RECORD OF DECISION

BOUNTIFUL/WOODS CROSS/5TH SOUTH

PCE PLUME NPL SITE

Operable Unit 1

BOUNTIFUL, DAVIS COUNTY, UTAH

PREPARED BY:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 8
DENVER, COLORADO

September 2006

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ACRONYMS

A-3	Area of Interest
ARAR	Applicable or Relevant and Appropriate Requirements
ATV	Alternate Toxicity Value
BRA	Baseline Risk Assessment – HDR Engineering Inc.
BDL	Below the Laboratory Detection Limit
bgs	Below the Ground Surface
BHHRA	Baseline Human Health and Ecological Risk Assessment - SRC
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cis-DCE	Dichloroethene (Contaminant of Concern, Degradation Product of TCE)
COC	Chemical of Concern
COPC	Chemicals of Potential Concern
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
ESD	Explanation of Significant Differences
FFS	Focused Feasibility Study
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index
HDR	HDR Engineering, Inc. (Contractor working for Hatchco)
HQ	Hazard Quotient
ICs	Institutional Controls
IRIS	Integrated Risk Information System
LOAEL	Lowest Observed Adverse Effects Level
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goals
MEP	Maximum Extent Practicable
mg/kg	milligrams per kilogram or parts per million (ppm)
MTBE	Methyl Tert-Buthyl Ether
OU1	TCE Groundwater Plume, Hatchco Property, Area-3,
OU2	PCE Groundwater Plume
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbons
PCE	Tetrachloroethene – Contaminant of Concern
POTW	Public Owned Treatment Works – Municipal Water Treatment Plant
ppb	parts per billion
ppm	parts per million
RAO	Remedial Action Objectives
RBC	EPA Region 3 Risk Based Concentrations
RCRA	Resource Conservation and Recovery Act
RI-HDR	Remedial Investigation – HDR Egineering Inc.
RI-CDM	Remedial Investigation - CDM
RI/FFS-HDR	Remedial Investigation/Focused Feasibility Study – HDR Engineering Inc.
RI/FFS-CDM	Remedial Investigation/Focused Feasibility Study – CDM Engineering Inc.

ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act of 1986
SI	Site Inspection
Site	Bountiful/Woods Cross/5th South PCE Plume NPL Site, OU1 and OU2
site	OU1
SQL	Sample Quantification Limit
SVOCs	Semi-Volatile Organic Compounds
TCE	Trichloroethene (Contaminant of Concern)
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxicity Equivalence Quotient
ug/kg	micrograms per kilogram (ppb)
ug/L	micrograms per Liter (ppb)
US	United States
VC	Vinyl Chloride (Contaminant of Concern – Degradation Product of TCE)
VOCs	Volatile Organic Compounds
yd^3	cubic yards
<	less than
>	greater than

THE DECLARATION

1.1 Site Name and Location

This Record of Decision (ROD) is for the Bountiful/Woods Cross/5th South PCE Plume NPL Site, Operable Unit 1, located between Interstate 15 and 800 West Street, and between 500 South and 700 South streets in Woods Cross, Davis County, Utah (Figure 1). The EPA Site Identification Number is UT0001119296.

1.2 Statement of Basis and Purpose

This decision document presents the Selected Remedy for the Bountiful/Woods Cross/5th South PCE Plume, Operable Unit 1 (OU1), 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 for the Site.

The remedy was selected by EPA Region 8. The State of Utah Department of Environmental Quality (UDEQ) concurs with the selected remedy.

1.3 Assessment of OU1

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 and pollutants or contaminants into the environment.

1.4 Description of Selected Remedy

The Bountiful/Woods Cross/5th South PCE Plume NPL Site has two operable units. Operable Unit 2 addresses a PCE groundwater plume emanating from the Bountiful Family Cleaners Facility located at 244 South 500 West, Bountiful, Utah. The remedial investigation/feasibility study and ROD for Operable Unit 2 is scheduled for completion during calendar year 2006.

The selected remedy for OU1 addresses both sub-soil and groundwater contaminated with Tetrachloroethene (PCE), Trichloroethene (TCE), cis Dichloroethene (cis-DCE), Vinyl Chloride (VC) and other volatile organic compounds (VOCs). The selected remedy will remove the potential threat to human health and it will achieve an accelerated risk reduction through treatment/destruction of contaminants in groundwater at OU1. The remedy also will meet the statutory preference for the selection of a remedy that involves treatment as a principal element. The major components for the Selected Remedy include:

- Institutional controls (ICs) will be required to eliminate potential exposure to

groundwater and ensure protectiveness of the remedy. At the source, the primary form of ICs will be proprietary controls, specifically, a restrictive covenant and easement which will require consultation with EPA/UDEQ prior to any earth disturbing activity (i.e., excavation of soil). In addition, ICs will restrict well drilling in areas affected by the plume. ICs are described in detail in Section 7.1 and Section 11.1;

- Injecting chemical/biological agents (food-grade compounds and microbes) into the contaminated sub-surface soil, and the saturated zone to enhance the biodegradation rates of the contaminants of concern;

- Monitoring groundwater to ensure the plume will respond to treatment over time. New and selected existing monitoring wells will be used to track VOCs and natural attenuation parameters until the Maximum Contaminat Levels (MCLs) standards are achieved. The first monitoring event will establish a baseline and will take place prior to the first injection of biological/chemical agents into the contaminated zone. Monitoring will continue until the Remedial Action Objectives (RAOs) are met or as required by the first five-year review.

- During each five-year review, EPA, in consultation with UDEQ, will review the monitoring data and evaluate the protectiveness of the remedy. Also, in consultation with UDEQ, EPA may modify the groundwater monitoring strategy as appropriate to ensure that the data gathered support the clean-up objectives. Five-year reviews will be required until the RAOs are met.

1.5 Statutory Determinations

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, is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

This action also satisfies the statutory preference for treatment as a principal element of the remedy. The selected remedy reduces the toxicity, mobility and volume of hazardous substances, pollutants or contaminants through treatment at the source, and by enhancing the chemical and biological degradation of the contaminants of concern in the groundwater plume.

Because this remedy may take more than five years to attain RAOs and clean-up levels, a policy review will be conducted within five years of the initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

1.6 Data Certification Checklist

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

- 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 (Section 2.4.1)
- Baseline risk represented by the chemicals of concern (Section 4)
- Chemicals of concern and their respective concentrations (Section 4.2)
- How source materials constituting principal threats are addressed (Section 9)
- Key factor(s) that led to selecting the remedy (i.e. describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (Section 10.1)
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 12.0)
- Potential land and groundwater use that will be available at the Site as a result of the Selected Remedy (Section 13.1)
- Clean-up levels established for chemicals of concern and the basis for these levels (Section 13.2)

1.7 Authorizing Signatures

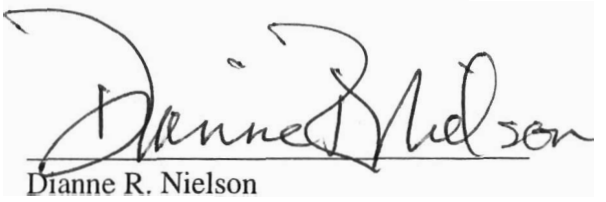
This Record of Decision documents the selected remedial action to address the groundwater contamination emanating from the Bountiful/Woods Cross/5th South PCE Plume NPL Site, Operable Unit 1.

EPA Region 8 approves the selected remedy as described in this ROD.

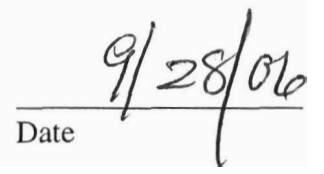
Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection and Remediation
U.S. Environmental Protection Agency, Region 8

9/28/06
Date

The following authorized official at the State of Utah concurs with the selected remedy for the Bountiful/Woods Cross/5th South PCE Plume NPL Site, Operable Unit 1.



Dianne R. Nielson
Executive Director
Utah Department of Environmental Quality



Date

THE DECISION SUMMARY

2.0 Site Name, Location, and Brief Description

The Bountiful/Woods Cross/5th South PCE Plume NPL Site, Operable Unit 1 (OU1), also known as the Hatchco property, is located between Interstate 15 and 800 West Street, and between 500 South and 750 South streets in Woods Cross, Davis County, Utah. The Hatchco property is located in Section 25, Township 2N, Range 1W of the Salt Lake Base Line and Meridian. The street address is 643 South, 800 West and the property's geographic coordinates are 40°52'57" north latitude and 111°54'02" west longitude (Figure 1).

The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number is UT0001119296. The lead agency for OU1 is the U. S. Environmental Protection Agency (EPA). The Utah Department of Environmental Quality (UDEQ), Division of Environmental Response and Remediation (DERR) is the supporting agency. The Site was proposed for listing on the National Priorities List (NPL) in the Federal Register on December 1, 2000, and was placed on the final NPL on September 13, 2001. The Site cleanup is planned to be conducted using Superfund Trust funds.

W. S. Hatch Company initially operated on 13 acres, 10 of which are now owned by Kalahari Properties (Kalahari). Properties adjacent to the Hatchco property include the Holly Refinery and Marketing Company to the north, and roadways to the east, west and south. The property terrain is basically flat. The topography of the area surrounding the Hatchco property slopes gently to the west at approximately 0.025-feet per foot and lies at an elevation of 4,300-feet above mean sea level.

2.1 OU1 History and Enforcement Activities

2.1.1 Site History and Land uses

W. S. Hatch Company (Hatchco) operated at the Site as a specialized carrier of bulk petroleum, petroleum products, petroleum solvents (such as toluene and xylene), and asphalt from 1936 to 1986. Hatchco facilities were also used to service, clean, and park tractor-trailers and tank trucks.

Hatch Service Company, a wholly owned subsidiary of Hatchco, also operated at this location. Hatch Service Company trucks reportedly carried ammonium nitrate, fuel oil, and high-energy fuel which were mixed by the truckload and used as explosives at mining operations. Hatch Service Company ceased operations in the late 1980s and was involuntarily dissolved on December 1, 1998. At the peak of their operations, the facility was home to approximately 75 trucks, 200 trailers, and 125 employees (Figure 2).

Jack B. Kelley Inc., a Texas corporation, purchased all of Hatchco's stock on December 10, 1986. The trucking operations continued until February 1996. In 1995, business operations were winding down on the original 13 acres, and Hatchco began removing structures to prepare a portion of the property to be sold. Hatchco sold 10 acres to Kalahari on December 30, 1997. Hatchco still retains title to approximately three of the original 13 acres.

The primary release mechanisms for contaminants at OU1 include leaks, spills, direct discharge, and infiltration to the surface or sub-surface. It is believed that the facility used various solvents to service, clean, and maintain the trailers and tank trucks. Media effected by the potential releases include surface soil, sub-surface soil, groundwater, and air. During the Remedial Investigation no surface water impacts were identified within the OU1 groundwater plume boundary.

2.1.2 Previous Investigations and Actions Taken At OU1

Several environmental investigations and actions occurred at OU1. In 1995, Hatchco hired TRTech to perform a Phase I Environmental Survey on the original 13-acre Hatchco property. In the Phase I, TRTech identified several environmental issues, including chlorinated solvent contamination of the shallow aquifer.

In 1996, EPA's Superfund Technical Assessment and Response Team (START) took several samples in the area in an attempt to identify the extent of groundwater contamination. Results of the START report confirmed the presence of chlorinated solvents in groundwater at the Jack B. Kelley Hatchco property with concentrations as high as 980 parts per billion (ppb).

From 1995 to 1998 Hatchco removed structures associated with potential past releases of contaminants of concern (an underground waste oil storage tank, a French drain, and an underground oil/water separator).

The waste from these operations was stored in a 200 gallon underground tank. In 1995, the tank was removed. Before removal, material from the tank was pumped into 55 gallon drums for disposal. The waste in the drums was characterized as containing waste petroleum products, carbon disulfide, methylene chloride, TCE, lead, and mercury. In 1996, the Utah Solid and Hazardous Waste Control Board issued a "no further corrective action" letter.

During the French drain removal, the oil residue in the drain was tested and, although chlorinated solvents were present in the sample, the oil waste was reported to be nonhazardous. According to the Hatchco Remedial Investigation Report, a contractor encountered gravel in the French drain at a depth of approximately 6-feet below the ground surface. The contaminated soils were treated with water and nutrients as part of a natural attenuation plan.

Preliminary Assessment (PA) – 1998. Through a Cooperative Agreement with EPA, the UDEQ conducted a Preliminary Assessment (PA) of the Hatchco/Jack B. Kelley Trucking Property, EPA ID# UTD003807930. At the time the PA was conducted (1998) OU1 covered 13 acres of land as shown in Figure 2. The property is rectangular in shape with the long axis oriented west to east. The eastern half of the property was covered with natural grasses. The western half was covered with asphalt and was occupied by buildings (welding shop, wash rack, and mechanical

shop) where semi-trucks and trailers were repaired and maintained. Grease, oils and solvents, including chlorinated solvents, were used extensively in the mechanics shop during the operation of the facility.

The principal PA conclusions are that soils at the Hatchco property were contaminated and that the wash rack and adjacent area appeared to be the primary source of contamination for OU1. Groundwater in the shallow aquifer was contaminated with solvents and presented the primary pathway for contaminants to migrate to potential receptors. There are 45 public supply wells which serve 104,477 people and over 2,000 privately owned wells located within a 4-mile radius from the Site. Additional information and conclusions are presented in the PA (1998). The primary contaminants of concern were chlorinated solvents. Other potential contaminants in the area include: greases, oils, diesel fuel, waste fuel, and waste oil.

The oil/water separator was removed in 1998. Petroleum hydrocarbons were detected at a depth of about three feet under the surface. However, no chlorinated solvents were detected at this location.

In 1998, TRTech conducted a pilot test and operated a low-volume air sparging system to remove vinyl chloride from the shallow aquifer. Reportedly, the pilot test was effective in reducing PCE, TCE and VC concentrations in groundwater; however, a report on the air sparging system results and groundwater impacts downgradient from the Hatchco property was not made available for EPA's review.

The Hatchco property is now vacant and fenced, all structures and contaminated surface soils have been removed. Detailed information on previous investigations and actions taken at the OU1 can be found in the Remedial Investigation Final Report (2003).

2.1.3 Remedial Investigation/Feasibility Study, 2001-2006

EPA and Hatchco entered into an Administrative Order on Consent for (AOC) for a Remedial Investigation/Feasibility Study (RI/FS) at Operable Unit 1, EPA Docket No. CERCLA-8-2001-14. Hatchco completed the RI/FS in July 2004. The purpose of the RI/FS was to determine the nature and extent of contamination caused by the release or threatened release of hazardous substances, pollutants or contaminants at or from the Hatchco property and to determine and evaluate alternatives to prevent, mitigate, or otherwise respond to, or remedy, any release or threatened release from the property. The results from the Hatchco RI confirmed the presence of hazardous substances, pollutants or contaminants in the Hatchco property sub-surface soil and in groundwater.

Because it was believed that there was a potential secondary source, the Hatchco RI only investigated the nature and extent of the groundwater plume from the Hatchco property to the suspected secondary source location area (in the vicinity of MW-14S) (Figure 5A). EPA took the lead to address the suspected secondary source via the Remedial Investigation/Feasibility Study (RI/FS) for Operable Unit 2 (OU2), study on Area of Interested Number 3 (A-3), illustrated on Figure 3. A potential secondary source was suspected in this area because the groundwater concentrations upgradient of A-3 were lower than the concentration at the location of the suspected secondary source. Results from the A-3 investigation do not support the presence of a

secondary source. In fact, subsequent sampling results collected via the OU2 RI, show a significant TCE concentration decrease at A-3 (MW-14S) and a concentration increase at two wells (MW-02S and MW-02D) located downgradient of the suspected secondary source, (Figure 5). At MW-14-S, TCE concentrations decreased from 551ug/L (July 2003) to 3.1ug/L (April 2005), and 110 ug/L (May 2006). TCE concentrations in MW-02S range from 58 ug/L (2001), 36 ug/L (April 2005), to 420 ug/L (May 2006). At MW-02D, TCE concentrations range from 280 ug/L (2001), to 380 ug/L (April 2005), and 240 ug/L (May 2006). Although it was not demonstrated by the remedial investigations for OU1 and OU2, it is conceivable that the plume condition observed during the Hatchco RI, was due to the 1998 air sparging pilot test. Groundwater sample results from April 2005 and the May 2006 sampling events are provided in Tables 1 and 2.

Also, results from the remedial investigation for OU2 identified twenty-six domestic wells and a municipal water supply well located within a mile side-gradient of the OU1 groundwater plume. The closest domestic wells are located within 1,000 feet from the leading edge of the TCE plume (Figure 5). The results of the groundwater contamination are presented in Section 2.6 of this ROD.

In December 2004, the EPA decided to complete the RI/FS for OU2 prior to issuing the ROD for OU1. The decision was to allow for a broad assessment of the groundwater conditions at the Site. Also, in order not to stall the work at OU1, EPA decided to conduct a pilot test to collect data to support the remedial design for the Proposed Cleanup Plan for OU1. In July 2005, EPA initiated a Pilot Study Implementation Plan designed to collect data on natural attenuation parameters, to assess biodegradation rates, and to test the organic compounds selected to accelerate the degradation of the contaminants of concern. EPA completed the RI/FS for OU2 in August 2006.

2.1.4 Ecological Risks

Ecological risks were determined to be below the level of concern. This conclusion was based on an evaluation of the low potential for contaminated groundwater to discharge to surface water, the lack of suitable natural habitat in the area, and the industrial/commercial location of the Site (HDR Base Line Risk Assessment (BRA)). Aquatic impacts are deemed unlikely due to the distance between the Site and the Great Salt Lake (approx. 2.5 miles) and the fact that no surface water features were identified within the OU1 groundwater plume boundary.

2.1.5 Enforcement Activities

In July of 1997, EPA completed an initial/preliminary Potentially Responsible Party Search for the Site, which was augmented by the issuance of information request letters to W.S. Hatch Company in January of 2001 and February of 2003. Other parties of interest for OU1 were sent information request letters in January of 2001 and in June of 2002.

On September 28, 2001, Hatchco entered into an Administrative Order on Consent for the Remedial Investigation/Feasibility Study for OU1.

In April of 2004, EPA issued a General Notice of Potential Liability and Intent to Perfect a Superfund Lien letter to W.S. Hatch Company. On July 7, 2004, the Lien was recorded with the Davis County Clerk and Recorder's Office.

Negotiations for future work at OU1 ensued. Hatchco claimed a limited ability to pay and submitted financial information to substantiate their claim. On December 9, 2005, W.S. Hatch Company, Inc. and its parent corporation Jack B. Kelley, Inc. entered into an Administrative Settlement Agreement and Order on Consent settling their liability for all response costs incurred and paid, or to be incurred and paid, in connection with the work conducted at OU1in exchange for a $490,000 settlement ($450,000 from Hatchco and $40,000 from Jack B. Kelley).

2.2 Community Participation

Community involvement efforts for OU1 included issuance of fact sheets, holding public meetings, publishing public notices and press releases, and developing a community involvement plan. An information repository was established at the Davis County Library, South Branch, enabling the public to view documents used in making decisions about this Site. A summary of these activities is included in this section.

In December 2000, a public notice was published announcing EPA's decision to propose the listing of the Bountiful/Woods Cross Site on the National Priorities List. In March 2001, a fact sheet was issued to inform the public of a domestic well sampling program for residential properties that might be impacted by the Site's contaminants. A news release announcing the final listing of the Site was published in local papers in September, 2001.

In the summer of 2002, EPA conducted community interviews to provide an assessment of the community concerns. Included in the interviews were elected officials, city engineers, public works directors, and community members that may be impacted by the Site's contaminants. The results of the interviews are presented in the August 2002, Community Involvement Plan.

In September 2002, a public health assessment, conducted by the U.S. Department of Health and Human Services - Public Health Service Agency for Toxic Substances and Disease Registry, was made available for public review and comment. Also that month, the public received a Project Update Fact Sheet. The Utah Department of Health, Davis County Health Department, Utah Department of Environmental Quality, and the Environmental Protection Agency produced a brochure about the chemicals in the groundwater and what it meant to the public.

In April 2004, a meeting with Bountiful City officials and Davis County officials was held to discuss the need to do additional water sampling. A Fact Sheet announcing the plans for more sampling was mailed to local residents.

An Administrative Record was placed in the Davis County Library, South Branch on August 5, 2004, as well as the EPA Region 8 Superfund Record Center, and at the Utah Department of Environmental Quality - Division of Environmental Response and Remediation. The notice of the availability of the Administrative Record and an announcement of the Proposed Plan public

meeting was published in the Davis County Clipper and the Deseret News on August 7, 2004.

The Proposed Plan Fact Sheet was issued to the public on August 5, 2004. The Utah Department of Environmental Quality and the Environmental Protection Agency accepted comments on the plan from August 7, 2004 to September 7, 2004. On August 24, 2004, a public meeting was held to discuss the various alternatives and to review in more depth the preferred alternative. On August 23, EPA received a request from Hatchco to extend the comment period to October 7, 2004. A response to the comments received during this period is included in the Responsiveness Summary located in Appendix B of this ROD. In July of 2005, EPA issued a fact sheet to announce to the public the initiation of a pilot study to support the remedial design for OU1.

2.3 Scope and Role of Operable Unit or Response Action

Due to the complexity of the groundwater contamination, the Bountiful/Woods Cross/5th South PCE Plume NPL Site was divided into two operable units. This ROD addresses Operable Unit 1 (OU1) and identifies the selected remedy to clean up the groundwater contaminated with TCE and the degradation products emanating from the Hatchco property. The remedy documented in this ROD includes remedial action necessary to protect human health and the environment.

The remedial investigations concluded that the groundwater in the shallow aquifer is contaminated with VOCs above the Maximum Contaminant Levels (MCLs). The risk assessments concluded that the groundwater should not be used as a drinking water supply or for indoor domestic use. The Hatchco risk assessment determined that the sub-surface at the Hatchco property is contaminated, but does not pose a direct exposure concern to human health. However, the sub-surface poses a continued source of contamination to groundwater. The selected remedy utilizes In Situ Chemical/Biological Remediation processes to accelerate the degradation of the contaminants of concern in groundwater and will accelerate the reduction of risks to human health and the environment.

The remedy also requires an Environmental Notice and Institutional Controls (May 17, 2006) on the Hatchco property deed describing the nature and extent of the sub-surface and groundwater contamination at OU1. Institutional controls will also be established to prohibit the installation of new domestic wells within the projected perimeter of the plume and will set controls to prevent the indoor use of groundwater from existing wells.

Operable Unit 2 (OU2) is addressed under the RI/FS for OU2. The OU2 ROD will address PCE contamination emanating from the vicinity of the Bountiful Family Cleaners property located east and upgradient of the Holly Refining & Marketing Company. The RI/FS for OU2 was completed in August 2006. The Bountiful Cleaners, Inc., owners of the Bountiful Family Cleaners property, entered into an AOC to perform a limited Remedial Investigation for their property only, at Operable Unit 2, EPA Docket No. CERCLA-8-2003-002. It is anticipated that the remedy for OU2 will be conducted using Superfund Trust funds.

2.4 Summary of OU1 Characteristics

2.4.1 Conceptual OU1 Model

As discussed in Section 2.2.1, the Hatchco property was used to repair, clean, and maintain tractor trailers and tank trucks. This land utilization presented the conditions for spills, leaks and/or direct discharges of petroleum hydrocarbons, solvents (such as benzene, toluene) and chlorinated solvents to the surface soil. Infiltration of these solvents into the soil resulted in elevated levels of contamination. All the contaminated surface soil has been removed. Currently the remaining contaminated sub-surface and the contaminated shallow groundwater on the Hatchco property are the primary sources of contamination. Other than presenting a continuous source of groundwater contamination, the contaminated sub-surface, 15 to 20 feet below the ground surface (bgs), does not present a direct human health exposure concern.

Based on the current and likely future land uses in the area of the PCE/TCE plume, the human populations most likely to be exposed include current and future residents, and current and future workers in area businesses. Potential exposure pathways by which residents and workers might be exposed to VOCs in groundwater include the following:

- Direct ingestion of the water (from a well) as drinking water
- Dermal contact with the water while showering or bathing
- Inhalation of volatile organic chemicals (VOCs) that are released from indoor water uses to indoor air
- Inhalation of VOCs that are released from groundwater and migrate through soil into indoor air
- Inhalation of VOCs that are released from groundwater and migrate through soil into outdoor air
- Incidental ingestion of groundwater that occurs at the surface

However, not all of these potential exposure routes to groundwater are likely to be of equal concern. Exposure scenarios that are considered most likely to be of concern are shown in the Site Conceptual Model by boxes containing a solid circle (Figure 4). Greatest attention is focused on quantification of exposure from these pathways in order to determine if the pathways contribute significant risk. Pathways that are judged to contribute only minor exposures are shown by boxes with an open circle. Section 3.2 of the Baseline Human Health and Ecological Risk Assessment (BHHRA) presents a detailed description of these pathways, and an analysis of their relative importance for human exposure. These scenarios were considered based on the expected current and future land use.

Although no domestic groundwater use is known within the perimeter of the delineated groundwater plume at OU1, contaminated groundwater is flowing to the north-west where several domestic groundwater wells are located. Some of these domestic wells are downgradient and within 1,000 feet from the leading edge of the plume (Figure 5).

2.4.2 Overview of OU1

Operable Unit 1, which includes the Hatchco property plus the extent of the TCE groundwater plume, is located in Woods Cross, Davis County, Utah. OU1 is delineated by the extent of the groundwater plume and consists of approximately 42 acres of land. The contaminated plume extends approximately 3,000 feet downgradient from the Hatchco property. The source of the groundwater contamination is within the perimeter of the three-acre Hatchco property. Currently, the three acre lot is vacant and fenced, and all structures and the contaminated surface soil have been removed.

The highest TCE concentrations were detected in the sub-surface, 15 to 25 feet below the ground surface (bgs), beneath the wash rack formerly located approximately in the center of the property (Figures 6 and 7). A groundwater plume contaminated with TCE and degradation products starts at this location and extends to the west-northwest (Figure 5).

2.4.3 Geology

Operable Unit 1 is located west of the Wasatch Mountains and east of the Great Salt Lake in an area known as the Wasatch Front (Figure 8). The Hatchco property is mainly flat and is located in the Basin and Range province on the southern portion of the East Shore Aquifer. The Basin fill deposits are characterized by unconsolidated and semi-consolidated sediments eroded from the mountains. The sediments tend to be thicker and coarser at the base of the mountains and become inter-bedded with gravel, sand, silts, and clay towards the Great Salt Lake.

Much of the north and east portions of OU1 are covered with gravel. Surface soils in non-driving areas consist of dark brown to black sandy, gravelly clay. All surface soils at sampling locations were fill material. Native soils begin approximately 4 to 8 feet bgs at most sub-surface sampling locations. Native sub-surface soils are primarily medium-stiff to stiff, medium to highly plastic clays to approximately 17 feet bgs. Below the clays are layers of dense, well-graded sand and gravel, which alternate with layers of sandy, silty clay. Water is typically encountered in sand and gravel zones at 24 to 30 feet bgs. A clay aquiclude exists at the Hatchco property at approximately 36 feet bgs. This low-permeability layer extends to 55 feet bgs in the boring used to install deep monitoring well MW-3D, below which there are clays alternating with minor (1 to 3 foot) layers of sand to 80 feet bgs. Below the clay at 80 feet bgs is sand and gravel. This sand and gravel extends to 91 feet bgs (MW-3D boring) and terminates at a clay base (Figures 5B and 9).

In borings outside the Hatchco property boundary line, approximately ten feet of native clay lies below fill and extends to 14 feet bgs. The vertical extent of the sand and gravel is not well known at OU1 because downgradient borings were completed only a few feet below the depth where water was encountered. However, boring MW-12S was advanced three feet into dry-to-moist clay beginning at 24 feet bgs. As shown in Figure 9, this clay could be interpreted to be located in the same aquiclude encountered in the Hatchco property borings.

2.4.4 Hydrogeology

East Shore Aquifer
Groundwater in the area is characterized by the East Shore Aquifer. The aquifer has been subdivided into the shallow, intermediate and the deep artesian aquifers. Wells believed to be completed within the shallow aquifer have completion depths between 60 to 250 feet bgs. The intermediate aquifer is generally about 250 to 500 feet bgs, and the deep aquifer has depths greater than 500 feet bgs. The shallow, intermediate, and deep portions of the East Shore aquifer may also be hydraulically connected with one another (CDM 2002). Aquifer recharge is generally interpreted to be at the base of the Wasatch Mountains where the coarser deposits are present and runoff infiltration occurs. Groundwater flow is generally from the east-southeast towards the west, following the topography towards the Great Salt Lake.

In the vicinity of OU1, two saturated intervals are considered relevant. At the Hatchco property, a shallow unconfined interval is present at depths ranging from about 24 to 30 feet bgs, with a deeper confined interval being present at approximately 80 feet bgs. A clay layer separates the shallow and deep intervals. The shallow interval is approximately 10 feet thick, and is present in the unconsolidated, coarse-grained alluvial sediments noted in borings completed at OU1. The confined interval, investigated at the borings for deep monitoring wells MW-1D and MW-3D, lies below the clay that was first encountered at approximately 36-feet bgs. The vertical extent of this clay is approximately 44 feet (with occurrences of minor, 1 to 3 foot thick layers of silt and sand), extending to a depth of 80 feet bgs. The deep interval begins at 80 feet bgs and continues to an undetermined depth, although clay was encountered at 91 feet bgs in both deep borings. Downgradient of the Hatchco property, groundwater is encountered at shallower depths (unconfined aquifer) due to ground elevations dropping to the west. Groundwater can be seen at depths as shallow as 6.5 feet bgs (MW-14S). Monitoring wells were installed in the unconfined aquifer just below depths where saturated conditions were first encountered. For this reason, the deepest well, installed outside the Hatchco property, extends to 30 feet bgs (MW-11S).

Historically, the shallow aquifer in the area is mainly use for industrial and irrigation purposes. However, the shallow aquifer is classified by the State of Utah as a Class II drinking water source (drinking water quality groundwater) and some domestic wells are believed to be installed in this aquifer.

2.4.5 Sampling Strategy

During the remedial investigations the following media were sampled: surface soil, sub-surface soil, and groundwater. There are no surface water features within the area impacted by OU1.

Over two hundred locations were sampled via a soil gas survey designed to locate and delineate potential hot-spots. Thirteen surface soil samples (2 to 6 inches bgs) and fifteen sub-surface samples (7 to 35 feet bgs) were collected and confirmed the sub-surface contamination in the area delineated by the soil gas survey. The soil gas samples were analyzed for VOCs and BTEX compounds which include: Benzene, Toluene, Ethylbenzene and Xylene. The maximum TCE concentration detected in sub-surface soil at OU1 was 90,956 ug/kg.

Six geoprobe samples and a total of thirteen groundwater monitoring wells were installed to assess water quality conditions, to evaluate hydraulic gradients, and to define the nature and extent of groundwater contamination (Figure 5A). Within the Hatchco property, the locations of the geoprobes and the monitoring wells were selected based on the soil gas survey, and the sub-surface sample results. The maximum TCE groundwater concentration detected on the Hatchco property was 1348 ug/L (Geoprobe Sample 207) at a depth of 36 feet. The maximum TCE groundwater concentration detected in the Hatchco property wells was 207 ug/L (MS-3S, screen 23 to 33 feet bgs). The maximum TCE concentration detected in wells outside the property boundary was 507 ug/L (MS-14, screen 12 to 22 feet bgs). For comparison the MCL concentration for TCE is 5 ug/L.

In addition, 19 groundwater samples were collected during the remedial investigation report for OU2 to assess the groundwater quality in Area 3. Contaminants of concern whose concentrations exceed MCLs are listed in Table 3.

2.4.6 Known and/or Suspected Sources of Contamination

The remedial investigations confirmed TCE contamination in the sub-surface and groundwater at OU1. Suspected sources of contamination include solvents utilized to clean and maintain tractor trailers and tank trucks. The Hatchco RI data show elevated concentrations of VOCs in the sub-surface located under the former wash rack and along the French drain. The data from the RI support that the bulk of the waste stream infiltrated into the ground surface from the drain system servicing the facility - mainly the wash rack, the French drain, and the oil-water separator.

2.5 Types of Contamination and Affected Media

2.5.1 Surface Soil

There are no contaminants of concern in surface soils. Surface soil data reveal VOCs at levels near or below the detection limits. This is not unexpected considering the volatility of the contaminants of concern and the fact that the Hatchco property has been vacant and inactive for several years. Also, prior to the RI, between 1995 and 1998, hot spots of contaminated surface soils were excavated, treated on the property and removed.

2.5.2 Sub-surface Soil

The waste materials considered for remedial action at OU1 include the saturated zone, at the Hatchco property, which contains concentrations of COCs posing a potential source for groundwater contamination. Contaminated sub-soils do not pose a health risk above a level of concern either through direct contact or through the inhalation of COC vapors collected in a hypothetical future OU1 structure.

In the absence of specific leaching tests on unsaturated zone soils, at OU1, soil screening guidance (Technical Background Document, EPA, 1996a) was used to conservatively identify the TCE concentration in soils that may constitute a source for groundwater contamination. The

default threshold concentration for TCE is 60 ug/kg (based on a 20-fold dilution/attenuation factor). This default value is driven by the potential of TCE in soils to act as a source for groundwater contamination. Concentrations of TCE alone, in sub-surface soils range from 2,834 ug/kg (Boring 64), 22,292 ug/kg (Boring 207) to 90,956 ug/kg (Boring 82), (Figure 10).

Using this default value (60 ug/kg) and the measured TCE concentration in the sub-soils at the Hatchco property, a soil waste volume of 21,350 cubic feet was estimated. Calculations supporting this estimate are found in Appendix K of the Hatchco RI Report. Average concentration for the sub-soil mass is estimated at 29,000 ug/kg. Additional concentrations of contaminants detected in sub-soil samples are listed in Table 4.

A review of the soil logs illustrates that, in general, the thickness of the contaminated zone ranges from 2 to 3 feet; however, this range is based on field observations, and it may vary by several feet.

2.5.3 Suspected Secondary Source

EPA conducted a separate investigation (CDM RI Phase 2, Remedial investigation for OU-2, Area 3) on sub-surface soil on a suspected secondary source. The location of this source was believed to be in the vicinity of Jensen Automotive, an auto body shop located at 500 South and 950 West, and slightly south of monitoring well MW-14S. EPA collected 25 soil samples in the vadose zone (portion of earth located above the groundwater table). The samples were collected around the Jensen Automobile building using six north-to-south transects at approximately 50 feet intervals. The sample results show a single detect on the northwest side of the auto shop, at a TCE concentration of 0.09 ug/kg, (Figure 11). A provable location of a secondary source may be directly under the building; however, there is no evidence of drains, sumps or cracks in the floor inside the building. After considering the presence of only one positive low concentration (TCE) sample result with 24 non-detects and the absence of a physical pathway to the sub-building soils, EPA opted to spend the resources to clean up the groundwater.

2.6 Groundwater

2.6.1 Permanent Monitoring Wells

During the RI, groundwater samples were obtained from temporary wells, permanent monitoring wells, and domestic wells. The domestic wells were sampled as part of the remedial investigation for OU2.

A total of thirteen (11 shallow and 2 deep) monitoring wells were installed to evaluate the groundwater contamination at OU1 (Figures 5A and 5B). Monitoring wells MW-1S and MW-1D were installed approximately 150 feet southeast of the 3-acre Hatchco property to establish background water quality conditions. Monitoring wells MW-2S, MW-3S, MW3D and MW-4S were installed within the 3-acre Hatchco property, and seven wells were located downgradient and sidegradient of the property. The well locations were selected based on soil gas survey results and direct-push soil boring sampling activities discussed in Section 6.3.2 and 6.3.3 of the

2003 RI report. All monitoring wells were developed and sampled for VOCs for four calendar quarters. With the exception of MW-1D and MW 3D, the groundwater samples were collected close to the water table surface. The sample results for the contaminants of concern exceeding MCLs are presented in Section 4.2.

Monitoring wells MW-2S, MW-3S and MW-10S were selected to assess the natural degradation indicators for the contaminants of concern (natural attenuation) at OU1. These monitoring wells were chosen based on their location relative to the axis of the contaminant plume, and because these wells have shown the highest concentrations of chlorinated organics. Results of the natural attenuation parameters are presented in Table 5, and presented in Section 7.4.3 of the Hatchco RI report.

2.6.2 Domestic Wells

The UDEQ, in cooperation with EPA Region 8, collected groundwater samples from 26 domestic wells. Although some of these wells are screened at deeper zones of the aquifer, geographically they are located within 1,500 feet downgradient from the leading edge of the TCE plume. Of the 26 domestic wells analyzed for VOCs, 20 wells show detects of PCE and TCE. Results of the contamination of domestic wells (designated as DW) are presented on Tables 6.

Of these results, six exceed the Utah standard for Maximum Contaminant Level or the Federal Safe Drinking Water Act Maximum Contaminant Level (MCLs) for PCE. It should be noted that, although TCE has been detected in some domestic wells, none of these wells exceed the MCL value for TCE, which is the main contaminant of concern attributed to OU1. Furthermore, the data collected during the remedial investigations did not show a direct link between the TCE plume emanating from the Hatchco property and the TCE concentrations detected in the domestic wells.

2.6.3 Municipal well - West Bountiful 5th South Well

An existing municipal production well is located approximately 2,600 feet from the Hatchco property. The well belongs to the Weber Basin Water Conservation District and is located in the intersection of West 500 South Street and 1100 West Street. The District briefly operated this well in 2003, but ceased operations after receiving complaints from local residents that their domestic wells had lost significant water pressure. Currently, the District is not using the well, but in the future it intends to operate the well to meet irrigation demands. None of the sample results reported by the City detected contaminants of concern.

2.6.4 Groundwater Contamination

The groundwater flow direction follows the Site's topography, flowing from the higher area contours at the eastern edge of the Hatchco property toward the north-west direction to the Great Salt Lake. The Warm Springs Fault is located approximately at the same location as the leading edge of the TCE groundwater plume. Several artesian domestic wells (DW) and a municipal well (West Bountiful 5th South Well) are located near the western edge of the TCE plume (Figures 5 and 8). Although the City has not reported detection of contaminants of concern in the

municipal well, some detections of PCE and TCE have been reported in the sample results from domestic wells (DW-17, DW-18, DW-19, DW-20, DW-21, DW-25) (see Table 6). It is worth noting that these wells operate under artesian conditions. The well screens are set on the middle and the lower aquifers and the fate and transport of the contaminants of concern from the OU1 source to the domestic wells has not been fully defined. However, results from the remedial investigation from OU2 support that the Warm Springs Fault may allow contamination to migrate downward in the aquifer.

The vertical gradient between the unconfined (shallow) and the confined (lower) aquifer was obtained through two well clusters. One well cluster (MW-1S and MW-1D) is located upgradient of the Hatchco property; the second cluster (MW-3S and MW-3D) is located on the Hatchco property. The vertical gradient was determined by measuring the difference between the hydraulic head of the two wells and dividing by the vertical distance from the bottom of the shallow well screen to the top of the deep screen. The results showed, at the Hatchco property, a downward gradient of 0.13 ft/ft and 0.12 ft/ft (Hatchco RI, Table 6-2) for the first and the second clusters, respectively. The potentiometric surface of the shallow aquifer indicates the dominant groundwater flow is to the west-northwest. However, a southerly flow component is inferred to exist south of the Hatchco property. This southerly flow component was not resolved during the RI; however, a corrective action investigation at the Holly Refinery (Request for Corrective Action Plan – Holly Refinery and Light Oil Dock, February 8, 2006) discovered an apparent groundwater mound beneath the Light Oil Dock (LOD) facility. Pressure testing was conducted to determine if any of the lines in the area were leaking. The testing revealed a leak in the sewer line in the middle bay of the loading terminal which is the possible source of the observed groundwater mound. The LOD facility is located approximately 300 feet north of the center of the Hatchco property. This leak may have been the cause for the southerly flow component observed during the OU1 RI. It is likely that groundwater level measurements collected during the RD/RA would confirm this hypothesis.

The magnitude of the horizontal groundwater gradient to the west-northwest across the shallow monitoring well network has been calculated to average 0.003 ft/ft over the four quarters of data. The magnitude of the horizontal gradient is greater (0.005 ft/ft) to the west of MW-10S. East of MW-10S the gradient is lower, at 0.001 ft/ft. An average hydraulic gradient of 0.005 ft/ft is estimated for the southerly flow component.

Three wells (MW-2S, MW-3S, and MW-12S) were selected to estimate the hydraulic conductivity of the shallow aquifer. The calculated values results show a hydraulic conductivity of 1.4 ft/day (MW-2S), 67.9 ft/day (MW-3S), and 2.7 ft/day (MW-12S), with a geometric mean hydraulic conductivity of 6.3 ft/day. These wells are screened in silty sand, clean sand, and silty-to-clean sand respectively. It should be noted that although a hydraulic conductivity of 6.3 ft/day was used for the groundwater model; the hydraulic conductivity at OU1 is variable based on the soil composition and on the results calculated for the three monitoring wells.

2.7 Location of Contamination and Migration

2.7.1 Lateral and Vertical Extent of Contamination

Surface soils are not contaminated above a level of concern; therefore, surface soils do not pose a threat to human health and the environment. Contaminated surface soils were excavated, treated and removed from the Hatchco property.

Sub-surface soils are contaminated and they pose a potential continuous source to groundwater contamination. The estimated volume of contaminated soils with the potential to be a continuous source of TCE contamination is estimated at 21,325 cubic feet. This sub-soil contamination is at a depth that ranges from 9 to 20 feet (DPS-207 and DPS-082, respectively). The thickness of the contaminated sub-soils layer ranges from 2 to 3 feet. Field observations indicate that in some cases this layer may vary by several feet. The inferred area of sub-surface soil contamination is presented in Figure 12.

Groundwater at OU1 is contaminated with PCE, TCE, DCE, and VC at concentrations that exceed State and Federal drinking water standards. The groundwater depths within the perimeter of the TCE plume ranges from 12 to 49 feet below the ground surface and the plume extends approximately 3,000 feet downgradient from the Hatchco property. The domestic wells where TCE has been detected are located on the Upper (0 to 59 feet bgs), Middle (60 to 160 feet bgs), and the Lower (greater than 160 feet bgs) portions of the aquifer (Figure 13). As noted previously, the data collected during the RIs did not show a direct link between the TCE plume emanating from the Hatchco property and the TCE concentration detected in the domestic wells.

3.0 Current and Potential Future Surface and Sub-Surface Routes of Human or Environmental Exposure

The land at OU1 is utilized for industrial, commercial, agricultural and residential purposes. The Hatchco property is currently vacant and fenced. Properties adjacent to the Hatchco property include the Holly Refinery and Marketing Company to the north, a vacant lot to the east (Kalahari property), and roadways to south and west.

The HDR Baseline Risk Assessment (BRA) evaluated cancer and non-cancer risks for a construction worker in a trench, an indoor worker, working within the Hatchco property boundary, and the current and hypothetical future resident living on and in the near proximity of the Hatchco property boundary. Exposure scenarios considered direct contact/ingestion of contaminated soils for the trench worker as well as inhalation risk due to intrusion of organic vapors in the trench and indoor spaces. The BRA determined that risks were below a level of concern (cancer risk range 1E-04 and Hazard Index <1) for all scenarios, for the potential exposure to contaminated soils. An assessment of potential ecological risks was limited to a discussion of the current conditions at OU1 and a reconnaissance to assess potential for contaminated groundwater to discharge to surface water. No groundwater discharge points were observed within the area impacted by the groundwater plume at OU1. As a result, ecological

risks are considered to be below a level of concern.

The sub-surface soil at the Hatchco property is contaminated and it presents a potential source for contaminants to leach to groundwater. High precipitation events could cause contaminated sub-soils to continue to release contaminants to groundwater.

3.1 Likelihood for Migration

The likelihood for migration of the contaminants of concern is high. The groundwater at OU1 is contaminated and it will continue to migrate outside the Hatchco property boundary. Heavy rains and fluctuating groundwater levels could cause contaminants of concern to continue to leach from the sub-soils into groundwater and flow towards a residential area where several domestic wells are located.

3.2 Current and Potential Future Land and Water Uses

3.2.1 Land Uses

The Hatchco property is currently vacant, fenced, and is zoned for commercial use. The future use of the Hatchco property remains uncertain although it is anticipated that it will be consistent with its current use. Other land uses of the area impacted by the contaminated groundwater plume at OU1 include: commercial, industrial, agricultural, and residential.

3.2.2 Groundwater Use

There are several domestic wells and one municipal well within a 1,500 foot radius from the leading edge of the TCE groundwater plume. One of these wells in the West Bountiful area is completed in the shallow (upper-unconfined, 0 to 59 feet bgs) aquifer. The remainder of the wells are completed in the middle (confined aquifer, approximately 60 to 160 feet bgs) or the lower aquifer (> 160 feet bgs). Although it is believed that these wells are currently used only for irrigation, in the past, some wells have been used for drinking water, and it is considered possible these wells could also be used for drinking or in the future for other indoor water use. Although contaminants of concern have been detected in several domestic wells, the source of this contamination, as of the date of this ROD, has not been linked to the Hatchco property. However, about 300 feet west of MW-2S and MW-2D is the Warm Springs Fault. Results from the CDM RI/FS for OU2 show the fault may allow the contaminant mass from OU2 to be transported vertically and downgradient of the fault into the deeper aquifer zone. The same transport mechanism may be responsible for delivering contaminants of concern from OU1 into the lower aquifer zones (Figures 5 and 13).

The Weber Basing Conservation District operates a municipal well (West Bountiful 5th, South Well). The well is located within 500 feet of the leading edge of the plume and approximately 2,600 feet west of the Hatchco property. The well intake screen is placed between 325 to 600 feet bgs. The District plans to use this well for irrigation as the demand increases with population growth.

4.0 Summary of OU1 Risks

4.1 Summary of Human Health and Ecological Risk Assessment

The Baseline Human Health Risk Assessment (BHHRA) estimates the potential risk to humans and ecological receptors from contaminants of concern related to OU1, assuming that no action is taken to cleanup the contamination. The risk assessment identifies the contaminants and exposure pathways that need to be addressed by the remedial action.

For human receptors, EPA's decision to take action is based primarily on the presence of contamination in groundwater at levels that exceed drinking water standards. Because the concentration of contaminants in groundwater tends to decrease as a function of distance from the source, and because most humans who use groundwater draw their water from a single well, human exposure was evaluated on a well-by-well basis. Current residents, living near OU1 may be impacted in the future by contaminants migrating downgradient from the Hatchco property. Because it is believed that most workers or residents do not drink water from the shallow aquifer, the exposure pathway to groundwater ingestion is considered mainly hypothetical, although some exceptions may occur.

In October 2005, EPA and UDEQ conducted interviews to assess if any property owners with domestic wells located downgradient from the Hatchco property were drinking contaminated groundwater. Results from the interviews indicate that there are up to seven residences where the well water is used for drinking; however, in all cases, the contamination levels are below the MCL. None of the well owners interviewed were interested in being connected to municipal water wells as long as the contaminant levels remained below screening levels. Two other wells are contaminated at levels above the MCL; however, the wells are used for stock watering only.

For ecological receptors, exposure can only occur if the groundwater is discharged at the surface (e.g., into a streams, lakes, or wetlands). Although there are no locations where contaminated groundwater from OU1 is known to discharge to the surface, screening-level risks were calculated for aquatic receptors as if water from wells completed in the upper aquifer might reach the surface (SRC, July 2004).

It is important to note that these risk estimates are screening-level and are based on very conservative assumptions. In particular, it is assumed the concentration of VOCs in surface water is the same as the highest value in groundwater. However, if groundwater were recharging to surface water bodies at or near OU1, it is likely that processes such as volatilization, degradation, and dilution would act to reduce the concentration in surface water to much lower levels than in the groundwater; consequently, the resulting risks to aquatic receptors would likely be lower. This is consistent with the limited surface water data that are available, where VOCs were not detected in grab samples collected from two canals at the western edge of the Site.

A reconnaissance, in the vicinity of OU1, was conducted to identify any locations where groundwater discharges to surface water. The survey revealed no surface water downgradient of OU1 or within the TCE plume (no streams or wetlands were noted between the Hatchco property and 1100 West Street). Mill Creek is a perennial stream located east of OU1 and flows to the

north. The probability of impacts to Mill Creek from the contaminants emanating from OU1 is considered to be very low for the following reasons:

1) Mill Creek is located hydraulically upgradient from OU1.
2) The depth to groundwater exceeds 20-feet.
3) The creek is concrete lined in the vicinity of OU1.

Also, it is important to note that no ecologically sensitive scenarios were identified due to the lack of suitable habitat, and the industrial/commercial/residential settings around OU1. Given the distance from OU1 to the Great Salt Lake (approx. 2.5 miles) and the fact that no surface water features were identified within the TCE plume boundaries, the baseline risk assessments concluded that OU1 poses no adverse ecological impacts. Consequently, ecological risks will not be presented in subsequent sections of this ROD. Additional information on the ecological exposure pathways and exposure point concentrations are provided in the BHHRA (SRC 2005).

4.2 Identification of Chemicals of Concern

The BHHRA evaluated soil, sub-surface soil and groundwater. Surface water was not evaluated because it is not present within the area impacted by OU1. Only the sub-surface soil and groundwater media were found to have Chemicals of Concern (COCs). The chemicals of potential concern for OU1 evaluated quantitatively in the BHHRA risk assessments are presented in Table 7.

Risks at OU1 are primarily due to TCE and/or VC, with the exception of two locations in the proximity of OU1. At location MW-3S/MW-3D, the risks are primarily due to PCE; at location MW03U the risks are due mainly to high concentrations of Methyl Tert-Buthyl Ether (MTBE). It has been established that PCE contamination at MW-3S/MW-3D is due to a potential upgradient source. The source for the MTBE contamination is the former Phillips Petroleum Refinery (now owned and operated by Holly Refinery and Marketing Co.). Therefore, PCE contamination will be addressed under the ROD for OU2. MTBE contamination is being addressed under a corrective action program under the oversight of the UDEQ – Division of Water Quality Program.

TCE is the only contaminant of concern identified in sub-surface soil at OU1. TCE and degradation products, in the sub-soil (saturated and unsaturated zone) pose a long-term concern as a continuous source to groundwater contamination. The principal reason for concern at OU1 is groundwater contamination and the expansion of the plume to residential areas where groundwater is being used mainly for irrigation. It must be noted that there may be few cases where groundwater is used indoors (DW 26) but, in all the domestic wells where TCE has been detected, the concentration levels are below the MCLs. Table 3 shows the groundwater results for OU1 sample locations exceeding MCLs.

The COCs in groundwater, the frequency of detection, the range of concentrations, and the exposure point concentrations are presented in Table 8.

4.3 Exposure Assessment - Hatchco Property

The Hatchco property is currently undeveloped and fenced, minimizing direct human exposure. Exposure within the property boundary is limited to two hypothetical future use scenarios: a hypothetical future worker associated with construction or utilities installation, and a hypothetical future worker inside any building that might be constructed on the property. A residential scenario at this property was not considered because the property is currently vacant, is zoned for commercial use and Hatchco intends to develop the land consistent with its current zoning.

The first exposure scenario at the Hatchco property assumes that an outdoor trench worker may be exposed to contaminants of potential concern (COPC) during construction of a building. This worker is assumed to be involved in construction activities (e.g., digging a foundation, installing utilities) in a 5 feet-deep trench. A trench depth of 5 feet is a conservative estimate based on the footer depth required for slab-on-grade construction. This estimate includes 32 inches for the foundation wall, plus a typical 8 inches footer and an additional 12 inches for utility lines to run beneath the footer. In addition, EPA soil screening guidance cites exposure depths between zero and one meter for construction activities (i.e., excavation, dozing, grading, tilling). This scenario represents the highest exposure potential at OU1.

The potential complete exposure pathways for the trench worker include incidental ingestion of sub-surface soil and inhalation of VOCs that emanate from sub-surface soil to outdoor air. The depth to groundwater at the Hatchco property ranges from 24 to 30 feet bgs; therefore, the trench worker would not be exposed directly to groundwater. The dermal exposure pathway is considered incomplete for all on-site receptors, based on EPA guidance for evaluating dermal exposures to chemicals (EPA/540/R/99/005, July 2004). The guidance does not provide a dermal absorption value for VOCs and states that volatile organic compounds would tend to be volatilized from the soil on skin and should be accounted for via inhalation routes in the combined exposure pathway analysis.

In the second exposure scenario, the potential exists for a future indoor worker to be exposed to COPCs via inhalation of VOCs that emanate from sub-surface soil or groundwater to indoor air in a structure that might be built on the Hatchco property. Johnson and Ettinger modeling was used to estimate indoor air concentrations that might result from volatilization of chemicals in sub-surface soil or groundwater through the vadose zone and a building's foundation to the enclosed space. Inhalation of VOCs is the only potentially complete exposure pathway for this scenario, because the lack of COPCs in surface soils and exposure to soils is not anticipated for a hypothetical future indoor worker due to the nature of indoor worker activities (EPA 2001a).

4.4 Exposure Assessment - Downgradient of the Hatchco Property

Based on the evaluations provided by the OU2 and OU1 risk assessments, only three exposure pathways warranted a quantitative risk evaluation, and are presented in this ROD.

- Direct ingestion of water (from a well) as drinking water

- Inhalation of VOCs that are released to indoor air from indoor use of groundwater
- Inhalation of VOCs that are released from groundwater and migrate through soil into indoor air

4.5 Human Pathways

4.5.1 Direct Ingestion

As noted in Section 2.5.4, the shallow aquifer is classified by the State of Utah as a Class II drinking water source. Several domestic wells have been installed in this aquifer and within 1,500 feet from the leading edge of the TCE plume. Therefore, it is possible that humans may ingest groundwater as drinking water (Figures 4 and 5). If so, drinking water ingestion is likely to be a major source of exposure; therefore, this pathway was evaluated quantitatively.

4.5.2 Inhalation of VOCs Released to Indoor Air from Indoor Water Uses

When VOCs are present in water that is used for indoor purposes by residents (e.g., showering, dishwashing, clothes washing, toilets, sinks, cooking) or commercial operations (e.g., process water), these VOCs may escape from the water into indoor air, leading to inhalation exposure. Measurements and calculations both indicate that this pathway can be significant; therefore, this pathway was evaluated quantitatively for both residents and workers.

4.5.3 Inhalation of VOCs Released from Groundwater to Air Via Soil Transport

Groundwater contaminated with VOCs may release those VOCs into soil gas, and the VOCs may diffuse upward through pores in the soil and be released at the surface. If the surface is not covered by a building, the VOCs enter outdoor air where they are diluted and dispersed by wind. Hence, inhalation of VOCs in outdoor air is not considered to be an important exposure route. However, if the VOCs approach the surface at a location near a building, the soil gas may be drawn into the building and the concentration in the building may tend to build up. Inhalation of VOCs in indoor air volatilized from soil gas emanating from groundwater and/or sub-surface soil is considered a complete and potentially significant pathway; therefore, this pathway was evaluated quantitatively.

4.6 Toxicity Assessment

The toxicity assessment considered both carcinogenic and non-carcinogenic effects. Tables 9 and 10 provide the exposure parameters and the cancer toxicity information relevant to OU1. The tables list the default exposure parameters recommended by EPA for evaluation of workers' and residents' exposure by ingestion of groundwater and inhalation of VOCs in indoor air. The BHHRA utilized information from the Integrated Risk Information System (IRIS), EPA Provisional Values, or as cited by EPA-related reports.

4.7 Risk Characterization

For carcinogens, the risks of cancer from exposure to a chemical are generally expressed as the incremental probability of an individual's developing cancer over a lifetime, 70 years, as a result of exposure to each chemical. This value is calculated from the average chronic daily intake of the chemical from the site, averaged over a lifetime (CDI_L), and the slope factor (SF) for the chemical. Excess lifetime cancer risk is calculated from the following equation:

Cancer Risk = CDI_L x SF

where:
Cancer Risk = a unitless probability (e.g., 2E-04) of an individual's developing cancer
CDI_L = chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor, expressed as (mg/kg-day)-1.

Excess cancer risks are summed across all chemicals of concern and all exposure pathways that contribute to exposure of an individual in a given population.

In general, the EPA considers excess cancer risks that are below one in one million (1E-06) to be so small as to be negligible and excess risks above one in ten thousand (1E-04) to be sufficiently large to merit some sort of intervention or remediation. Excess cancer risks that range between 1E-04 and 1E-06 are generally not considered large enough to warrant action under Superfund (USEPA 1991b), although this is evaluated on a case-by-case basis.

The potential for non-cancer effect is evaluated by calculating the ratio of exposure (CDI) to toxicity level (RfD) for a chemical over a specified time period (e.g., lifetime). The RfD represents a level that an individual may be exposed to and not expected to have any harmful effects. This ratio is called the Hazard Quotient and is calculated as follows:

HQ = CDI_L / RfD

where:

HQ = Hazard Quotient
CDI_L = Chronic Daily Intake (mg/kg-day) for non-cancer effects
RfD = Reference Dose (mg/kg-day)

If the HQ for a chemical is equal to or less than 1, it is believed that there is no appreciable risk that non-cancer health effects will occur. If an HQ is greater than 1, there is some possibility that non-cancer effects may occur, although an HQ above 1 does not indicate an effect will definitely occur. This is because of the margin of safety inherent in the derivation of all RfD values. However, the larger the HQ value, the more likely it is that an adverse effect may occur.

If exposure to the chemical occurs by more than one pathway, the HQ values are added across pathways to yield a total indicator risk referred to as a Hazard Index (HI). If exposure occurs to more than one chemical, and if two or more chemicals act on the same target tissue or organ

system (e.g., the liver), then the total risk of adverse effects in that tissue is calculated by adding the HI values across those chemicals.

4.8 Results for Human Receptors

The detailed calculations of cancer and non-cancer risks to humans from exposure to groundwater are presented in Appendix F of the BHHRA. Results are summarized below. In accordance with EPA guidance, all risk values are expressed to one significant figure.

As presented in Section 4.2.2 of the BHHRA, there is uncertainty in the oral and inhalation slope factors for TCE. Thus, a range of slope factors was used to evaluate risks to both residents and workers. As a consequence, the risk summary tables described below present a range of cancer risks (minimum and maximum) instead of a single point estimate. For both oral and inhalation exposure, the minimum value is based on the "old" slope factors that were originally established in 1987 and then withdrawn from Integrated Risk Information System (IRIS). For oral exposure, the maximum is based on the new oral slope factor (USEPA 2001b), and the maximum for inhalation is based on the assumption that the new inhalation slope factor is equal to the new oral slope factor. Thus, the range of human cancer risks presented in the risk tables in this section provides an index of the range of uncertainty in the cancer risk resulting from exposure to TCE.

4.8.1 Risks from Ingestion of Groundwater

Results for current or future residents and workers are summarized in Table 11. As noted previously, it is believed that most residents and workers do not currently ingest water from the shallow aquifer for drinking water. Thus, risks from this pathway are largely hypothetical, although some exceptions may occur. Note that only risks that exceed E-04 are listed on the tables provided in this ROD. Additional information on exposure risks are provided in the BHHRA for each exposure station.

Non-cancer risks from the ingestion of groundwater are below a level of concern in all cases (HI<1) for current or future residents and workers and therefore are not included in this ROD. At most locations, excess cancer risks are within or below EPA's target risk range of (1E-04 to 1E-06) for residents and workers. However, there are several stations where cancer risks exceed the upper end of EPA's target risk range. Most of these stations are located within the southern boundary of the Site, including the Holly Refinery, within Study Area 3, the Hatchco property, and in the vicinity of the Hatchco property. Risks in these areas are primarily due to TCE and/or vinyl chloride, with the exception of two locations on or near the Hatchco property (Stations MW-1S and MW-3D) where risks are due to PCE. At one station near the southern boundary of the Site, (MW03U), high concentrations (2,400 to 13,000 µg/L) of Methyl Tert-Butyl Ether (MTBE) are the main source of the excess cancer risks. The risk from MTBE contamination is being addressed under a corrective action program under the oversight of the UDEQ – Division of Water Quality Program.

4.8.2 Risks from Inhalation of VOCs Intruding from Groundwater by Vapor Intrusion

Intrusion of VOCs from groundwater into indoor air is a complete exposure pathway for current and future residents and workers. The magnitude of the risk will depend on the concentration of contaminants of concern in groundwater underlying the residential or commercial buildings and the TCE slope factor used in the risk calculations. Detailed calculations of risk from inhalation of VOCs released to indoor air from the vapor intrusion pathway are presented in Appendix F of the BHHRA. Results to current or future residents and workers are summarized in Table 12.

For current or future residents and workers, non-cancer risks from the vapor intrusion pathway are below a level of concern in all cases (HI<1); therefore, these risks are not included in this ROD. Excess cancer risks are within or below EPA's target risk range of 1E-04 to 1E-06 for residents at most stations (groundwater at the well head) and for workers at all stations. However, there are a few stations where excess cancer risks to current or future residents from TCE may exceed 1E-04, depending on which inhalation slope factor is used. These stations are located at the Hatchco property and within Study Area 3. However, stations within the Hatchco property are not currently residential, so these risks are hypothetical. Land use within Study Area 3 is mixed (commercial and residential), and thus risks to residents could be either current or hypothetical.

4.8.3 Risks from Inhalation of VOCs Released During Indoor Use of Groundwater

As noted previously, it is believed that most current residents do not use water from the shallow aquifer for indoor purposes, although some exceptions may exist. Thus, risks from this pathway to residents are mainly hypothetical.

With the exception of station MW03U, non-cancer risks are at or below a level of concern in all cases (HI<1) for current or future residents and workers, and therefore are not discussed in this ROD. At MW03U the non-cancer risk is slightly above a level of concern (HI = 2E+00) for residents due to MTBE. At most stations, excess cancer risks are within or below EPA's target risk range of (1E-04 to 1E-06) for residents and workers. However, as presented in Table 13, there are several stations where cancer risks exceed the upper end of EPA's target risk range. These stations are located in likely source areas. For stations located within Study Area 3, the Hatchco property, and at the Holly Refinery, excess cancer risks are primarily due to TCE. At stations WPH10, DP35, and at several stations near the Hatchco property, vinyl chloride also contributes to excess cancer risks.

4.8.4 Combined Risks from All Exposure Pathways

Table 14 presents a summary of the range of risks which might occur if the same resident or worker were exposed by all three of the primary exposure pathways at a well (groundwater ingestion, inhalation of VOCs intruding into indoor air from groundwater, and inhalation of VOCs released to indoor air from indoor water). As seen, excess cancer risks exceed the upper

end of EPA's target risk range (1E-04) for residents and workers at several stations. These exceedences are due mainly to risks attributable to ingestion of groundwater with lower risks from inhalation of VOCs released to air from indoor use of groundwater and inhalation of VOCs intruding from groundwater. In cases where excess cancer risks to residents and workers are due to TCE, the risks are primarily due to the inhalation of VOCs from the indoor use of groundwater pathways. With the exception of MTBE, when all exposure pathways are combined, non-cancer risks are below a level of concern (HI < 1) for workers for all stations; therefore, non-cancer risks are not discussed in this ROD. The source of the MTBE contamination is not attributed to the Hatchco property and is being addressed under UDEQ-DWQ program (UDEQ November 1, 2005); consequently, MTBE contamination is not subject to the remedy specified in this ROD.

5.0 Uncertainties

Quantitative evaluation of the risks to human or ecological receptors from environmental contamination is frequently limited by uncertainty (lack of precise knowledge) regarding a number of important exposure and toxicity factors. Thus, exposure and risk calculations are usually derived using a number of estimated values. In general, when data are limited or absent, the exposure and risk parameters selected are chosen in a way that is intentionally conservative. That is, the values selected are more likely to overestimate than underestimate actual risk. However, some assumptions and approaches used in risk assessment may tend to underestimate risks. It is important for risk managers and the public to keep these uncertainties in mind when interpreting the results of a risk assessment. Additional information on the main sources of uncertainties in the exposure and risk calculations is provided in Section 6.0 of the BHHRA (SRC 2005).

5.1 Summary of Uncertainties

Table 15 summarizes the direction and potential magnitude of the errors introduced by the uncertainties discussed above. Because of these uncertainties, none of the exposure and risk calculations presented above should be interpreted as accurate measures of the true risk. Rather, all values should be interpreted as uncertain estimates. Because many (but not all) of the approaches for dealing with uncertainty are intended to be conservative (i.e., are more likely to overestimate than underestimate), the risk values above should generally be thought of as high-end estimates of the true risk, and actual risks are probably somewhat lower than the calculated values. The exposure assumptions used to calculate risks were, in general, conservative. This generally results in the overestimation of risks. For several Chemicals of Potential Concern (COPCs), the maximum concentrations were used instead of the 95 percent Upper Concentration Limit of the Mean (UCL). This typically results in the overestimation of risk. Quantitative risk calculations for future residential exposure to groundwater were calculated on the maximally impacted wells, or worst-case analysis.

Evaluation of all the uncertainties utilized in the BHHRA suggests that the risks have been overestimated. Thus, the EPA's goal to ensure that health risks are not underestimated was accomplished.

Additional information on the main sources of uncertainties in the exposure and risk calculations performed are provided in Section 6.0 of the Baseline Human and Ecological Risk Assessment for the Bountiful/Woods Cross Site (July 2004).

6.0 Remedial Action Objectives

Remedial Action Objectives (RAOs) for Operable Unit 1 - Hatchco Property were developed from a review of the results of the Site-wide sampling data for OU1 and OU2, evaluation of the BHHRA for OU1 and OU2, fate and transport evaluations, and review of Applicable or Relevant and Appropriate Requirements (ARARs).

6.1 Need for Remedial Action

Past operations conducted at the Hatchco property resulted in contamination of sub-surface soils and groundwater. The key contaminant of concern for sub-surface soils is TCE. The key contaminants of concern for groundwater include: TCE, PCE, cis-1,2-dichloroethene, VC, naphthalene, benzene and 1,2,4-trimethylbenzene. TCE and its degradation products (DCE and VC) pose the majority of the risk at OU1. MTBE contamination is also present in the OU1 groundwater plume, but the source is attributed to the Holly Refinery Marketing Company (former Phillips 66). MTBE contamination is being addressed under a State of Utah Department of Environmental Quality, Division of Water Quality Program; consequently, MTBE is not addressed under this ROD.

The groundwater plume, under current conditions, will continue to expand and potentially could increase the contaminant concentrations in groundwater underlying residences and in domestic wells. Active remediation will eliminate or reduce potential exposure pathways for human receptors. Effective remediation at OU1 will treat groundwater at the source, at potential hot spots, and will restore groundwater to beneficial uses within a time that is reasonable. The response action selected in this Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

6.2 Sub-Soil (Saturated Zone) Remedial Action Objective

The RAOs for the sub-soil is to reduce the potential for contaminant migration from sub-soils to groundwater and therefore, to reduce the unacceptable risk to human health and the environment. Based on Soil Screening Guidance (Technical Background Document, EPA, 1996a), the default threshold concentration for TCE in soils is driven by the potential for it to act as a source for groundwater contamination. The default value is 60 ug/kg (based on a 20-fold dilution/attenuation factor). The Remedial Action Objective for the Sub-Soil (saturated zone soils) is to reduce the potential of the saturated zone soils to act as a source to groundwater contamination

6.3 Groundwater Remedial Action Objectives

The Remedial Action Objectives at OU1 are:

- Prevent unacceptable exposure risk to current and future human populations posed by ingestion of contaminated groundwater, and prevent potential inhalation of VOCs released during the indoor use of contaminated groundwater

- Return groundwater to beneficial use if possible or practicable

6.4 Clean-up Goals

The clean-up goals were derived predominantly from the human health risk assessment and ARARs. At OU1, the potential cancer risk from exposure to contaminated groundwater exceeds $1x10^{-6}$ for residents and workers.

Under the NCP, EPA's goal is to reduce the excess cancer risk to the acceptable range of $1x10^{-4}$ to $1x10^{-6}$. For residential exposures, $1x10^{-6}$ is the threshold risk factor for making risk management decisions, but risk managers may consider risk factors up to $1x10^{-4}$ before taking action. For OU1, EPA selected the MCLs or risk base concentrations based on a hazard index of one and a cancer risk factor of 1E-4 assuming a Reasonable Maximum Exposure (RME) through ingestion of contaminated groundwater. Chemical-specific cleanup goals for groundwater are provided in Section 13.2. Non-cancer risks are below a level of concern (HQ < 1). Ecological risks are below a level of concern.

7.0 Description of Alternatives

Several clean-up options and technologies were considered to clean up the groundwater at OU1. This section summarizes each of the nine alternatives selected for detailed analysis in the Final Focused Feasibility Study Report OU1 (2004). For consistency and clarity, the alternatives are numbered to correspond with the numbers provided in the FFS report.

7.1 Common Elements

Institutional Controls (ICs)

Each groundwater alternative (except the "No Action") includes ICs to prevent or restrict groundwater use until the aquifer is returned to beneficial use. Since the remedy will not result in an unrestricted use and unlimited exposure for the long term, ICs are necessary to limit unacceptable exposures at OU1.

The principal Site concern at OU1 is the ingestion of groundwater contaminated with PCE, TCE

degradation products (DCE, VC), and the potential inhalation of VOC vapors from groundwater that could accumulate in indoor spaces. The target areas for potential future inhalation concerns are where new residential or commercial structures may be constructed and the current residential areas located downgradient from the current extent of the groundwater plume. Groundwater modeling can be used to predict the correlation between solvent plumes and VOC accumulation in buildings. However, modeling alone is usually not a reliable indicator where buildings are located above solvent plumes. Groundwater monitoring coupled with soil vapor intrusion testing will alert the agencies of the potential vapor intrusion impacts to current and future residential areas. ICs (including land use controls, restricting groundwater uses on domestic wells, or municipal wells, restricting new well development, or requiring mitigation for vapor intrusion,) may be used to eliminate these potential exposure pathways. These ICs are a common element to all alternatives presented in this ROD. The objectives of the ICs are presented below:

ICs Objectives

1) Restrict the use of groundwater as a drinking water source until the MCLs are met;
2) Restrict new well development for drinking water and domestic use along the projected path of the contaminated groundwater plume; and,
3) Recommend vapor intrusion mitigation in all permits for new construction of commercial (office space) and/or residential buildings planned on or along the projected path of the contaminated plume.

Implementation of ICs will be the result of agreements with the State and the appropriate local jurisdictions. Details on the proposed ICs for the Site generally will be presented to the public via the Proposed Plan for OU2. None of the remedies rely exclusively on ICs to achieve protectiveness.

Monitoring

Except for the “No Action” alternative, groundwater monitoring (as well as ICs monitoring) is a common element to all alternatives. Monitoring is a key component to ensure protection of human health and the environment and to measure the effectiveness of the remedy.

7.2 Alternative 1 - No Action Alternative

Estimated construction timeframe: None
Regulations governing the Superfund program require that the "no action" alternative be evaluated generally to establish a baseline for comparison. Under this alternative, EPA would leave soil and groundwater in its current condition and would not take any action at OU1 to prevent human exposure to groundwater or to prevent further degradation of groundwater resources. The source material and contaminated groundwater would be left in place without treatment, allowing continued migration of the contaminants of concern. Any reduction in groundwater concentrations would be due to natural migration, dispersion, attenuation, and degradation processes.

7.3 Alternative 2 - Monitored Natural Attenuation (MNA) With Institutional Controls

Estimated construction timeframe: 6 months
Estimated date range to achieve clean-up objectives downgradient from the Hatchco property: 2022 to 2057 - based on groundwater modeling for the TCE plume (FS Report, 2004).
This alternative allows natural processes to restore groundwater to a beneficial use. Under this alternative the concentrations of VOCs would be reduced to Safe Drinking Water standards (MCLs). Long term groundwater monitoring will be required to demonstrate MNA, contaminants degradation rates and to ensure the effectiveness of the remedy.
Estimated Present Worth Cost (2003 estimate): $67,998.00

7.4 Alternative 3 - Surface Capping with Institutional Controls

Estimated construction timeframe: 6 months
Estimated time to achieve clean-up objectives: Shorter time frame than under Alternatives 1 and 2. This alternative involves installing a low-permeability barrier over the area on the Hatchco property that contains contaminated sub-soils. The barrier would minimize the potential for rain, snow melt or irrigation water to seep through contaminated soils and into groundwater. Cap material may include a building footprint, geomembrane, compacted clay, concrete, asphalt or some combination of these.
Estimated Present Worth Cost (2003 estimate): $147,207.00

7.5 Alternative 4 - Soil Vapor Extraction with Institutional Controls

Estimated construction timeframe: 6 months
Estimated time to achieve clean-up objectives: Shorter time frame than alternatives 1, 2 and 3. It is assumed that the Soil Vapor Extraction (SVE) system will operate for five years.
This alternative calls for the construction of a soil vapor extraction system to remove contaminants from vadose zone soils (unsaturated soils above the groundwater table). The system would require multiple vertical soil gas recovery wells or several lengths of slotted pipe installed in the target treatment area. A vacuum would collect vapors and discharge them directly into the atmosphere.
Estimated Present Worth Cost (2003 estimate): $316,644.00

7.6 Alternative 5 - Excavation with Offsite Disposal

This alternative was rejected during the screening process due to the quantity of overburden soil to access the relative thin and potentially discontinuous layer of contamination, and the high cost when compared to the other alternatives.

7.7 Alternative 6 - Enhanced In-Situ Biological/Chemical Remediation with Institutional Controls

Estimated construction timeframe: 6 months
Estimated time to achieve clean-up objectives: According to the FFS, it will take shorter time frame than alternatives 1, 2, 3, and 4; however, based on a Technical Memorandum – Cost Estimate for Full-scale Remediation at OU1 (September 18, 2006), the groundwater remedy for OU1 may be completed in as few as 4 years at the source area and 15 years in the plume to as long as approximately 50 years depending on the rate of MNA in the plume fringe. Under this alternative, a substance (electron donor i.e., emulsified soybean oil) would be injected into the aquifer to stimulate bacteria activity and speed up the breakdown of the VOCs. The overall purpose of this alternative would be to stimulate the breakdown of VOCs at the source, to accelerate the degradation rates of contaminants of concern in the saturated zone, groundwater, and prevent the expansion of the groundwater plume (Figure 12).
Estimated Present Worth Cost (2003 estimate): $328,800.00

7.8 Alternative 7a - Treatment via Air Stripping With Institutional Controls

Estimated construction timeframe: 6 months
Estimated date to achieve clean-up objectives in the off-site area: Shorter time frame than alternatives 1, 2, 3, and 4.
This alternative involves capturing contaminated groundwater onsite without adversely affecting a petroleum plume, which originates to the north outside the Hatchco property. An extraction well located near the west property boundary would remove contaminated groundwater. The extracted water would cascade over a column designed to distribute the contaminated water into a thin film. Air would be blown up through the column. The air would cause the VOCs to vaporize and be carried out the column into the atmosphere. Treated groundwater would be discharged to surface water via the storm sewer.
Estimated Present Worth Cost (2003 estimate): $335,409.00

7.9 Alternative 7b - Treatment via Ultraviolet Oxidation With Institutional Controls

Estimated construction time frame: 6 months
Estimated date to achieve clean-up objectives in the off-site area: Shorter time frame than alternatives 1, 2, 3, and 4.
The extraction system would be the same as Alternative 7a. The groundwater would be treated via an ultraviolet oxidation (UV) process. Hydrogen peroxide would be injected in the extracted groundwater prior to the UV light treatment. The VOCs are destroyed in the UV oxidation process. Treated groundwater would be discharged to surface water via the storm sewer system.
Estimated Present Worth Cost (2003 estimate): $625,705.00

7.10 Alternative 7c - Discharge to Public Owned Treatment Works (POTW) With Institutional Controls

Estimated Construction Time frame: 6 months
Estimated date to achieve clean-up objectives in the off-site area: Shorter time frame than alternatives 1, 2, 3, and 4.
The extraction system is the same as Alternative 7a. The untreated groundwater would be discharged to the South Davis Sewer District Facility. Extracted groundwater would be conveyed via a pipe to a point within the District's system. Contaminant toxicity, mobility, and volume would be reduced through treatment at the POTW.
Estimated Present Worth Cost (2003 estimate): $206,556.00

7.11 Summary

The Present Worth Cost was estimated to mitigate groundwater contamination emanating from the Hatchco property only. The cost did not include an estimate to remediate potential hot spots or potential secondary sources. Except for the "No Action" alternative, in the long-term, all alternatives are expected to attain the Cleanup Goals. For additional information, details on each alternative are available in the Final Focused Feasibility Study Report (July 2004)

8.0 Comparative Analysis of Alternatives Criteria

The NCP requires that each remedial alternative analyzed in detail in the FS documents be evaluated according to specific criteria. The purpose of this evaluation is to promote consistent identification of the relative advantages and disadvantages of each alternative, thereby guiding selection of remedies offering the most effective and efficient means of achieving the OU1 clean-up goals. There are nine criteria by which feasible remedial alternatives are evaluated. While all nine criteria are important, they are weighted differently in the decision-making process depending on whether they describe or involve protection of human health and the environment or compliance with Federal or State statutes and regulations (threshold criteria), a consideration of technical or socioeconomic merits (primary balancing criteria), or the evaluation of non-EPA reviewers that may influence an EPA decision (modifying criteria).

Threshold Criteria

(1) Overall Protection of Human Health and the Environment
(2) Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Primary Balancing Criteria

(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

Modifying Criteria

(8) State acceptance
(9) Community acceptance

8.1 Evaluation of the Proposed Alternative

8.1.1 Overall Protection of Human Health and the Environment.

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or ICs.

With ICs, all the alternatives, except the "no action" alternative, would adequately protect human health and the environment by eliminating, reducing, or controlling risk through treatment, engineering controls, and/or ICs. The VOCs are either treated to safe levels, or over time break down to safe levels through natural processes. It should be noted that for the remedy to be protective during the time it will take to reach safe levels, all the alternatives rely on ICs. Table 16 presents a summary of the comparative analysis of alternatives.

With the exception of Alternative 2 - Monitored Natural Attenuation (MNA), and Alternative 3 - Surface Capping, all groundwater alternatives would eliminate human exposure risks from direct contact with contaminated groundwater through treatment.

Alternatives 2 and 3 do not prevent contaminants at the source area from flowing down gradient of the Hatchco property. Alternative 3 - Surface Capping, would reduce infiltration by seeping rain, snow melt, or irrigation; therefore, reducing oxygen delivery through some elimination of recharge. While capping would enhance reductive dechlorination of the parent compounds (PCE, TCE), it may decrease the degradation rate of DCE and VC, and allow these compounds to eventually discharge into groundwater. Capping of contaminated soils would reduce the amount of contaminants leaching into groundwater and would allow natural processes to eventually mitigate or significantly reduce the levels in the soils. Because capping does not fully contain the source material and regional groundwater levels fluctuate severely (depending on regional precipitation and changes in water table elevations), Alternative 3 may not reach the clean-up objectives in a time effective manner and may actually increase the time to achieve groundwater restoration.

Because the "no action" alternative is not protective of human health and the environment, it will be eliminated from further consideration. The uncertainties associated with Alternative 3 - "Capping" as a stand alone remedy also warrant dropping it from further evaluation.

8.1.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA and 40 C.F.R. §300.430(f)(1)(ii)(B) of the NCP require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations, which are collectively referred to as ARARs, unless such ARARs are waived under CERCLA 121(d)(4).

All remaining alternatives would meet their respective State and federal ARARs. See Tables 17 and 18.

8.1.3 Long-term Effectiveness and Permanence

This criterion evaluates the ability of an alternative to maintain protection of human health and the environment over time. The long-term effectiveness of the alternatives relies heavily on ICs for protection of human health. They also rely to a significant degree on natural processes to attain clean-up objectives. Alternatives 7a & 7b are effective in the long-term by reducing contaminant concentrations in groundwater. Pump and treatment technologies have proven to be effective for treating VOCs in groundwater. Alternatives 7a, 7b and 7c would also have low, long-term risks, but the remedy would take longer to achieve the clean-up objectives.

Alternative 2 - Monitored Natural Attenuation, has some uncertainty with regard to its effectiveness and the time required to reach final clean-up levels. Alternative 4 - Soil Vapor Extraction, would reduce contaminant concentrations in the unsaturated zone above the groundwater table but would continue to allow contaminated groundwater to migrate until the clean-up objectives are met. The groundwater treatment alternatives offer a high degree of permanence once the clean-up objectives are met.

Alternative 6 - In-Situ Biological/Chemical Remediation, would have the greatest long-term effectiveness. This alternative would accelerate the natural destruction of VOCs at the source area and in the shallow aquifer. Alternative 6 would decrease the time needed to achieve clean-up objectives at OU1. Alternative 6 treatment technology is permanent, so the long-term potential exposure risk would be low.

8.1.4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

This criterion considers the use of treatment to remove, reduce or destroy the harmful effects of the contaminants. Alternative 2 - Monitored Natural Attenuation, does not use treatment to reduce or destroy the VOCs. The alternative relies on natural processes to degrade these substances to non-harmful effects. Reduction of toxicity, mobility or volume would be achieved through a natural breakdown process. Alternative 4 - Soil Vapor Extraction, would reduce toxicity, mobility and volume at the source to some extent and consequently in the groundwater. Contaminant mass reduction would be limited to the unsaturated zone above the groundwater table. Contaminant mobility will increase by discharging recovered soil gas into the atmosphere,

although it is anticipated that the overall impact will be negligible.

Alternative 6 - In-Situ Biological/Chemical Remediation, would enhance the natural breakdown of the VOCs at the source and in groundwater, thereby accelerating the reduction of toxicity, mobility or volume of COCs. Alternative 7a - Air Stripping, contaminant mobility would increase VOCs to the atmosphere. Alternative 7b - Ultraviolet Oxidation, would reduce the contaminant toxicity, mobility or volume through the destruction of the VOCs. Alternative 7c – Discharging Untreated Groundwater to the South Davis Sewer District (the District) Facility, does not treat the VOCs, instead it relies on the District to handle the contaminated groundwater allowing the District reduce the contaminant toxicity, mobility or volume through treatment at the publicly owned treatments works (POTW). In the long-term, the portion of alternatives 7a, 7b and 7c subjected to natural breakdown processes would also attain reduction in toxicity, mobility, or volume of VOCs thru treatment and natural processes.

8.1.5 Short-term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved.

There are no short-term risks associated with Alternative 2 - Monitored Natural Attenuation. Risks associated with Alternative 4 - Soil Vapor Extraction, and Alternative 7a - Air Stripping, involve the discharge of contaminants at low levels into the atmosphere. This action would slightly increase potential health risks to the surrounding community; however, the increased risk would be negligible.

There are no short-term risks associated with implementing Alternatives 6, 7b and 7c. Short-term risk to workers associated with normal construction hazards and potential contact with contaminated water will be eliminated through appropriate controls and use of proper health and safety protocols.

8.1.6 Implementability

This criterion addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability for services and materials, administrative feasibility and coordination with other governmental entities are also considered.

All treatment technologies and remedies are readily available, generally proven, and are equally implementable without construction difficulties. There is a potential for operation and maintenance problems associated with alternatives 4, 7a, 7b and 7c. Alternative 7c - Discharging to the POTW does not treat the VOCs on-site, instead it relies on the District to handle the contaminated groundwater. Because the District may not allow untreated contaminated water to be discharged into its system, this alternative may not be implementable.

8.1.7 Cost

It should be noted that the estimated present worth cost, calculated by Hatchco to clean up the contaminants originating at the Hatchco property, represented the response cost of only a portion (approximately one-half) of the groundwater plume. Hatchco's determination was based on July 14, 2003 data and on the premise of a potential a secondary source. However, results from the CDM RI for OU2 did not support the presence of a secondary TCE source of groundwater contamination. EPA's 2006 cost estimate is based on the present worth cost to remediate the entire TCE plume and includes contract requirements and obligations not anticipated by Hatchco. Cost information to implement the selected remedy is provided in Section 12.0. Table 16, provides a cost comparison of each alternative as they were evaluated in Hatchco's 2004 FFS report.

8.1.8 State Acceptance

The State of Utah, UDEQ, participated in the development and review of the remedial investigation/feasibility study and the pilot study implementation. UDEQ provided technical comments and oversight support to all the sampling and field activities as they relate to OU1.

UDEQ supports a combination of Alternative 2 - Monitored Natural Attenuation, and Alternative 6 - Enhanced In-Situ Biological/Chemical Remediation with Institutional Controls. UDEQ has indicated that it believes that the selected remedy can accomplish the remedial action objectives presented in this ROD. UDEQ will continue to work with EPA and the cities of Bountiful and Woods Cross to ensure the remedy is protective.

8.1.9 Community Acceptance

This criterion evaluates whether the local community agrees with EPA's analyses and preferred alternative.

Because no written comments were received on the Proposed Plan from the community, and only a few comments were provided in the public meeting, it is difficult to determine community acceptance of the alternatives. There were no vocalized objections to any of the alternatives. At the public meeting, one person was concerned with the groundwater plume and the impact on her property. EPA explained that the property of interest was outside the boundary of the OU1 groundwater plume.

On August 21, 2004, the PRP requested an extension to the public comment period to allow them adequate time to comment. An extension was granted until October 7, 2004. The PRP submitted comments to EPA on October 8, 2004. Most of the comments were related to the technical aspects of the project and to challenge EPA's preferred alternative. Responses to written comments received are included in the responsiveness summary section of this report.

9.0 Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP, 40 C.F.R. §300.430(a)(1)(iii)(A)). Identifying principal threat waste combines concepts of both hazard and risk. In general, principal threat wastes are those source materials that include and contain hazardous substances, pollutants or contaminants that act as a reservoir for contamination to groundwater, surface water, or air, or act as a source for direct exposure. The source material in the sub-surface soil at OU1 is considered to be highly toxic and highly mobile, which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. The sub-soil at the Hatchco property is contaminated and is considered to be principal threat wastes because the chemicals of concern are found at concentrations that pose a significant risk to either human health or the environment should exposure occur.

10.0 Selected Remedy

10.1 Summary of the Rationale for the Selected Remedy for Groundwater Contamination

The Selected Remedy for OU1 for cleaning up the PCE/TCE groundwater plume is a combination of Alternative 2 - Monitored Natural Attenuation with Institutional Controls, and Alternative 6, Enhanced In-Situ Biological/Chemical Remediation. The combination of these alternatives would achieve all clean-up objectives by preventing exposure to groundwater and increasing the breakdown rate of VOCs (PCE/TCE) in the source material located in the saturated zone and groundwater through treatment. Groundwater monitoring and institutional controls would be required until the RAOs are met.

The monitored natural attenuation alternative (Alternative 2) was selected to monitor the natural degradation parameters to ensure that the plume emanating from the Hatchco property would decrease over time once the source material in the saturated zone and potential hot spots are remediated. Remediation is needed at OU1 because the evidence of natural attenuation in groundwater is limited (no significant decrease in groundwater concentrations over time is evident in any well), see Table 5. However, the presence of breakdown products coupled with groundwater modeling suggests that some natural breakdown is occurring, favoring the potential for natural attenuation.

EPA selected Alternative 6 over the other alternatives because it will accelerate the breakdown of VOCs at the source area. This alternative will achieve substantial risk reduction through treatment/destruction of contaminants in groundwater at the source, in the saturated zone, and the potential hot spots downgradient of the Hatchco property. Alternative 6 will more quickly reduce the risk of potential human exposure to contaminated groundwater and will accelerate the time needed to restore the aquifer to beneficial uses. The combination of Alternatives 2 and 6, hereafter referred to as the Selected Remedy, reduces the risk within a reasonable time frame when compared to the other alternatives, provides for long-term effectiveness of the remedy and

will cost less than the active groundwater treatment alternatives presented in the FFS (FFS-2003).

Since the remedy leaves contaminants in place until the clean-up objectives are achieved, EPA will conduct five-year reviews as required by statute until contaminant levels at the source and groundwater do not pose an unacceptable risk to human health and the environment. During each five-year review, EPA will review the monitoring data, and will modify the groundwater monitoring plan as appropriate to ensure the information gathered continues to support the cleanup objectives.

Based on the information available at this time, EPA and the State of Utah, Department of Environmental Quality, believe that the Selected Remedy will be protective of human health and the environment, will comply with ARARs, will be cost effective, will achieve permanent solutions, and use alternative treatment technologies to the maximum extent practicable.

11.0 Description of the Selected Remedy

A pilot study was initiated in July 2005 (Pilot Study Implementation Plan July-2005) to collect data necessary to support the ROD and the design of the selected remedy. Three specific objectives contributed to the overall purpose of the pilot test:

- Determine substrate requirements
- Determine the injection strategy
- Determine the biodegradation capability of the indigenous microbial community

The data generated by the pilot study support the Selected Remedy and will provide the basis for the remedial design. A description of the selected remedy in the sequence that is expected follows:

11.1 Step 1 - Institutional Controls (ICs)

Since contaminants of concern will remain in groundwater until the remedy is completed, ICs will be required to protect the public health and the environment. Results from the RI/FS for both OU1 and OU2, for the short and the long term do not allow for unrestricted groundwater use and unlimited exposure; therefore, ICs are necessary to limit unacceptable exposure resulting from contaminants emanating from OU1 and OU2. EPA will work with the State of Utah, UDEQ, and local jurisdictions to set reliable ICs for the entire NPL Site. The ICs will remain in place until the groundwater quality improves to allow for unrestricted use.

The combined ICs objectives for both OU1 and OU2 are:

1. Restrict the use of groundwater as a drinking water source until the MCLs are met

2. Restrict new well development for drinking water and domestic use along the projected path of the contaminated groundwater plume

3. Recommend vapor intrusion mitigation in all permits for construction of new commercial (office space) and/or residential buildings planned on or along the projected path of the contaminated plumes

11.2 Step 2 – Monitoring

Design a long-term groundwater monitoring plan to assess the effectiveness of in-situ treatment process, the natural attenuation processes, and the effectiveness of the Selected Remedy. The long-term groundwater monitoring plan will be developed during the remedial design phase for OU1. A groundwater baseline for the entire TCE plume will be required prior to implementing the remedial action. Based on groundwater modeling, additional monitoring wells will be installed at selected intervals to understand the interaction between MNA and the in-situ bioremediation. All the groundwater samples will be analyzed for VOCs and MNA parameters according to EPA MNA guidance and the long-term groundwater monitoring plan. It is assumed that two wells will be installed to monitor groundwater upgradient of the domestic wells. These wells will be used to alert EPA and/or UDEQ to either increase or decrease the level of institutional controls, (i.e., increase groundwater use restrictions, coupled with monitoring for vapor intrusion from groundwater). Groundwater monitoring will be required during the first five years after the initiation of the remedial action. The data will be evaluated annually until the first five-year review. During the five-year review, EPA, in consultation with UDEQ will evaluate the data and continue or opt to modify the groundwater monitoring plan for the subsequent five-year review period.

11.3 Step 3 - Well Abandonment

All the monitoring wells not selected for the long-term monitoring program will be abandoned according to the State of Utah's well abandonment requirements.

11.4 Step 4 - Groundwater Treatment

Injections of bioremediation amendments (injection of an electron donor i.e., emulsified soybean oil to stimulate the microbial community) will start at the source area and at one biobarrier downgradient from the source area. This first biobarrier will immediately contribute to decreasing plume concentrations, as well as ensuring that any contaminant degradation products not completely destroyed in the source area are effectively polished. After the first two years of operations it is assumed that an additional electron donor injection event will be required throughout the source area and the first biobarrier. In addition, in order to mitigate hotspots, it is anticipated that two additional biobarriers will be installed in the plume downgradient from the first biobarrier. Additional biobarrier injections to recharge the electron donor supply are anticipated 4 years and 6 years after the original injection. This will result in a total of two electron donor injections throughout the source area, and three in each of the biobarriers. This strategy may be modified based on the data collected during the remedial action. Groundwater will be monitored according to the long-term monitoring plan. At the end of the first five-year review EPA, in consultation with UDEQ, will evaluate the effectiveness of the remedy and the need for additional injections of amendments.

11.5 Step 5 - Exit Strategy

Groundwater and MNA monitoring will continue until the performance standards are reached for a period of two consecutive years. Once EPA, in consultation with UDEQ, concludes that groundwater quality has improved to allow for unrestricted use (results at or below MCLs), the remedy shall terminate.

12.0 Summary of the Estimated Remedy Costs

The Selected Remedy is expected to cost approximately $1.69M (Table 19) depending on the effectiveness of bioremediation amendments, the degree of natural attenuation, and the degradation capability of the microbial community. It is anticipated it will take about 4 years to reduce groundwater concentrations to levels that will be conducive for MNA in the source area. In the plume, the biobarriers are anticipated to reduce groundwater contaminant concentrations to levels conducive to MNA in about 8 years. Groundwater monitoring is expected to be required for at least 15 years. While the bioremediation activities will directly address the high concentration core of the plume, the lower concentration fringe will be treated solely through MNA. Given the concentrations in the plume fringe, approximately 6-7 half-lives will be required to meet MCLs. The time that will be required, and the impact that will have on the monitoring time period will be further evaluated during the remedial design.

13.0 Expected Outcomes of the Selected Remedy

13.1 Available Land Use After site Cleanup

After the groundwater is cleaned up (at or below MCLs for a period of two consecutive years) the remedy will be completed. Institutional controls restricting groundwater use shall be evaluated against the ICs needed for OU2 and may remain in place until the completion of the remedy for OU2. Based on a Technical Memorandum – Cost Estimate for Full-scale Remediation at OU1 (September 18, 2006), the groundwater remedy for OU1 may be completed in as few as 4 years in the source area and 15 years in the plume to as long as approximately 50 years depending on the rate of MNA in the plume fringe. Until the groundwater remedy is complete, restrictions will be required to prevent the groundwater from being used indoors or as a drinking water source. The potential land that will be available for unrestricted use after OU1 is cleaned up is 42 acres.

13.2 Clean-up Levels

The clean-up levels are based on unrestricted groundwater use, MCLs and MCL goals (MCLG). CERCLA Section 121(d)(2)(A)(ii) and NCP, 40 C.F.R. §300.430(e)(i)(B) directs that MCLGs, set at a level above zero, may be relevant and appropriate remedial actions involving ground or surface water that are currently or potential sources of drinking water. If the MCLG is zero, the corresponding MCL will be relevant and appropriate instead. EPA and UDEQ have adopted the National Primary Drinking Water Standards 40 CFR Part 141 FR 8750 (MCLs) as the groundwater clean-up levels for the OU1 plume. The values of the contaminants of concern are

health based standards for public drinking water systems and are listed below:

Groundwater Clean-up Levels

Chemical	MCL/MCLG [a, b] (ug/L)	State Groundwater Quality Standards (ug/L)	Preliminary Remediation Goal (ug/L)
Trichloroethene	5 / 0	5	5
Tetrachloroethene	5 / 0	5	5
Vinyl chloride	2 / 0	2	2
Cis-1, 2-dichloroethene	70 / 70	70	70
Benzene	5 / 0	5	5
napthalene	NA	NA	6.5
1,2,4-trimethylbenzene	70	70	70

[a]Land use at the OU1 source is expected to be commercial/industrial.
[b] Land use out side the Hatchco property is expected to be commercial/industrial/agricultural or residential.

13.3 Statutory Determinations

Under CERCLA 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and provide permanent solutions to the extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against offsite disposal of untreated waste. The following sections present how the Selected Remedy meets the statutory requirements:

13.4 Protection of Human Health and the Environment

The Selected Remedy will adequately protect human health and the environment through treatment, engineering controls, and/or institutional controls (NCP, 40 C.F.R. §300.430(f)(5)(ii)). The remedy will prevent unacceptable risks to current and future populations presented by direct contact, or ingestion of contaminated groundwater and the potential inhalation of vapors emanating from groundwater to indoor air. Contaminated groundwater will be treated and monitored until the contaminants of concern for OU1 are at or below federal MCLs. EPA in consultation with UDEQ will issue notices to City officials and property owners on the status of

the contaminated groundwater. The notices will be issued annually until the groundwater is returned to unrestricted use. ICs as discussed in Section 7.1 will be implemented to control exposures until the clean-up levels are met. These actions will reduce the risks to human health and are not expected to cause unacceptable short-term risks.

13.5 Compliance with Applicable or Relevant and Appropriate Requirements

Section 122(d) of CERCLA and NCP, 40 C.F.R. §300.430(f)(l)(ii)(B) require that actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations which are collectively referred to as "ARARs", unless such ARARs are waived under CERCLA Section 121(d)(4). Applicable requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address hazardous substances, the remedial action to be implemented at the site, the location of the site, or other circumstances present at the site. Relevant and appropriate requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law which, while not applicable to the hazardous materials found at the site, the remedial action itself, the site location, or other circumstances at the site, nevertheless address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the site.

There are three types of ARARs: chemical-specific; action-specific; and location-specific. Chemical-specific ARARs may determine clean-up levels for specific chemicals or discharge limits. Action-specific ARARs establish controls or restrictions on the remedial activities that are part of the remedial solution. Action-specific ARARs are triggered by the specific remedial activity rather than the contaminants present. Location-specific ARARs set limitations on remedial activities as a result of the site's location or characteristics (such as being located in a flood plain). Also considered at the time ARARs are established are policies, guidance, and other sources of information which, though not enforceable, are "to be considered" in the selection of the remedy and the implementation of the ROD. These "to be considered" standards may provide additional important benchmarks that can be considered in selecting a remedy.

The chemical-specific ARARs for the OU1 include: Safe Drinking Water Act of 1974, 42 U.S.C. Section 300(f) et seq., as amended in 1986 - establishes chemical-specific standards, applicable at the tap. Under the NCP, 40 C.F.R. §300.430(e)(2)(i)(B), these standards are relevant and appropriate to a cleanup of groundwater which is a current or potential source of drinking water. The SDWA's maximum contaminant level (MCL) is used for any contaminant whose maximum contaminant level goal (MCLG) is zero; otherwise, the MCLG is used. Table 17 provides a list of the chemical-specific ARARs that apply to OU1.

The action-specific ARARs for the selected alternatives are set out in Table 18. There are no Location Specific ARARs for OU1. The selected alternative will comply with all ARARs.

13.6 Cost Effectiveness

The Selected Remedy meets the statutory requirement that all Superfund remedies be cost-effective. A cost-effective remedy in the Superfund program is one whose "costs are proportional to its overall effectiveness" (NCP, 40 C.F.R. §300.430(f)(1)(ii)(D)). The "overall effectiveness" is determined by evaluating the following three of the five balancing criteria used in the detailed analysis of alternatives: (1) Long-term effectiveness and permanence; (2) Reduction in toxicity, mobility and volume (TMV) through treatment; and, (3) Short-term effectiveness. The overall effectiveness of the Selected Remedy is cost-effective and, therefore, represents a reasonable cost vs. benefit value. For determination of cost effectiveness, a cost effectiveness matrix was utilized in the FFS. In the matrix, the alternatives were listed in order of increasing costs. For each alternative, information was presented on long-term effectiveness and permanence, reduction of toxicity, mobility and volume through treatment, and short-term effectiveness. The information in those three categories was compared to the prior alternative listed and evaluated as to whether it was more effective, less effective, or of equal effectiveness. When considering the entire TCE plume extend (approximately 42 acres), the Selected Remedy is considered to be cost effective, because it is a permanent solution that reduces risks to human health to acceptable levels. A cost-effectiveness analysis of all the alternatives to treat the entire TCE plume was not included in the final analysis; however, it is anticipated that the cost will be proportional to the 2003 cost analysis when applied to the entire TCE plume. Therefore, it is estimated that the Selected Remedy cost would be less than or equal to the cost of some of the other permanent, risk-reducing alternatives.

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

The Selected Remedy represents the maximum extent to which a permanent solution and innovated treatment technologies can be used with a practical outcome at OU1. Of all the alternatives considered, the Selected Remedy provides the best balance of the five balancing criteria, provides for the statutory preference for treatment as the principal element, and is accepted by the State and community.

13.8 Preference for Treatment as a Principal Element

The Selected Remedy for groundwater includes treatment of the saturated zone soil in the source area. The contaminated sub-surface soil at the source area contains high concentrations of substances that are highly toxic and mobile and act as a reservoir for contaminants to move into groundwater. In-situ treatment of the saturated portion of the source will accelerate the degradation rate of the contaminants of concern and will reduce the impact to groundwater and the potential impact to domestic wells located down gradient from the leading edge of the plume.

13.9 Five Year Review Requirements

Because the Selected Remedy will not treat the sub-soils in the source area, above the groundwater table, contaminants may persist to leach into groundwater for an undetermined time. These sub-soils may continue to release hazardous substances, pollutants, or contaminants into groundwater; therefore, it may take more than five years (see Section 7.7) to meet the remedial action objectives and clean-up levels. A statutory review will be conducted within five years after the first electron donor/bioaugmentation injection (initiation of the remedial action) to ensure that the remedy is or will be protective of human health and the environment. Five year reviews will continue until the clean-up objectives are met.

14.0 Documentation of Significant Changes from Preferred Alternative of Proposed Plan

The Proposed Plan for the Bountiful/Woods Cross/5th South PCE Plume Operable Unit 1 (OU1) was released on August 2004. The initial public comment period was from August 7, 2004 to September 7, 2004 and the public meeting took place on Tuesday, August 24, 2004. On August 23, the PRP requested an extension to the public comment period. The extension was granted until October 7, 2004. The Proposed Plan identified the preferred alternatives, Monitored Natural Attenuation and In-Situ Biological/Chemical Remediation, which are also the Selected Remedy for this ROD. The Proposed Plan also included the State's support for the Selected Remedy. EPA reviewed the verbal comments submitted during the public meeting, which was transcribed by a court reporter. No written comments were received by EPA during the first 30 days of the public comment period. Three general comments and 17 specific comments were received from the PRP on October 8, 2004. It was determined that no significant changes to the selected preferred alternative were necessary or appropriate. The remedy selected in this ROD is consistent with the preferred alternative in the Proposed Plan.

PART 3: RESPONSIVENESS SUMMARY

Appendix A – Public Comment Meeting Transcript

Appendix B – Responses to Hatchco Comments