Operable Unit 1 (Front Street site)
Executive Summary

Riverfront Superfund Site
New Haven Missouri

The U.S. Environmental Protection Agency (EPA) has initiated a remedial investigation and feasibility study (RI/FS) for Operable Unit 1 (OU1) at the Riverfront Superfund Site in New Haven, Missouri. The RI/FS process is the methodology authorized by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 (i.e., Superfund program) for characterizing the nature and extent of risks posed by uncontrolled hazardous waste sites and for evaluating potential remedial options.

Site History, Contamination, and Risk

The town of New Haven (population 1,600) is located along the southern bank of the Missouri River in Franklin County, Missouri. 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. Subsequent investigations in New Haven found PCE in the groundwater and soils at several locations within the City of New Haven. 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) for environmental clean-up under Superfund.

The Riverfront Superfund Site consists of six OUs within the City of New Haven. OU1, known as the Front Street Site, encompasses approximately 2 acres and is an industrial area in downtown New Haven. OU3, known as the Old City Dump, encompasses approximately 3-acres and is located just north of State Highway 100 on the eastern side of New Haven. The scope of this FS addresses only OU1, the Front Street Site, and OU3, the Old City Dump Site. OU1 is discussed exclusively in this volume (Volume 1) of the FS. Discussion of OU3 can be found in Volume 2 of this FS.

Located on the northeast corner of Front Street and Cottonwood Street, OU1 consists of: a 15,000-square foot, one story, concrete building (the Front Street Building); a vacant lot to the east of the building; and a vacant lot to the west of the building on the west side of Cottonwood Street. A groundwater plume in the alluvial aquifer extends from just south of the Front Street Building northeast to the Missouri River. The plume passes under two residential properties as it migrates to the River.

During the RI, sampling was conducted by the U.S. Geological Survey for EPA. Sampling consisted of vegetation sampling, soil sampling, groundwater sampling, and surface water sampling in the Missouri River. Results of vegetation sampling at OU1 indicated that trees around the Front Street Building uptake PCE-contaminated groundwater from the contaminant plume, and these results provided insight into locations for subsurface probing. PCE and its degradation products, (trichloroethylene [TCE], cis-1,2-dichloroethylene [cis-DCE], and vinyl chloride [VC]), were detected in 128 of 144 soil sample locations at OU1. PCE was detected in 22 of the 28 alluvial groundwater sampling locations in the vicinity of OU1. Plumes of PCE's degradation products, (TCE, cis-DCE, and VC), were also present at OU1. PCE was also detected at much smaller concentrations in bedrock monitoring wells at OU1. No PCE contamination was detected in surface water or in stream bed-sediment samples from the Missouri River. For this FS, the primary contaminants of concern (COCs) that were identified for both soil and groundwater at OU1 are PCE, TCE, cis-DCE, and VC.

Risk assessments were performed to determine the effect of contamination at OU1 on human health and the environment. Exposure to contaminated groundwater at OU1 was found to pose unacceptable excess risks to future residents and workers if they were to use the contaminated water for drinking, cooking, or bathing. The risk assessment found that surface soils at OU1 may pose unacceptable excess risks to future residents, workers, trespassers, and recreational visitors to OU1. The ecological risk assessment for the Riverfront Site found that OU1 poses minimal risk to ecological receptors.

Remedial Action Objectives

To satisfy CERCLA requirements, remedial action objectives were developed for OU1 at the Riverfront Site. Remedial action objectives were used to develop general response actions for the Site. The remedial action objectives developed for the contaminated groundwater and contaminated soil at OU1 are presented in Table ES-1.

Remedial actions must comply with applicable or relevant and appropriate requirements (ARARs) of federal laws and more stringent, promulgated state laws. Chemical-specific, action-specific, and location-specific ARARs for OU1 have been preliminarily identified.

Information concerning the nature and extent of contamination in the soil and groundwater was used to estimate the volume of contamination that would need to be remediated. Soil contamination was estimated as having a volume of approximately 34,000 yd^3 based on the cleanup level for Missouri (CALM) leaching to groundwater. The approximate volume of the PCE-contaminated groundwater is 5,740,000 gallons

based on the extent of groundwater containing PCE above the federal maximum contaminant level (MCL) of 5 µg/L.

General response actions were identified for both soil and groundwater contamination. Remedial technologies and process options were identified for each general response action. Remedial technologies refer to general categories of technology types, and process options refer to specific processes within each technology type. The remedial technologies and process options identified were screened on the basis of technical implementability, effectiveness, implementability specifically at OU1, and cost.

Remedial Alternatives

Combining individual process options develops possible solutions for the contamination problem, which are referred to as remedial alternatives. The remedial alternatives combine technologies to address both soil and groundwater contamination at OU1.

The goals in developing the preliminary remedial alternatives are to provide both a range of cleanup options and sufficient detail to adequately compare alternatives. Alternatives are listed with the primary process option chosen for groundwater, followed by a slash, and then followed by the primary process option chosen for soil, (i.e., hydraulic containment/capping means that hydraulic containment will be used for groundwater and capping will be used for soils).

Alternative 1—No Action/No Action. Alternative 1 would not involve any remedial actions, and the site would remain in its present condition. This alternative, required by the National Contingency Plan and CERCLA, is a baseline alternative against which the effectiveness of the other alternatives can be compared. Under the no action alternative, the site is left "as is" and no funds would be expended for monitoring, control, or cleanup of the contaminated groundwater and soils. However, a 5-year review of the site would be required under CERCLA, so funds would have to be expended to conduct the review.

Alternative 2—Limited Action/Limited Action. Alternative 2 would use institutional controls to address potential health risks associated with both the contaminated groundwater and soils. Institutional controls would consist of deed and zoning restrictions, permits, and public education. Restrictions and permitting could prevent contact with contaminated soils and groundwater, and public education could alert the public about the health risks associated with using contaminated groundwater for bathing, cooking, and drinking.

Alternative 3—Monitoring/Limited Action. Alternative 3 would use groundwater monitoring and institutional controls to address the potential health risks associated with the contaminated groundwater. Monitoring of the groundwater would involve the installation of monitoring wells and periodically sampling those wells. Sampling would allow the migration of the plume to be monitored. Institutional controls, as described in Alternative 2, would also be implemented to prevent human contact with contaminated water and soils.

Alternative 4—Monitoring/Limited Soil Excavation. Alternative 4 would use groundwater monitoring and institutional controls, as described in Alternative 3, to address the potential health risks associated with contaminated groundwater. The upper 6 feet of contaminated soils would be excavated and the excavation would be backfilled with clean fill. This would minimize human exposure to contaminated soils and allow limited future redevelopment of the property. Contaminated soil would be transported off-site for disposal in an appropriate landfill. Institutional controls, as described in Alternative 2, would also be implemented to human contact with contaminated water and soils.

Alternative 5—Hydraulic Containment and Monitored Natural Attenuation/ Capping and Sheet Piling. Alternative 5 would use hydraulic containment, above-ground groundwater treatment, monitored natural attenuation, and institutional controls to address the potential health risks associated with contaminated groundwater. This alternative would minimize the migration of the contaminant plume to the Missouri River. The Front Street Building would be removed. Sheet piling and capping would be used to create an enclosure around the contaminated soils to prevent groundwater flow from contacting contaminated soils. Water within the enclosure would be pumped out creating an inward hydraulic gradient. Hydraulic containment wells would also be placed within the plume outside the enclosure to prevent plume migration. Extracted groundwater would be treated with granular activated carbon to remove VOCs. With the source are soils contained, natural attenuation processes should begin to reduce the contaminant levels in the plume. Institutional controls, as described in Alternative 2, would also be used to prevent human contact with contamination.

Alternative 6—Groundwater Extraction/Excavation and Off-site Disposal. Alternative 6 would use extraction wells, above ground groundwater treatment, and institutional controls to address the potential health risks associated with contaminated groundwater. Groundwater would be extracted at a rate to actively remove

contamination, rather than merely contain the contamination. Extracted contaminated groundwater would be treated using a tray aeration system to remove VOCs. Contaminated soil would be excavated and transported off-site for disposal in an appropriate landfill. The excavation would be backfilled with clean fill. Institutional controls, as described in Alternative 2, would also be used to prevent human contact with contamination.

Alternative 7—In Situ Bioremediation/Excavation and On-Site Treatment. Alternative 7 would use in situ bioremediation and institutional controls to address the potential health risks associated with contaminated groundwater. A slow-release, reductive chemical would be injected into the groundwater through the use of direct-push techniques. As the chemical is released into the aquifer, it would mix into the contaminated groundwater and make the groundwater anaerobic, which promotes the biodegradation of the contaminants. Contaminated soils would be excavated, treated by solvent extraction to below cleanup levels, and then backfilled into the excavation. Institutional controls would be implemented to prevent contact with contaminated materials while the remediation efforts were being conducted.

Alternative 8—In Situ Physical Treatment/In Situ Treatment. Alternative 8 would use in situ physical treatment and institutional controls to address the potential health risks associated with the contaminated groundwater and soils. Advanced remedial technology (ART) wells would be installed. ART wells combine in-well air stripping with soil vapor extraction to remediate VOCs from soils and groundwater concurrently. Soil vapor extraction wells would be used to supplement the ART wells in the heavily contaminated soils below the building. Institutional controls would be implemented to prevent contact with contaminated materials while the remediation efforts were being conducted.

Comparison of Alternatives

A detailed comparative analysis of the eight alternatives against seven of the nine criteria required by the National Contingency Plan was performed. These criteria include: protection of human health and the environment; compliance with ARARs; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and costs. The two remaining criteria, state acceptance and community acceptance, will be addressed in the Record of Decision after the public comment period. Table ES-2 provides a summary of the detailed comparative analysis.