Superfund Proposed Plan
Riverfront Site - OU 3
Old City Dump Site
New Haven, Missouri

EPA
Region 7

July 2003

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for Operable Unit (OU) 3, the Old City Dump Site, one of the areas of the Riverfront Superfund Site in New Haven, Missouri. This Proposed Plan identifies the preferred remedial alternative with the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), as lead agency, with support from the Missouri Department of Natural Resources (MDNR), and is being issued as part of EPA's public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This Proposed Plan is being provided as required by law, in coordination with the state of Missouri to: 1) inform the public of the EPA's preferred remedy; 2) highlight key information in the administrative record, especially the Remedial Investigation (RI) and the Feasibility Study (FS) Reports; 3) to describe the remedial alternatives analyzed during the FS, and; 4) to solicit public comments pertaining to the preferred alternative as well as all the remedial alternatives evaluated. The Riverfront Superfund Site consists of six OUs within the city of New Haven. Other Proposed Plans will be developed to describe the alternatives for the other OUs.

Changes to the preferred remedy, or a change from the preferred remedy to another remedy, may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after the EPA has taken into consideration all public comments made during the comment period. The final decision will be contained in a Record of Decision (ROD) issued by the EPA.

COMMUNITY ROLE IN SELECTION PROCESS

The EPA and the MDNR rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. The Baseline Risk Assessment, the Administrative Record of Activity, the RI Report, the FS Report, and supporting documentation have been made available to the public for a public comment period which begins on July 15, 2003, and concludes on August 14, 2003.

A public meeting will be held on July 29, 2003, at the Trinity Lutheran Church, New Haven, Missouri, to receive public comments.

Comments received at the public meeting, as well as written comments submitted during the comment period, will be addressed in the Responsiveness Summary Section of the ROD, the document which formalizes the selection of the remedy.

All written comments should be addressed to:

Hattie Thomas, Community Involvement Coordinator
Office of External Programs
U.S. EPA, Region 7
901 N. 5th Street
Kansas City, Kansas 66101
Telephone: 1-913-551-7003 or
Toll-free 1-800-223-0425

Dates to remember:
MARK YOUR CALENDAR

July 24, 2003, to August 21, 2003
Public Comment Period on the RI and FS Reports, Proposed Plan, and remedies considered.

July 29, 2003
Public Meeting at the Trinity Lutheran Church, New Haven, Missouri, at 7:00 p.m.

Copies of the project documents are available at the following repositories:

New Haven Scenic Regional Library
109 Maupin
New Haven, Missouri

EPA, Region 7 Records Center
901 N. 5th Street
Kansas City, Kansas
Hours:
Monday - Friday (8:00 a.m. - 5:00 p.m., C.T.)

Supporting information can be found at the website,

SITE BACKGROUND

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). The principal road, State Highway 100, runs along an east-west trending ridge about 1 mile south of the Missouri River. The ridge forms a topographic divide between the Missouri River valley to the north and the Boeuf Creek valley to the south.

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; and 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 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 FS of these two areas began in the summer of 2002.

This Proposed Plan focuses on OU3, the Old City Dump Site. 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.

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.

Public participation activities prior to the issuance of this Proposed Plan 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.

Site Characteristics

Site setting and hydrogeology

The Old City Dump is located just north of State Highway 100, in the southeastern part of New Haven (Figure 2). It 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 Old City Dump Site sits atop bedrock. Shallow groundwater flow in the bedrock beneath the Old City Dump is believed to be towards the northeast and east. There are ephemeral (intermittent) surface water seeps from the faces of the Old City Dump.

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.

There are four domestic wells within 2,000 feet of the Old City Dump. 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.

There are no wetlands or areas of major historical importance at the Old City Dump. Besides residential, the surrounding land use includes industrial and undeveloped, forested areas.

Results of Site Investigations

PCE contamination at the site is minimal. Despite hundreds of drums of industrial waste being placed in the Old City Dump before 1974, only trace concentrations of PCE have been detected in groundwater, surface water, and vegetation samples from the Old City Dump. Concentrations of PCE in previous soil sampling conducted by MDNR were also small. Because of the minimal PCE contamination detected and because groundwater flow from the site is not in the direction of the contaminated public-supply wells, the Old City Dump is not a source of the PCE contamination in these wells.

In 2000, the EPA was informed that several hundred drums of industrial wastes from the Kellwood Fabrics Plant were hauled to local farms after the closure of the Old City Dump in 1974. A local landowner discovered and initiated a cleanup of wastes at his farm. Other farms have not been identified to date. The EPA collected samples of the waste to aid in the characterization of the types of industrial wastes that were placed into the Old City Dump. Analysis of these samples found that the industrial wastes did not contain PCE.

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 micrograms per kilogram [ug/kg]) were detected in 3 of the 22 trees sampled.

Water samples were collected from domestic water wells and a monitoring well in the vicinity of the Old City Dump, nearby streams and springs, and seeps from the face of the Old City Dump. 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.

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 this Proposed Plan was being prepared. Three nested wells were installed downgradient (northeast of the dump), and sampling of domestic wells within ½ mile of the dump was conducted.

Initial data from the new well cluster northeast of the dump confirm our suspected direction of groundwater flow as being northeast. These wells were installed May 15 to May 18, 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 gas chromatography, 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 one 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.

Table 1
Contaminants Exceeding Federal or State Regulatory Standards

Sample Location	Parameter	(ug/L)	Reg. Stand. (Ug/L)	Type of Standard
Seep M	Antimony	82	6	NPDWS*
Seep M	Boron	2,710	600	ATSDR Lifetime Health Advisory
Seep M	Manganese	147	5	NPDWS Secondary
Seep M	Nitrate	9,990**	10,000	NPDWS

*NPDWS = National Primary Drinking Water Standard (health based). The secondary standard is aesthetic (taste, smell)
**The nitrate standard was not exceeded, but was included because it was very close to exceeding the standard.

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.

SCOPE AND ROLE OF OU 3

This action, referred to as the Old City Dump Site (OU3), will be the final action for this OU. Other actions will be implemented to address the other OUs at the site. The Remedial Action Objective (RAO) for OU3 is to minimize contact with contaminated groundwater and surface water. Institutional controls consisting of deed and zoning restrictions, permits, 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.

SUMMARY OF SITE RISKS

As part of the RI/FS, a complete assessment of the human health risk at OU3 was conducted by the Missouri Department of Health and Senior Services (MDHSS). This report, *Baseline Risk Assessment Operable Unit 3 - The Old City Dump* contains detailed information on the current and future risks of the Site's contaminants to human health. An assessment of the ecological risks for OU3 can be found in the *Ecological Risk Assessment,* prepared for EPA by Black & Veatch Special Projects Corp. (BVSPC). The reasonably anticipated future use of OU3 is as a yard waste/gravel storage area and compost site, hence no residential or industrial development should occur at the site. Residences near OU3, however, 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. Currently (May 2003) there is no human exposure to the contaminants migrating from the Site. These contaminants are found in the seeps and not in the domestic wells nearby. It is the EPA's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare and the environment from actual or threatened releases of hazardous substances into the environment.

Human Health Risk Assessment

The MDHSS prepared a Baseline Risk Assessment (RA) using the data collected during the RI. After the RI and FS Reports were completed, an additional field investigation was conducted at the Site. This data was used to further refine the conclusions in the RA and together, both reports serve as the basis for determining appropriate action at the site. Each of these reports may be found in the Administrative Record file.

Risk is estimated using a four-step process:

Step 1: Analyze contamination
Step 2: Estimate Exposure
Step 3: Assess Potential Health Dangers
Step 4: Characterize Site Risk.

In Step 1, EPA looks at concentrations of contaminants found at a site, as well as scientific studies regarding health effects.

In Step 2, EPA considers the different ways people might be exposed to contaminants identified at the site. EPA calculates a "Reasonable Maximum Exposure" which portrays the highest level of human exposure that could reasonably be expected to occur.

In Step 3, EPA use the information from Step 2, combined with toxicity information of each chemical to assess potential health risks. The likelihood of any kind of cancer resulting from a Superfund site is described as a probability; for example, "1 in 10,000 chance." It means that for every 10,000 people exposed, one extra cancer *may* occur. An extra cancer means that one more person could get cancer than would normally be expected to from all other causes.
EPA considers a risk unacceptable when the total excess lifetime cancer risk for a reasonable maximum exposure exceeds 10^{-4} (1 in 10,000). Total excess lifetime cancer risks below 10^{-6}, (1 in one million), are considered acceptable.

For non-cancer health effects, EPA calculates a "hazard index." The key concept here is that a "threshold level" (measured as a hazard ind of less than 1) exists below which non-cancer health effects are no longer predicted.

In Step 4, EPA determines whether site risks are great enough to cause health problems for people at or near the Superfund site. The results of the three previous steps are combined, evaluated, and summarized. The EPA adds up the potential risks from the individual contaminants and exposure pathway and calculates a total site risk.

The MDHSS evaluated exposure to carcinogenic and non-carcinogenic contaminants at OU3. The chemicals evaluated included PCE, nitrate, manganese, antimony, and boron. Based on the data collected after the RI and FS Reports were completed, no Chemicals of Concern (COCs) were identified. The above chemicals are considered Chemicals of Potential Concern (COPCs). Analytical results indicate that there is no current risk and only minimal potential for future risk. The following discussion addresses both of these scenarios.

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. The MDHSS also calculated carcinogenic risks to future residents and 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 even more protective than EPA's threshold excess cancer level of 1×10^{-6}, (one excess cancer in a million people). See the box on risk calculations for more detail on risk calculation.

Non-carcinogenic health risks were identified at OU3. See Table 2. There were no non-carcinogenic risks for current residents downgradient of the Old City Dump, because current residents are not exposed to any non-carcinogenic contaminants from the Old City Dump. As required by the Risk Assessment Guidance, the MDHSS also calculated "hazard indexes" (which estimate non-carcinogenic risks) for future residents and future full time workers at the Old City Dump who drink the water from the seeps. The hazard indexes for these future residents and workers were 9 and 2.5, respectively. (Antimony contributed 7 to the hazard index and boron contributed 1.) These levels exceed EPA's threshold hazard index level of 1. However, attributing drinking water ingestion risk values to seeps is highly conservative. It is unlikely that a health risk would occur as seeps are not used for drinking water. (See the box on risk calculations for more detail on risk calculation.)

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. Recent sampling suggests no problem with the domestic wells, but continued monitoring of these wells, BW-03 and the new monitoring well cluster under Alternative 3A will ensure that domestic supplies continue to be of good quality. In addition, an 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. Therefore, the

Table 2
Summary of Human Health Risks
Operable Unit 3, Riverfront Superfund Site
New Haven, Missouri

Non-Carcinogenic Risks at OU3			
Population Scenario	**Exposure Pathway**	**Total Hazard Index**	**Contaminant(s) Driving Risk**
Future Resident	Groundwater (from seep sampling)	9.0	Antimony and Boron
Future Occupational Worker	Groundwater (from seep sampling)	2.5	Antimony
Note 1: Human health risks may exist when the total hazard index for non-carcinogenic effects exceeds a value of 1.0. Table adapted from MDHSS, 2002.			

future non-carcinogenic risk to workers or residents at the Site can reasonably be estimated to be zero.

Ecological Risk Assessment

An Ecological Risk Assessment indicated that the potential for significant ecological impacts from OU3 are small. State and Federal Threatened and Endangered Species exist within Franklin County, however, none of these species are known to exist 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.

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 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 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 for a continued evaluation of this remedy and any potential future risks from the Old City Dump Site.

SUMMARY OF REMEDIAL ALTERNATIVES

The remedial alternatives that were investigated during the FS for OU3, the Old City Dump Site, are:

Alternative 1	No further action
Alternative 2	Institutional controls
Alternative 3	Institutional controls and monitoring

Common Elements

All of the alternatives, except the no further action alternative, include institutional controls as a common element. All alternatives facilitate the reasonably anticipated future land use of OU3, which is as a waste/gravel storage area and compost site.

The institutional controls include the following:

1. The use of access controls at OU3, including deed/zoning restrictions, and public education. The deed/zoning restrictions would prevent the drilling of public or private wells at OU3 and prevent residential development at the Old City Dump Site. Public education would be used to inform citizens of the potential health hazards associated with exposure to contaminated water and to inform city officials on well drilling restrictions. Public education would be implemented through the informational meetings and flyers;

2. An agreement providing the EPA access to the Site; and

3. Potential listing of the Site on the Registry of Confirmed, Abandoned, or Uncontrolled Hazardous Waste Disposal Sites in Missouri (Registry).

Alternative 1: No further action

Estimated Capital Cost: $0

Estimated Annual O&M Costs: $5,500

Estimated Present Worth Cost: $163,000

Estimated Construction Time Frame: 0 months

Estimated Time to Achieve RAOs: Indeterminate

The NCP requires that the EPA consider a no further action alternative against which other remedial alternatives can be compared. Under this alternative, no further action would be taken to monitor, control, or remediate the groundwater contamination. However, five-year reviews of the Site are required under CERCLA, so there are very low operation and maintenance (O&M) costs (which occur every five years). The annual O&M costs were calculated by dividing the present worth of Alternative 1 by the assumed life of the alternative (30 years). Alternative 1 would not meet the RAO because it does not minimize any future potential exposure to the Site.

Alternative 2: Institutional controls

Estimated Capital Cost: $8,000

Estimated Annual O&M Costs: $8,000

Estimated Present Worth Costs: $249,000

Estimated Construction Time Frame: 0 months

Estimate Time to Achieve RAOs: Indeterminate

The institutional controls described above would be implemented to limit exposure. While no physical construction would be required, it is estimated that three to six months would be needed to complete the institutional controls. Alternative 2 is protective, but whether the RAO was being met would be difficult to quantify without monitoring.

Alternative 3: Institutional controls and monitoring

Estimated Capital Cost: $183,000

Estimated Annual O&M Costs: $27,000

Estimated Present Worth Costs: $992,000

Estimated Construction Time Frame: 3- 6 months

Estimated Time to Achieve RAOs: Indeterminate

Alternative 3 includes institutional controls and periodic sampling of eight nearby domestic wells, the sampling of four surface water seeps, the sampling of six surface water locations, and the installation and sampling of six monitoring wells. Monitoring the groundwater would provide a greater

level of protection to local residents who rely on private wells for their water supply, and monitoring of surface water would allow future environmental impacts to be assessed. The six additional monitoring wells installed around the Old City Dump would also be used to establish groundwater flow. Sampling parameters include VOCs, semi-volatile organic compounds, metals, field geotechnical parameters, and field parameters on a quarterly basis for two years, a semi-annual basis for three more years, and then on a yearly basis for the next 25 years. Alternative 3 is protective, and monitoring would be effective in determining any future potential risk. RAOs could be met.

Alternative 3A: Institutional controls and monitoring

Estimated Capital Cost: $14,000

Estimated Annual O&M Costs: $10,000

Estimated Present Worth Costs: $309,000

Estimated Construction Time Frame: 0 months

Estimated Time to Achieve RAOs: Indeterminate

Alternative 3A includes institutional controls and periodic sampling of four existing monitoring wells and one surface water seep. As discussed above, data from the well cluster installed in May 2003 confirmed the direction of groundwater flow, while the May 2003 sampling of the nearby domestic wells confirmed that widespread groundwater contamination was not migrating from the Old City Dump. Monitoring the groundwater would provide a greater level of protection to local residents who rely on private wells for their water supply, and monitoring of surface water would allow future environmental impacts to be assessed. Sampling parameters would include VOCs, inorganic compounds, and field geochemical parameters. The wells and the seep would be sampled on a quarterly basis for the first year. If no PCE is detected in the first-year samples, the four monitoring wells, the seep, and the four domestic wells nearest the Old City Dump would be sampled every five years, in the year before the five-year review (years 4, 9, 14, 19, 24, and 29). If PCE is detected above the maximum contaminant level (MCL), the four monitoring wells and the seep would be sampled annually. For calculating the costs of Alternative 3A, it was assumed that no PCE would be detected. Alternative 3A is protective, and monitoring would be effective in determining any future potential risk. RAOs could be met.

EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different alternatives individually and against each other in order to select a remedy. The nine evaluation criteria are: (1) overall protection of human health and the environment; (2) compliance with Applicable or Relevant and Appropriate Requirements (ARARs); (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume of contaminants through treatment; (5) short-term effectiveness; (6) implementability; (7) cost; (8) state/support agency acceptance; and (9) community acceptance. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed below. A detailed analysis of these alternatives can be found in the FS.

1. **Overall Protection of Human Health and the Environment** *determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.*

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. 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.

Alternative 3 provides the greatest amount of protection of human health and the environment. In addition to providing the restrictions on groundwater usage and public education, Alternative 3 also implements monitoring of the groundwater. 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, surface water, and groundwater would be monitored by regulatory agencies.

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.

2. **Compliance with ARARs** *evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site or whether a waiver is justified.*

Both alternatives 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 contamination will spread, so it is unknown if compliance with chemical-specific ARARs would continue to be attained in the future. Alternative 3 is the only alternative that would provide monitoring of contaminant changes in the future. Alternative 2 does not have any location- or action-specific ARARs. Alternative 3 would comply with all location- and action-specific ARARs.

3. **Long-Term Effectiveness and Permanence** *consider the ability of an alternative to maintain protection of human health and the environment over time.*

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 would require an indefinite number of five-year reviews because it has no means of evaluating changes in groundwater or seep water contaminant levels.

Alternative 3 would have the least amount of long-term risk. It provides monitoring, which would allow increases or decreases in contamination to be evaluated. Alternative 3 would implement the same public education and institutional controls as Alternative 2. Five-year reviews would also be required, but monitoring would provide data that could be used to make more informed decisions during the five-year reviews.

4. **Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment** *evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.*

Neither Alternative 2 nor Alternative 3 would reduce the toxicity, mobility, or volume of the contaminants through treatment. Alternative 3 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 spreading offsite.

5. **Short-Term Effectiveness** *considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.*

In general, alternatives with the fewest construction or intrusive activities pose the lowest risk to site workers and the community during the remedial action. Alternative 2 does not require any intrusive activities, so there would be no increase in short-term risk to workers, the community, or the environment. 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 OSHA safety guidelines. The risk to the community would be reduced by limiting access to areas where well installations were being conducted. Since no one is currently exposed to contaminated groundwater or seep water, only workers involved in the well drilling operations and sample collection from monitoring wells or seeps could be exposed to contaminants. This exposure could be minimized by proper use of personal protective equipment.

Alternative 3 would provide a means of evaluating the short-term effectiveness of natural processes in attenuating the contaminants at OU3.

6. **Implementability** *considers the technical and administrative feasibility of implementing the alternative such as relative availability of goods and services.*

Both 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. Deed restrictions and public education could be easily implemented. All of OU3 is owned by the city of New Haven , so deed/zoning restrictions and well permits could be easily enforced by the city. Public education could be easily achieved through notices in the newspaper, direct mailings, and public meetings. 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 equipment and procedures are well developed and available. Both of the alternatives have few associated administrative difficulties.

7. **Cost** *includes estimated capital and operation and maintenance costs as well as present worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.*

These estimates are approximate and made without detailed engineering data. The actual cost of the project would depend on the final scope of the remedial action and on other unknowns. The present net worth costs were calculated using an assumed life of 30 years and a 3.9 percent discount rate. Alternative 3 is considerably more costly than Alternative 2 because of the significant costs associated with the installation of additional monitoring wells and the sampling of the monitoring and domestic wells, the seeps, and surface water at OU3.

8. **State/Support Agency Acceptance** *considers whether the state agrees with the EPA's analyses and recommendations of the RI/FS and the Proposed Plan.*

The MDNR supports the preferred alternative selected by the EPA.

9. **Community Acceptance** *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.*

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the ROD for the site.

POST-FEASIBILITY STUDY DATA EVALUATION

After the FS for OU3 was completed, further sampling was conducted at OU3 to help support an Agency for Toxic Substances and Disease Registry (ATSDR) health consultation on the Site. Based on these sampling results and the recommendations of the health consultation, a revised Alternative

3, known as Alternative 3A, was developed. Alternative 3A is discussed below in the Preferred Alternative Section.

PREFERRED ALTERNATIVE

The Preferred Alternative is Alternative 3A, Institutional Controls and Monitoring. Alternative 3A should be as protective as Alternative 3, but has lower costs. Data collected from the newly installed well cluster appear to verify that groundwater flow from the Old City Dump is to the northeast. If after surveying and comparing water levels in this well to BW-03, EPA finds that the flow may be in another direction, additional wells may be needed, but this is unlikely given the results of recent domestic well sampling and the steep topography in the area which drive much of the groundwater flow.

Alternative 3A would also implement a less intensive sampling schedule than Alternative 3. The monitoring will ensure that any changes in contaminant levels in the groundwater and surface seeps can be evaluated. The monitoring will also allow evaluation of reductions in the contaminant levels. Institutional controls, deed/zoning restrictions, and public education will minimize any potential future exposure.

Alternative 3A was selected over Alternatives 1 and 2 because it is the only alternative expected to achieve the RAOs and provide data to quantify that the objectives have been met. Alternative 3A was chosen over Alternative 3 because it is more cost-effective and also provides greater short-term effectiveness, as no new monitoring wells would need to be installed.

Continued monitoring reduces the long-term risk by allowing for regulatory agencies to evaluate sampling results. The reasonably anticipated future land use, which is as a yard waste/gravel storage area and compost site, will continue, with only limited use by the city of New Haven. Alternative 3A reduces the risk within a reasonable time frame and provides for long-term reliability of the remedy. The EPA and MDNR will periodically review the remedy in order to evaluate its ongoing effectiveness. These five-year reviews are required for this remedy.

Although Alternative 3A is the more expensive than Alternatives 1 and 2, it is significantly less expensive than Alternative 3. The EPA believes Alternative 3A provides the best balance of trade-offs among alternatives, with respect to the evaluation criteria. Alternative 3A could change in response to public comment or new information.

Based on the information available at this time, the EPA believes that Alternative 3A meets the threshold criteria. Alternative 3A also provides the best balance of trade-offs among the other alternatives with respect to the balancing and modifying criteria. The EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

GLOSSARY

Of Terms Used In the Proposed Plan

This glossary defines many of the technical terms used in this Proposed Plan.

Aquifer: An underground layer of rock, sand, or gravel capable of storing water within cracks and pore spaces, or between grains. When water contained within an aquifer is of sufficient quantity and quality, it can be tapped and used for drinking or other purposes. The water contained in the aquifer is called groundwater.

Bedrock: The layer of rock located below the overburden soils. Bedrock can be unweathered (solid and unaltered), weathered (altered by water, exposure to the elements), or fractured (altered by earth's movements). Aquifers can be found in certain types of bedrock.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act. The acts created a special tax that goes into a Trust Fund, commonly known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites. Under the program, EPA can either: 1) pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work; or, 2) take legal action to force parties responsible for site contamination to clean up the site or pay back the federal government the cost of the cleanup.

Chemicals of Concern (COCs): Contaminants, identified during the site investigations and risk assessments, that pose a potential risk because of their toxicity and potential routes of exposure to public health and the environment.

Groundwater: Water, filling spaces between soil, sand, rock and gravel particles beneath the earth's surface, that often serves as a source of drinking water.

Institutional Controls: Controls placed on property to restrict access and future development.

Maximum Contaminant Levels (MCLs): The maximum permissible level of a contaminant in water that is or may be consumed as drinking water. These levels are determined by EPA and are applicable to all public water supplies.

Monitoring Wells: Special wells installed at specific locations on or off a hazardous waste site where ground- water can be sampled at selected depths and studied to determine such things as the direction in which the ground- water flows and the types and concentrations of contaminants present.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The Federal regulation that guides the Superfund program.

Operation and Maintenance (O&M): Activities conducted at a site after response actions occur, to ensure that the cleanup or containment system continues to be effective.

Plume: A body of contaminated groundwater flowing from a specific source. The movement of the groundwater is influenced by such factors as local groundwater flow patterns, the character of the aquifer in which groundwater is contained, and the density of contaminants.

Present Worth: The amount of money necessary to secure the promise of future payment or series of payments at an assumed interest rate.

Toxicity: A measure of the degree to which a substance is harmful to human and animal life.