RECORD OF DECISION

RIVERFRONT SITE
OPERABLE UNIT 3: OLD CITY DUMP SITE

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Prepared by
U.S. Environmental Protection Agency
Region 7
Kansas City, Kansas

RECORD OF DECISION
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PART I THE DECLARATION

1.1 Site Name and Location

Riverfront Site
Operable Unit 3 (OU3): Old City Dump
Highway 100
New Haven, Missouri 63068

1.2 Statement of Basis and Purpose

This decision document presents the selected remedy for the Riverfront Superfund Site, OU3, Old City Dump, in New Haven, Missouri, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record file for the Old City Dump Site.

The state of Missouri, acting through the Missouri Department of Natural Resources (MDNR), concurs with the selected remedy.

1.3 Assessment of Site

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

1.4 Description of Selected Remedy

The remedial action for OU3 addresses the tetrachloroethene (PCE) contamination at the Site. Institutional controls and monitoring will be implemented to prevent exposure to groundwater contamination. There are no source materials or dense non-aqueous phase liquids (DNAPLs) in the groundwater constituting a principal threat at OU3. Only trace concentrations of PCE were found in the groundwater, surface water, and vegetation samples at this OU. To provide a level of protection to local residents who rely on private wells for their water supply, the following key components of the Site remedy will be instituted:

- Monitoring the groundwater through periodic sampling of four monitoring wells.

- Monitoring one surface water seep (M).

- Sampling parameters to include volatile organic compounds (VOCs), inorganic compounds, and field geochemical parameters.

- Monitoring nearby domestic wells on a recurring basis, particularly immediately prior to the five-year review.

- Institutional controls will involve a layering of proprietary and governmental controls on the Site to prohibit or limit certain land uses, provide notice of the contamination to future Site owners and users, and educate the public on potential health hazards based on contaminants at the Site.

The scope and role of this OU is very minimal compared to the other OUs at the Riverfront Site. PCE contamination at the Site is minimal. Tree cores indicated only trace PCE in 3 of 22 trees sampled, monitoring wells indicated contamination below levels that would present any human health risks, and seep sampling indicated only one seep with very low levels of PCE. OU3 is not a source of the PCE contamination found in the public supply wells. This remedial action will be a final action for this OU.

1.5 Statutory Determination

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action and is cost-effective. The remedy does not meet the statutory preference for treatment. The rationale for choosing a remedy that does not include treatment is based on the fact that no source materials constituting principal threats exist onsite, hence treatment is not within the scope of this action.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unrestricted use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

1.6 ROD Data Certification Checklist

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

- Chemicals of concern and their respective concentrations - Page

- Baseline risk represented by the chemicals of concern - Page

- Cleanup levels established for chemicals of concern and the basis for these levels - Page

- How source materials constituting principal threats are addressed - Page

- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD - Page

- Potential land and groundwater use that will be available at the Site as a result of the Selected Remedy - Page

- Estimated capital, annual operation and maintenance, and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected - Page

- Key factor(s) that led to selecting the remedy - Page

1.7 Authorizing Signature

/s/ Andrea Jirka, for	9/30/03
Cecilia Tapia, Acting Director	Date
Superfund Division	

PART II THE DECISION SUMMARY

1.1 Site Name, Location and Description

The Riverfront Site, Operable Unit 3 (OU 3), the Old City Dump, is located on the north side of Highway 100 in the southeastern part of New Haven, Missouri 63068. New Haven (population 1,600) is located along the southern bank of the Missouri River in Franklin County, Missouri, about 50 miles west of St. Louis, Missouri (Figure 1-2). The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number is MOD981720246. The lead agency for the Riverfront Site is the U.S. Environmental Protection Agency (EPA). The Missouri Department of Natural Resources (MDNR) is the support agency. The expected source of cleanup monies is the Superfund trust fund for this landfill site.

The surface of the dump is about 1.4 acres with a maximum width of about 350 feet (east-west). It is located in an area of mixed industrial use, residential, and a natural forested land surface. The Site was used for the disposal of household, industrial, and demolition wastes. Originally, it was a tree-covered ravine, but was filled with debris during a period from the mid-1950s to about 1974. It is currently used by the city of New Haven for the disposal of yard waste and debris from utility excavations and road maintenance.

2.0 Site History and Enforcement Activities

2.1 Site History

In 1986, the volatile organic compound (VOC) tetrachloroethene (PCE) was detected in two public-supply groundwater wells (Wells W1 and W2) in the northern part of New Haven. Following the discovery of contamination, two new public-supply wells were installed in the southern part of the city, and several investigations were conducted by the MDNR and EPA. The Site became known as the Riverfront Site; and in December 2000, the PCE contamination prompted the listing of the Riverfront Site on the National Priorities List (NPL). (The NPL is a list compiled by EPA pursuant to CERCLA of uncontrolled hazardous substance releases in the United States that are priorities for long-term remedial evaluation and response.)

The Riverfront Site encompasses six OUs in and around the city of New Haven. The OUs have been designated by EPA based on the results of prior investigations and information received through interviews with local citizens regarding waste generation and disposal. These areas include facilities which are possible sources of the PCE contamination. These include an abandoned manufacturing building in downtown (OU1); a metal fabrication plant in south New Haven (OU2); the Old City Dump (OU3), a yard waste/gravel storage area and compost site; an undeveloped area south of the contaminated city well #2 (OU4); an abandoned hat factory (OU5); and an area containing contaminated domestic wells south of the city (OU6).

The Old City Dump Site was used for the disposal of household, industrial, and demolition wastes during the period from the mid-1950s to 1974. Industrial wastes from the manufacturing of tents were placed in the Old City Dump. These wastes included unused dyes, flammable solvents, chlorinated solvents, waterproofing compounds, waste fabrics and other assorted wastes. Liquid contents of drums were routinely burned onsite. Unrestricted use of the Site continued until 1974. After 1974, only the city of New Haven used the Old City Dump. It was used for the disposal of demolition debris from utility excavations and road maintenance and for the disposal of yard waste. Currently, the area is used as a yard waste/gravel storage area and compost site.

2.2 Previous Investigations and Enforcement Activities

A Preliminary Assessment (PA) was conducted by MDNR on July 15, 1987. A Site Investigation (SI) was completed by MDNR on November 23, 1988. An Expanded Site Investigation (ESI) was completed in January 1994 under the Alternative Remedial Contracting Strategy (ARCS). An ESI/Remedial Investigation (RI) was completed by the U.S. Geological Survey (USGS) on January 17, 2001.

The EPA began a RI in June 2000 and focused this effort at OU1, the Front Street Site, and OU3, the Old City Dump Site. A Feasibility Study (FS) of these two areas began in the summer of 2002. There have been no previous response actions at the Old City Dump Site. Information gathering by EPA has not revealed a Potentially Responsible Party (PRP), other than the city of New Haven.

3.0 Community Participation

Public participation activities prior to the issuance of this decision document included several community meetings, distribution of fact sheets, publication of notices, assistance in the formation of a Community Advisory Group (CAG), development of a Riverfront website for public use, attendance at city council meetings, and participation in discussions within the community regarding future use of the land and groundwater. Copies of all project documents are available in the Administrative Record file in Region 7 and at the New Haven Scenic Regional Library. The notice of the availability of these documents was published in the New Haven Leader on July 23, 2003, and an article describing the remedy components was published on July 30, 2003. The public meeting was held on July 29, 2003. The public comment period began on July 15, 2003, and concluded on August 14, 2003. Efforts to solicit views on the reasonably anticipated future land use included discussions at the public meeting and with city officials.

4.0 Scope and Role of Operable Unit or Response Action

This action, referred to as the Old City Dump Site (OU3), will be the final response action for this OU. Other actions will be implemented to address the other OUs at the Riverfront Site. This action, and the future actions at the other OUs, will be conducted under remedial authorities.

The Remedial Action Objective (RAO) for OU3 is to minimize contact with contaminated groundwater and surface water. Institutional controls consisting of proprietary and governmental controls, and public education will prevent contact with the minimally contaminated seeps and surface water and maintain the Site's current land use (which is as a yard waste/gravel storage area and compost site). In addition, sampling of the seep and nearby monitoring and residential wells will provide EPA and MDNR the means to monitor contaminant migration from this Site. The current sampling data indicate that the contaminants in OU3 are not migrating at levels or rates that endanger human health or the environment, and the materials (demolition debris and yard waste) added to the landfill since 1974 are so heavily compacted they are acting as a cap to minimize infiltration of rainwater and runoff. Therefore, no source control actions will be implemented in this action, and no source control actions are contemplated in the future. This OU is not contributing to the PCE contamination of the public-supply wells. All sources of information, including prior investigations, personal interviews, responses to information request letters, and analytical results from sampling have been considered.

5.0 Site Characteristics

5.1 Conceptual Site Model

The conceptual site model (CSM), presented in Figure 5-1, is based on the following exposure pathways: 1) ingestion, dermal contact and inhalation of groundwater contaminants, and 2) ingestion and dermal contact with surface water. The receptors include future offsite residents and future onsite workers. The assumptions applied to these pathways include: 1) incidental contact with surface water by a future worker who could use it as an untreated drinking water source; and 2) although the deeper drinking water aquifer at OU3 has not been impacted by contamination above drinking water standards, the potential exists that contamination could migrate into the deeper aquifer, adversely impacting nearby domestic wells. There is minimal ecological exposure at OU3. The exposure pathways illustrated in the CSM are discussed in Section 7.1.2.

5.2 Overview of OU3

The Old City Dump is located just north of State Highway 100, in the southeastern part of New Haven (Figure 1-3). No roads or buildings are present on the Site. The entrance to the Old City Dump is immediately off State Highway 100. Although the Old City Dump is closed to the public, the city of New Haven uses the Site for the disposal of yard wastes and demolition debris. The Old City Dump is situated at the upper end of a steep ravine. Wastes were pushed into the ravine until the entire upper end of the ravine was filled. The surface of the Old City Dump now is about eight feet below the level of State Highway 100. The Old City Dump's surface area is about 1.4 acres and is covered by demolition debris (concrete rubble, old asphalt, gravel, and dirt).

The north face is steep (about a 45 percent slope) and about 20-35 feet above the original land surface. The fill height gradually decreases away from the middle of the north face and along the west and east sides. The Old City Dump surface blends into the natural topography along the southwestern part of the Site, but the east side remains about 5-10 feet above the natural land surface. The area immediately north and west of the dump is covered by dense woods composed of a mixture of deciduous trees.

There are ephemeral (intermittent) surface water seeps from the faces of the Old City Dump. There are no areas of archaeological or historical importance at OU3.

5.3 Sampling Strategy

Media investigated at OU3 include groundwater, surface water seeps, streams, vegetation, and nearby domestic wells. The potential source of PCE contamination at OU3 is from wastes, especially liquid wastes, placed within the dump. Paint wastes and dozens of drums were found at the dump during an inspection in September 1989 by the MDNR. A composite soil sample (0-7 feet deep) from immediately downslope of the dump had an organic solvent odor and contained PCE at 150 micrograms per kilograms (ug/kg). The location of the soil sample is unknown, but during a reconnaissance of the Site in 1999, stained soils were noted in the vicinity of Seep H. (Figure 5-2.) Because the dump is more than one mile southeast of the public supply wells W1 and W2, the MDNR did not consider the dump a likely source of the PCE contamination, and no further investigations were done by MDNR at the Site. The dump was also not considered a potential source of PCE in public supply wells W1 and W2 in the ESI 1994.

5.4 Known and Suspected Sources of Contamination

As discussed above, the Old City Dump Site was an unrestricted dump for the disposal of household, industrial, and demolition wastes during the period from the mid-1950s to 1974. Industrial wastes from the manufacturing of tents were also purportedly placed in the Old City Dump. These wastes included unused dyes, flammable solvents, chlorinated solvents, waterproofing compounds, waste fabrics and other assorted wastes. Liquid contents of drums were routinely burned onsite. Unrestricted use of the Site continued until 1974. After 1974, only the city of New Haven used the Old City Dump. It was used for the disposal of demolition debris from utility excavations and road maintenance and for the disposal of yard waste. Currently, the area is used as a yard waste/gravel storage area and compost site. It appears that the hazardous substances found in the Old City Dump were placed there while disposal at the site was unrestricted. Definitive information pertaining to who generated the hazardous substances disposed of at the site, or who transported these wastes to the site, is unavailable.

5.5 Types of Contamination and Affected Media

During the RI, additional samples were collected from trees, seeps, and streams in the vicinity of

the dump. Water samples were taken from the monitoring well and domestic wells. Tree-core samples were collected from 22 trees along the flanks of the Old City Dump and analyzed for PCE and other VOCs. Tree-coring was conducted because the amount of PCE detected in tree-cores has been found to mimic the amount of PCE contained in the shallow groundwater. Most of the sampled trees were at the toe of the slopes or growing through fill material along the slopes of the Old City Dump. Trace concentrations of PCE (0.23 to 1.01 ug/kg) were detected in 3 of the 22 trees sampled. None of the samples from the domestic wells or springs contained detectable concentrations of PCE. Only trace amounts of PCE were detected in a monitoring well, one stream sample, and one seep sample.

There are four domestic wells within 2,000 feet of the Old City Dump (Figure 1-3). None of the wells are downgradient (northeast) of the dump. The nearest domestic well downgradient is about one mile away. All domestic wells in the vicinity of the dump have been sampled for a variety of contaminants, none of which have been found in the domestic wells.

5.6 Location of Contamination and Potential Routes of Migration

5.6.1. Soil Contamination

The only soil sample collected by MDNR at OU3 was from the north side of the dump. It was a composite soil sample (0-7 feet deep) collected from a hand-augered borehole. The surface soil was described as having a chemical odor and was sampled for VOCs, RCRA metals, and flashpoint. The sample contained Hg (4 ug/kg), 2-butanone (170 ug/kg), and PCE (150 ug/kg). The compound 2-butanone, also knows as methylethyl ketone (MEK) was used in large quantities at the fabric plant and was detected in small concentrations (66 ug/kg) in soil samples from the farm dump site south of OU3. Because only small concentrations of PCE were detected at OU3 and at the farm dump site and because former employees recalled no PCE used at the fabric plant, no further soil sampling was conducted.

Vegetation samples included tree-core samples from 22 trees along the flanks of the dump and analyzed for PCE and other VOCs using a portable Gas Chromatography (GC). Most of the trees were growing at the toe of the slopes or through fill along the slopes of the dump. Trace concentrations of PCE (0.23 to 1.01 ug/kg) were detected in three trees on the north and northeast sides of the Site. The infrequent detections and small concentrations of PCE in the tree-core samples suggest minimal PCE contamination at OU3.

5.6.2 Groundwater Contamination

Monitoring well, BW-03, is located about 300 feet northwest of the Old City Dump. Groundwater flow at the dump is to the northeast, therefore, this well is not downgradient of the dump. However, this location was chosen to determine if there was PCE contamination between the Old City Dump and the contaminated public-supply wells. Small concentrations of PCE and larger concentrations of ethanol and ethyl acetate were detected in water samples from the well borehole at depths less than 100 feet. All concentrations were below levels that would present

any human health risks. The contaminants seen in BW-03 were detected in "perched" water that is moving along bedding planes and fractures in the bedrock above the water table. This is a common occurrence in limestone aquifers as infiltrating water works its way down to the water table. None of these compounds were detected at the water table. Well BW-03 is less than 250 feet from the Old City Dump, and it is not unusual to find that contaminants have migrated this short distance in the unsaturated zone. The fact that seeps and the creeks in the steep ravines north and east of the Old City Dump have no contaminants suggests that extensive lateral movement of contaminants from the Old City Dump is not occurring. The presence of ethanol and ethyl acetate at the Site is not surprising because these compounds are widely used for textile cleaning and are microbial decomposition products of methyl ethyl ketone, a solvent that was used extensively at the fabric plant and probably disposed of at the Old City Dump Site.

Two additional actions were taken at the time the Proposed Plan was being prepared. Three nested wells were installed downgradient (northeast of the dump), and sampling of domestic wells within one-half mile of the dump was conducted.

Initial data from the new well cluster northeast of the dump confirm the suspected direction of groundwater flow as being northeast. These wells were installed in the spring 2003. Sampling during drilling detected elevated specific conductance in shallow (less than 100 feet deep) groundwater samples suggesting landfill leachate impacts. This is important because the same samples, when analyzed in the field by the GC, did not contain detectable concentrations of PCE, other solvents, or BTEX compounds at the 0.1 micrograms per liter (ug/L) range. The high specific conductance in the shallow wells in this cluster indicates that the wells were placed in the proper location and depth to monitor leachate from the landfill, and also indicates that significant concentrations of PCE are not present in this leachate. The absence of contaminants in the four nearby domestic wells recently sampled around the Old City Dump (two east, one southwest, and one west) indicates that widespread groundwater contamination from the dump has not occurred.

Surface water samples collected from the streams in the vicinity of the Old City Dump Site contained a trace concentration of PCE (estimated at 0.02 ug/L) in 1 of the 12 samples. This sample was collected at the base of the bedrock exposure in the stream channel north of the Old City Dump.

Four seeps in the face of the Old City Dump were sampled. PCE was detected in one of these seeps at a low level, 0.11 ug/L. Tetrachloroethylene, cis-dichlorethylene, and toluene were also detected in low concentrations at the seeps. Elevated levels of antimony, boron, manganese, and nitrate are present in the seeps at concentrations which exceed federal or state regulatory standards. These four inorganic compounds are listed in Table 1. It is important to note that these compounds commonly leach from landfills and are not related to the PCE contamination at the Riverfront Site. In addition, the seeps emerge from the north side of the Old City Dump at the lowest elevation of the original land surface (an old creek channel). They appear from the toe of the fill and not from unconsolidated materials or bedrock beneath the Old City Dump. They

issue directly into an ephemeral stream branch. The seeps do provide an indication as to the nature of the leachate that is generated within the Old City Dump that may be moving vertically down into the bedrock. However, the "perched" water sampled in nearby monitoring well BW-03 encountered contaminants not detected in the leachate. Therefore, the seeps are not very representative of groundwater at the dump.

Overall, the infrequent and small concentrations of PCE detections suggest minimal PCE contamination at the Old City Dump Site. Although antimony, boron, manganese, nitrate, ethanol, and ethyl acetate have been found at the Old City Dump, they were only found at the seeps which are not considered a drinking water source. The levels detected do not require remediation, so no preliminary remediation goals (PRGs) have been set for these chemicals. The Old City Dump Site is not considered a source of PCE contamination in the closed public-supply wells, and nearby residences are not currently affected by the contaminants at the Old City Dump Site.

6.0 Current and Potential Future Land and Water Uses

6.1 Land Uses

The Old City Dump, OU3, is currently used as a yard waste/gravel storage area and compost site. The City of New Haven Public Works Department maintains the Site and its future use will remain the same. A gravel storage area located elsewhere in New Haven will be consolidated into OU3. The surface of the Site is currently a mixture of gravel, dirt, and occasional pieces of weathered asphalt and concrete. The area immediately north and west of the Old City Dump is covered by dense woods of deciduous trees. The land surface immediately north of the dump is rugged, consisting of steep, tree-covered slopes 5-15 feet high. On the east side of the dump, there is a gravel parking lot used for light industrial. As the city will remain the owner of OU3 and it will maintain the use, it is reasonable to expect the land use will remain and no development will occur.

6.2 Groundwater and Surface Water Uses

Currently there is no surface water or groundwater use on the Site. The contaminants seen in monitoring well BW-03 were detected in "perched" water that is moving along bedding planes and fractures in the bedrock above the water table. This is a common occurrence in limestone aquifers as infiltrating water works its way down to the water table. None of these compounds were detected at the water table. Well BW-03 is less than 250 feet from the Old City Dump, and it is not unusual to find that contaminants have migrated this short distance in the unsaturated zone. The fact that seeps and the creeks in the steep ravines north and east of the Site have no contaminants suggests that extensive lateral movement of contaminants is not occurring.

Several residences nearby use domestic wells as their water supply. Most domestic wells in the area target the Roubidoux Formation because it is the first unit that yields appreciable quantities of water for domestic use. Groundwater age dating in the New Haven area indicates that most water in the Roubidoux Formation (a permeable sand-rich unit about 300-400 feet deep in the area) is less than 40 years old. Given the less than 40-year age of water in the Roubidoux Formation and the large amount of water produced from it compared to shallower units, it is

likely that if the nearby domestic wells were to be impacted by the Old City Dump that impacts should already have been seen. A well advisory prohibiting any new domestic wells in the immediate vicinity of the Old City Dump and/or requiring extended casing depths on new wells in the area will provide additional protections. It is extremely unlikely that wells would be installed at the Old City Dump Site to supply water to residents or future workers.

Recently, nested wells were installed and all domestic wells within one-half mile of the Site were sampled. Data confirmed that the new nested well cluster confirms the suspected direction of groundwater flow. The high conductance of the wells indicates they are properly placed and intercepting typical landfill leachate. The absence of contaminants in the four nearby domestic wells indicates that widespread groundwater contamination form OU3 has not occurred and is unlikely in the future.

7.0 Summary of Site Risks

The Missouri Department of Health and Senior Services (MDHSS) completed a *Baseline Risk Assessment Operable Unit 3 (OU3) - The Old City Dump (HHRA)* in 2003. The HHRA estimates the human health risks that the Old City Dump could pose if no action were taken. It is one of the factors EPA considers in deciding whether to take actions at a site. The risk assessment also identifies the contaminants and exposure pathways that need to be addressed by the remedial action.

For OU3, the Old City Dump, EPA's decision to take action is based primarily on the presence of contamination in groundwater and seep water at levels that exceed drinking water standards. Residences near OU3 have domestic wells that could be affected in the future by contaminants migrating from the Old City Dump. A future occupational worker at the Site could also be affected. Additional field work was conducted at the Site after the RI/FS and the HHRS were completed. These data were used to further refine the conclusions in the HHRA and serve as the basis for determining appropriate action. Each of these reports may be found in the Administrative Record file. Currently (May 2003) there is no human exposure to the contaminants at the Site. This section of the ROD summarizes the Site risks at the Old City Dump.

7.1 Summary of Human Health Risk Assessment

This summary of health risk identifies the chemicals of concern (COCs), the chemicals of potential concern (COPCs), the exposure assessment, the toxicity assessment, and the risk characterization.

7.1.1 Identification of Chemicals of Concern

Based on the data collected during and after the RI/FS, no COCs were identified, instead COPCs drive the need for remedial action. These COPCs were identified from the data collected during the RI between 1999 and 2002 and further supplemental sampling in 2003. Sampling data were available from four monitoring wells, four seeps, twelve surface water samples, and from four nearby domestic water wells. These domestic wells are within one-half mile of OU3.

Initially, there was a concern that OU3 might be the source of the PCE contamination that closed City Wells 1 and 2. However, only trace amounts (well below the maximum contaminant level

[MCL]) of PCE were detected, and none of the other VOCs detected in the groundwater and seep water contributed significantly to the estimated risks. Because trace amounts of PCE were detected, PCE is still considered a COPC. Inorganic contaminants were detected in the groundwater and seep water. Of these, four contaminants contribute significantly to the estimated risks and are considered site COPCs. Tables 7-1 and 7-2 present the concentrations of COPCs which pose potential threats to human health in the groundwater and seep water. The tables also identify the exposure point concentrations (EPCs) for groundwater, the concentration ranges, the detection frequency, and how the EPCs were derived. Boron and nitrate are the most frequently detected COPCs. The entire lists of COPCs for the groundwater pathway are antimony, boron, manganese, nitrate, and PCE.

Table 7-1

OU3 - Old City Dump

Summary of Chemicals of Potential Concern and Medium-Specific Exposure Point Concentrations (Groundwater)

Scenario Timeframe Current

Medium: Groundwater

Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Concentration Detected Groundwater/ Seep Water * (mg/L)		Frequency of Detection Groundwater/ Seep Water *	Exposure Point Concentration (mg/L)	Statistical Measure
		Min	Max			
Ground-water OffSite	Antimony	ND/0.001	ND/0.082	0/10 6/6	0.082	MAX
	Boron	0.0081/0.166	0.468/2.71	9/10 7/7	2.71	MAX
	Manganese	0.0019/0.017	0.045/0.284	4/10 7/7	0.147 **	MAX
	Nitrate	0.00006/3.3	0.0058/10.0	8/10 7/7	9.99 **	MAX
	Tetrachloro-ethene (PCE)	0.00022/0.0001	0.0008/0.00011	2/18 2/10	0.0008	MAX

Key

mg/L - milligrams per liter

MAX - Maximum Concentration Detected

***The Baseline Risk Assessment combined the sampling results from two surface water seeps, one monitoring well location, and two domestic well locations into the Groundwater category.**

****Exposure Point Concentration used was the maximum detected result when the Baseline Risk Assessment was prepared (January 2003).**

This table includes all analytical data through August, 2003.

Table 7-2

OU3 - Old City Dump

Summary of Chemicals of Potential Concern and Medium-Specific Exposure Point Concentrations (Groundwater)

Scenario Timeframe: Future

Medium: Groundwater

Exposure Medium: Groundwater

Exposure Point	Chemical of Potential Concern	Concentration Detected Groundwater/ Seep Water * (mg/L)		Frequency of Detection Ground-water/ Seep Water *	Exposure Point Concentration (mg/L)	Statistical Measure
		Min	Max			
Ground-water OnSite and OffSite	Antimony	ND/0.001	ND/0.082	0/10 6/6	0.082	MAX
	Boron	0.0081/0.166	0.468/2.71	9/10 7/7	2.71	MAX
	Manganese	0.0019/0.017	0.045/0.284	4/10 7/7	0.147 **	MAX
	Nitrate	0.00006/3.3	0.0058/10.0	8/10 7/7	9.99 **	MAX
	Tetrachloro-ethene (PCE)	0.00022/0.0001	0.0008/0.00011	2/18 2/10	0.0008	MAX

Key

mg/L - milligrams per liter

MAX - Maximum Concentration Detected

*** The Baseline Risk Assessment combined the sampling results from two surface water seeps, one monitoring well location, and two domestic well locations into the Groundwater category.**

****Exposure Point Concentration used was the maximum detected result when the Baseline Risk Assessment was prepared (January 2003).**

This table includes all analytical data through August, 2003.

7.1.2 Exposure Assessment

Exposure refers to the potential contact of an individual (the receptor) with a contaminant. The exposure assessment evaluates the magnitude, frequency, duration, and route of potential exposure. This section describes which populations may be exposed, the exposure pathways, and how much exposure to the contaminants is present. A complete discussion of all the scenarios and exposure pathways is presented in the Baseline Risk Assessment, OU3 - The Old City Dump (HHRA).

As shown in the CSM (Figure 5-1), the following pathways for current and future receptors were considered. Reasonable exposure scenarios were developed based on how the Site is currently used and assumptions about its future use.

- Ingestion, dermal contact, and inhalation of groundwater contaminants for domestic usage (washing, bathing, laundry, etc.) for potential offsite residents and as a potable drinking water supply for potential offsite residents and onsite occupational workers (i.e., untreated water supply).

It is a highly conservative assumption that residents and workers could be exposed to contaminated groundwater from OU3. The contamination has not affected drinking water in the area around OU3. Most domestic wells do not use the aquifer that may be affected by OU3, but rather use a deeper one. OU3's current and future use makes it unlikely that a drinking water well would be installed onsite. Onsite workers would have to drink the water from the surface seeps at OU3 to be exposed, and these seeps are very difficult to access (at the bottom of a steep slope), have very low flows, and are ephemeral.

7.1.3 Toxicity Assessment

Tables 7-3 and 7-4 show the five COPCs that are the major risk contributors for OU3, the Old City Dump. Based on data from the EPA Integrated Risk Information System (IRIS) and other published data, one of the COPCs is classified as a probable human carcinogen (EPA weight of evidence B2), and four of the COPCs were either not classifiable as a human carcinogen (one) or have not been assessed (three). The carcinogenic oral/dermal and inhalation slope factors for the COPCs are presented in Table 7-3.

Table 7-3
OU3 - Old City Dump
Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Potential Concern	Oral Cancer Slope Factor (mg/kg)/day	Dermal Cancer Slope Factor (mg/kg)/day	Weight of Evidence/Cancer Guideline Description	Source	Date (MM/DD/YYYY)
PCE	0.0207	0.0207	C - B2	N	June 1997 and December 2001
Antimony	NA	NA			
Boron	NA	NA			
Manganese			D		
Nitrate	NA	NA			

Pathway: Inhalation

Chemical of Potential Concern	Inhalation Cancer Slope Factor	Units	Weight of Evidence/Cancer Guideline Description	Source	Date (MM/DD/YYYY)
PCE	0.0107	(mg/kg)/day	C - B2	N	June 1997 and December 2001
Antimony	NA	NA			
Boron	NA	NA			
Manganese			D		
Nitrate	NA	NA			

Key

NA - Not Assessed

A - Human Carcinogen

B1- Probable Human Carcinogen - Indicates that limited human data are available.

B2- Probable Human Carcinogen - Indicates sufficient evidence in animals and inadequate or no evidence in humans.

C - Possible Human Carcinogen.

D - Not Classifiable as a Human Carcinogen

E - Evidence of noncarcinogenicity

N - National Center for Environmental Assessment Risk Assessment Issue Papers

Table 7-4
OU3 - Old City Dump
Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value (mg/kg)/day	Dermal RfD Value (mg/kg)/ day	Primary Target Organ	Source	Date of RfD: Target Organ (MM/DD/ YYYY)
PCE		0.01	0.01	Hepatotoxicity	IRIS	September/ 2002
Antimony		0.0004	0.00006	Blood Chemistry	IRIS	September/ 2002
Boron		0.09	0.09	Reproductive	IRIS	September/ 2002
Manganese		0.14	0.0056	CNS	IRIS	September/ 2002
Nitrate		1.6	1.6	Circulatory System	IRIS	September/ 2002

Pathway: Inhalation

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value (mg/kg)/day	Primary Target Organ	Source	Date of RfD: Target Organ (MM/DD/ YYYY)
PCE		0.17	Kidney	N	June 1997 and December 2001
Antimony		NA			
Boron		NA			
Manganese		NA			
Nitrate		NA			

Key

NA - Not Applicable

IRIS - Integrated Risk Information System (USEPA, September, 2002)

N - National Center for Environmental Assessment Risk Assessment Issue Papers

In addition, the five COPCs have toxicity data which describe their potential for adverse non-carcinogenic health effects. The chronic toxicity data available for these COPCs have been used to develop oral and inhalation reference doses (RfDs). The RfD is a level that an individual may be exposed to that is not expected to cause any harmful effect. The oral and inhalation RfDs are presented in Table 7-4. For complete information on the toxicity of the COPCs, see the OU3 HHRA.

The following are used to determine toxicity values:

- The EPA's IRIS database for toxicity value (i.e., carcinogenic slope factors and noncarcinogenic reference doses (EPA, September 2002).
- National Center for Environmental Assessment (NCEA) - Superfund Technical Support Center Risk Assessment Issue Papers for Tetrachloroethene (June 1997 and December 2001).

7.1.4 Risk Characterization

This section presents the results of the evaluation of the potential risks to human health associated with exposure to contaminated groundwater at OU3, the Old City Dump.

For carcinogens, risks are generally expressed as the probability of an individual developing cancer over a lifetime as a result of exposure to site-related contaminants. This is described as "excess lifetime cancer risk" because it is in addition to the risk of cancer from other causes. Risk is expressed in scientific notation, that is, 1e-06 means the individual has a 1 in 1,000,000 chance of developing cancer from site-related exposure. The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three. The EPA's generally acceptable risk range for site-related exposures is 1e-04 to 1e-06 (in effect, one in ten thousand to one in a million). An excess lifetime cancer risk greater than 1 in 10,000 (1e-04) is the point at which action is generally required at a site.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level, over a specified time period (e.g., life-time), with a RfD, based on an average daily exposure or dose. This comparison represents a ratio of the dose to the RfD and is called the hazard quotient (HQ). If the HQ is less than one, this means the receptor (individual) is exposed to a dose *less than* the RfD and is not expected to experience any harmful effects. The Hazard Index (HI) is the sum of all the HQs. An HI<1 means that, based on the sum of HQs from different contaminants and exposure routes, toxic effects are unlikely.

Conclusions

Tables 7-5 and 7-6 present the risk characterization summaries for carcinogenic effects. Tables 7-7 and 7-8 present the risk characterization summaries for noncarcinogenic effects. The risk estimates presented in these tables are based on reasonable maximum exposure scenarios and considered various conservative assumptions about the frequency and duration of exposure to groundwater, as well as the toxicity of the COPCs. The results are summarized below for the groundwater exposure pathway.

Table 7-5

OU3 - Old City Dump

Risk Characterization Summary - Carcinogens

Scenario Timeframe: **Future**

Receptor Population: **Resident**

Receptor Age: **Adult**

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground-water	Ground-water	Domestic Supply	PCE	2.5e-07	1.52e-08	3.8e-08	3.0e-07
Groundwater Risk Total =							3.0e-07

Key

NA - Route of exposure is not applicable to this medium and receptor.

Table 7-6

OU3 - Old City Dump

Risk Characterization Summary - Carcinogens

Scenario Timeframe: **Future**

Receptor Population: **Worker**

Receptor Age: **Adult**

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground-water	Ground-water	Domestic Supply	PCE	5.8e-08	NA	NA	5.8e-08
Groundwater Risk Total =							5.8e-08

Key

NA - Route of exposure is not applicable to this medium and receptor.

Table 7-7

OU3 - Old City Dump

Risk Characterization Summary - Noncarcinogens

Scenario Timeframe: **Future**

Receptor Population: **Resident**

Receptor Age: **Adult**

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Primary Target Organ	Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground-water	Ground-water	Domestic Supply	Antimony	Blood Chemistry	7	NA	0.2	7.2
			Boron	Reproductive	1	NA	0.005	1.005
			Manganese	CNS	0.04	NA	0.004	0.044
			Nitrate	Circulatory System	0.2	NA	0.001	0.201
			PCE	Hepato toxicity	0.003	0.00002	0.0004	0.00342
Groundwater Hazard Index Total =								8.5 *
Receptor Hazard Index =								9

Key

NA - Route of exposure not applicable to this medium and COPC.

* - Other chemicals contributed 0.5 HI, but none were greater than 0.1 individually.

Table 7-8

OU3 - Old City Dump

Risk Characterization Summary - Noncarcinogens

Scenario Timeframe: **Future**

Receptor Population: **Worker**

Receptor Age: **Adult**

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Primary Target Organ	Carcinogenic Risk			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground-water	Ground-water	Domestic Supply	Antimony	Blood Chemistry	2	NA	NA	2
			Boron	Reproductive	0.3	NA	NA	0.3
			Manganese	CNS	0.01	NA	NA	0.01
			Nitrate	Circulatory System	0.1	NA	NA	0.1
			PCE	Hepato toxicity	0.001	NA	NA	0.001
Groundwater Hazard Index Total =								2.411 *
Receptor Hazard Index =								2.5

Key

NA - Route of exposure not applicable to this medium and COPC.

* - Other chemicals contributed 0.1 HI, but none were greater than 0.04 individually.

There was no excess cancer risk for current residents downgradient of the Old City Dump because current residents are not exposed to any carcinogenic contaminants from the Old City Dump. Carcinogenic risks were calculated for potential future residents and potential future full-time workers at the Old City Dump who drink the water from the seeps. The excess cancer risk to these future residents and workers were 3×10^{-7} and 5.8×10^{-8}, respectively. These levels are more protective than EPA's threshold excess cancer level of 1×10^{-6} (one excess cancer in a million people).

Regarding noncarcinogenic effects, the HI is estimated to be 9 for a future resident at OU3 and 2.5 for a future occupational worker. The COPCs antimony, boron, and nitrate generate the elevated HI. The hazards presented are based on a hypothetical future offsite residential or onsite occupational exposure to these COPCs through ingestion and dermal contact of water from an untreated groundwater supply.

The exposure pathway and scenarios driving the health risks are the groundwater pathways (ingestion and dermal contact) for the future resident. The excess carcinogenic risks are all less than EPA's threshold value of 1e-06. The noncarcinogenic risk drivers are antimony (HI= 7.2) and boron (HI=1.005) for the future resident. Ingestion contributed most to the estimated HI value, resulting in a route-specific HI value of 8.2 (out of 9).

The exposure pathway and scenarios driving the health risks are the groundwater pathways (ingestion) for the future worker. The excess carcinogenic risks are all less than EPA's threshold value of 1e-06. The noncarcinogenic risk drivers are antimony (HI= 2) and boron (HI=0.3) for the future worker. Ingestion contributed all of the estimated HI value, resulting in a route-specific HI value of 2.5.

7.1.5 Uncertainty Analysis

There are several areas of uncertainty with the OU3 HHRA. The following uncertainties could lead to overestimation of the risk from the Site: 1) the daily chemical intake was estimated using the maximum sample concentration for each COPC; 2) the sampling results from the seep locations (for which exposure is likely to be incidental, at most) were combined with the monitoring well results to calculate EPCs; and 3) in the modeling of contaminant uptake, chemical concentrations were assumed to remain constant over the exposure period.

The following uncertainties could lead to over- or underestimation of the risk from the Site: 1) the concentrations of the chemicals in the sample results may have been over- or underestimated; 2) toxicity information was not available for some of the elements compounds detected, so the toxicity data from similar elements or compounds were used; and 3) dose-response information from animal studies was used to predict effects in humans.

The following uncertainties could lead to an underestimation of the risk from the Site: 1) the uncertainty about the accuracy of some of the Tentatively Identified Compounds led to some compounds not being carried through the HHRA; 2) for some of the inorganic elements detected at the Site, carcinogenic toxicity information was not available, so these elements were assigned a weight-of-evidence classification of D, not classifiable as to human carcinogenicity; and 3) it is

also possible that not all of the contaminants in the sample were recovered by the laboratory extraction.

7.2 Summary of Ecological Risk Assessment

A screening-level ecological risk assessment (ERA) was conducted to assess the potential for the existence of ecological receptors and pathways between those receptors and COPCs associated with the Riverfront Site as a whole. There was not a separate ERA done for OU3 specifically. The ERA was conducted using the methodology described in the Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (USEPA 1997). The screening-level ERA was designed to assess the need for a follow-up Baseline ERA. The results of the screening-level ERA are discussed in detail in the Ecological Risk Assessment, Revision 0, prepared for EPA by Black & Veatch Special Projects Corp. (BVSPC). Figure 3-1 shows the ecological exposure model for the Riverfront Site.

The ERA indicated that the potential for significant ecological impacts from OU3 is small. State and federal threatened and endangered species exist within Franklin County; however, none of these species are known to exist in the area or at OU3. The presence of suitable habitat within the vicinity indicates that there is potential for these species to be present. Surface water analytical results detected contaminants, but the concentrations were below the Ecological Screening Values, which determine the ecological risks. Consequently, the potential for ecological receptors to be exposed to contaminants in the surface water would be considered minimal, and there is no need for any additional Baseline ERA. See Figures 2-2, 2-3, 3-2, and photographs 06, 07, and 08.

7.3 Risk Assessment Conclusion

There are no COCs at OU3. There are COPCs, and of these, antimony and boron pose the greatest health risk in the groundwater pathway. Other COPCs contributing to the overall groundwater risk include manganese, nitrate, and PCE. However, exposure to the COPCs in the groundwater assumes that domestic wells would be contaminated by the COPCs in OU3 or that workers would access the seeps at OU3.

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment from the OU3 Site.

8.0 Remedial Action Objectives

RAOs provide a general description of what the response action is expected to accomplish. The RAO for this action is to minimize contact with contaminated groundwater and surface water. Currently, no exposure exists that represents an unacceptable risk to human health or the environment, hence there are no COCs. The COPCs for the Old City Dump Site include PCE, antimony, nitrate, boron, and manganese. No PRGs have been set for these chemicals as they do not currently require remediation, based on the low levels detected. However, institutional controls will be used, as well as periodic monitoring of residential wells, one seep, and monitoring wells in the vicinity, to limit any potential future exposure to the COPCs. Antimony and boron present a potential risk to a resident or occupational worker. This response action will

provide EPA and MDNR the means to evaluate this remedy, monitor any contaminant migration, and prevent any potential future risks from the Old City Dump Site. The current sampling data indicate that the contaminants in OU3 are not migrating at levels or rates that endanger human health or the environment. The current and reasonably anticipated future land use will continue to be a yard waste/gravel storage area and compost site for city use.

9.0 Description of Remedial Alternatives

From the screening of technologies, EPA evaluated and assembled a range of alternatives including:

- Alternative 1 - No Action
- Alternative 2 - Institutional Controls
- Alternative 3 - Institutional Controls and Monitoring

The FS was prepared in January 2003. In May 2003, an additional monitoring well cluster was installed at OU3 and an additional round of groundwater samples was collected. The data from this May 2003 work allowed a modification of Alterative 3 to be prepared. It is also discussed in this section:

- Alternative 3A - Institutional Controls and Monitoring

9.1 Description of Groundwater Alternatives/Remedy Components

9.1.1 Groundwater Alternative 1 - No Action

The NCP requires that the EPA consider a no further action alternative. The No Action Alterative serves as a baseline against which the other remedial alternatives can be compared. Under the No Action Alternative, no further action would be taken to monitor, control, or remediate the groundwater contamination. There are no capital or operation and maintenance (O&M) cost associated with this alternative. However, five-year reviews of OU3 are required under CERCLA, so there are very low periodic costs (which occur every five years). Because this alternative is not protective of human health and the environment and does not comply with applicable or relevant and appropriate requirements (ARARs), this alternative is not further evaluated.

9.1.2 Groundwater Alternative 2 - Institutional Controls

Treatment/Containment Components

No treatment or containment components are included.

Institutional Controls

Institutional controls will be implemented at OU3 in layers to enhance the protectiveness of the remedy. The primary form of institutional control will be a proprietary control, specifically a restrictive covenant and easement. This form of proprietary control was selected as it is effective as an informational device and creates a readily enforceable legal property interest.

The city of New Haven currently owns OU3. It is expected that the city of New Haven will grant to the state of Missouri a restrictive covenant and easement. The EPA will be named as a third-

party beneficiary in this instrument so that EPA will have the ability to enforce the terms of the restrictive covenant and easement in addition to the state of Missouri. This restrictive covenant and easement will be patterned on the model restrictive covenant and easement found in the MDNR Cleanup Levels for Missouri (CALM), Appendix E, Attachment E1.

The objectives of imposing a restrictive covenant and easement on OU3 are to eliminate or minimize exposures to contamination remaining at OU3 and limiting the possibility of the spread of contamination. These objectives will be achieved by use of the restrictive covenant and easement as it will: (1) provide notice; (2) limit use; and (3) provide federal and state access. Specifically, the restrictive covenant and easement will achieve this by:

- Providing notice to prospective purchasers and occupants that there are contaminants in soils and the groundwater.
- Ensuring that future owners are aware of any engineered controls put into place as part of this remedial action.
- Prohibiting residential, commercial, and industrial uses, except those uses which would be consistent with the remedial action.
- Limiting the disturbance of contaminated soils.
- Prohibiting the placement of groundwater wells.
- Prohibiting other ground penetrating activities which may result in the creation of a hydraulic conduit between water bearing zones.
- Providing access to EPA and the state of Missouri for verifying land use.
- Prescribing actions that must be taken to install and/or maintain engineered controls (if applicable).
- Providing access to EPA and the state of Missouri for sampling and the maintenance of engineered controls.

In addition to the above proprietary control, governmental controls operate as effective institutional controls at OU3. The MDNR has promulgated regulations pertaining to the location and construction of wells. These regulations prohibit the placement of a well within 300 feet of a landfill. This prohibition, found at 10 C.S.R. 23-3.010, precludes the possibility that any well will be located in OU3.

An additional governmental control may take the form of the Riverfront Superfund Site being listed by the MDNR on the State's Registry of Confirmed, Abandoned, or Uncontrolled Hazardous Waste Disposal Sites in Missouri (Registry). The Registry is maintained by the MDNR pursuant to the Missouri Hazardous Waste Management Law, Section 260.440 RSMo. Sites listed on the Registry appear on a publicly available list. A notice filed with the Recorder of Deeds in the county where the site is located details hazardous waste contamination at the site, and notice regarding the contamination must be provided by the seller to potential buyers. In addition, the use of property listed on the Registry may not change substantially without the written approval of the MDNR.

The EPA may also provide public education through the preparation and distribution of a newsletter on the Site and informational meetings, which may be held every five years. The public education campaign would be intended to inform citizens of the potential health hazards associated with exposure to contaminated groundwater and would remind city officials of the restrictions on OU3.

Monitoring Components

No groundwater or seep monitoring would occur in this alternative.

Operation and Maintenance (O&M) Components

O&M activities would consist of public education activities, including: 1) preparation of a newsletter on OU3; 2) publication in the local newspaper; 3) direct mailing to local officials and concerned citizens; and 4) holding public information meetings on OU3 in New Haven every five years. In addition, five-year reviews of OU3 are required under CERCLA, so there will be a five-year review report prepared periodically.

Expected Outcomes

The contaminated groundwater under OU3 is shallow. Implementation of Alternative 2 would prevent exposure to the contaminated groundwater. However, without monitoring it would be difficult to determine if the contaminants were migrating farther from the Site or deeper into the aquifer. Land use would be restricted by the imposition of institutional controls.

9.1.3 Alternative 3 - Institutional Controls and Monitoring

Treatment/Containment Components

No treatment or containment components are included.

Institutional Controls

The institutional controls would be the same as in the other alternatives.

Monitoring Activities

Six additional monitoring wells would be installed around OU3. These monitoring wells, four seeps, and eight nearby domestic wells would be sampled for VOCs, semi-volatile organic compounds (SVOCs), metals, field geotechnical parameters, and inorganics. The sampling would occur on a quarterly basis for two years, twice a year for three years, and annually thereafter.

Operation and Maintenance (O&M) Activities

O&M activities for the monitoring activities would include well maintenance (periodic cleaning/redevelopment). O&M activities for the institutional controls would be the same as those listed in Alternative 2. In addition, five-year reviews of OU3 are required under CERCLA, so there will be a five-year review report prepared periodically.

Expected Outcomes

The contaminated groundwater under OU3 is shallow. Implementation of Alternative 3 would

prevent exposure to the contaminated groundwater. In addition, monitoring of the groundwater will allow EPA to determine if the contaminants were migrating farther from the Site or deeper into the aquifer. Land use would be restricted by the imposition of institutional controls.

9.1.4 Groundwater Alternative 3A - Institutional Controls and Monitoring

Treatment/Containment Components

No treatment or containment components are included.

Institutional Controls

The institutional controls remain the same as in the other alternatives.

Monitoring Activities

As discussed above, in May 2003 three additional monitoring wells were installed around OU3. The sampling data from these wells and all the domestic wells within one-half mile of OU3 indicate that no significant groundwater contamination is migrating from OU3. Therefore, Alternative 3A would implement a less intensive sampling schedule than Alternative 3. The four existing monitoring wells at the Site and the most contaminated seep would be sampled for VOCs, field geotechnical parameters, and inorganics on a quarterly basis for the first year. If no PCE is detected above its MCL in the Year 1 samples, the four monitoring wells, the seep, and the four domestic supply wells nearest to OU3 would be sampled every five years, in the year before the five-year review. If PCE is detected, the four monitoring wells and the seep will be monitored annually.

Operation and Maintenance (O&M) Activities

O&M activities for the monitoring activities would include well maintenance (periodic cleaning/redevelopment). O&M activities for the institutional controls would be the same as those listed in Alterative 2. In addition, five-year reviews of OU3 are required under CERCLA, so there will be a five-year review report prepared periodically.

Expected Outcomes

The contaminated groundwater under OU3 is shallow. Implementation of Alternative 3A would prevent exposure to the contaminated groundwater. In addition, monitoring of the groundwater will allow EPA to determine if the contaminants were affecting local domestic supply wells, or were migrating farther from the Site or deeper into the aquifer. Land use would be restricted by the imposition of institutional controls.

9.2 Common Elements and Distinguishing Features of Each Alternative

Common elements of Alternatives 2, 3, and 3A include institutional controls:

- Alternatives 2 and 3A have similar implementation times, since neither requires any additional site work.
- Alternatives 2 and 3A are similar regarding wastes to be disposed of offsite or managed onsite. Neither requires the installation of new monitoring wells, hence, drill cuttings or well installation wastes would not be present.

- Alternatives 3 and 3A would prevent the exposure to the contaminated groundwater at OU3.

The distinguishing features include:

- Alternatives 3 and 3A would monitor the groundwater contamination, whereas Alternative 2 would not.
- Alternative 3 requires the installation of additional monitoring wells.
- Alternative 3 would require the disposal of drill cuttings and other well installation wastes.
- Alternative 2 would not conduct any monitoring at the Site.
- Alternatives 3 and 3A attain ARARs, whereas Alternative 2 would not.

Table 9-1 summarizes the cost, estimated time for design and construction, time to meet the RAO and the remedy reliability data for the alternatives.

Table 9-1

OU3 - Old City Dump

Summary of General Comparison Information for Each Alternative

Alternative	Cost ($1,000)			Time to Implement Construct. (Months)	Time to Reach RAO (Months)	Time of Operation (Years)	Long-Term Reliability
	Capital	Annual O&M	Present Worth				
1	0	5.5	163	0	Never	30 *	Very Low
2	8	8	249	0	0 **	30 *	Low
3	183	27	992	3 to 6	0	30 *	High
3A	14	10	309	0	0	30 *	High

Key

* The time of operation is indeterminate. 30 years was used to prepare costs.

** - While Alternative 2 is protective, it would be difficult to determine if the RAO is being met without monitoring.

10.0 Comparative Analysis of Alternatives

As required by the NCP, EPA evaluated the alternatives using the nine criteria listed in CERCLA. Two of the nine criteria, overall protection of human health and the environment and compliance with ARARs, are threshold criteria. If an alternative does not meet these two criteria, it cannot be considered as the Site remedy.

Five of the criteria are balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume of contaminants through treatment; short-term effectiveness; implementability; and cost. The EPA can make tradeoffs between the alternatives with respect to the balancing criteria.

Two of the criteria are modifying criteria: state/support agency acceptance and community acceptance.

This section of the ROD compares each alternative against the nine criteria, noting how it compares to the other alternatives. A detailed evaluation of these alternatives against the nine criteria can be found in the FS. Table 10-1 summarizes the comparative analysis of the alternatives.

Table 10-1 OU3 - Old City Dump Comparative Analysis of Alternatives				
Criterion	**Alternative 2 - Institutional Controls**	**Alternative 3 - Institutional Controls and Monitoring**	**Alternative 3A - Institutional Controls and Monitoring**	**Alternative Ranking**
THRESHOLD CRITERIA				
OVERALL PROTECTION *	Protective	Protective	Protective	Threshold Criterion: All pass
COMPLIANCE WITH ARARS				Threshold Criterion: All pass
Chemical-Specific	Complies	Complies	Complies	
Location-Specific	None Identified	Would Comply	Would Comply	
Action-Specific	Not Applicable	Would Comply	Would Comply	
BALANCING CRITERIA				
LONG-TERM EFFECTIVENESS	Risk reduced as long as institutional controls are maintained. Without monitoring, would be difficult to evaluate future risk.	Risk reduced as long as institutional controls are maintained. Monitoring would allow evaluation of future risk.	Risk reduced as long as institutional controls are maintained. Monitoring would allow evaluation of future risk.	Ranked from alternative that provides the most long-term effectiveness to the least: 3 = 3A, 2
REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT	Not Applicable	Not Applicable	Not Applicable	Not Applicable
SHORT-TERM EFFECTIVENESS	No intrusive actions conducted, so no increase in short-term risk.	Some intrusive work (well installation and sampling) conducted, so some, low, increase in risk to the workers and community.	Some intrusive work (sampling) conducted, so some, low, increase in risk to the workers.	Ranked from alternative that provides the most short-term effectiveness to the least: 2, 3A, 3

Table 10-1

OU3 - Old City Dump

Comparative Analysis of Alternatives

Criterion	Alternative 2 - Institutional Controls	Alternative 3 - Institutional Controls and Monitoring	Alternative 3A - Institutional Controls and Monitoring	Alternative Ranking
IMPLEMENT-ABILITY	Administratively and technically feasible.	Administratively and technically feasible. Sightly more difficult than Alternative 3A.	Administratively and technically feasible. Sightly more difficult than Alternative 2.	Ranked from alternative that is the easiest to implement to the least: 2, 3A, 3
COST **				Ranked from the least costly alternative to the most costly: 2, 3A, 3
Capital Cost	$8,000	$183,000	$14,000	
Annual O&M Cost	$8,000	$27,000	$10,000	
Present Worth Cost ***	$249,000	$992,000	$309,000	
MODIFYING CRITERIA				
STATE ACCEPTANCE	Not Acceptable.	Acceptable.	Acceptable. MDNR agrees with EPA that this should be the preferred Alterative	Ranked from alternative that is most acceptable to MDNR to the least: 3A, 3, 2
COMMUNITY ACCEPTANCE	Acceptable.	Acceptable.	Acceptable. Comments indicate that community agrees with EPA that this should be the preferred Alterative	Ranked from alternative that is most acceptable to the community to the least: 3A, 3 = 2

Key

* - Because Alternative 1 did not meet the Overall Protectiveness criterion, it is not included in this table.

** - Based on a 30-year operational period for the alternatives.

*** - Assuming a 3.9% discount rate.

10.1 Overall Protection of Human Health and the Environment

This criterion determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment. This is a threshold criterion.

All of the alternatives, except the no further action alternative, would adequately protect human health and the environment from contaminants in the groundwater and surface seeps. Because Alternative 1 (the no further action alternative) is not protective of human health and the environment, it was eliminated from consideration under the remaining eight criteria.

The restrictions on groundwater usage and public education effort in Alternative 2 would prevent human exposure to contaminated groundwater. However, because no monitoring is required under this alternative, it would not be possible to determine if contaminants are continuing to migrate from the Old City Dump or are posing additional threats to human health and the environment.

Alternatives 3 and 3A provide the greatest amount of protection of human health and the environment. In addition to providing the restrictions on groundwater usage and public education, Alternatives 3 and 3A also implement groundwater monitoring. Sampling of wells in and around OU3 would allow the contaminants to be detected before human ingestion of the contaminated water. Monitoring also provides greater protection of the environment because changes in contaminant concentrations in the seeps and groundwater would be monitored by regulatory agencies.

10.2 Compliance with ARARs

This criterion evaluates whether the alternative meets the federal and state environmental statutes, regulations, and other requirements that regulate the Site and the actions in the alternative. These regulations are known as ARARs. ARARs are generally placed into one of three categories: chemical-specific, location-specific, and action-specific. Chemical-specific ARARs regulate the levels of chemicals at the Site. They are generally a level that must be met for the Site to be considered remediated and are specific to a media (such as groundwater). Location-specific ARARs regulate contaminant levels or activities in specific locations, such as flood plains. Action-specific ARARs regulate remedial activities, not a specific contaminant. If necessary, this evaluation may also provide an explanation of why a waiver of a regulation is justified. This is a threshold criterion.

Alternatives 2, 3, and 3A currently comply with chemical-specific ARARs, as contaminants above regulatory levels have only been detected in ephemeral surface water seeps. No contaminants have been detected above regulatory levels in residential or monitoring wells around OU3. It is uncertain if the groundwater contamination will migrate, so it is unknown if compliance with chemical-specific ARARs would continue to be attained in the future. Alternatives 3 and 3A include monitoring of the groundwater and seeps, so they would detect contaminant changes in the future. Alternative 2 does not have any location- or action-specific ARARs. Alternatives 3 would comply with all location- and action-specific ARARs. Alternatives 3A does not have any

location-specific ARARs and would comply with all action-specific ARARs.

10.3 Long-Term Effectiveness and Permanence

This criterion considers the ability of an alternative to maintain protection of human health and the environment over time, including the adequacy and reliability of the alternatives' controls. This is a balancing criterion.

Alternative 2 would have some long-term effectiveness and permanence. Institutional controls and public education would lessen the current long-term risk by restricting access to the groundwater and seeps around the Old City Dump Site. However, Alternative 2 could require an indefinite number of five-year reviews because it has no means of evaluating changes in groundwater or seep water contaminant levels other than sampling that may be conducted during a five-year review. Alternatives 3 and 3A would be more effective in the long term, because these alternatives provide monitoring, which would allow increases or decreases in contamination to be evaluated. Alternatives 3 and 3A would also monitor nearby domestic wells, providing additional long-term protection of human health. Alternatives 3 and 3A would implement the same public education and institutional controls as Alternative 2. Five-year reviews would also be required for 3 and 3A, but monitoring would provide data that could be used to make more informed decisions during the five-year reviews.

10.4 Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment

This criterion evaluates an alternative's use of treatment to reduce the harmful effects of contaminants, their ability to move in the environment, and the amount of contamination present. This is a balancing criterion.

None of the alternatives would reduce the toxicity, mobility, or volume of the contaminants through treatment. Alternatives 3 and 3A would use monitoring to evaluate the rates of natural attenuation of the contaminants. The monitoring data could also be used to determine if contaminant toxicity, mobility, or volumes were increasing and migrating offsite.

10.5 Short-Term Effectiveness

This criterion considers the length of time needed to implement an alternative. It also evaluates the risks the alternative poses to workers, residents, and the environment during implementation. This is a balancing criterion.

Alternatives 2 and 3A would require the least time to implement. They would be complete as soon as the institutional controls were finalized and the sampling program begun (Alternative 3A only). Alternative 3 would require a short time (three to six months) to implement, since it requires that some additional monitoring wells be installed.

In general, alternatives with the fewest construction or intrusive activities pose the lowest risk to site workers and the community during the remedial action. Alternatives 2 and 3A do not require any additional well installation, so there would be no increase in short-term risk to the community or the environment from these alternatives.

Alternative 3 requires a small amount of intrusive work during the drilling and installation of the additional monitoring wells. Short-term risks to workers, the community, and the environment

could be controlled by the proper use of personal protective equipment, equipment decontamination, monitoring during site activities, and following Occupational Safety and Health Act (OSHA) safety guidelines. The risk to the community would be reduced further by limiting access to areas where well installations were being conducted. Since no one is currently exposed to contaminated groundwater or seep water, only the workers involved in the well drilling operations (Alternative 3) and sample collection from monitoring wells or seeps (Alternatives 3 and 3A) could be exposed to contaminants. This exposure could be minimized by proper use of personal protective equipment. Alternatives 3 and 3A would provide means of evaluating the short-term effectiveness of natural processes in attenuating the contaminants at OU3.

10.6 Implementability

This criterion considers the technical and administrative feasibility of implementing the alternative. It evaluates such concerns as the relative availability of the goods and services needed to construct or operate the remedy. This is a balancing criterion.

All three alternatives are easy to accomplish. Five-year reviews are required for each alternative; and the services, materials, and personnel needed to complete the reviews are readily available. Institutional controls could be easily implemented. All of OU3 is owned by the city of New Haven and the Site is currently in use, so enforcement of the controls and supervision of the Site should be routine. Public education could be easily achieved through notices in the newspaper, direct mailings, and public meetings if necessary.

Alternative 3 would be slightly more difficult, but still easy to accomplish. Installation of monitoring wells is a common practice, and technical assistance is readily available for health and safety concerns.

Sampling personnel, equipment, and procedures are well developed and available for Alternatives 3 and 3A.

All three of the alternatives have few associated administrative difficulties.

10.7 Cost

This criterion evaluates the estimated capital and O&M costs as well as present worth costs. Present worth costs are the total cost of an alternative over time in terms of today's dollars (i.e., present worth costs correct for expected inflation). The cost estimates are order-of-magnitude estimates, which are expected to be accurate within a range of +50 to -30 percent. This is a balancing criterion.

Alternative 2 was the least costly, with a present worth of $249,000. Alternative 3A had a present worth of $309,000 while Alternative 3 had a present worth of $992,000. Alternative 3 is considerably more costly than Alternatives 2 and 3A because of the significant costs associated with the installation of additional monitoring wells and its more intensive sampling program. The present worth costs were calculated using an assumed life of 30 years and a 3.9 percent discount rate.

10.8 State/Support Agency Acceptance

This criterion considers whether the state agrees with the EPA's analyses and recommendations of the RI/FS and the Proposed Plan. This is a modifying criterion.

The MDNR supports the preferred alternative, Alternative 3A, selected by the EPA.

10.9 Community Acceptance

This criterion considers whether the local community agrees with the EPA's analyses and preferred alternative. Comments received on the Proposed Plan are important indicators of community acceptance. This is a balancing criterion.

During the Proposed Plan public comment period, no written comments were received that opposed EPA's choice of Alterative 3A. The city did comment favorably on the selection of Alterative 3A. None of the questions raised during the public meeting opposed EPA's choice of Alternative 3A. All questions raised at the public meeting were addressed at the meeting by EPA staff.

11.0 Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment on principal threat wastes wherever practicable. Principal threat wastes are source materials that are considered highly toxic or highly mobile, that cannot be reliably contained, or present a significant risk to human health or the environment. Generally, contaminated groundwater is not considered to be a source material.

There are no principal threat wastes at OU3. The contamination in the groundwater is characterized by very low levels and is located in the "perched" water above the water table. Nearby domestic wells access a deeper aquifer. Monitoring will ensure that the levels will continue to be evaluated, and institutional controls will prevent exposure to these low levels.

12.0 Selected Remedy

Alternative 3A, the selected remedial alternative for OU3, will address contaminated groundwater. The alternative uses several institutional controls to prevent access to the contaminated groundwater. It also uses monitoring to ensure that the contaminants do not migrate from the Site and reach receptors.

Alternative 3A meets both of the threshold criteria, protection of human health and the environment and compliance with ARARs. It also provides the best balance among the four applicable balancing criteria and was the preferred choice of the MDNR and the local community.

12.1 Summary of the Rationale for the Selected Remedy

The main factors in selecting Alternative 3A as the Site remedy are:

1) The institutional controls will eliminate or minimize the chance of a receptor being exposed to the contaminated groundwater.

2) Current monitoring data have not found any indication that there is source material or non-aqueous phase liquids (NAPLs) in the groundwater, so there is no evidence of principal threat wastes at OU3.

3) Monitoring of OU3 is warranted because of the Site's history and because of trace detections of PCE and other COPCs in the groundwater around the Site. Monitoring of nearby domestic supply wells is warranted as a protective measure. Monitoring of the seeps is warranted because they represent the best data on the conditions of water within the old fill material in the Old City Dump.

4) The less intensive sampling schedule in the selected remedy (compared to Alternative 3) is suitable because:

   A) Only trace amounts of PCE (all detections at least one order of magnitude below the MCL) have been detected at OU3, so it is not a source of the PCE that closed city Wells W1 and W2.

   B) Analyses of two current rounds of samples from the domestic supply wells within a one-half mile of OU3 have not detected any site contaminants above regulatory standards.

   C) The three groundwater monitoring wells installed in May 2003 have confirmed the direction of groundwater flow around OU3. These wells are downgradient of the Site and will be able to act as sentinel wells to provide early warning of large-scale migration of contaminants from OU3.

   D) The highest COPC detections were in the seep water. It is these detections that drive the risk analysis. However, these seeps are very difficult to access, have very low flows, and are ephemeral. Therefore, exposure to the seep water is unlikely.

12.2 Description of the Selected Remedy

Institutional controls will be implemented at OU3 in layers to enhance the protectiveness of the remedy. The primary form of institutional control will be a proprietary control, specifically a restrictive covenant and easement. This form of proprietary control was selected as it is effective as an informational device and creates a readily enforceable legal property interest.

The city of New Haven currently owns OU3. It is expected that the city of New Haven will grant to the state of Missouri a restrictive covenant and easement. The EPA will be named as a third-party beneficiary in this instrument so that EPA will have the ability to enforce the terms of the restrictive covenant and easement in addition to the state of Missouri. This restrictive covenant and easement will be patterned on the model restrictive covenant and easement found in the MDNR Cleanup Levels for Missouri (CALM), Appendix E, Attachment E1.

The objectives of imposing a restrictive covenant and easement on OU3 are to eliminate or minimize exposures to contamination remaining at OU3 and limiting the possibility of the spread of contamination. These objectives will be achieved by use of the restrictive covenant and

easement as it will: (1) provide notice; (2) limit use; and (3) provide federal and state access. Specifically, the restrictive covenant and easement will achieve this by:

- Providing notice to prospective purchasers and occupants that there are contaminants in soils and the groundwater.
- Ensuring that future owners are aware of any engineered controls put into place as part of this remedial action.
- Prohibiting residential, commercial, and industrial uses, except those uses which would be consistent with the remedial action.
- Limiting the disturbance of contaminated soils.
- Prohibiting the placement of groundwater wells.
- Prohibiting other ground penetrating activities which may result in the creation of a hydraulic conduit between water bearing zones.
- Providing access to EPA and the state of Missouri for verifying land use.
- Prescribing actions that must be taken to install and/or maintain engineered controls (if applicable).
- Providing access to EPA and the state of Missouri for sampling and the maintenance of engineered controls.

In addition to the above proprietary control, governmental controls operate as effective institutional controls at OU3. The MDNR has promulgated regulations pertaining to the location and construction of wells. These regulations prohibit the placement of a well within 300 feet of a landfill. This prohibition, found at 10 C.S.R. 23-3.010, precludes the possibility that any well will be located in OU3.

An additional governmental control may take the form of the Riverfront Superfund Site being listed by the MDNR on the State's Registry of Confirmed, Abandoned, or Uncontrolled Hazardous Waste Disposal Sites in Missouri (Registry). The Registry is maintained by the MDNR pursuant to the Missouri Hazardous Waste Management Law, Section 260.440 RSMo. Sites listed on the Registry appear on a publicly available list. A notice filed with the Recorder of Deeds in the county where the site is located details hazardous waste contamination at the site, and notice regarding the contamination must be provided by the seller to potential buyers. In addition, the use of property listed on the Registry may not change substantially without the written approval of the MDNR.

The EPA may also provide public education through the preparation and distribution of a newsletter on the Site and informational meetings, which may be held every five years. The public education campaign would be intended to inform citizens of the potential health hazards associated with exposure to contaminated groundwater and would remind city officials of the restrictions on OU3.

The selected remedy also uses monitoring to ensure that the contaminants do not migrate from the Site and reach new receptors. In the first year, the four exiting monitoring wells at the Site

and the most contaminated seep would be sampled quarterly. The samples would be analyzed for:

1) VOCs, to confirm that no PCE (or any other VOC) is migrating from OU3 at levels above its MCL.

2) Inorganics, to measure the levels of the other COPCs (antimony, boron, manganese, and nitrate).

3) Field parameters (dissolved oxygen [DO], iron II, pH, oxidation-reduction potential [ORP], and temperature).

It is expected that PCE will not be detected above its MCL in these four quarterly rounds. If this is the case, the four monitoring wells, the seep, and the four domestic supply wells nearest to OU3 will be sampled every five years. The samples would be collected in the year before the five-year review (4, 9, 14, 19, 24, and 29) so that the data will be available for evaluation during the five-year review. The samples would be analyzed for VOCs, inorganics, and field parameters.

If PCE is detected above its MCL during the first year, the four monitoring wells and the seep would be sampled annually.

12.3 Summary of the Estimated Remedy Costs

Table 12-1 presents the following costs for the selected remedy:

- The capital subtotal
- Annual costs for the various O&M work activities to be done and the year(s) that the costs would be incurred
- The total (undiscounted) costs for O&M activities
- The total present worth of the annual O&M costs
- The total present worth for the selected remedy

The following assumptions were made to generate the cost estimate:

- After Year 1, the monitoring well/seep sampling would occur every five years, not annually
- Undiscounted costs are in 2002 dollars
- The remedy will begin in January 2004
- The operational life of the remedy would be 30 years
- A 3.9 percent discount rate was used to calculate present worth

The values in this cost estimate summary table are based on the best available information regarding the expected scope of the remedy. Changes in the costs and changes in the various work items that were costed are likely to occur as a result of new information and data collected during the design and implementation of the remedy. Major changes may be documented in the

form of a memorandum in the Administrative Record file, an ESD, or an amendment to this ROD. This estimate is an order-of-magnitude engineering cost estimate. It is expected to be within + 50 to (-) 30 percent of the actual costs of the remedy.

Table 12-1
Cost Estimate Summary
for the Selected Remedy - Institutional Controls and Monitoring

Cost Estimate Component	Quantity	Units	Unit Cost	Capital Cost	Annual Cost
CAPITAL COSTS					
Place Deed/Zoning Restrictions (1 property)	1	EA	$1,200	$1,200	
Assist Missouri Division of Geology & Land Survey with well drilling restrictions	1	EA	$5,000	$5,000	
Assist City Drafting of Well Permitting Requirements	1	LS	$5,000	$5,000	
DIRECT CAPITAL COST SUBTOTAL				$11,200	
Scope Contingency (15%)				$1,700	
TOTAL DIRECT CAPITAL COST				$12,900	
Permitting and Legal (5%)				$600	
CONSTRUCTION COSTS TOTAL				$13,500	
Engineering Design (0%)				$0	
TOTAL CAPITAL COST				$14,000	
ANNUAL O&M COSTS					
GROUNDWATER MONITORING (Analysis Only) + *					
Year 1 (Monitoring Wells and Seeps)	6	EA	$471		$2,800
Quarterly sampling of 4 monitoring wells and one surface water seep locationsfor VOCs, metals, and field parameters (standard turnaround +QA/QC), (5 primary, 1 QA/QC)					
Years 4, 9, 14, 19, 24, and 29 (Residential Wells)	5	EA	$397		$2,000
Sampling of 4 residential wells for VOCs, metals, nitrates, and field parameters (standard turnaround), (5 primary, QA/QC with well samples).					
Years 4, 9, 14, 19, 24, and 29 (Monitoring Wells and Seeps)	6	EA	$471		$2,800
Sampling every 5-years of 4 monitoring wells and one surface water seep locations for VOCs, metals,and field parameters (standard turnaround + QA/QC)					
GROUNDWATER MONITORING (Labor only)					
Year 1	36	HR	$75		$2,700
2 Level P1 persons for 1, 10-hour day per sampling event and 1 Level P1 person for 2, 8-hour days per data evaluation report					
Years 4, 9, 14, 19, 24, and 29.	36	HR	$75		$2,700
2 Level P1 persons for 1, 10-hour day per sampling event and 1 Level P1 person for 2, 8-hour days per data evaluation report					
PLAN PREPARATION / INSTITUTIONAL CONTROLS					
Preparation of Health and Safety Plan (Year 1 only)	40	HR	$75		$3,000
Preparation of QAPP/Sampling Plan (Year 1 only)	60	HR	$75		$4,500
Prepare Annual Newsletter	40	HR	$75		$3,000
Annual Newsletter Publication in Local Newspaper and Direct Mailing	1	LS	$500		$500
Public Informational Meeting @ 5, 10, 15, 20, 25, and 30 yrs	1	LS	$5,000		$5,000
Five-Year Review @ 5, 10, 15, 20, 25, and 30 yrs	1	LS	$50,500		$50,500
TOTAL PRESENT WORTH O&M COST				$295,000	
TOTAL PRESENT WORTH				$309,000	

3.9 percent discount rate used to calculate present worth.
Costs assumed that the quarterly monitoring well sampling from Year 1 would not have to be repeated.
Undiscounted costs are based on 2002 dollars.
The assumed start date for the remedy is January, 2004. The actual start date may be later.
O&M costs were based on a 30-year operational life for the remedy.

Table 12-1 (Continued)				
Present Worth Cost Estimate				
for the Selected Remedy - Institutional Controls and Monitoring				
Year	Yearly O&M Cost×	Intermittent O&M Costs	Total Annual O&M Costs	Intermittent O&M Costs Include:
1	$3,500	$29,500	$33,000	Year 1 (plans, monitoring)
2	$3,500	$0	$3,500	Year 2 monitoring
3	$3,500	$0	$3,500	Year 3 monitoring
4	$3,500	$7,500	$11,000	Year 4 monitoring
5	$3,500	$55,500	$59,000	Year 5 monitoring, 5-yr review, info. meeting
6	$3,500	$0	$3,500	Years 6 - 30
7	$3,500	$0	$3,500	Years 6 - 30
8	$3,500	$0	$3,500	Years 6 - 30
9	$3,500	$7,500	$11,000	Year 9 Sampling
10	$3,500	$55,500	$59,000	Year 10, 5-yr review, informational meeting
11	$3,500	$0	$3,500	Years 6 - 30
12	$3,500	$0	$3,500	Years 6 - 30
13	$3,500	$0	$3,500	Years 6 - 30
14	$3,500	$7,500	$11,000	Year 14 Sampling
15	$3,500	$55,500	$59,000	Year 15, 5-yr review, informational meeting
16	$3,500	$0	$3,500	Years 6 - 30
17	$3,500	$0	$3,500	Years 6 - 30
18	$3,500	$0	$3,500	Years 6 - 30
19	$3,500	$7,500	$11,000	Year 19 Sampling
20	$3,500	$55,500	$59,000	Year 20, 5-yr review, informational meeting
21	$3,500	$0	$3,500	Years 6 - 30
22	$3,500	$0	$3,500	Years 6 - 30
23	$3,500	$0	$3,500	Years 6 - 30
24	$3,500	$7,500	$11,000	Year 24 Sampling
25	$3,500	$55,500	$59,000	Year 25, 5-yr review, informational meeting
26	$3,500	$0	$3,500	Years 6 - 30
27	$3,500	$0	$3,500	Years 6 - 30
28	$3,500	$0	$3,500	Years 6 - 30
29	$3,500	$7,500	$11,000	Year 29 Sampling
30	$3,500	$55,500	$59,000	Year 30, 5-yr review, informational meeting
Total Costs of Annual O&M			**$513,000**	
Present Worth of Annual O&M			**$295,000**	
× Yearly O&M costs include: preparation, mailing, and publication of annual newsletter.				

* Field parameters include DO, iron II, pH, ORP, and temperature.

\+ For each sampling event, include 1 duplicate.

12.4 Expected Outcome of the Selected Remedy

The city of New Haven is currently using OU3 as a yard waste/composting site and a gravel storage area. These uses will be able to continue after the remedy is implemented. It is anticipated that the future land use of the Site will be the same as the current land use. Because the Site is located in very rugged terrain and is a former dump, it is very unlikely that it would be developed for residential, hospital, day care, school use, or even commercial use.

The selected remedy is expected to prevent/minimize exposure to contaminated groundwater from OU3. Currently, there is no human exposure to the contaminated groundwater from OU3. The groundwater will be monitored to ensure that migration of contaminants above regulatory levels does not occur. In addition, the closest domestic supply wells to OU3 will be monitored to ensure that they are not affected by contaminants from OU3. Thus, the current uses of the groundwater around OU3 (primarily for individual residence domestic supply) will be maintained. The time to reach cleanup levels for the COPCs onsite is unknown, but is anticipated to be greater than 30 years. If cleanup levels are not met within 30 years but there are no other effects from the groundwater, the current remedy could continue to be implemented beyond 30 years.

The residual risk is minimal. The purpose of this response action is to control the potential risks from ingestion and dermal contact with contaminated groundwater. The HHRA indicates that there are non-carcinogenic risks to future residents (HI = 9) and future workers (HI = 2.5) who ingest or have dermal contact with the groundwater. However, site access is limited so seep exposure is unlikely. Residential development will not occur on the Old City Dump, and potential future residential development would occur at a distance farther than the current residences. The residences nearest OU3 do not have any detections in their domestic wells. This remedy is designed to prevent exposure to groundwater in excess of the cleanup levels. Table 12-2 summarizes the cleanup levels for the COPCs.

The anticipated socio-economic and community impacts include the continued use of the Site as a gravel storage area/yard waste and compost site. The availability of a compost site has environmental benefits and aids the citizens in their use of compost. The Public Works Department, city of New Haven, plans to expand the gravel storage area at OU3 in order to consolidate gravel from another storage location in town. This consolidation will allow for another use at the prior location, which is in a more urban area and is no longer the best use of that parcel.

Environmental exposure is limited to the contaminants in the seep water. Since the seeps are ephemeral and have very low flows even when active, environmental exposure is minimal. The seep water will also be monitored to ensure that migration of contaminants above regulatory levels does not occur. There are no endangered species in the area and the only PCE detected in

a surface water sample was at another OU. This risk presented in the ERA was very minimal. The ERA concluded that sufficient data are available to fully evaluate the effects on ecological receptors in the area and as these were minimal, no further ecological investigation is warranted.

Table 12-2

OU3 - Old City Dump

Cleanup Levels for Chemicals of Potential Concern

Media: Groundwater

Available Use: Individual Residential or Occupational Supply

Controls to Ensure Restricted Use: Not Applicable

Chemical of Potential Concern	Cleanup Level (ug/L)	Basis for Cleanup Level	Risk At Cleanup Level*		
			No Exposure ^	Future Resident ^^	Future Worker ^^
Antimony	6	MCL	0	HI - 0.53	HI - 0.15
Boron	600	LHAL **	0	HI = 0.22	HI = 0.07
Manganese	50	Table A	0	HI < 0.04	HI < 0.01
Nitrate	10,000	MCL	0	HI < 0.2	HI < 0.1
PCE	5	MCL	0	HI < 0.02	HI < 0.01

Notes

ug/L - micrograms per liter

MCL - EPA Maximum Contaminant Level

LHAL - Lifetime Health Advisory Level

Table A - Table A - Criteria for Designated Uses, Chapter 7 - Water Quality, 10 CSR 20.7

* - All carcinogenic risks would be less than EPA's threshold of 1e-06.

** - No MCL or other ARAR established for boron. The To-Be-Considered (TBC) value (the LHAL) was used.

^ - Remedy should prevent exposure to these COPCs, therefore risk would be 0.

^^ - If exposed to groundwater with COPC levels at cleanup levels.

13.0 Statutory Determinations

13.1 Protection of Human Health and the Environment

The selected remedy will prevent future exposure to contaminated groundwater by implementing institutional controls. Currently, there is no exposure to the contaminated groundwater. The selected remedy includes monitoring of the groundwater around the Site and from nearby residences to ensure that exposure to contaminant levels that could cause risk will be detected in time to take remedial action. The selected remedy does not require any additional Site work, so there should not be any unacceptable short-term risks or any cross-media impacts. There is a very slight ecological risk from the seeps at the Site, but the selected remedy includes seep monitoring to ensure that contaminant levels that could cause risk will be detected in time to take remedial action.

13.2 Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy must meet the federal and state environmental statutes, regulations, and other requirements that regulate the site and the actions in the alternative. These regulations are known as ARARs. ARARs are generally placed into one of three categories: chemical-specific, location-specific, and action-specific. Chemical-specific ARARs regulate the levels of chemicals at the Site. They are generally a level that must be met for the Site to be considered remediated and are specific to a media (such as groundwater). Location-specific ARARs regulate contaminant levels or activities in specific locations, such as flood plains. Action-specific ARARs regulate remedial activities, not a specific contaminant. In addition, if there is no ARAR for a chemical or action, the EPA may evaluate non-promulgated advisories issued by federal or state governments as “to-be-considered” (TBC) materials. If used, a standard based on a TBC is a legally enforceable performance standard. The ARARs and TBCs for the selected remedy are listed in Table 13-1. In addition, the sampling activities will need to comply with the OSHA requirements.

This remedial action can comply with all ARARs and does not require that any waivers be invoked.

Table 13-1 OU3 - Old City Dump Description of ARARs for Selected Remedy					
Authority	**Medium**	**Requirement**	**Status**	**Synopsis of Requirement**	**Action to be Taken to Attain Requirement**
Chemical-Specific ARARs					
Federal Regulatory Requirement	Groundwater	Federal Safe Drinking Water Maximum Contaminant Levels (MCLs), 40 CFR Part 141	Relevant and Appropriate	MCLs have been issued for a number of common organic and inorganic contaminants. These standards regulate the concentrations of these contaminants in public water supplies. They are considered relevant and appropriate for groundwater aquifers that are used for drinking water.	The selected remedy will comply with these regulations by using institutional controls and monitoring to prevent exposure to groundwater with contaminant levels above the MCLs.
State Regulatory Requirement	Seep Water	Missouri Water Quality Standards, 10 CSR 20.7, October 31, 1999.	Relevant and Appropriate	Criteria for Designated Uses have been issued for several common organic and inorganic contaminants. These standards regulate the concentrations of these contaminants in surface water. They are considered relevant and appropriate for the seeps.	The selected remedy will comply with these regulations by using institutional controls and monitoring to prevent exposure to seep water with contaminant levels above these standards.
To-Be-Considered Criteria					
To-Be-Considered	Groundwater	Lifetime Health Advisory Level (LHAL) for Boron, USEPA Office of Water, EPA 822-B-00-001, Summer, 2000	Legally Enforceable Performance Standard	Because no federal or state standard for boron could be located and because it is a risk driver at the site, the LHAL was selected as the cleanup standard.	The selected remedy will comply with these regulations by using institutional controls and monitoring to prevent exposure to groundwater with boron levels above the LHAL.

13.3 Cost Effectiveness

The selected remedy, Alternative 3A, is cost effective. This section provides a summary of how cost effectiveness is defined and provides an analysis of the selected remedy and the other two protective remedial alternatives.

The NCP defines a cost-effective remedy as one whose "costs are proportional to its overall effectiveness." Overall effectiveness is determined by evaluating three of the balancing criteria: long-term effectiveness; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness. More than one of the remedial alternatives can be cost effective, and the EPA does not have to select the most cost-effective alternative.

None of the alternatives use treatment to reduce the toxicity, mobility, or volume of the contaminants so this criterion is not applicable.

Alternative 3A's monitoring schedule will be protective, giving it a high rank in the long-term effectiveness category. It does not require any well installation work, and its sampling schedule is less intensive than Alternative 3, giving it a high rank in the short-term effectiveness category. Its overall effectiveness is high.

Because Alternative 2 does not include monitoring, it would not be able to evaluate changes in the contaminant levels in the groundwater or seep water, giving it the lowest ranking in long-term effectiveness. It would not require any intrusive work at the Site, so in the short term, it is effective. However, it has moderate overall effectiveness.

Alternative 3 has high long-term effectiveness due to its more intensive sampling schedule, but has the lowest short-term effectiveness, due to the intrusive work (well installation) needed at the Site and its more intensive sampling schedule. Its overall effectiveness is moderate.

Alternative 3A had moderate costs ($309,000 present worth) and high overall effectiveness. It is a cost-effective remedy. Alternative 2 had slightly lower costs ($249,000 present worth) and moderate overall effectiveness. It is also a cost-effective remedy. Alternative 3 had high costs ($992,000 present worth) and moderate overall effectiveness. It is not a cost-effective remedy.

13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Possible

The selected remedy does not use treatment. The rationale for not using treatment is:

1) Current monitoring data and the HHRA have not found any current exposure to the Site contaminants.

2) Current monitoring data have not found any indication that there is source material or NAPLs in the groundwater, so there is no evidence of principal threat wastes at OU3.

3) The institutional controls will eliminate or minimize the chance of a receptor being exposed to the contaminated groundwater or seeps in the future.

4) Monitoring of the groundwater from OU3 will provide a warning if contaminants begin migrating from the Site. Monitoring of nearby domestic supply wells will provide additional protection. Monitoring of the seeps will provide a warning if contaminants begin to migrate into the environment.

Long-term Effectiveness and Permanence: The selected remedy has long-term effectiveness nearly as high as Alternative 3. Both the selected remedy and Alternative 3 would sample the groundwater, the seeps, and nearby domestic wells. While Alternative 3 uses a more intensive sampling schedule, the additional costs make Alternative 3 not cost effective.

Reduction of Toxicity, Mobility, or Volume Through Treatment: This criterion is not applicable. See the text at the beginning of this section for the rationale as to why no treatment was selected.

Short-Term Effectiveness: The short-term effectiveness of the selected remedy was nearly as high as Alternative 2. Like Alternative 2, the selected remedy does not require any additional intrusive work at the Site. The only increase in short-term risk from the selected alternative is to the workers who collect the groundwater samples. These risks should be minor.

Implementability: The selected remedy, and the other two remedial alternatives, would be easy to implement. The selected remedy would use institutional controls, and the city of New Haven and the MDNR have agreed with the controls and are assisting in their implementation.

Costs: The selected remedy is cost effective. The additional O&M costs for the selected remedy (compared to Alternative 2) are warranted. The additional costs will be used to collect groundwater samples to confirm that the remedy is still protective, thus increasing the long-term effectiveness of the remedy. The monitoring will also provide EPA and MDNR current data before the five-year reviews.

State Acceptance: The MDNR supports the remedy (Alternative 3A) selected by the EPA.

Community Acceptance: The local community and the city of New Haven support the remedy (Alternative 3A) selected by the EPA.

13.5 Preference for Treatment as a Principal Element

There are no principal threat wastes at OU3. Therefore, the EPA's statutory preference for treatment of principal threats does not apply.

13.6 Five-Year Review Requirements

After the selected remedy is implemented, the RAO will be met but hazardous substances may remain in the groundwater at OU3 above levels that allow unlimited use and unrestricted exposure. Therefore, a statutory review will be required every five years to ensure that the selected remedy is still protective of human health and the environment.

14. Documentation of Significant Changes from Preferred Alternative of Proposed Plan

The Proposed Plan for OU3 was released for public comment on July 24, 2003. The Proposed Plan identified Alternative 3A - Institutional Controls and Monitoring. The EPA reviewed all written and verbal comments submitted during the public comment period. No changes were

requested in the comments; therefore, EPA determined no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

PART III RESPONSIVENESS SUMMARY

1.0 Stakeholder Issues and EPA Responses

During the public comment period for the Proposed Plan, no written comments were received. The MDNR submitted one letter, concurring with the preferred alternative. All questions and comments raised at the public meeting were addressed at that time. There were no significant issues or objections to the selected remedy. The EPA believes that the selected remedy addresses the community concerns and fully satisfies the expectations of the community.

2.0 Technical and Legal Issues

2.1 Technical Issues

There are no outstanding technical issues on OU3. The institutional controls and monitoring are in place, and the sampling schedule has been accepted by the community and MDNR.

2.2 Legal Issues

There were no legal issues identified. The EPA has coordinated with the city of New Haven and re-use of the Site as a gravel storage area/yard waste and compost site will continue.