not used as a source of drinking water. The monitoring will also ensure protectiveness for the downgradient residential drinking water wells.

Under this alternative, the current pump-and-treat system will be shut down and maintained in a standby mode. A shutdown of the current pump-and-treat system will eliminate hydraulic containment provided by pumping, but sufficient remedy effectiveness should be provided due to the nature of the relatively tight aquifer and the tendency of the contaminants to strongly adsorb onto the aquifer rock. Although significant biodegradation of contaminants is not likely at the Site, adsorption of the contaminants to the surface of the aquifer rock material, and the associated immobility, should limit migration of contaminants, especially given the low ground water velocities. The ground water contaminant plume will be monitored on a regular basis to determine the migration and attenuation of contaminants. The monitoring frequency will be determined during the Remedial Design phase, but will probably be on the order of twice per year unless contamination is found in a sentinel monitoring well. In that case, early follow-up sampling will be conducted to confirm the presence of contamination, and an increased sampling frequency will be instituted. Evaluation of monitoring data will determine whether natural attenuation is occurring, and should the evaluation indicate the natural attenuation is not effective (i.e., the contaminant plume is expanding past the "sentinel monitoring wells," whose number and location will be selected during the Remedial Design), additional actions will be taken to maintain protectiveness. For example, the pump-and-treat system may be restarted and modified as necessary to reestablish ground water containment and prevent further plume migration. Also, the location of the sentinel monitoring wells and the boundary location of the TI Zone will be re-valuated, and additional sentinel monitoring wells may be required. The actual location of the sentinel monitoring wells, as installed, and the boundary of the TI Zone will be documented in a remedial action report following completion of construction activities, and in the IC for the Site. This information will be placed in the public repository for the Site.

The criteria for determining that the contaminant plume is expanding will be determined during the Remedial Design phase. One possible criterion, for example, would be if a contaminant exceeded its cleanup goals for three samples taken over a three-month period in a sentinel monitoring well. Collecting data over a three-month period to confirm continuing plume expansion is reasonable for the Site since contaminant migration was previously found to be only 10 to 13 feet per year as discussed in the "Site Characteristics" section above. Finally, any future decision to restart the pump-and-treat system, or to take other actions necessary to maintain protectiveness, will be made after an evaluation of the future Site conditions.

Alternative 3: Continue Current Pump-and-Treat Remedy with TI Waiver and IC

This alternative includes continued operation of the existing pump-and-treat system, but with the addition of the six new monitoring wells. The recovered ground water will continue to be treated on the on-site waste water treatment plant (WWTP). This system has prevented migration of the containment plume in the past and is expected to continue this into the future.

Alternative 4: Chemical Oxidation and MNA with TI Waiver and IC

The Chemical Oxidation process involves flooding of the source area with chemical oxidants, such as potassium permanganate, hydrogen peroxide, or Fenton's reagent (hydrogen peroxide and catalyst) to produce the direct oxidation of the contaminants present at the Site. Oxidation will result in the reduction of toxicity through the breakdown of the contaminants. Implementation of this alternative would reduce source area contaminants during chemical oxidant batch floods. Between batch floods, discharge of extracted ground water to the WWTP will aid in achieving hydraulic control of the treatment. Dissolved contaminants downgradient of the source area will be addressed by MNA (see Alternative 2), and will be monitored on a regular basis to determine the migration and attenuation of contaminants. This alternative will treat the source area, and thereby reduce the migration of the dissolved contaminant plume. Low permeability or complex media, such as fractured bedrock, will impede the ability of the oxidant injection systems to bring the oxidant into contact with the contaminant. The addition of buffers may also be required to ensure the treatment area remains within the optimal pH for oxidation to occur. The concentration of other oxidant-consuming substances, such as natural organic matter, reduced minerals, carbonate, and other free radical scavengers may compete with contaminants for oxidants, resulting in a need for high concentrations of oxidants or multiple applications.

Common Elements

Many of these alternatives include common components. All of the remedies, except the No Action Alternative, require ICs to ensure that the water is not used for drinking water until

attainment of remedial goals has been achieved. ICs are legal and administrative measures designed to prevent exposure to Site contaminants at concentrations above protective levels. The EPA and ADEQ intend to work with the property owner to develop and record deed restrictions that are appropriate under Arkansas law and that prevent the use of ground water on the Site for drinking, household, or any other purpose that would endanger human health or the environment.

The ICs will be developed during the Remedial Design phase for the selected remedy. The ICs will be in place prior to construction completion of the amended remedy. The ICs will be needed for an indeterminate time, probably many decades, for as long as the ground water remains contaminated above the cleanup goals identified above. Monitoring to ensure the effectiveness of the remedy, including ICs, is a component of each alternative except the No Action Alternative. ADEQ will be responsible for performing the monitoring, which will include sampling and evaluation of the changes in ground water contaminant concentrations. During the performance of routine ground water monitoring activities at the Site, an evaluation will also be conducted to ensure that there is no use of the contaminated ground water. An evaluation of the effectiveness of the ICs will be performed as a part of the five-year reviews described below.

Down gradient of the vicinity of the capture zone for the current pump-and-treat remediation system, there are two pairs of monitoring wells and two single monitoring wells. The closest of these is 100 to 150 feet from the capture zone. As a result, the plume extent and migration are not as well defined as may be necessary to make conclusive determinations on the performance of any remediation system. This information is required to properly manage future Site activities, and to make any operational changes that may be necessary to maintain protectiveness. Therefore, all alternatives, except the No Action Alternative, include the addition of six new monitoring wells down gradient of the plume. The exact placement of these monitoring wells will be determined during the Remedial Design. A TI Waiver for the TI Zone is included in all alternatives, except the No Action Alternative, as discussed below in the "Compliance with ARARs" section. The area of the TI Zone will be bounded by the location of the "sentinel monitoring wells," which will be decided during the Remedial Design.

Because wastes will remain on-site under all alternatives, and this Amended ROD is signed after October 17, 1986 (the effective date of Superfund Amendments and Reauthorization Act of 1986, or SARA), statutory five-year reviews will be required for all alternatives to insure protectiveness as required by Section 121(c) of CERCLA, 42 U.S.C. §9621(c).

XII. COMPARATIVE ANALYSIS OF REMEDY ALTERNATIVES

The EPA has established nine evaluation criteria to address the statutory requirements of CERCLA. The criteria can be classified into three categories: threshold criteria, primary

balancing criteria, and modifying criteria. This section evaluates each potential RA alternative by these criteria.

Threshold Criteria

Threshold criteria are requirements that each remediation alternative must achieve to be eligible for selection as a permanent remedy. The two threshold criteria are as follows:

- Overall Protection of Human Health and the Environment: The overall protection of human health and the environment is evaluated for each alternative on the basis of the alternative's ability to provide adequate protection by reducing, controlling, or eliminating the risk of exposure to contaminants through treatment, engineering controls, and/or institutional controls.

- Compliance with ARARs: Section 121(d) of CERCLA and the NCP, Section 300.430(f)(1)(ii)(B), require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations (unless they are waived). This criterion evaluates each alternative's compliance with location, chemical, and action specific ARARs.

Primary Balancing Criteria

The five balancing criteria are used to compare and evaluate the major tradeoffs among alternatives that fulfill the two threshold criteria. The balancing criteria are:

- Long Term Effectiveness and Permanence: Remediation alternatives are reviewed and evaluated under this criterion to assess the potential for risk, in the form of treatment residuals and untreated wastes, that would remain at the Site following implementation of the alternative. Likewise, the evaluation of each alternative with respect to this criterion requires assessment of the adequacy and suitability of controls that could be used to manage those residuals or untreated wastes remaining after Site remediation. This evaluation also includes an assessment of the reliability of remedy components, and the potential need for redoing components that were implemented during the original Site remediation such as caps, slurry walls, or on-site treatment systems over the life of the Site.

- Reduction of Toxicity, Mobility, or Volume Through Treatment: Remediation alternatives are evaluated for effectiveness at achieving the statutorily driven

preference for alternatives that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as their principal element. The evaluation includes the level to which the alternative will destroy or treat contaminants, the permanence of the treatment, and the type and volume of treatment residuals that will remain subsequent to treatment.

- Short Term Effectiveness: Remedial alternatives are evaluated under this criterion with respect to the immediate threat of risk to human health and the environment during implementation of that alternative. This risk threat is not only evaluated for the surrounding community, but for the workers at the Site conducting the remediation and the expected environmental impacts as well.

- Implementability: Each alternative is evaluated with respect to the technical and administrative feasibility of implementation, as well as the availability of necessary equipment and services. This criterion includes such items as the ability to obtain services, capacities, equipment, and specialists necessary to construct components of the alternative; the ability to operate and monitor the permanence and effectiveness of the technologies; and the ability to coordinate with and obtain necessary approvals from other relevant agencies.

- Cost: Cost estimates are derived from current information, including vendor quotes; conventional cost-estimating guides; and costs associated with similar remediation projects. The actual cost of the project will depend on labor and material costs, Site conditions, competitive market conditions, the final project scope, and the implementation schedule at the time the remedial activities are initiated. Costs expected to be incurred over the life of the project are compiled, then distilled to a common comparative year through a process known as present worth analysis. A "discount rate," published by the Office of Management and Budget, is used to evaluate how much money would need to be set aside, during the common base year, to cover the costs expected to be incurred over the life of the project. Because some alternatives are more capital-intensive, with more costs toward the beginning of the project, and other alternatives can have more extended treatment times and greater operation and maintenance costs, present worth analysis provides a means to compare each in a common format.

Modifying Criteria

The two modifying criteria are used in the final evaluation of remedy alternatives. Evaluation of these two criteria will be based on comments on the remedial investigation, the feasibility study, and the proposed plan received during the public comment period. The modifying criteria are:

- State Acceptance: This assessment reflects the state's (or support agency's) preferences or concerns about remedy alternatives.
- Community Acceptance: This assessment reflects the community's preferences or concerns about remedy alternatives.

The following is a comparison of the 1988 ROD remedy and the alternatives evaluated for this Amended ROD, contrasting each remedy's components with respect to the nine evaluation criteria.

Overall Protection of Human Health and the Environment

These criteria address the way in which a remedy alternative would reduce, eliminate, or control the risks posed by the Site to human health and the environment. The method used to achieve an adequate level of protection may be through engineering controls, treatment techniques, or other controls such as restrictions (i.e., institutional controls) on the future use of a site. The total elimination of the risk is often impossible to achieve; yet any remedy must minimize risk to assure that human health and the environment would be protected.

The original remedy included pump-and-treat technology as the method to achieve ground water restoration throughout the Site. This selection was consistent with the belief at the time that this technology could effectively restore contaminated ground water. In 2001, EPA concluded that restoration was not feasible (EPA, 2001). Therefore, without achieving restoration within a reasonable time frame or having a long-term means to prevent exposure to the contaminated ground water, the original remedy is not protective of human health and the environment in the long-term. The No-Action Alternative is not protective because at least some protective devices, such as institutional controls and long term ground water monitoring, must be in place to ensure that potential future receptors are prevented from drinking or having contact with contaminated water. The remaining alternatives provide for protection of human health and the environment since use of the ground water will be restricted through institutional controls. Alternatives 3 and 4 provide more aggressive measures for source reduction by removal (Alternative 3) or treatment (Alternative 4). Alternatives that reduce the source area contamination are expected to be more effective in reducing the long term risks because the source area contamination would be remediated sooner than under the other MNA alternative (Alternative 2).

Compliance with ARARs

A selected remedy alternative must comply with all Applicable or Relevant and Appropriate Requirements (ARARs) unless the ARAR is waived in accordance with the NCP. "Applicable"

requirements are those cleanup requirements promulgated under federal or state law that specifically address a hazardous substance, remedial action, location, or other circumstance at a Superfund site. "Relevant and appropriate" requirements are those cleanup requirements which, while not "applicable" at a Superfund site, address problems or situations sufficiently similar to those encountered at the Superfund site that their use is well-suited to the site. ARARs can be action-specific, location-specific, or chemical-specific. The benchmark potential ARAR for comparing Site alternatives is the restoration of ground water to MCLGs for the contaminants, which are PCP and PNAs. Where the MCLGs are set at zero, as in the case of PCP and benzo(a)pyrene (a PNA chemical), then the MCLs are the ARARs. MCLs have not been established for the other Site contaminants.

When the original remedy was selected in the 1988 ROD, it was believed that the remedy would attain all identified federal and state ARARs. However, based on the ground water remedy's performance as discussed in this Amended ROD, EPA now believes that the original remedy will not be able to attain the ground water ARARs.

None of the alternatives will meet the drinking water ARARs within the TI Zone. While Alternative 3 (pump-and-treat) and Alternative 4 (chemical oxidation) will both reduce the mass of contaminants in the source area, neither is expected to be effective enough to result in sufficient mass reduction to meet the drinking water ARARs. Both are limited by the fracturing in the aquifer, which impacts their ability to contact the contaminants. The MCLs within the TI Zone are waived in this Amended ROD for the Site. The TI Waiver applies to the cleanup level for PCP of one µg/L, and for benzo(a)pyrene of 0.2 µg/L. Because the ARARs will not be achieved in the TI Zone, ICs are important to make sure that ground water is not used for drinking water purposes.

Long Term Effectiveness and Permanence

These criteria address the ability of a potential remedy to reliably protect human health and the environment over time. The 1988 ROD implemented a pump-and treat remedy for the Site, which is included as Alternative 3 here, with the expectation that it would achieve long-term effectiveness by restoring the aquifer so that it could be used for supplying drinking water. The pump-and-treat remedy has prevented migration of the contaminant plume and provided some source reduction, yet as explained above, it is unlikely to achieve the original RAOs within a reasonable time frame.

Alternative 4 (chemical oxidation) will break down the contamination that is contacted by the treatment. However, it relies on hydraulic means of delivery, and is therefore likely to only effectively treat areas in and near the aquifer fractures, and leave significant levels of residual

contaminants in low permeability zones following active remediation. Any contaminants remaining in low permeability zones at the close of active remediation will tend to diffuse into the more permeable areas (i.e., fractures) and pose a long-term threat to ground water quality. Alternative 2, MNA, will ensure long-term protectiveness through monitoring and the use of institutional controls to prevent exposure to Site contaminants, as will Alternatives 3 and 4. However, since MNA will not result in contaminant reduction in the source area, unlike Alternatives 3 and 4, it is not considered to have the same degree of long-term effectiveness as the other alternatives.

Since all of the remedy alternatives rely on institutional controls, their long-term effectiveness will be affected by the effectiveness of the institutional controls in preventing exposure to Site contaminants. The EPA and ADEQ intend to implement effective, enforceable institutional controls as described above in the "Common Elements" section to provide reliable protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume Through Treatment

These criteria assess how effectively a proposed remedy alternative will address the contamination problem. Factors considered include the nature of the treatment process, the amount of hazardous materials destroyed by the treatment process, how effectively the process reduces the toxicity, mobility, or volume of waste, and the type and quantity of contamination that will remain after treatment.

The 1988 ROD remedy has achieved a reduction of toxicity and volume through the recovery of the contaminated ground water. But, toxicity reduction sufficient to restore the aquifer to drinking water standards will not be achieved within a reasonable time frame.

Chemical oxidation (Alternative 4) should result in reduction in contaminant toxicity and volume in the aquifer, however, since this method relies on hydraulic delivery and recovery of fluids, its effectiveness in lower permeability areas is limited. Monitored natural attenuation is unlikely to provide any significant reduction in source area contamination. On the basis of reduction of toxicity, mobility, and volume through treatment, Alternatives 3 and 4 are the most aggressive at reducing source area contamination.

Short Term Effectiveness

Short-term effectiveness addresses the protection of the community and site workers during remedy construction activities, environmental impacts, and time until remedial action objectives are achieved.

Alternative 2, MNA, poses virtually no risk to the community or workers during implementation with the exception of well drilling, construction and sampling activities conducted during implementation of the MNA remedy. These risks are considered low. Continued operation of the current pump-and-treat remedy (Alternative 3) would result in only slightly increased risk as a result of operation of the WWTP. Chemical oxidation (Alternative 4) would include handling of chemicals and strong oxidants. The strong oxidants present a health and safety hazard. The oxidation reactions are also exothermic, which may present a health and safety hazard from heat and steam. This alternative would pose the highest of short term risk to Site workers and the community in the event of a mishap. Nonetheless, safety measures and controls should reduce this risk considerably. None of the alternatives pose a significant risk to human health or the environment that cannot be managed with readily available engineered controls. All of these risks are considered manageable with appropriate planning, design, and controls. None of the remediation alternatives are considered short term remedies. The current pump-and-treat remedy has demonstrated the RAOs are not likely to be obtained in the foreseeable future, and MNA would be expected to take even longer because there is no removal of contaminants. Chemical oxidation does have the potential for an earlier remediation because it breaks down the contaminants, but its ability to contact sufficient NAPL to achieve the ARARs and cleanup goals in a fractured aquifer is problematic.

While, for cost estimating purposes, each remedy alternative was assigned a life of 30 years, it is likely that all alternatives will require more than 30 years to complete given the persistent nature of the contaminants.

Implementability

Implementability addresses the ease with which a potential remedy can be put in place. Factors such as availability of materials and services are considered. All alternatives evaluated are considered implementable. The alternatives, except the No Action Alternative, are ranked below based on the difficultly of implementation, from the least difficult to the most difficult.

- Alternative 2, MNA, requires no construction other than additional monitoring wells.
- Alternative 3, continuation of the current pump-and-treat remedy, would likewise have minimal implementation issues since it is currently operating.
- Alternative 4, chemical oxidation, is a proven technology but would be the most difficult alternative to implement. Modification of the existing remediation system would be required to provide for injection of the chemical oxidizers. Handling of the strong chemicals would have to be carefully managed.

Cost

Cost includes estimated capital costs required for design and construction, projected long-term operation and maintenance (O&M) cost, and present worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. As shown in Table 4 below, the total estimated present worth costs for the alternatives varies from $0 for no-action (Alternative 1) to $2.6 million for continuation of the pump-and-treat system (Alternative 3).

The costs described below do not include previous site-wide costs which were substantial. The cost estimates only reflect those costs that would be incurred henceforth to implement the alternatives evaluated. The estimated total present worth costs associated with the ground water remediation component in the 1988 ROD was $1,400,000.

Table 4
Remediation Alternative Cost Summary

Alternative	Original Cost Estimate		Current Cost Estimate[1]		Estimated Life Cycle Costs[2] (Present Worth)
	Capital[3]	Annual O & M[4]	Capital[3]	Annual O & M[4]	
Alternative 1: No Action	$0	$0	$0	$0	$0
Alternative 2: Monitored Natural Attenuation[5]	$97,600	$32,000	$110,000	$36,000	$588,000
Alternative 3: Continue Pump-and-Treat Remedy[6]	$61,000	$166,000	$69,000	$187,000	$2,552,000
Alternative 4: Chemical Oxidation[7]	$1,005,000	$32,000	$1,130,000	$36,000	$1,608,000

[1] Current Costs escalated from the original 2001 cost estimates (RSE Report) using an inflation factor of 4% per year.
[2] Assumes 30 years of operation with a discount rate of 7% and no discounting the first year.

[3] Common Capital Cost elements for all alternatives except Alternative 1 include new monitoring wells and institutional controls.
[4] Common O&M Cost elements for all alternatives except Alternative 1 include analytical, supplies, and labor for sampling and Site maintenance.
[5] Alternative 2 capital costs also include treatment plant shutdown so that it could be potentially used in the future.
[6] Alternative 3 capital costs also include treatment plant equipment; O&M costs also include operation of the pump-and-treat system.
[7] Alternative 4 capital costs also include the chemical oxidation treatment.

State Acceptance

State acceptance addresses whether the State concurs with, opposes, or has no comment on the preferred remediation alternative. The ADEQ has reviewed a draft of this Amended ROD. The ADEQ concurs with the EPA's selected remedy and has provided a letter of concurrence which is provided in Appendix A.

Community Acceptance

The EPA acknowledges that the community within the area of a Superfund site is the principal beneficiary of all remediation actions performed. The EPA also recognizes its responsibility to inform interested citizens of the nature of environmental problems at a site, as well as potential solutions, and to learn what the community's preferences are regarding these sites.

The Amended Proposed Plan for the Old Midland Products Site was released for public review and comment in June 2005. The public comment period began on June 14, 2005, and ended on July 13, 2005. A public meeting was held in Ola, Arkansas, near the Site on June 30, 2005, to provide the local community with an opportunity to hear a description of the Site conditions and the EPA's proposed amended remedy, and provide an opportunity for the public to make either written and/or verbal comments on the Amended Proposed Plan. A court reporter was present to record a transcript of the meeting.

Based on the public meeting and comments received during the public comment period, it appears that the proposed amendment has community support.

XIII. SELECTED REMEDY

The EPA has selected the remedy described below as the best balance between the nine criteria. The selected remedy relies on institutional controls and long-term monitoring of ground water. This remedy was selected within the context of the determination by EPA that it is technically

impracticable to restore the ground water for a limited portion of the Site within a reasonable time frame. For the amended cleanup plan for the Site, EPA has selected a remedy which ensures protectiveness of human health and the environment, attains all federal and state regulations with the exception of waiving drinking water standards for a portion of the site, provides long-term and short-term effectiveness, and is implementable.

The selected remedial alternative for the Site is Alternative 2, Monitored Natural Attenuation (MNA) with institutional controls and a technical impracticability waiver. EPA and ADEQ have concluded that the proposed amended remedy is equally protective of human health and the environment as the current remedy and will achieve the amended remedial action objectives established for the Site. The low solubility of the PCP and PNA contaminants, their strong tendency to adsorb onto aquifer rock, and the slow velocity of ground water movement support the selection of the MNA alternative. In addition, the present worth cost of Alternative 2 is the lowest of the alternatives evaluated. The amended remedy consists of the following components:

- Install six ground water monitoring wells to track the movement of the ground water plume.
- Implement a ground water monitoring program to ensure that there is no significant movement of the ground water plume.
- Continue monitoring of the nearby drinking water wells.
- Implement institutional controls to prevent use of the contaminated ground water. The ADEQ will work with the current landowner, the Two Rivers School District, to develop a restrictive covenant for the Site, to be filed with the deed records.
- Retain and "moth ball" the existing pump-and-treat remediation system.
- An operation and maintenance plan will be implemented to ensure that the institutional controls are being followed and that they are effective and protective. The O&M Plan will include a schedule for periodic ground water monitoring to ensure that the contaminants are not migrating beyond the TI Zone at concentrations above the cleanup goals.
- If the ground water plume moves past the sentinel monitoring wells in the future, then additional actions may be taken to maintain protectiveness. This may include restarting the pump-and-treat system to provide containment and prevent further migration.

XIV. STATUTORY DETERMINATIONS

Under its legal authorities, the EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and

preferences. These specify that, when complete, the selected remedial action must comply with applicable or relevant and appropriate environmental standards established under federal and State environmental laws unless a waiver is justified.

The selected remedy must also be cost-effective and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy, Alternative 2, addresses these statutory requirements and preferences.

Protection of Human Health and the Environment

The selected remedy will be protective of human health and the environment. Exposure to contaminated ground water will be prevented through a restrictive covenant or other institutional controls. If other institutional controls are required, they will ensure the protectiveness of the remedy. Long-term monitoring of the ground water will allow ADEQ to track the contaminant concentrations present in the aquifer. There are no significant short-term risks to human health or the environment during implementation of the selected remedy.

Because this remedy will result in contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory five-year review will be conducted at least every five years after the last review for this Site, which was completed on March 5, 2001, to insure that the remedy continues to provide adequate protection of human health and the environment. The five-year reviews will continue thereafter as long as ground water contaminant concentrations exceed the cleanup goals to ensure that the remedy continues to provide adequate protection of human health and the environment.

Compliance with ARARs

The selected remedy will comply with all location and action specific ARARs as defined below. If ground water extraction is reinstated in the future to maintain containment of the contaminated ground water plume, the extracted ground water will be treated in the on-site treatment plant to comply with applicable discharge requirements. The remedy will also comply with the chemical-specific requirements of the Safe Drinking Water Act (SDWA) outside of the TI Zone.

The selected remedy will not comply with the chemical specific requirements of the SDWA in the TI Zone. Residual NAPL trapped interstitially in pore spaces and within fractures of the aquifer will act as continuous sources of dissolved-phase contamination. Therefore, as discussed

in Section X above, a waiver from meeting these requirements based on technical impracticability is appropriate.

Remedial actions selected under CERCLA must comply with all ARARs under federal environmental laws or, where more stringent than the federal requirements, State or State subdivision environmental or facility siting laws. Applicable or relevant and appropriate requirements are identified on a site-specific basis from information about site-specific chemicals, specific actions that are being considered, and specific features of the site location. Only the substantive provisions of ARARS, and not the permitting or other procedural or administrative requirements, are applicable or relevant and appropriate.

This Amended ROD modifies the ground water remedy selected in the 1988 ROD. However, it does not modify the remedy selected for the 1988 ROD for source control. ARARs for the Site were identified during the development of the 1988 ROD. A review of ARARs related to ground water was conducted and is summarized below. Section 300.430 (e) of the National Contingency Plan (NCP) requires that on-site remedial actions at CERCLA sites must meet ARARs under federal or state environmental or facility siting laws unless there are grounds for invoking a waiver. A waiver is required if ARARs cannot be achieved. Other federal and state advisories, criteria, or guidance, as appropriate (to be considered), should be considered in formulating the remedial action. ARARs are promulgated, enforceable federal and state environmental or public health requirements. There are two categories of requirements: "applicable" and "relevant and appropriate." CERCLA does not allow a regulation to be considered as both "applicable" and "relevant and appropriate." These categories are defined below:

- Applicable Requirements: Section 300.5 of the NCP defines applicable requirements as "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site."

- Relevant and Appropriate Requirements: Section 300.5 of the NCP defines relevant and appropriate requirements as "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well suited to the particular site."

- To Be Considered (TBC) Guidelines: Non-promulgated criteria, advisories, and guidance issued by the federal or state governments. Along with ARARs, TBCs may be used to develop interim action limits necessary to protect human health and the environment.

ARARs and TBCs are divided into three categories: chemical-specific, location-specific, and action-specific. This section briefly summarizes the most significant chemical, location and action specific ARARs for the remedy and identifies those for which a technical impracticability waiver is applied.

- *Chemical-Specific ARARs:* Chemical specific ARARs are usually health or risk-based numerical values or methodologies, which, when applied to site-specific conditions, result in the determination of numerical values that establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. These requirements do not consider the mixture of chemicals. The federal MCLs are chemical-specific ARARs that govern the quality of drinking water provided by public water supply. MCLs are relevant and appropriate requirements in establishing remediation goals for ground water at the Site and are ARARs outside the TI Zone. The MCLs for which a technical impracticability waiver will apply are noted in the Table 3 in Section X above.

- *Location-Specific ARARs*: Location-specific ARARs are restrictions placed on the concentrations of hazardous substances, or the conduct of activities solely because they are in specific areas. No waiver of location-specific ARARs is being sought for the technical impracticability waiver for the Site.

- *Action-Specific ARARs*: Action-specific ARARs are usually technology or activity-based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are generally focused on actions taken to remediate, handle, treat, transport, or dispose of hazardous wastes. These action specific requirements do not in themselves determine the remedial alternative; rather they indicate how a selected alternative must be implemented. No waiver for action-specific ARARs is being sought for the technical impracticability waiver for the Site.

The selected remedy complies with those Federal and State requirements that are applicable or relevant and appropriate for this remedial action. There were no location-specific ARARs

pertinent to the selected amended remedy. A summary of ARARs and TBC guidelines is presented in Table 5 below.

Table 5
ARARs for the Ground Water Remedy

Standard or Criteria	Citation	Status	Discussion
Chemical Specific			
National Primary Drinking Water Standards	SDWA 42 U.S.C. §300f et seq.; 40 CFR 141.11-141.6	Relevant and Appropriate	MCLs have been promulgated for several common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for ground water aquifers used for drinking water. The selected remedy will comply with this ARAR outside of the TI Zone.
Federal Clean Water Act (CWA) Water Quality Criteria	33 USC § 1251 et seq.; CWA 303 and 304; 40 CFR 131	TBC	These criteria (ambient water quality criteria) apply to water classified as a fisheries resource. The water quality criteria are non-enforceable guidance developed under the CWA, but are used by the State to establish water quality standards. This TBC requirement may be appropriate in the future if the pump-and-treat system is restarted.
National Pollutant Discharge Elimination System	CWA; 40 CFR 125 (NPDES)	Relevant and Appropriate	Regulations address criteria and standards for removal of pollutants prior to discharge. The selected remedy complies with this ARAR.
ADEQ Pollutant Discharge Elimination System	ADEQ Regulation No. 6	Applicable to the discharge of water from WWTP.	Specifies requirements of an NPDES permit for surface discharge, including removal of pollutants prior to discharge. The existing treatment plant discharges to the on-site intermittent creek according to these ADEQ standards.

Table 5
ARARs for the Ground Water Remedy

Standard or Criteria	Citation	Status	Discussion
ADEQ Water Quality Standards for Surface Waters	ADEQ Regulation No. 2	Applicable to the discharge of water from treatment plant	Specifies water quality standards for surface water and implementation procedures for application of the surface water quality standards. The existing treatment plant discharges to the on-site intermittent creek according to these ADEQ standards. These standards will be met in the future if the pump-and-treat system is restarted.
Action Specific			
Permits and Enforcement	CERCLA Section 121(e)	Applicable	This section specifies that no federal, state, or local permit shall be required for any portion of a CERCLA remedial action that is conducted on the site of the facility being remediated. This includes exemption from the RCRA permitting process.
Resource Conservation and Recovery Act (RCRA)	42 U.S.C. §6901 et seq.; 40 CFR 300.440	Applicable or Relevant and Appropriate	Hazardous substances identified by the EPA in the ground water at the Site (PCP, benzo(a) pyrene) are "listed" hazardous wastes under RCRA regulations at 40 CFR 261.33(a)and(f). RCRA standards for waste characterization (40 CFR Part 261), standards for generators of hazardous waste (40 CFR Part 262), standards for transporting hazardous waste (40 CFR Part 263), standards for treatment, storage, and disposal facilities (40 CFR Part 264), and disposal of hazardous waste subject to land disposal restrictions (40 CFR Part 268) will apply. The selected remedy complies with this ARAR.

Table 5
ARARs for the Ground Water Remedy

Standard or Criteria	Citation	Status	Discussion
Storm Water Regulations	40 CFR Parts 122, 125	Applicable	NPDES permits are addressed relative to storm water discharges associated with industrial activity. These regulations require the development and implementation of a storm water pollution prevention plan or a storm water best management plan. Monitoring and reporting requirements for a variety of facilities are outlined. The selected remedy complies with this ARAR
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 CFR Part 264 Subparts B, C, D and G	Relevant and appropriate if wastes on-site are identified as RCRA hazardous wastes.	Subparts B, C, and D establish minimum standards that define the acceptable management of hazardous waste for owners and operators of facilities that treat, store, or dispose of hazardous waste. Subpart G establishes standards for closure and post closure care for site design and operation. These standards will be met in the future if the pump-and-treat system is restarted.

Table 5
ARARs for the Ground Water Remedy

Standard or Criteria	Citation	Status	Discussion
Exceptions to ARAR Rules	CERCLA 121(d)(4)	Applicable	Allows EPA to waive compliance with ARARs in six circumstances: 1. The selected action is only part of a total remedial action that will comply with the ARAR requirements when completed. 2. Compliance with the ARAR requirements would present greater health/environmental risks than alternative options. 3. Compliance with the ARAR requirements is technically impracticable from an engineering perspective. 4. The selected remedy will attain a standard of performance that is equivalent to an ARAR required standard through use of another method or approach. 5. With respect to a state requirement, the state has not demonstrated consistent application of the requirement in similar circumstances. 6. Where the remedy is to be fund-financed (as opposed to private-party financed), meeting the ARAR standard would not provide balance between the need for cleanup at the site in question considering the amount of fund resources that must be used at other sites in need of cleanup.
Use and Management of Containers Tank Systems	40 CFR Part 264 Subparts I and J	Relevant and appropriate	Subpart I sets operating and performance standards for container storage of hazardous waste used for storage of liquids, soil, or other wastes as part of the remedial action. Subpart J outlines similar standards but applies to tanks rather than containers. The selected remedy complies with this ARAR.

Table 5
ARARs for the Ground Water Remedy

Standard or Criteria	Citation	Status	Discussion
Department of Transportation Requirements Governing the Transportation of Hazardous Materials	49 CFR Parts 107 and 171-179	Applicable to the Site if the hazardous wastes are identified and transported offsite for disposal.	Establishes the requirements for the transportation of hazardous materials as defined by the U. S. Department of Transportation. The selected remedy complies with this ARAR.
Certification of Wastewater Utilities Personnel	ADEQ Regulation 3	Applicable	Establishes licensing and certification by ADEQ for operators in responsible charge of wastewater treatment facilities. The selected remedy complies with this ARAR.
Natural Attenuation Guidance	Use of MNA at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (EPA 1999)	TBC	Guidance on the applicability, use, and evaluation of MNA. This guidance was considered in selection of the amended ground water remedy.

Cost Effectiveness

The estimated present worth cost of the selected remedy is $583,000. The selected remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following standard was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (NCP 300.430(f)(1)(ii) (D)). The overall effectiveness of the remedy is determined by evaluating three of the five balancing criteria used in the detailed analysis of the alternatives: (1) long-term effectiveness and permanence; (2) reduction in toxicity, mobility, and volume through treatment; and (3) short-term effectiveness. Overall effectiveness

was then compared to costs to determine cost-effectiveness. The selected remedy attains long-term effectiveness comparable to the current ground water remedial action and the other alternatives since those other alternatives will not result in improved protectiveness or restoring the ground water within a reasonable time frame; achieves a comparable reduction in toxicity, mobility, and volume as the current remedy or the other alternatives, and is equally effective in the short-term when compared with the current remedy and the other alternatives since all require institutional controls for short-term protectiveness. The cost of the selected remedy is less than the other alternatives considered. The comparable effectiveness of the selected remedial alternative, and its lower cost, was determined to represent a reasonable value for the cost.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The Amended Remedy recognizes that the principal threats posed by the soils have been addressed by the completed source control remedial action. The prior actions prevent or significantly reduce further leaching into the ground water. In accordance with Section 121(d)(4)(C) of CERCLA and Section 300.430(f)(l)(ii)(C)(3), a TI waiver is being implemented at this Site for the ground water cleanup goals. A TI waiver is appropriate for this Site because the ground water extraction system will not be able to effectively address the free-phase NAPL present in the aquifer. Unless free-phase NAPL is removed from the aquifer, a ground water extraction remedy will not be able to attain the remedial goals in a time frame that would be considered reasonable for this Site. Therefore, EPA has determined that the Amended Remedy for ground water meets the statutory requirement to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. The Site's natural capacity to limit further migration rather than active extraction and treatment is the most practicable and cost efficient treatment method available. While a treatment technology is not employed at the Site, the Site's natural capacity to contain ground water contamination is an alternative means of achieving the remedial objectives compared to the other alternatives. The EPA has determined that the selected ground water remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element and considering state and community acceptance.

Preference for Treatment as a Principal Element

Prior treatment of contaminated soils by incineration has addressed the principal threats posed by the Site through the use of treatment technologies. By utilizing treatment as a significant portion

of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied. However, the presence of NAPLs in the aquifer represents a principal threat waste at the Site that has not been completely addressed through treatment. The prior extraction and treatment system has recovered approximately 12,000,000 gallons of contaminated ground water. Based on the field data collected for this Site, a TI waiver is appropriate for the remaining ground water contamination because the ground water extraction system will not be able to effectively address the free-phase NAPL present in the aquifer. Reliance on the natural capacity of the aquifer and in-situ biodegradation to limit further spreading of the NAPL and the associated dissolved plume instead of active recovery and treatment for the ground water is more cost effective because the same degree of protectiveness to human health and the environment is achieved at a much lower cost.

Five-Year Review Requirements

Section 121(c) of CERCLA and NCP §300.430(f)(5)(iii)(C) provide the statutory and legal bases for conducting five-year reviews. Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site in the ground water above levels that allow for unlimited use and unrestricted exposure, a statutory review pursuant to Section 121(c) of CERCLA, 42 U.S.C. 9621(c) will be conducted at least every five years after the last review for this Site, which was completed on March 5, 2001, to insure that the remedy continues to provide adequate protection of human health and the environment.

XV. DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Old Midland Products Site was released for public comment on June 14, 2005. The Proposed Plan identified Alternative 2, monitored natural attenuation and institutional controls with a TI Waiver, as the preferred alternative for the contaminated ground water. Based upon its review of the written and verbal comments submitted during the public comment period, the EPA determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

One change that was made to the remedy identified in the Proposed Plan is the preliminary extent of the TI Zone. In the Proposed Plan, the downgradient extent of the TI Zone was shown to be approximately 300-feet downgradient from the source area, with the final extent to be determined during the Remedial Design. In this Amended Rod, the downgradient extent is shown to be larger, out to approximately 500-feet downgradient from the source area, but with the final extent still to be determined during the Remedial Design. This adjustment was made as a result of revisions that were made to the Bioscreen Model. In summary, the model revision resulted in a more conservative estimate by extending the model time frame to 100 years from the 50 year

period used initially. At 100 years, no further plume advance was predicted since equilibrium conditions (meaning no further ground water plume movement) had been reached. The larger preliminary TI Zone described in this Amended ROD is still on-site, and still south of the railroad tracks crossing the Site. Finally, the exact location of the sentinel monitoring wells, which define the actual location of the TI Zone, will still be determined during the Remedial Design.

PART 3: RESPONSIVENESS SUMMARY

Stakeholder Comments and Lead Agency Responses

The EPA has prepared this Responsiveness Summary for the Site, as part of the process for making a final remedy selection. This Responsiveness Summary documents, for the Administrative Record, public comments and issues raised during the public comment period on the EPA's recommendations presented in the Proposed Plan, and provides the EPA's responses to those comments. The EPA's actual decisions for the Site are detailed in the Amended ROD. Pursuant to Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9617, the EPA has considered all comments received during the public comment period in making the final decision contained in the Amended ROD for the Site.

Overview of Public Comment Period

The EPA issued its Amended Proposed Plan detailing remedial action recommendations for public review and comment on June 14, 2005. These and other Site documents can be found in the Administrative Record file and the information repositories at the locations described above in Section IV. A public comment period was held from June 14, 2005 to July 13, 2005.

The EPA and the ADEQ conducted a public meeting on June 30, 2005, to discuss the Proposed Plan and receive comments from the community. The public meeting was held at the Ola High School Library, 307 West Hill Street, Ola, Arkansas. A transcript of the public meeting is included in the Administrative Record.

This Responsiveness Summary summarizes comments submitted during the public comment period and presents the EPA's written response to each issue, in satisfaction of community relations requirements of the NCP. The EPA's responses to comments received during the public meeting are provided below and in some cases include subsequent expanded responses to those comments as appropriate.

Summary of Public Comments and EPA Responses

Comment: The area in the middle of the Site is going to have six new wells on it. How often are they going to be monitored?

EPA Response: The monitoring frequency will be decided during the Remedial Design phase, which will follow issuance of this Amended ROD. However, it is expected that the wells will be monitored semi-annually.

Comment: Will the existing wells that are already at the Site be removed? Will they be monitored or are they just going to be shut down?

EPA Response: No. The existing monitoring wells will remain and will be used as additional ground water monitoring locations. They will be monitored at a frequency to be determined during the Remedial Design. Using the wells to monitor ground water is necessary to determine the extent, if any, of plume migration and how well the "monitored natural attenuation" remedy is performing.

Comment: I wanted to keep track of what's going on, because I know when you try to sell the property, they do always go back and want a copy of all this stuff where we can say that it's not running over onto our property, our ponds, our wells or anything that we have.

EPA Response: Actual details of the planned actions will be developed in the Remedial Design. A copy of this as well as future updates and reports will be available in the local repository which is located at:

Two Rivers School District
510 West Main Street
Plainview, Arkansas 72857
Attn: Mr. Earl Jamison, Superintendent
(479) 272-3113

Comment: What part of the land surface at the Site would be released for use? Is there a part of it that the Two Rivers School District, who is the property owner, could use?

EPA Response: The school district and ADEQ were discussing an approach for reuse of the Site in the past. At Superfund sites, EPA and ADEQ wish to encourage reuse and/or redevelopment so that properties can be beneficially utilized while maintaining the protectiveness of the remedial actions. That opportunity is still available. ADEQ, the lead agency for this Site, is available to work with the Two Rivers School District should they wish to develop a plan for a specific parcel of land. The only additions to the Site remedial action facilities are the six new wells, generally located in the area adjacent and north of the existing monitoring and recovery wells. No changes or new facilities are planned for the eastern portion of the Site.

Technical and Legal Issues

No technical or legal issues were raised by the stakeholders during the public comment period. Institutional controls will be a necessary component of the long-term Site management to ensure future property development is consistent with the source control remedial action and the restricted ground water usage.

Figure 1
Old Midland Superfund Site Location, Yell County, Arkansas

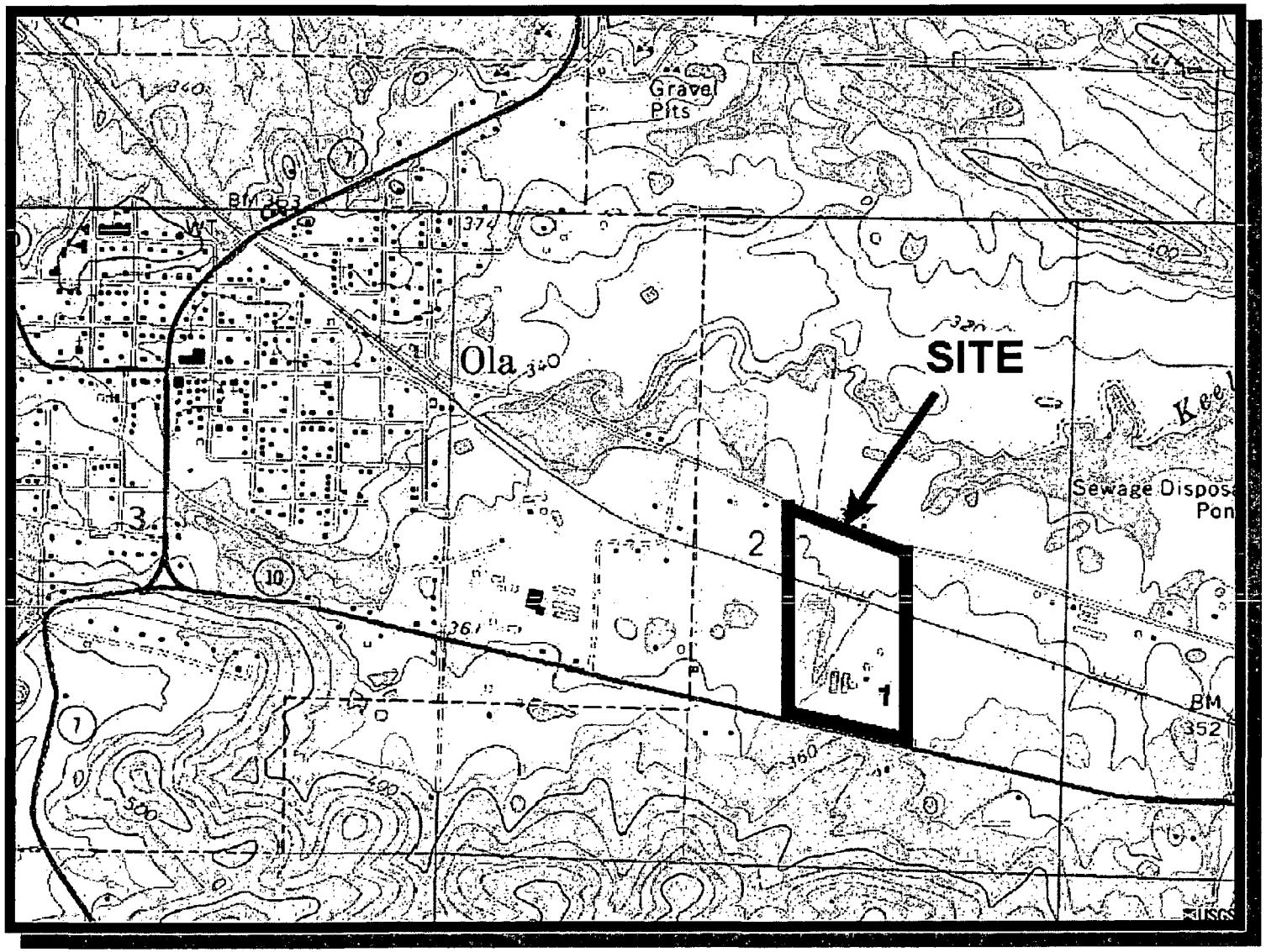
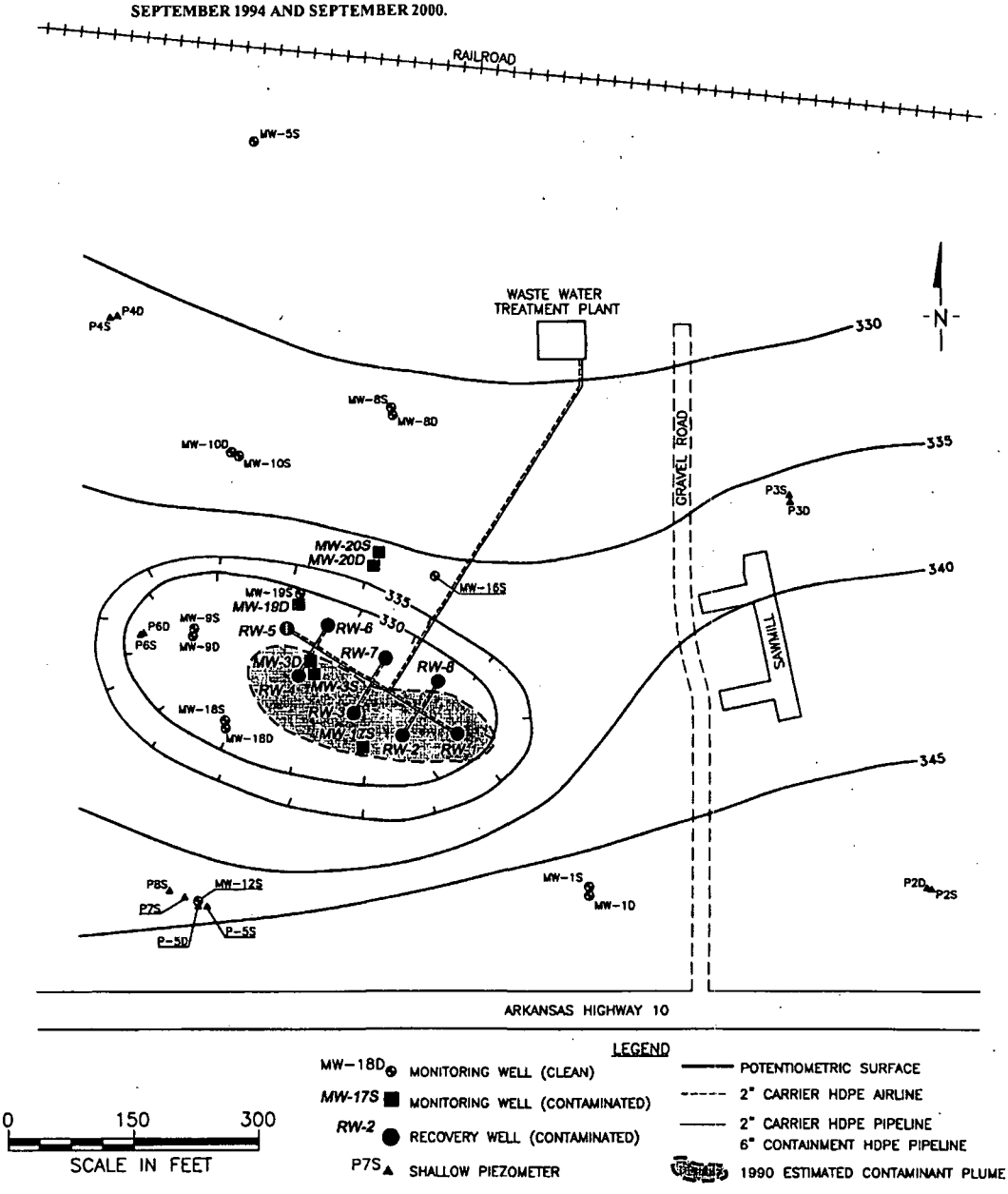


Figure 2
Old Midland Superfund Site

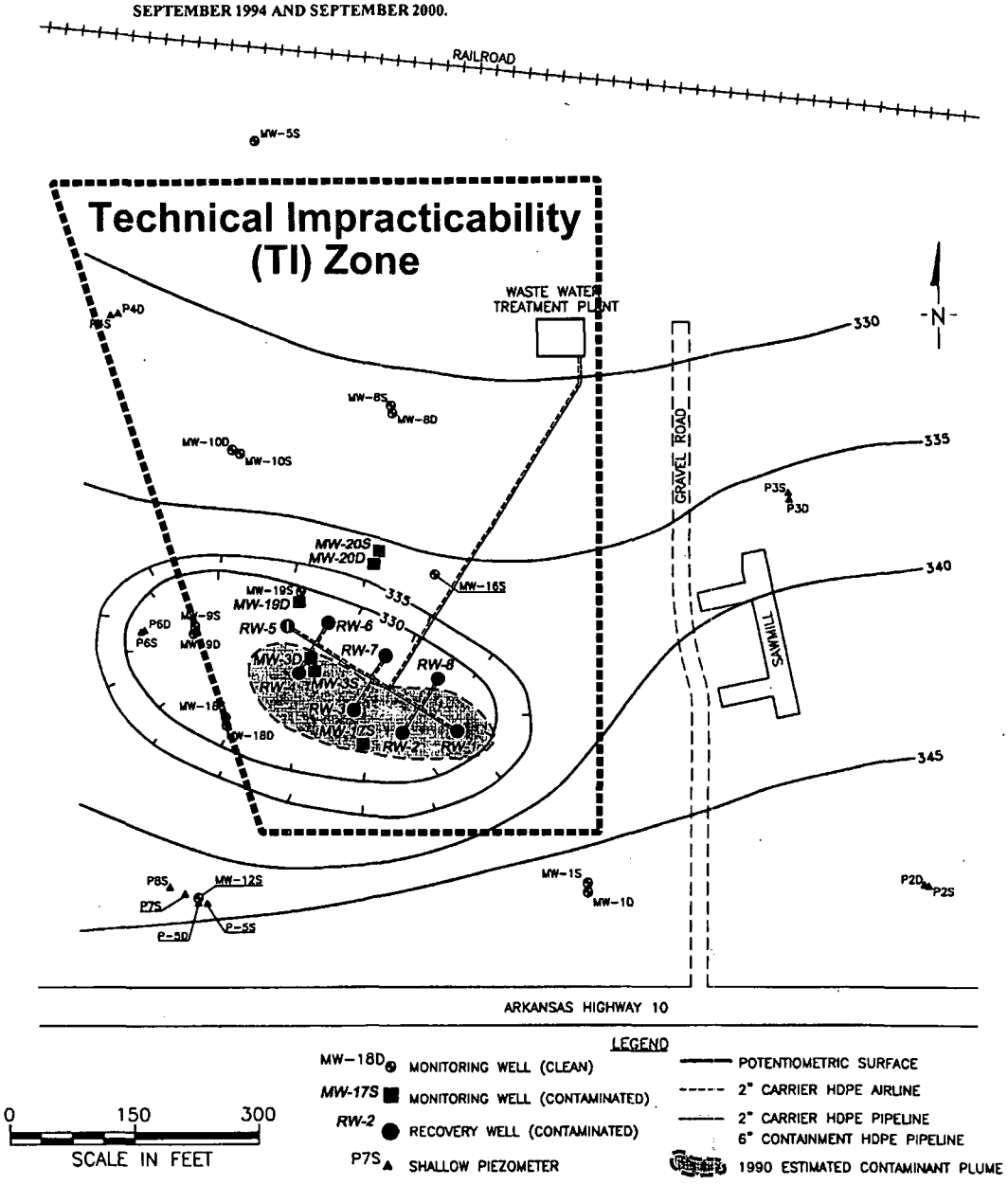
SITE LAYOUT SHOWING THE POTENTIOMETRIC SURFACE FROM SEPTEMBER 2000, 1990 ESTIMATED CONTAMINANT PLUME, AND WELLS WITH AND WITHOUT CONTAMINATION BETWEEN SEPTEMBER 1994 AND SEPTEMBER 2000.



NOTE: Potentiometric surface taken from the September 2000 O&M Report, IT Corporation. 1990 estimated contaminant plume taken from the Old Midland Products Remedial Action, Vol. III, IT Corporation, 1990. Well sampling data taken from September 1994 through September 2000 O&M Reports, IT Corporation.

Figure 3
Old Midland Products Site

SITE LAYOUT SHOWING THE POTENTIOMETRIC SURFACE FROM SEPTEMBER 2000, 1990 ESTIMATED CONTAMINANT PLUME, AND WELLS WITH AND WITHOUT CONTAMINATION BETWEEN SEPTEMBER 1994 AND SEPTEMBER 2000.



NOTE: Potentiometric surface taken from the September 2000 O&M Report, IT Corporation. 1990 estimated contaminant plume taken from the Old Midland Products Remedial Action, Vol. III, IT Corporation, 1990. Well sampling data taken from September 1994 through September 2000 O&M Reports, IT Corporation.

PART 4: REFERENCE LIST

Arkansas; 1987; "Public Hearing, Ola Community Center, Ola, Arkansas"; December

Arkansas Department of Pollution Control And Ecology (ADPCE);1987a; "Remedial Investigation Report, Old Midland Products Site, Ola, Arkansas, Volume 1 of 2"; October.

ADPCE; 1987b; "Remedial Investigation Report, Old Midland Products Site, Ola, Arkansas, Volume 2 of 2"; October.

ADPCE; 1987c; "Feasibility Study Report, Old Midland Products Site, Ola, Arkansas"; October.

ADPCE; 1996; "Remedial Action Report, Construction Phase, Old Midland Products Site, Ola, Arkansas"; May.

Arkansas Department of Environmental Quality (ADEQ); 2005a; "Table 1: Summary of Groundwater Analytical Results, ADEQ, Former Old Midland Products Site, Ola, Arkansas"; August.

ADEQ; 2005b; "ADEQ, Former Old Midland Products Site, Monthly O&M Report # 46"; December.

Lee, R. W.; 2005; "Fate and Transport Potential for dissolved Pentachlorophenol and Naphthalene in a Shallow Aquifer at the Old Midland Products Superfund Site"; May.

U.S. Environmental Protection Agency (EPA); 1988a; "Summary of the Remedial Alternative Selection"; March.

EPA; 1988b; "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA"; October.

EPA; 1989; "CERCLA Compliance with State Requirements: CERCLA Compliance with Other Laws Manual"; Office of Solid Waste and Emergency Response (OSWER) Directive 9234 .2-05/FS.

EPA; 1990; "A Guide to Selecting Superfund Remedial Actions"; April.

EPA; 1991a; "ARARs Q's & A's: General Policy, RCRA, Clean Water Act, SDWA, Post-ROD Information, and Contingent Waivers"; OSWER Directive 9234 .2-01/FS-A.

EPA; 1991b; "A Guide to Principal Threat and Low Level Wastes"; November.

EPA; 1993; "Guidance for Evaluating the Technical Impracticability of Ground Water Restoration: Interim Final"; OSWER Directive 9234.2-25.

EPA; 1995; "Land Use in the CERCLA Remedy Selection Process"; May.

EPA; 1999; OSWER Directive 9200.4-17P, "Use of MNA at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites".

EPA; 2000a; "Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups"; September.

EPA; 2000b; "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study"; July.

EPA; 2001a; "Five Year Review of the Old Midland Products Site"; March.

EPA; 2001b; "Remediation System Evaluation, Midland Products Superfund Site, Yell County, Arkansas"; June.

EPA; 2003; "Draft Institutional Controls: A Guide to Implementing, Monitoring, and Enforcing Institutional Controls at Superfund, Brownfields, Federal Facility, UST and RCRA Corrective Action Cleanups"; February.

EPA; 2004: " Strategy to Ensure Institutional Control Implementation at Superfund Sites"; September.

EPA; 2005a; "Community Involvement Plan for the Midland Products Superfund Site"; June.

EPA; 2005b; "Amended Proposed Plan for the Old Midland Products Site"; June.

EPA; 2005c; "EPA Region 6 Human Health Medium-Specific Screening Levels"; November.

APPENDIX A

ADEQ Concurrence Letter

ADEQ

A R K A N S A S
Department of Environmental Quality

RECEIVED
2006 MAY -4 PM 5:20
AR/OK/TX BRANCH

April 19, 2006

Mr. Sam Coleman, Director
Superfund Division (6SF)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202

RE: Amended Record of Decision
Old Midland Products Superfund Site, Ola, Arkansas

Dear Mr. Coleman:

The Arkansas Department of Environmental Quality (ADEQ) has reviewed and concurs with the Amended Record of Decision (ROD) for the Old Midland Products Superfund Site in Ola, Arkansas.

If you have any questions, please contact Mr. Clark McWilliams at (501) 682-0850.

Sincerely,

Marcus C. Devine
Director

cc: Gary Miller, EPA
John Hepola, EPA
Gus Chavarria, EPA
Tammie Hynum
Tom Ezell
Jerry Neill
Clark McWilliams
Kin Siew

APPENDIX B

Administrative Record Index

Prepared for

United States Environmental Protection Agency

Region 6

AMENDED RECORD OF DECISION ADMINISTRATIVE RECORD INDEX

for

OLD MIDLAND PRODUCTS INCORPORATED SUPERFUND SITE

EPA ID No. ARD980745665

GS09K99BHD0010
Task Order No. T0703BG1026

Gary Miller
Remedial Project Manager
U.S. EPA Region 6

Prepared by

Science Applications International Corporation
555 Republic Drive, Suite 300
Plano, TX 75074

June 29, 2006

PREAMBLE

The purpose of this document is to provide the public with an index to the Administrative Record File (AR File) for the U.S. Environmental Protection Agency's (EPA) amended selected remedial action to respond to conditions at the Old Midland Products Superfund site (the "Site"). EPA's action is authorized by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. Section 9601 et seq.

Section 113 (j)(1) of CERCLA, 42 U.S.C. Section 9613 (j)(1), provides that judicial review of the adequacy of a CERCLA response action shall be limited to the Administrative Record (AR). Section 113 (k)(1) of CERCLA, 42 U.S.C. Section 9613 (k)(1), requires the EPA to establish an AR upon which it shall base the selection of its remedial actions. As the EPA decides what to do at the site of a release of hazardous substances, it compiles documents concerning the site and it's decision into an "AR File." This means that documents may be added to the AR File from time to time. After the EPA Regional Administrator or the Administrator's delegate signs the Action Memorandum or the Record of Decision memorializing the selection of the action, the documents which form the basis for the selection of the response action are then known as the Administrative Record "AR."

Section 113(k)(1) of CERCLA requires the EPA to make the AR File available to the public at or near the site of the response action. Accordingly, the EPA has established a repository where the AR File may be reviewed near the Site at:

Two Rivers School District
Office of the Superintendent
510 West Main Street
Plainview, Arkansas 72857
(479) 272-3113

The public also may review the AR File at the EPA Region 6 office in Dallas, Texas, by contacting the Remedial Project Manager at the address listed below. The AR File is available for public review during normal business hours. The AR File is treated as a non-circulating reference document. Any document in the AR File may be photocopied according to the procedures used at the repository or at the EPA Region 6 office. This index and the AR File were compiled in accordance with the EPA's Final Guidance on Administrative Records for Selecting CERCLA Response Actions, Office of Solid Waste and Emergency Response (OSWER) Directive Number 9833.3A1 (December 3, 1990).

Documents listed as bibliographic sources for other documents in the AR File might not be listed separately in the index. Where a document is listed in the index but not located among the documents which the EPA has made available in the repository, the EPA may, upon request, include the document in the repository or make the document available for review at an alternate location. This applies to documents such as verified sampling data, chain of custody forms, guidance and policy documents, as well as voluminous site-specific reports. It does not apply to documents in EPA's confidential file. (Copies of guidance documents also can be obtained by calling the RCRA/Superfund/Title 3 Hotline at (800) 424-9346.)

These requests should be addressed to:

Gary Miller
Remedial Project Manager
U.S. EPA Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 665-8318

The EPA response selection guidance compendium index has not been updated since March 22, 1991 (see CERCLA Administrative Records: First Update of the Compendium of Documents Used for Selecting CERCLA Response Actions [March 22, 1991]); accordingly, it is not included here. Moreover, based on resource considerations, the Region 6 Superfund Division Director has decided not to maintain a Region 6 compendium of response selection guidance. Instead, consistent with 40 CFR Section 300.805(a)(2) and 300.810(a)(2) and OSWER Directive No. 9833.3A-1 (page 37), the AR File Index includes listings of all guidance documents which may form a basis for the selection of the response action in question.

The documents included in the AR File index are arranged predominantly in chronological order. The AR File index helps locate and retrieve documents in the file. It also provides an overview of the response action history. The index includes the following information for each document:

- **Doc ID**- The document identifier number.
- **Date** - The date the document was published and/or released. “01/01/2525" means no date was recorded.
- **Pages** - Total number of printed pages in the document, including attachments.
- **Title** - Descriptive heading of the document.
- **Document Type** - General identification, (e.g. correspondence, Remedial Investigation Report, Record of Decision.)
- **Author** - Name of originator, and the name of the organization that the author is affiliated with. If either the originator name or the organization name is not identified, then the field is captured with the letters “N/A”.
- **Addressee**- Name and affiliation of the addressee. If either the originator name or the organization name is not identified, then the field is captured with the letters “N/A”.