PROPOSED PLAN
FOR INTERIM ACTION REMEDY

GARVEY ELEVATOR SUPERFUND SITE, OU 1 and OU 2

HASTINGS, ADAMS COUNTY, NEBRASKA

Cecilia Tapia, Director
Superfund Division

7-19-13
Date

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Superfund

SUPERFUND PROGRAM
PROPOSED PLAN FOR INTERIM REMEDIAL ACTION

GARVEY ELEVATOR SUPERFUND SITE
OPERABLE UNITS 1 and 2
HASTINGS, NEBRASKA

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 7

July 2013

EPA PROPOSES PLAN FOR THE GARVEY ELEVATOR SUPERFUND SITE

This ***Proposed Plan*** identifies the ***Preferred Alternatives*** and provides the rationale for an ***interim remedial action*** to address contaminated soil in the area designated as ***Operable Unit*** 1 (OU 1) and the contaminated groundwater plume in the area designated as OU 2 at the Garvey Elevator Superfund Site (Site) in Hastings, Nebraska. The ***Preferred Alternative*** for OU 1 amends the soil component of the 2010 interim remedy that was selected by EPA and documented in the Interim ***Record of Decision*** (Interim ROD) signed on June 30, 2010. All other remedial actions identified in the 2010 Interim ROD will continue to be implemented. The purpose of this ***interim remedial action*** is to prevent further impacts to the groundwater from the OU 1 soils, prevent human exposures to contaminated groundwater in and near the OU 2 plume, prevent further migration of the contaminated groundwater plume, and restore the ***aquifer*** to its beneficial use.

This document is issued by the **U.S. Environmental Protection Agency**, the lead agency for Site activities, and the **Nebraska Department of Environmental Quality** (NDEQ), the support agency. The EPA, in consultation with NDEQ, will select an ***interim remedial action*** for the Site after reviewing and considering all information submitted during the 30-day public comment period. The EPA, in consultation with NDEQ, may modify the ***Preferred Alternative*** or select another response action presented in this ***Proposed Plan*** based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this ***Proposed Plan***.

OPPORTUNITIES FOR PUBLIC INVOLVEMENT

Public Comment Period:
30 days: July 31 – August 30, 2013

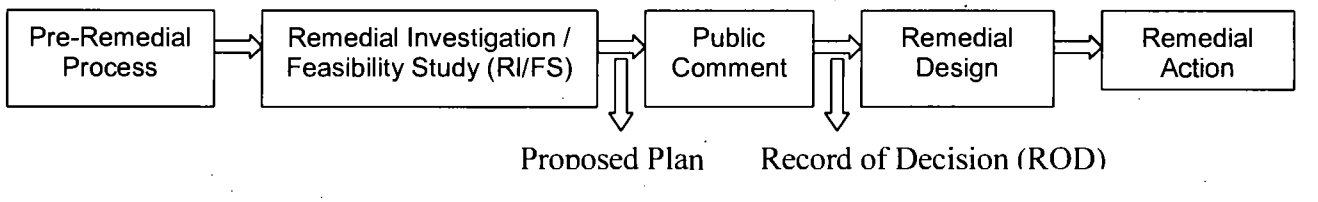
Send Written Comments to:
Ben Washburn (EPA Community Involvement Coordinator)
U.S. Environmental Protection Agency
11201 Renner Boulevard
Lenexa, Kansas 66219
Email: washburn.ben@epa.gov

Public Meeting: August 8, 2013, 6:30 p.m.
The EPA will hold a public meeting to explain the alternatives evaluated in the ***Feasibility Study***. Oral and written comments will also be accepted at the meeting. The meeting will be held at the Hastings Public Library Auditorium, 517 West Fourth Street, Hastings, Nebraska.

Information Repositories: The ***Administrative Record***, file containing the ***Proposed Plan*** and supporting documents, is available at the following locations:

U.S. EPA Records Center
11201 Renner Blvd
Lenexa, KS 66219
(913) 551-7166

Hastings Public Library
517 W. Fourth Street
Hastings, NE 68901
(402) 564-7116



[1] Words in **bold** introduce abbreviations. Words in ***bold italics*** are in the glossary. The list of abbreviations and glossary are at the end of the document.

The EPA is issuing this ***Proposed Plan*** as part of its public participation responsibilities under section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA) of 1980, as amended by the **Superfund Amendments and Reauthorization Act** of 1986, and section 300.430(f)(2) of the **National Oil and Hazardous Substances Pollution Contingency Plan** (NCP). This ***Proposed Plan*** summarizes information that can be found in greater detail in the ***Feasibility Study*** (FS) report located in the ***Administrative Record*** file which can be found in the Hastings Public Library. The EPA and NDEQ encourage the public to review these documents to gain a more comprehensive understanding of the Site and the Superfund activities being conducted there.

This ***Proposed Plan*** includes a summary of the following interim action remedial alternatives that were considered for the OU 1 soils: **Alternative S1** – No Action; **Alternative S2** – Excavation, Treatment and Disposal of Contaminated Soil and Operation of Existing ***Soil Vapor Extraction*** (SVE) System; **Alternative S3** – Expansion and Operation of the Existing SVE System; and **Alternative S4** – Excavation, Treatment and Disposal of Contaminated Soil and Expansion and Operation of the Existing SVE System.

This ***Proposed Plan*** also includes a summary of the alternatives that were considered for the OU 2 groundwater: **Alternative G1** – No Action; **Alternative G2** – Groundwater Recovery, Treatment and Discharge at Leading Edge of Plume; **Alternative G3** – Groundwater Recovery, Treatment and Discharge at Mid-plume and Leading Edge of Plume; and **Alternative G4** – In Situ Treatment at Core of Plume and Groundwater Recovery, Treatment and Discharge at Leading Edge of Plume.

The ***Preferred Alternatives*** for OU 1 soils and OU 2 groundwater are, respectively: **Alternative S4** – Excavation, Treatment and Disposal of Contaminated Soil and Expansion and Operation of the Existing SVE System and **Alternative G3** – Groundwater Recovery, Treatment and Discharge at Mid-plume and Leading Edge of Plume. These alternatives were chosen because they best address further impacts to the groundwater from source area soils, prevent human exposures to contaminated groundwater in and near the OU 2 plume, prevent further migration of the contaminated groundwater plume, and restore the ***aquifer*** to its beneficial use.

This ***Proposed Plan*** does not amend the groundwater component of the ***interim remedial action*** for OU 1, which was documented in the June 2010 Interim ROD. In accordance with the June 2010 Interim ROD, the EPA continues to perform upgrades to, and to operate and maintain the ***Groundwater Extraction and Treatment*** (GET) system that is currently addressing OU 1 (source area) groundwater. The EPA, in consultation with NDEQ, will conduct a supplemental FS to develop and evaluate a range of remedial alternatives that reflects the complexity of the remedial actions under consideration. The scope of the supplemental FS will be limited to OU 1 groundwater. The supplemental FS will provide a basis for the EPA to select a final remedial action to address OU 1 groundwater.

SITE BACKGROUND

The contamination associated with the Site consists of ***volatile organic compound*** (VOC)-contaminated soils and groundwater beneath the grain storage facility (facility), formerly owned and operated by Garvey Elevators, Inc. (Garvey), and an associated groundwater contaminant plume approximately 4 miles long that extends from the facility in an east-southeasterly direction. The facility, located at 2315 West Highway 6, is an active 8-million-bushel-capacity grain elevator currently owned and operated by **Ag Processing Inc.** (AGP). Garvey owned the facility from its construction in 1959 until the sale to AGP in 2005. Garvey operated the facility from 1959 until April 1998. The property consisted of a total of 106 acres, but historically, only the 22-acre parcel was used for facility operations. The facility consists of concrete silos, a flat storage building, steel grain storage bins and associated buildings (maintenance shop, office building, and chemical storage shed) (Figure 1).

Garvey used a liquid mixture of **carbon tetrachloride** (CCl_4) and **carbon disulfide** (CS_2) as a grain fumigant from 1959 to 1985. This fumigant mixture is commonly referred to as 80-20 fumigant. CCl_4 and CS_2 are CERCLA hazardous substances and are categorized as VOCs. In 1960, Garvey installed a 3,000-gallon **above-ground storage tank** (AST) north of the silos to store the liquid fumigant. Leaks from the buried piping between the AST and the silos and from fittings on the AST caused the release of fumigants to the soil at the Site. Garvey ceased use of the liquid fumigant in 1985 and the AST and underground piping were removed in 1986. A ban on the production and import of CCl_4 in the United States took effect on January 1, 1996.

The former Garvey facility first came to the attention of NDEQ in July 1994, when Garvey notified NDEQ of the presence of groundwater contamination at its facility. Garvey stated it did not know the source of the contamination. Enclosures to the notification letter included results of its self-described Phase I activities of direct push soil sampling and sampling of five monitoring wells that Garvey had installed. The field activities were conducted in June 1994. These activities appear to have been exploratory and Garvey did not define their purpose, scope, and intent in the notification to NDEQ. The results indicated CCl_4 was detected in the soil and groundwater samples. The CCl_4 concentrations in the groundwater exceeded the ***maximum contaminant level*** (MCL) for CCl_4 of 5 **micrograms per liter** (µg/l). In October 1994, Garvey reported that, according to these sample results, its monitoring wells, facility water supply well and several nearby private water supply wells were contaminated with CCl_4 at levels as high as 300 µg/l. In December 1994, Garvey notified NDEQ it was beginning site assessment activities in accordance with Nebraska Title 118. Garvey installed an additional 18 monitoring wells.

In April 1995, Garvey met with NDEQ to present preliminary site characterization results and to petition for entry into the **Voluntary Cleanup Program** (VCP), which is authorized by the Nebraska **Remedial Action Plan Monitoring Act** (RAPMA). The site characterization results indicated the presence of CCl_4 soil gas contamination in the unsaturated zone across approximately 1/3 of the 22-acre property and a CCl_4 contaminated groundwater plume. The extent of the plume was not totally defined, but it was found to be at least 1 mile long. The highest concentration of CCl_4 observed was 29,943 µg/l in **monitoring well** (MW)-3B. Garvey also described its efforts to provide alternate water (reportedly either installing a new well in an uncontaminated portion of the ***aquifer*** or connecting to the municipal water supply) to private water supply well users. In June 1995, NDEQ notified Garvey of its acceptance in the VCP.

In September 1995, Garvey met with NDEQ to present additional site characterization and groundwater modeling results and to propose actions to address the soil and groundwater contamination on its property. Garvey summarized its investigations in an October 1995 Site Characterization Report which can be found in the ***Administrative Record*** file.

In late 1997, the city of Hastings notified NDEQ that CCl_4 was detected in municipal well #13 located 1,500 feet northeast of the former Garvey facility, at 5 µg/l (refer to Figure 2). In November 1997, the city reassigned municipal well #13 for emergency use only. To date, its status remains unchanged.

In January 1999, Garvey completed construction of and began operating a GET system and an SVE and treatment system (Figure 2). The systems were intended only to treat contaminated soils at the source area and prevent groundwater migration from the source area. The systems were not designed to address that portion of the plume that had already migrated east-southeast of the facility. The GET system consisted of five wells screened in the shallow ***aquifer*** (RW-1 through RW-5) and three wells screened in the intermediate ***aquifer*** (RW-6, RW-7 and RW-8). Extracted groundwater was treated by an air stripping tower and then reinjected into two deep injection wells (IW-1 and IW-2) located west of the elevator. The SVE system consisted of five wells screened in the unsaturated zone from approximately 20 to 50 feet **below ground surface** (bgs) (SVE-1, SVE-3, SVE-4, SVE-7 and SVE-8) and three wells screened in the

unsaturated zone from about 60 to 110 feet bgs (SVE-9, SVE-10 and SVE-11). Based on pilot study testing, the SVE wells had an expected **radius of influence** (ROI) of 25 to 30 feet in the shallow vadose zone and an ROI of 150 to 180 feet in the deeper vadose zone. Soil vapors were treated by a catalytic oxidation unit and scrubber prior to discharge to the atmosphere.

In May 2002, Garvey notified NDEQ that it would not sign the NDEQ RAPMA Memorandum of Agreement, which would have required cleanup of not only the source area, but also the contaminated groundwater plume stretching eastward from the former Garvey facility. By this action, Garvey ceased participating in the VCP program. Following this development, in October 2002, NDEQ requested the EPA's assistance in performing a removal site evaluation to identify the full extent of the contaminant plume. NDEQ had several concerns, including the fact that additional private drinking water wells might be impacted and that Garvey was unwilling to perform the necessary work. The EPA recommended that NDEQ perform a ***Preliminary Assessment/Site Investigation*** (PA/SI) under its cooperative agreement with the EPA.

In April 2003, NDEQ conducted a PA/SI of the Site and prepared a ***Hazard Ranking System*** report that assessed whether there was a potential threat to human health and the environment and to identify source(s) of groundwater contamination. Thirty-five private and business water supply wells were sampled. The CCl_4 concentrations in these wells ranged from nondetect to greater than 500 µg/l. CCl_4 was the only VOC detected in the samples. The PA/SI report concluded that a release of CCl_4 at the facility had impacted the city of Hastings' municipal well #13 and several nearby private wells at levels exceeding the MCLs.

In correspondence dated December 9, 2003, NDEQ expanded its October 17, 2002, request for EPA assistance. NDEQ requested the EPA's assistance to provide alternate water supplies to impacted private well users, evaluate the effectiveness of and make recommendations for improving the source area control system, characterize the CCl_4 plume in the groundwater downgradient of the former Garvey facility and evaluate potential remedial alternatives for the CCl_4 plume. In response to these requests, EPA assumed the role of lead agency and identified Garvey as a **potentially responsible party** (PRP). The EPA initiated negotiations on an **Administrative Order on Consent** (AOC) with Garvey and oversaw Garvey's ongoing activities related to providing alternate water supplies to impacted private well users and operating the existing GET and SVE systems.

On April 27, 2005, the EPA proposed the Site for listing on the EPA's ***National Priorities List*** (NPL). The Site was listed on the NPL on September 14, 2005.

On October 7, 2005, Garvey entered into an AOC with EPA (CERCLA Docket No: 07-2005-0215). The AOC identified Garvey as a PRP and required Garvey to perform removal actions and to perform a ***Remedial Investigation/Feasibility Study*** (RI/FS). The removal and RI/FS activities were to be funded by Garvey through an escrow account that was established from the proceeds of the sale of the former Garvey property to AGP, as documented in the Agreement between Garvey, AGP, and EPA (CERCLA Docket No. 07-2005-0268). The Agreement also required, among other things, that AGP implement institutional controls (ICs).

The removal activities described in the AOC included monitoring private residential/business wells and providing alternate water provisions if the wells showed contamination was present above the MCLs. The AOC also required Garvey to perform an evaluation to assess the effectiveness of the SVE and GET systems in containing the OU 1 groundwater.

Between October 2005 and April 2008, Garvey performed a portion of the removal and RI/FS activities. Specifically, Garvey monitored private residential/business wells within and near the known extent of the contaminated groundwater plume and provided alternate water supplies for the impacted well users in the form of bottled water and whole-house carbon filtration systems. Garvey also operated the GET and SVE systems; however, Garvey did not demonstrate that it could reliably do so. The systems shut down frequently,

repairs were not made in a timely manner, and the GET system was nonoperational the majority of the time.

As part of its evaluation of the effectiveness of the SVE and GET systems, Garvey performed a portion of their planned field activities. These included monitoring well installation and soil, soil gas and groundwater sampling. Garvey collected soil and soil gas samples at multiple depths throughout the unsaturated zone. A total of 85 soil samples were collected at 6 locations and 227 soil gas samples were collected at 19 locations. All soil samples were nondetect for CCl_4 and **chloroform** ($CHCl_3$), a degradation compound of CCl_4, including samples collected between the round grain bin and the flat storage. The soil gas sampling indicated CCl_4 contamination of the soil gas throughout the unsaturated zone at a sample location near the former AST as well as at a location between the round grain bin and the flat storage. The lateral extent of contamination varied with depth, with the broadest extent being observed at approximately 80 feet bgs.

To characterize the distribution of contaminated groundwater as it migrated from the source area, Garvey collected groundwater samples at seven locations immediately east of and along the Burlington Northern and Santa Fe railroad tracks. From each location, samples were collected at multiple depths throughout the entire thickness of the upper, medial and lower ***aquifers***. CCl_4 contamination above the MCL was found in the upper and medial ***aquifers***. Generally the highest levels were found at the base of the upper ***aquifer***, with a maximum detected concentration of 626 µg/l. This investigation was followed by the targeted installation of four multi-level monitoring wells for long-term monitoring. The characterization revealed the source area of groundwater contamination was more than 1,500 feet wide when measured perpendicular to the direction of groundwater flow.

Garvey did not complete characterization of the nature and extent of contamination downgradient of the source area.

On March 27, 2008, Garvey filed a voluntary petition for relief pursuant to Chapter 7 of the United States Bankruptcy Code in the United States Bankruptcy Court for the Northern District of Texas, Fort Worth Division. Following this development, in April 2008, the EPA directed Garvey to halt work at the Site.

The EPA has not required AGP to perform any response actions at the Site except to establish ICs and provide access to the EPA and the state. In October 2010, AGP filed the Declaration of Environmental Protection Easement and Restrictive Covenants with the Adams County Register of Deeds, which restricts the property owner from certain activities including but not limited to the following: (a) use of the groundwater underlying the property for human use or consumption, (b) causing or allowing a disturbance of the surface of the site and (c) using the property for residential purposes.

The EPA initiated ***Fund-financed removal actions*** on May 19, 2008 to address the immediate threat to human health posed by the contaminated private wells and to implement source control measures to prevent further impacts to the groundwater at the former Garvey facility. These activities included providing alternate water systems or municipal water connection of impacted and potentially impacted residential/business private well users. They also included the source control measures of operating and maintaining the existing GET and SVE systems and enhancing these systems as necessary.

On September 26, 2008, the EPA expanded the scope of removal actions to include fabrication of an enclosure for the existing GET system, extension of municipal water supply main lines to impacted private well users, and connection of those residences/businesses to the main lines. Between November 2008 and September 2009, the EPA extended municipal water supply main lines 1.44 miles and connected 19 residences whose private wells were impacted. With the exception of one currently unoccupied residence, all potentially impacted or impacted residential/business private well users have been connected to the municipal water supply. The

EPA continues to maintain a whole-house carbon filtration system at the single residence still using private well water.

In addition to conducting general **operation and maintenance** (O&M) of the GET and SVE systems between May 2008 and July 2012, the EPA performed evaluations, conducted a number of critical repairs and made a number of significant improvements to the GET and SVE systems. The evaluations revealed numerous electrical, mechanical and control systems issues that led the EPA to conclude the GET system had been maintained in an unsatisfactory manner for a number of years and the status reports previously submitted to the EPA by Garvey, as well as contaminant removal estimates from the ***aquifer***, were unreliable. The EPA repairs and improvements greatly enhanced the effectiveness and reliability of both systems.

Concurrent with ***Fund-financed removal actions***, the EPA conducted ***Fund-financed*** RI/FS activities beginning in October 2008. Removal actions are primarily intended to address threats to human health and the environment that can be remedied in a relatively short time frame and for limited cost. Through the RI/FS process, the EPA determined that a remedial action would be necessary as conditions at the Site posed a threat to human health and the environment by exposures to the large plume of contaminated groundwater which would require long-term, costly and complex cleanup. ***Remedial actions***, in contrast to removal actions, are intended to address threats to human health and the environment that are more complex, more costly, take longer to achieve protectiveness and require long-term management. While the final remedial solution was being developed, the EPA determined an ***interim remedial action*** was necessary to prevent further migration of contaminants from the OU 1 source area.

To establish the basis for taking the Interim Action, in September 2009, the EPA developed an Interim Data Summary to summarize the existing information collected during historic and recent field investigations conducted by Garvey, the state and the EPA. The EPA developed a Risk Assessment Memorandum to assess the potential human health risks based on the data contained in the Interim Data Summary. In December 2009, the EPA issued a Focused FS, which relied on the data in the Interim Data Summary, to evaluate remedial alternatives that would address the OU 1 source area.

The EPA issued the Interim ROD for the OU 1 soils and groundwater in June 2010. The interim remedy included the following main components:

- Continued O&M of the GET system
- Expansion of GET system as necessary to contain OU 1 source area
- Continued O&M of SVE system
- ICs at OU 1 to prevent exposure

The objectives of the 2010 Interim ROD were to prevent further impacts to groundwater from the OU 1 soils, prevent further migration of contaminated groundwater from the source area and reduce contamination below the MCLs in the groundwater at OU 1.

Between July 2010 and September 2011, the EPA conducted the **remedial design** (RD) for the interim remedy. Additional characterization of ***aquifer*** properties was performed during the RD. The effectiveness of the existing GET system was evaluated by groundwater flow modeling and it was concluded that the GET system, with some electrical, mechanical and control system modifications to improve reliability and if properly operated and maintained, could effectively prevent migration of the contaminated groundwater from the source area.

In August 2012, the EPA initiated on-site construction activities to implement the interim remedy for OU 1.

While the interim remedial action was being implemented in 2010 through 2012, the EPA continued work on a full scale RI/FS to select a final remedial action for the Site. In April 2011, the EPA completed the RI which fully characterized the nature and extent of contamination in soil and groundwater at the Site. The RI report did not identify a PRP for the Site

other than Garvey. The current owner, AGP, met the criteria set forth in CERCLA as a bona fide prospective purchaser, and therefore, was exempt from liability. AGP did, however, enter into an agreement with the EPA to implement ICs in accordance with the EPA's directive.

In August 2012, the EPA completed the FS and issued an FS Report that presented the development and full evaluation of remedial action alternatives to address the entire Site.

SITE CHARACTERISTICS

The Site consists of an area of contaminated soil and groundwater at the former Garvey facility (source area) and an associated groundwater contaminant plume that extends approximately 4 miles east-southeast from the source area. The EPA has organized the Site into two OUs: OU 1 is designated as the area of soil and groundwater contamination that is generally within the boundaries of the former Garvey facility and commonly referred to as the source area; OU 2 is the area of contaminated groundwater that is migrating to the east-southeast of OU 1 in the direction of groundwater flow (Figure 3). Because the plume of contaminated groundwater continues to migrate and spread with time, the area of contaminated groundwater may change. The boundary of the OU is defined as near the maximum horizontal extent of contaminated groundwater that exceeds the MCL, regardless of depth in the ***aquifer***.

The former Garvey facility is located in a predominately rural area with a sparse distribution of residential properties to the north, east and west, with the nearest approximately 200 feet away. Topography of the area is relatively flat, with a slight slope to the east-southeast. The Site sits on a generally flat area with poor drainage that tends to pond water. Drainage to the east is restricted by the railroad tracks, which divert surface water northward toward Highway 6. Regionally, surface water flow is toward the south-southeast to the Little Blue River approximately 10 miles away. Pawnee Creek, the nearest named perennial surface feature, is as close as 0.5 miles south-southeast of the Site.

The unconsolidated materials beneath the Site are composed of Pleistocene age loess and coarser-grained alluvial deposits that extend from the ground surface to the weathered shale bedrock at approximately 233 feet bgs. The loess extends from the ground surface to approximately 65 feet bgs. The alluvial sand and gravel deposits occur below the surficial loess and extend from approximately 65 feet bgs all the way to bedrock. The Pleistocene sands and gravels contain thin layers and lenses of silt and clay. The sands tend to become coarser with increasing depth and gravel beds up to 10 feet thick have been reported.

The ***aquifer*** beneath the Site has been divided into three zones. The upper water table ***aquifer*** zone extends from the water table at about 115 feet bgs to 130 feet bgs, where it is divided from the medial ***aquifer*** zone by a thin, fine-grained unit. The fine-grained unit acts as an ***aquitard*** and is referred to as the upper ***aquitard***. It appears to be continuous across OU 1 and varies in thickness from 0.1 to 4 feet. East of the Site, in OU 2, it also appears to be continuous, with a maximum observed thickness of up to 10 feet. The medial ***aquifer*** extends from the base of the upper ***aquitard*** to approximately 150 feet bgs. This ***aquifer*** is semi-confined by the overlying upper ***aquitard*** and an underlying lower fined-grained unit that is referred to as the lower ***aquitard***. The lower ***aquitard*** is present across only portions of the Site and is generally less than 2 feet in thickness. The lower ***aquifer*** zone extends from the lower ***aquitard***, or the medial ***aquifer*** in locations where the lower ***aquitard*** is not present, to the weathered shale bedrock. The medial and lower ***aquifers*** consist of highly permeable sands and gravels. The upper ***aquifer*** is composed of slightly finer sands.

Based on water level measurements in the more than 30 monitoring wells distributed across the Site, groundwater flow in the upper, medial and lower ***aquifer*** zones is in an east-southeast direction. The groundwater flow rate is estimated to be approximately 0.5 and 1.4 feet per day in the upper and medial/lower ***aquifer*** zones, respectively.

RI field activities were conducted at the Site to define the nature and extent of contamination in the sediment, surface soil, subsurface soil, sub-slab soil gas and groundwater at OU 1 and the groundwater at OU 2. Field investigations at OU 1 focused on those areas where contaminants were known to have been or potentially could have been released. These areas included the known source area of the former AST and buried piping, areas where pesticides or herbicides may have been stored or disposed of, areas where fumigant application equipment was washed and areas where electrical transformers were positioned.

At OU 1, sediment samples were collected from eight locations in the natural drainageways. All samples were analyzed for VOCs, ***semi volatile organic compounds*** (SVOCs), pesticides, herbicides and ***polychlorinated biphenyls*** (PCBs). With the exception of one sampling location between the railroad tracks east of the main silos, contaminants were below ***screening levels***. In the sample location between the tracks, the SVOCs benzo(a)pyrene and benzo(b)fluoranthene were both detected at concentration of 230 ug/kg, which exceeds the residential soil ***screening levels*** of 15 and 150 µg/kg, respectively. Comparing the observed concentrations to their industrial soil ***screening levels*** of 210 and 2100 ug/kg, respectively, benzo(a)pyrene is the only contaminant that is in exceedance. The contaminants at this location are believed to be unrelated to Garvey's activities at the Site. The source of the benzo(a)pyrene and benzo(b)fluoranthene is likely the nearby asphalt pad or the ties supporting the railroad tracks.

Surface soil samples were collected from 19 locations across OU 1 at depths between 0 and 1.5 feet bgs. Depending on their location relative to known or suspected source areas and the type of contaminants potentially released in these areas, the samples were analyzed for VOCs, SVOCs, pesticides, herbicides and/or PCBs. The results indicated there were no contaminants detected above residential soil ***screening levels***. Aroclor 1248 (a PCB) was detected in one surface soil sample near the transformer pad on the south side of the main elevator, but was below the ***screening level***. The source was likely the oil from the transformer.

Subsurface soil sampling was performed at multiple depths at 31 locations across OU 1. At one location near the former AST, soil sampling was performed approximately every 5 feet to a depth of 81.5 feet bgs. The other locations were sampled to total depths ranging between 10 and 20 feet bgs. Samples were analyzed for one or more of the following groups of contaminants: VOCs, SVOCs, pesticides, herbicides, and PCBs. A total of 108 subsurface soil samples from 27 locations across OU 1 were analyzed for VOCs.

CCl_4 and/or $CHCl_3$ were detected above the protection of groundwater ***screening levels*** at two locations, near the former AST and near the buried piping that transferred the fumigant from the AST to the grain elevator. At the location near the AST, the only CCl_4 exceedance found was at 7 feet bgs. At the location near the buried piping, CCl_4 exceedances were found at all four depths sampled from 4 to 20 feet bgs. There were no detections of herbicides or PCBs in the subsurface soil samples. Naphthalene, an SVOC, was detected above its ***screening level*** at one location near the fumigant applicator wash area. Heptachlor epoxide, a pesticide, was detected in one location, but the concentration was below its screening level. Based on these results, it appears that soil contamination is present in the area directly adjacent to or beneath the former liquid fumigant AST and near the buried piping between the AST and the elevator. Subsurface soil samples collected from locations north, south, and east of the former AST did not contain CCl_4 or its degradation product $CHCl_3$.

Prior to ***Fund-financed*** RI/FS activities, Garvey performed a soil-gas survey to define the extent of soil gas contamination. Garvey sampled 19 locations across the Site. At each location, soil gas samples were collected every 10 feet down to a depth of 115 feet bgs. In general, the aerial extent of soil gas contamination expands with increasing depth. At depths approaching the water table, a large portion of OU 1 is found to contain CCl_4 in the soil gas at levels above 500 $\mu g/m^3$. At the 70 foot bgs depth, the maximum CCl_4 concentration observed was 10,000 $\mu g/m^3$ near the railroad spur in the southern part of OU 1. Between 80 and 115 feet bgs,

contamination is widespread across OU 1, with the highest level of 79,900 $\mu g/m^3$ observed just east of the scale house.

Ten subslab soil gas samples were collected within two facility buildings: the office/shop building and the shop area of the maintenance building. These samples were collected to evaluate if vapor concentrations in the soil gas directly beneath the building slab might be considered an indoor worker health and safety issue due to their proximity to the former location of the liquid fumigant AST. Ten indoor air samples were also collected in the two buildings, along with two ambient outside air samples. These samples were collected to evaluate whether subslab contaminants were present in the building, and if so, whether they exceeded ***screening levels***.

Three subslab soil gas samples from the office/shop building, as well as three samples from the maintenance building, were found to have concentrations that exceeded industrial indoor air ***screening levels*** for one or more of the following compounds: $CHCl_3$, CCl_4, tetrachloroethene (PCE), and trichloroethene (TCE). However, with the exception of three TCE detections in the maintenance building, none of the compounds were detected above ***screening levels*** in the indoor air samples. The compounds 1,2-dichloropropane, benzene, ethylbenzene and methylene chloride were detected above industrial indoor air ***screening levels*** in the indoor air samples. Since these compounds are absent in the subslab soil gas, their presence is attributed to compounds used within the shop. The carbon tetrachloride and its degradation compound chloroform appear to be related to the liquid fumigant. The detections of PCE and TCE may be related to the small-scale use of solvents at the facility for parts washing.

Groundwater contamination at OU 1 was characterized based on 146 samples collected from 40 **direct-push technology** (DPT) boring locations, as well as 416 samples collected from 46 monitoring wells. CCl_4, the primary ***Contaminant of Concern*** (COC) in OU 1 groundwater, was found at its highest concentrations in the upper ***aquifer*** immediately downgradient of the location of the former CCl_4 AST shown in Figure 1. The width of the CCl_4 plume, measured perpendicular to the direction of groundwater flow, has been interpreted to be approximately 2,500 feet wide in the vicinity of the railroad tracks at the eastern boundary of the Site. While CCl_4 is more widespread and observed at its highest concentrations in the upper ***aquifer***, it has been detected at significantly lower concentrations in the medial ***aquifer*** at the source area. $CHCl_3$, a compound formed as CCl_4 degrades, was detected on a consistent basis in areas where high CCl_4 levels are present. Benzene was not detected in monitoring well samples, but was detected at levels less than its MCL in three DPT sampling locations. TCE was detected in samples from one DPT sampling location at a level that exceeded its MCL. TCE was detected in two MWs at levels that were less than its MCL.

Groundwater contamination at OU 2 was evaluated using a combination of DPT borings and monitoring well sampling. In late 2009, 145 groundwater samples were collected from multiple depths at 19 DPT locations. The DPT locations were positioned along four transects oriented approximately perpendicular to the regional groundwater flow direction. These data were supplemented with the results of 53 groundwater samples collected in early 2008 from six DPT locations during characterization of the West Highway 6 & Highway 281 site located ½ mile northeast of the Site. The optimal locations in which to place additional monitoring wells were identified by interpreting the extent of the CCl_4 plume from DPT groundwater sampling. The wells are distributed within and just outside the perimeter of the groundwater contaminant plume. A total of 269 groundwater samples were collected from the 39 OU 2 MWs during the period October 2008 through March 2013.

Figure 3 illustrates the extent of the CCl_4 plume in the groundwater as defined by the highest concentrations observed at each location, regardless of depth. Figure 4 illustrates the CCl_4 plume in a vertical cross section along the C-C' cross-section line shown in Figure 3. Figure 5

illustrates the CCl_4 plume in vertical cross section along the E-E' cross-section line shown in Figure 3. Figures 3, 4 and 5 were constructed using results from the 2009 DPT sampling event, the June 2010 MW sampling event, as well as the 2008 DPT sampling event at the Dana site. There is a slight downward component to groundwater flow and this is reflected in the transport of the CCl_4 as the plume migrates from OU 1. Table 1 summarizes the highest concentrations of the ***contaminants of potential concern*** (COPCs) observed since the start of RI activities in October 2008. The only other VOCs detected in OU 2 were $CHCl_3$ and benzene. Benzene was detected in only two DPT locations in OU 2 at levels less than the MCL and does not appear to be attributable to the Garvey OU 1 source area.

Table 1
Groundwater COPCs

COPC	Maximum Concentration (µg/l) Detected / DPT or MW location		EPA MCL (µg/l)
	OU 1	OU 2	
1,2-DCA	1.2/MW-51B	ND	5
CCl_4	2200/MW-51B	770/MW-46D1	5
$CHCl_3$	190/DPT-20D	140/TS1-01	70 [1]
Benzene	4/SB-37	3.9 TS4-01	5
TCE	6.8/SB-38	ND	5

1,2-DCA – 1,2-Dichloroethane
[1] $CHCl_3$ has an ***maximum contaminant level goal*** (MCLG) of 70 µg/l. $CHCl_3$, bromodichloromethane, dibromochloromethane, and bromoform are trihalomethanes (THM). The EPA has established an MCL of 80 µg/l for total THM.

SCOPE AND ROLE OF THE ACTION

The Site covers a large geographical area and encompasses both contaminated soil and groundwater at the source area and an associated groundwater contaminant plume extending to approximately 4 miles east-southeast of the former Garvey property. The EPA has organized the Site into two OUs. OU 1 is the soil and groundwater contamination that is generally within the boundaries of the property used by Garvey in its grain storage activities, and OU 2 is the plume of groundwater contamination downgradient of OU 1 and in the direction of groundwater flow.

This ***Proposed Plan*** addresses the contaminated groundwater plume at OU 2 and the contaminated soil at OU 1. With respect to the contaminated soil at OU 1, this ***Proposed Plan*** expands the ***interim remedial action*** documented in the 2010 Interim ROD. With respect to the contaminated groundwater at OU 1, this ***Proposed Plan*** does not alter the ***interim remedial action*** documented in the 2010 Interim ROD.

Together, this ***Proposed Plan*** and the 2010 Interim ROD, address the entire Site, both OU 1 and OU 2 and the risks posed by the contaminated soil and groundwater. This ***Proposed Plan*** incorporates a portion of and is consistent with the on-going ***interim remedial action*** at OU 1.

SUMMARY OF SITE RISKS

Superfund requires the EPA to seek permanent solutions to protect human health and the environment from hazardous substances. These solutions provide for removal, treatment or containment of hazardous substances, pollutants and contaminants so any remaining contamination does not pose an unacceptable risk to human receptors, ecological receptors or the environment. A **baseline human health risk assessment** (HHRA), **screening level ecological risk assessment** (SLERA) and an assessment of the leaching potential of contaminated soils were performed to quantify the risks and/or hazards.

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline HHRA is an analysis of the potential adverse health effects caused by hazardous substances at a site in the absence of any actions to control or mitigate these under current and future land uses. A four step process is used for assessing site-related human health risks for reasonable maximum exposure scenarios.

Step 1: Analyze Contamination
Step 2: Estimate Exposure
Step 3: Assess Potential Health Dangers
Step 4: Characterize Site Risks

Step 1 – Hazard Identification. In this step, the COPCs – those chemicals detected at levels above which they may pose a human health risk (i.e., screening levels) and contribute to the majority of exposure and risk, in various media (i.e., soil, groundwater, surface water, air) – are identified based on their occurrence, distribution, fate, mobility and persistence in the environment.

Step 2 – Exposure Assessment. In this step, the type and magnitude of exposures to COPCs at a site are evaluated. It considers the source from which a chemical is released to the environment, the

pathway by which the chemicals are transported through the environmental medium, and the routes by which individuals are exposed. Parameters necessary to quantitatively evaluate dermal exposures, such as exposure point concentrations, permeability coefficients, soil adsorption factors, body surface area exposed, and soil adherence factors are developed in the exposure assessment.

Step 3 – Toxicity Assessment. In this step, the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other noncancer health hazards, such as changes in the normal functions of organs within the body (e.g. changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and noncancer health hazards.

Step 4 – Risk Characterization. This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 1.0E-04 (or 10^{-4}) ***cancer risk*** means a "one in 10,000 excess ***cancer risk,***" or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for acceptable exposures specify an upper value of individual lifetime excess ***cancer risk*** as between 10^{-4} to 10^{-6}. For noncancer health effects, a Hazard Index (HI) is calculated. The key concept for a noncancer HI is that a threshold level of HI = 1 exists, below which noncancer health effects are not expected to occur. The goal of protection is less than 10^{-6} for ***cancer risk*** and an HI of less than or equal to 1 for a noncancer health hazard. Chemicals which are estimated to cause an excess ***cancer risk*** greater than 10^{-4} or an HI of 1 are typically those that will require remedial action at the site and are referred to as COCs in the ROD.

HHRA

An HHRA was conducted for the Site as part of the RI/FS to estimate the risks and hazards to human receptors associated with current and future potential uses. The HHRA is an analysis of the potential adverse human health effects caused by exposure to the hazardous substances in the absence of any actions to control or mitigate the exposures.

A four-step process is used in the HHRA to assess the site-related ***cancer risks*** and noncancer health hazards. The four-step process is comprised of identification of COPCs, assessment of potential exposures, assessment of toxicity of COPCs and risk calculation based on exposures, toxicity and concentrations of COPCs.

The HHRA began with identifying COPCs in the various media (i.e., soils, groundwater and sediment) that could potentially cause adverse health effects in exposed populations. The land use scenarios included the following exposure pathways and populations:

- Current and Future Indoor Industrial Workers: ingestion of sediment, inhalation of volatile and fugitive dust and inhalation of vapors from soil gas.
- Current and Future Outdoor Industrial Workers: ingestion and dermal adsorption of sediment and inhalation of volatile and fugitive dust emissions.
- Future Construction Workers: ingestion and dermal adsorption of sediment and inhalation of volatile and fugitive dust emissions.
- Current and Future Trespassers: ingestion and dermal adsorption of sediment and inhalation of volatile and fugitive dust.
- Current Off-property Residents: ingestion, dermal adsorption, and inhalation of VOCs from domestic use of groundwater, and ingestion and dermal adsorption of VOCs from groundwater used for irrigation.
- Future On-property Residents: ingestion and dermal adsorption of sediment; inhalation of volatile and fugitive dust emissions from sediment; inhalation of volatiles from vapor intrusion; ingestion, inhalation and dermal adsorption of volatiles from domestic use of groundwater; and ingestion and dermal adsorption of volatiles from groundwater used for irrigation. For ***cancer risk***, the most conservative approach is to use the age-adjusted resident. This approach assumes that the resident lives 30 years at the site—6 years as a child and 24 years as an adult.

In this assessment, exposure point concentrations were estimated using either the maximum detected concentration of a contaminant or the 95 percent upper-confidence limit of the average concentration. Chronic daily intakes were calculated based on the reasonable

maximum exposure (RME), which is the highest reasonably anticipated to occur at the Site. The RME is intended to estimate a conservative exposure scenario that is still within the range of possible exposures. A complete summary of all exposure scenarios can be found in the HHRA. At the end of the risk-assessment process, those COPCs found to pose an unacceptable human or ecological risk, called risk drivers, are identified as COCs.

Sediment

Risks and hazards were evaluated for exposure to sediment in the OU 1 source area. The populations of interest included future on-property residents, future adolescent trespassers, current and future indoor industrial workers, current and future outdoor industrial workers and future construction workers.

Receptor	Hazard Index	Cancer Risk
Future On-property Residents	NV	2.0E-05
Future Trespassers	NV	2.0E-07
Current and Future Indoor Industrial Workers	NV	3.3E-07
Current and Future Outdoor Industrial Workers	NV	1.1E-06
Future Construction Workers	NV	1.1E-07

NV - Toxicity criteria are not available to quantitatively address this route of exposure.

The ***cancer risk*** does not exceed acceptable levels and the HI does not exceed threshold levels. Based on this evaluation, there are no COCs for sediment at OU 1.

Surface and Subsurface Soil

Risks and hazards were evaluated for exposure to surface and subsurface soil in the OU 1 source area. The populations of interest included future on-property residents, future adolescent trespassers, current and future indoor industrial workers, current and future outdoor industrial workers, and future construction workers. Current and future indoor industrial workers and future on-property residents were the only populations found to be potentially exposed to COPCs at concentrations above the screening levels used in Step 1 of the risk-assessment process. The exposure pathway that presented ***cancer risk*** and/or hazard was exposure to soil gas from the subslab soils via vapor intrusion.

Receptor	Hazard Index	Cancer Risk
Future On-Property Residents	0.6[(a)]	4.3E-04
Current and Future Indoor Industrial Workers	0.1	8.4E-05

[(a)] HI for child.

For a hypothetical, future, on-property resident, the ***cancer risk*** exceeds acceptable levels primarily due to PCE in soils that can migrate via the vapor intrusion pathway into indoor air. Based on this evaluation, PCE is the only COC for the surface and subsurface soils at OU 1.

Groundwater

Risks and hazards were evaluated for exposure to groundwater in the OU 1 source area and the OU 2 downgradient plume area. The populations of interest included future on-property residents and current, off-property residents.

Receptor	Hazard Index	Cancer Risk
Future On-property Residents	33[(a)]	2.1E-03
Current Off-property Resident	24[(a)]	1.4E-03

[(a)] HI is for child.

The COCs for the OU 1 groundwater are CCl_4, $CHCl_3$ and TCE. This is based on the unacceptable ***cancer risk*** and/or HI, to a future, on-property resident posed by CCl_4 and TCE in groundwater used for domestic purposes. $CHCl_3$ was not detected above its MCL within OU 1, but was detected immediately downgradient of OU 1. For this reason, and because $CHCl_3$ is a degradation compound of CCl_4, it is included as a COC. The COCs for OU 2 groundwater are CCl_4 and $CHCl_3$. This is based on the unacceptable ***cancer risk*** and/or HI to a current, off-property resident posed by CCl_4 and $CHCl_3$ in groundwater used for domestic purposes.

SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT (SLERA)

A SLERA was performed to analyze the potential effects of Site contaminants on plants, soil invertebrates, mammals and birds. Detected concentrations were compared to benchmark

values and were used to estimate daily doses via the food web. The several chemical compounds required further evaluation, and a refined exposure assessment was completed. Based on this refined assessment, current Site conditions do not pose a threat to ecological receptors.

ASSESSMENT OF LEACHING POTENTIAL OF CONTAMINATED SOILS

The primary contaminant released to OU 1 soils from former facility operations was CCl_4. $CHCl_3$, a degradation product of CCl_4, has been found in the soils as well. Other contaminants that could have been used in small quantities include TCE and PCE. To assess the potential for contaminated soils in OU 1 to leach to the groundwater and cause an exceedance of the MCL in the groundwater, the measured concentrations of contaminants in soil were compared to soil leaching screening levels developed for the Site. Concentrations that exceed the soil leaching screening levels indicate the potential to leach. CCl_4 was the only contaminant detected above the soil leaching screening levels. CCl_4 was detected in samples from 4 to 5 feet and 16.5 to 17 feet bgs in the area between the former AST and the main elevator.

The table below summarizes the unacceptable risk posed by COCs in the different media at the Site.

		OU 1	OU 2
HHRA			
	Sediment	None	N/A
	Surface/Subsurface Soils	PCE	N/A
	Groundwater	CCl_4, $CHCl_3$, TCE	CCl_4, $CHCl_3$
SLERA			
		None	N/A
Potential to Leach			
	Surface/Subsurface Soils	CCl_4	N/A

N/A – Not applicable

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

CONTAMINANTS OF CONCERN

Two contaminants pose the greatest potential threat to human health at OU 1.

Carbon Tetrachloride (CCl_4): A colorless, highly volatile compound that quickly evaporates when exposed to the atmosphere. It is a nonflammable chemical that is slightly soluble in water. CCl_4 has been used as a cleaning fluid both in industry and dry cleaning establishments, in fire extinguishers and as a grain fumigant. The use of CCl_4 as a pesticide was stopped in 1986. In the subsurface, pure CCl_4 behaves as a **dense nonaqueous phase liquid** (DNAPL) due to its high specific gravity and relatively low solubility in water. CCl_4 does not bind to soil and may leach into groundwater. The primary effects of CCl_4 in humans are on the liver, kidneys and **central nervous system** (CNS). Human symptoms of acute (short-term) inhalation and oral exposures to CCl_4 include headache, weakness, lethargy, nausea and vomiting. Acute exposures to higher levels and chronic (long-term) inhalation or oral exposure to CCl_4 produces liver and kidney damage in humans. The EPA has classified CCl_4 as a Group B2, probable human carcinogen.

Chloroform ($CHCl_3$): A colorless, volatile, and nonflammable liquid that is slightly soluble in water. Because of its volatility, it tends to escape from contaminated water or soil into air. It may also be released in vapor from some types of industrial or chemical operations. $CHCl_3$ appears to be ubiquitous in the environment. It is derived primarily from various industrial and chemical processes, or as a by-product of disinfecting water with chlorine. $CHCl_3$ is also a breakdown product of CCl_4. Other sources include pulp and paper mills, hazardous waste sites, and sanitary landfills. The major effect from acute, short-term inhalation exposure to $CHCl_3$ is central nervous system CNS depression. Chronic exposure to $CHCl_3$ by inhalation in humans has resulted in effects on the liver, including hepatitis and jaundice and CNS effects such as depression and irritability. The EPA has classified $CHCl_3$ as a Group B2, probable human carcinogen.

REMEDIAL ACTION OBJECTIVES

Proposed ***Remedial Action Objectives*** (RAOs) have been developed for the Site for the protection of public health and the environment based on findings of the RI/FS. The RAOs are organized by media and specify the exposure

pathway and preliminary ***cleanup level*** for each COC. Preliminary ***cleanup levels*** are based on chemical-specific ***applicable or relevant and appropriate requirements*** (ARARs) where available, and to be considered (TBC) criteria. The ARARs identify Standards, Criteria, and Guidances (SCGs) that were used to establish soil and groundwater preliminary ***cleanup levels*** that eliminate or mitigate the significant threat to public health and environment.

The site-specific RAOs listed below address the soils at OU 1 and the groundwater in the OU 2 area. They do not address groundwater at the OU 1 source area. The RAOs set forth in the 2010 Interim ROD addressed OU 1 soils and OU 1 groundwater. With respect to the OU 1 soils, the RAOs presented below supersede the RAOs in the 2010 Interim ROD. The RAOs set forth in the 2010 Interim ROD for OU 1 groundwater remain unchanged.

The proposed RAOs for this interim action for the Site are:

- To prevent or minimize the release of contaminants from the unsaturated soils to groundwater at concentrations that would cause exceedances of the ***cleanup levels*** for groundwater.
- To prevent further migration of contaminated groundwater in excess of the ***cleanup levels*** from the OU 2 area.
- To prevent exposure of current and future residents to concentrations of contaminants at or above the ***cleanup levels*** in the groundwater beneath the OU 2 area from its domestic use.
- To provide an interim remedy that would not interfere with the future effectiveness of other long-term remedial action alternatives that might warrant detailed evaluation in a supplemental FS such as in situ treatment technologies for groundwater restoration at the OU 1 source area.

The long-term objective for this **remedial action** is:

- To reduce the contaminants in the ground water beneath the OU 1 source area to concentrations less than or equal to the ***cleanup levels*** within a reasonable time frame so that the ***aquifer*** is restored to its beneficial use.
- To reduce the concentration of contaminants in groundwater in the OU 2 area to concentrations less than or equal to their respective ***cleanup levels*** so that the ***aquifer*** is restored to its beneficial use.

The preliminary ***cleanup level*** for PCE in the soil gas is 90 $\mu g/m^3$. In accordance with EPA guidance, this soil gas ***cleanup level*** is calculated as 10 times the calculated site-specific risk-based level for indoor air (i.e., 10 percent or less of indoor air originates from the subsurface).

The preliminary ***cleanup level*** for CCl_4 in the fine-grained soil that generally extends from the ground surface to 65 feet bgs is 45 ug/kg. The basis of the preliminary soil ***cleanup level*** is the concentration above which the soils have the potential to leach to the groundwater and cause and exceedance of the groundwater ***cleanup level***. This ***cleanup level*** will be applied to the soils in the vicinity of the former AST and buried transfer piping.

The preliminary ***cleanup levels*** for CCl_4 in the soil gas are 95,000 ug/m^3 and 130,000 ug/m^3 for the fine-and coarse-grained soils, respectively. The basis of the soil gas ***cleanup levels*** is the equilibrium partitioning between the gaseous, dissolved, and adsorbed phases of CCl_4 and the potential for CCl_4 to leach to the groundwater and cause an exceedance of the groundwater ***cleanup level***. These cleanup levels will be applied to the soils in all areas of the Site.

The preliminary ***cleanup level*** for CCl_4 in OU 2 groundwater is 5 $\mu g/l$, which is the MCL. The ***cleanup level*** for $CHCl_3$ in OU 2 groundwater is 70 $\mu g/l$. $CHCl_3$ is the only THM that has been

observed at levels of concern. The EPA does not have an MCL for $CHCl_3$, but has established an MCLG of 70 µg/l.

This remedy is termed an ***interim remedial action*** under CERCLA because it does not select the final remedy for the groundwater at OU 1. The selected remedy in this document is expected to achieve the RAOs in the OU 1 soils and the OU 2 groundwater.

SUMMARY OF ALTERNATIVES

The remedial alternatives evaluated for Site OU 1 soil and OU 2 groundwater are presented below. More detailed descriptions of the remedial alternatives for addressing the Site contamination can be found in the FS report.

OU 1 SOURCE AREA SOILS

Four alternatives to address OU 1 soils were evaluated in the FS report. The four alternatives share two common elements. The first is the monitoring and enforcement of existing ICs to restrict land and water uses on the former Garvey property. The second common element is the performance of five-year reviews until contaminants are reduced to levels that allow for unlimited use and unrestricted exposure.

Alternative S1 – No Action

Estimated Time Frame:	*30 years*
*Estimated **Capital Cost**:*	*$53,000*
*Estimated **O&M Cost**:*	*$156,000*
Estimated Periodic Cost:	*$372,000*
*Estimated **Present Value**:*	*$298,000*

The NCP requires that the EPA consider a "no-action" alternative against which other remedial alternatives can be compared. Under this alternative, the EPA would discontinue operation of the SVE system and take no action to address the OU 1 soils. Periodic subslab vapor monitoring and reporting would be conducted every five years in support of the mandatory five-year reviews. This alternative does include monitoring and enforcement of existing ICs.

Alternative S2 – Excavation, Treatment, and Disposal of Contaminated Soil and Operation of Existing SVE System

Estimated Time Frame:	*30 years*
*Estimated **Capital Cost**:*	*$345,000*
*Estimated 5-year **O&M Cost**:*	*$498,000*
Estimated Periodic Cost:	*$372,000*
*Estimated **Present Value**:*	*$929,000*

Alternative S2 would involve excavating and treating the contaminated soils in the vicinity of the former AST and buried transfer pipe as well as operating the existing SVE system. The expected volume of contaminated soil that is to be excavated and treated is approximately 89 cubic yards, which consists of an area 40 feet by 10 feet to a depth of approximately 6 feet. The depth of excavation is limited by the proximity to the grain elevator. The excavation is not expected to address the deeper contaminated soils in this area. Clean fill from an on-site borrow area would be used to backfill the excavated area to match the surrounding grade. Excavated soil would be treated with an ex situ SVE process to reduce concentrations below the ***cleanup levels***. The treated soil would be placed into the on-site borrow area, compacted, and seeded. This alternative includes operating the existing SVE system with no expansions or upgrades. It is assumed the existing SVE system would continue to operate for five years. One subslab vapor monitoring and reporting event per year would be conducted through the fifth year. It is assumed that ***cleanup levels*** for the OU 1 shallow soils would be achieved by this remedy in the area of excavated soils and beneath the building slab. However, since deeper soils that exceed the ***cleanup levels*** would not be addressed, five-year reviews for these OU 1 soils would be necessary and performed every five years as required by CERCLA. For costing purposes, a 30-year time frame is assumed.

Soil vapors extracted by the SVE system would be discharged directly to the atmosphere so long as monitoring indicates emissions meet state and federal standards.

Alternative S3 – Expansion and Operation of Existing SVE System

Estimated Time Frame:	*10 years*
*Estimated **Capital Cost**:*	*$336,000*
*Estimated 10-year **O&M Cost**:*	*$946,000*
Estimated Periodic Cost:	*$186,000*
*Estimated **Present Value**:*	*$1,168,000*

Alternative S3 would expand the treatment area of the existing SVE system by installing one shallow and one deep SVE well in the area of contaminated soils near the former AST and buried transfer pipe. Soil vapors extracted by the existing SVE system do not currently require treatment because the total emission rate is below the NDEQ threshold of five tons per year for any single hazardous air pollutant. A catalytic oxidation unit and scrubber are located on-site but are not currently used; this equipment could be reactivated if treatment prior to discharge is needed to comply with state air regulations after expanding the existing SVE system. It is estimated that ***cleanup levels*** would be achieved in all of the OU 1 soils at the conclusion of the 10-year period. One subslab vapor monitoring and reporting event per year would be conducted through the tenth year. Two five-year reviews would be necessary as required by CERCLA.

Alternative S4 – Excavation, Treatment and Disposal of Contaminated Soil and Expansion and Operation of Existing SVE System

Estimated Time Frame:	*5 years*
*Estimated **Capital Cost**:*	*$407,000*
*Estimated 5-year **O&M Cost**:*	*$516,000*
Estimated Periodic Cost:	*$62,000*
*Estimated **Present Value**:*	*$883,000*

Alternative S4 combines Alternatives S2 and S3 to reduce the time frame that the SVE system would be required to operate by removing a portion of the contaminated soils from the source area. This alternative protects the environment through excavation and ex situ treatment of contaminated soil in the area of the former AST and buried transfer pipe described in detail in Alternative S2 as well as expansion and operation of the existing SVE system as described in Alternative S3. For costing purposes, it is assumed the SVE system would continue to operate for five years. One subslab vapor monitoring and reporting event per year would be conducted through the fifth year of the remedial action. Only one five-year review would be necessary under CERCLA and is included in this cost estimate.

OU 2 GROUNDWATER

Two remedial alternatives, the first involving monitored natural attenuation and the second involving in situ treatment, were screened out during the alternatives screening process. Four remedial alternatives for OU 2 contaminated groundwater are presented below. The alternatives share two elements. The first is the implementation, monitoring and enforcement of an IC on the areas within or in close proximity to the contaminated groundwater plume. The IC would prevent the installation of water wells for domestic uses and would protect human health and the environment by preventing exposures to the contaminated groundwater. The IC would remain in place throughout the remedial action on OU 2 until RAOs are achieved. The second common element is the performance of five-year reviews, which will be performed every five (5) years to ensure protection of human health and the environment until contaminants are reduced to levels that allow for unlimited use and unrestricted exposure as required by CERCLA.

Alternative G1 – No Action

Estimated Time Frame:	*30 years*
*Estimated **Capital Cost**:*	*$312,000*
*Estimated 10-year **O&M Cost**:*	*$924,000*
Estimated Periodic Cost:	*$462,000*
*Estimated **Present Value**:*	*$852,000*

Contaminated groundwater throughout OU2 would not be remediated under this "no-action" alternative. The contaminated groundwater would continue to migrate and spread in the direction of groundwater flow and to impact previously uncontaminated areas. This alternative would include the conduct of groundwater monitoring every five years to characterize water quality for the five-year reviews. As described previously, this "no-action" alternative includes the implementation, monitoring and enforcement of existing ICs. Typically, IC are excluded from "no-

action" alternatives and instead included in a "limited action" alternative. However, it is considered appropriate to include them in this "no-action" alternative because the Site is located adjacent to two other Superfund sites in the Hastings, Nebraska, area. An **Institutional Control Area** (ICA) is already in place in the Hastings area which requires, among other things, registration of existing wells and approval by the city of Hastings before installation of new private wells. These restrictions are also appropriate for this Site. Implementing the IC would involve expanding the ICA boundaries through modification of the city ordinance. The "no-action" alternative is carried through the FS process to provide a baseline for comparisons of Site remedial alternatives as required by the NCP. For cost-estimating purposes, a 30-year time frame is assumed.

Alternative G2 – Groundwater Recovery, Treatment, and Discharge at Leading Edge of Plume

Estimated Time Frame:	*100 years*
*Estimated **Capital Cost**:*	*$4,715,000*
*Estimated **O&M Cost**:*	*$30,052,000*
Estimated Periodic Cost:	*$4,539,000*
*Estimated **Present Value**:*	*$11,485,000*

Under Alternative G2, a groundwater extraction, treatment, and reinjection system would be constructed at the leading (eastern-most) edge of the contaminated groundwater plume. The system would extract the contaminated groundwater as it migrates eastward and treat the extracted groundwater to remove contaminants and reduce concentrations to or below the ***cleanup levels***. The treated groundwater would either be beneficially reused and/or reinjected into the ***aquifer***. This alternative would include the construction of six recovery wells, system piping, a treatment building equipped with air stripping system and three injection wells. Over the duration of the remedial action, this alternative would also include system O&M, periodic groundwater monitoring and assessment of system performance, as well as five-year reviews, as required by the NCP.

Implementation of this alternative would require land acquisitions or easements for the wells, piping and treatment building. The estimated time to reach ***cleanup levels*** in the OU 2 groundwater for this alternative is 100 years. The process of air stripping transfers the dissolved phase VOCs to the atmosphere. Emissions of VOCs to the atmosphere are projected to be well below acceptable federal and state requirements, so it is assumed that control technology for air emissions would not be necessary.

During remedial actions, this alternative would provide protection of human health through ICs to restrict access to VOC-contaminated groundwater. At the conclusion of remedial actions, the groundwater would be at or below the ***cleanup levels*** and available for unrestricted and unlimited use.

Alternative G3 – Groundwater Recovery, Treatment and Discharge at Mid-plume and Leading Edge of Plume

Estimated Time Frame:	*75 years*
*Estimated **Capital Cost**:*	*$7,199,000*
*Estimated **O&M Cost**:*	*$29,552,000*
Estimated Periodic Cost:	*$3,541,000*
*Estimated **Present Value**:*	*$15,550,000*

Under Alternative G3, a groundwater extraction, treatment, and reinjection system would be installed on the leading (eastern-most) edge of the contaminated groundwater plume, similar to Alternative G2. In addition, to reduce the cleanup time frame, groundwater extraction wells would be installed in two areas within the plume where some of the highest contaminant concentrations were observed. The groundwater extracted from these wells would be piped to the treatment system at the leading edge of the plume for treatment by air stripping and reinjection. The first area within the plume for the additional groundwater extraction wells is generally in the vicinity of South Elm Avenue in the medial (C-zone) ***aquifer***. These extraction wells would target the groundwater with CCl_4 concentrations greater than 100 µg/l. The second area is generally in the vicinity of Showboat Boulevard in the lower (D/E-zone) ***aquifer***. These extraction wells would target the groundwater with CCl_4

concentrations greater than 45 µg/l. Over the duration of the remedial action, this alternative would also include system O&M, periodic groundwater monitoring and assessment of system performance as well as five-year reviews as required by the NCP.

As with Alternative G2, implementation of this alternative would require land acquisitions or easements, not only for the wells, piping, and treatment building at the leading edge of the plume, but also in the mid-plume areas. The estimated time to reach ***cleanup levels*** in the OU 2 groundwater for this alternative is 75 years. The process of air stripping transfers the dissolved phase VOCs to the atmosphere. Emissions of VOCs to the atmosphere are projected to be well below acceptable federal and state requirements, so it is assumed that control technology for air emissions would not be necessary.

During remedial actions, this alternative would provide protection of human health through ICs to restrict access to VOC-contaminated groundwater. At the conclusion of remedial actions, the groundwater would be at or below the ***cleanup levels*** and available for unrestricted and unlimited use.

Alternative G4 – In Situ Treatment at Core of Plume and Groundwater Recovery, Treatment, and Discharge at Leading Edge of Plume

Estimated Time Frame:	*75 years*
*Estimated **Capital Cost**:*	*$7,525,000*
*Estimated **O&M Cost**:*	*$27,607,000*
Estimated Periodic Cost:	*$27,063,000*
*Estimated **Present Value**:*	*$36,651,000*

Alternative G4 combines Alternative G2 with in situ treatment through groundwater amendments in the core of the OU 2 groundwater contaminant plume to reduce the time frame for ***aquifer*** restoration. Refer to the description of Alternative G2 for details of its components. The groundwater amendments would consist of injecting a compound, either organic substrate, chemical oxidant or reducing agent or a variety of compounds through a series of an estimated 78 injection points. One or more types of compound will be selected for full-scale injection based on pilot-scale studies. Due to the depths involved, the injection points would be permanent well installations. A series of five injections would be conducted annually for the first five years. Over the duration of the remedial action, this alternative would also include system O&M, periodic groundwater monitoring and assessment of system performance as well as five-year reviews, as required by the NCP.

As with Alternative G2, implementation of this alternative would require land acquisitions or easements not only for the wells, piping and treatment building at the leading edge of the plume, but also for multiple rounds of injections. Groundwater modeling results provided an estimated time to reach ***cleanup levels*** in the OU 2 groundwater for this alternative of 75 years. The process of air stripping transfers the dissolved phase VOCs to the atmosphere. Emissions of VOCs to the atmosphere are projected to be well below acceptable federal and state requirements, so it is assumed that control technology for air emissions would not be necessary.

During remedial actions, this alternative would provide protection of human health through ICs to restrict access to VOC-contaminated groundwater. At the conclusion of remedial actions, the groundwater would be at or below the ***cleanup levels*** and available for unrestricted and unlimited use.

EVALUATION OF ALTERNATIVES

The different remediation alternatives were evaluated in detail using the nine criteria identified in the NCP. The nine criteria and a summary of the evaluation are provided below.

1. <u>Overall Protection of Human Health and the Environment</u> evaluates whether or not an alternative provides adequate protection, focusing on how risks posed through each pathway are eliminated, reduced, or controlled.

Alternative S1 would provide adequate protection of human health, through existing ICs, but would not provide adequate protection of the environment because contaminants would continue to leach and impact the groundwater.

Alternatives S2, S3 and S4 would meet this criterion through the combination of institutional and engineering controls.

Alternatives G1—G4 protect human health through the implementation and monitoring of ICs. Alternatives G2—G4 are protective of the environment because they prevent further migration of the OU 2 contaminant plume. Alternative G1 fails to meet the protection of the environment criterion because it allows continued migration of the OU 2 contaminant plume. Alternative G1 was eliminated from consideration under the remaining eight criteria.

Alternatives S1 and G1 are "no-action" alternatives that do not meet this threshold criteria, but are carried through for the full detailed analysis to establish a baseline.

2. Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations and other requirements that pertain to the Site or whether a waiver is justified. Chemical-, location- and action-specific ARARs are evaluated.

In accordance with the NCP, 40 CFR 300.430(f)(1)(ii)(C)(1), because this is an interim action remedy, an alternative that does not meet ARARs may be selected if it will become part of the a subsequent final remedial action that will attain ARARs. The ARARs pertinent to the Site are outlined in Appendix A of the FS report located in the ***Administrative Record*** file for the Site. This ***interim remedial action*** will become part of the final remedial action, which will attain ARARs.

There are no location-specific ARARs to evaluate for Alternatives S1—S4. There are no chemical- or action-specific ARARs for the "no-action" Alternative S1 to meet. The action- and chemical-specific ARARs related to the on-site treatment and disposal of excavated soils and the air emissions from the SVE system in Alternatives S2 and S4 would be met.

There are no location-specific ARARs to evaluate for Alternatives G1—G4. Alternative G1 does not meet federal and state chemical-specific ARARs in groundwater that is a current source of drinking water. Alternatives G2—G4 would meet chemical-specific ARARs including the Nebraska Title 118 groundwater quality standards. Alternatives G2—G4 would meet action specific ARARs including Nebraska Title 122 underground injection control.

3. Long-term Effectiveness and Permanence evaluates the residual risk at the conclusion of remedial activities and the adequacy and suitability of controls, if any, that are used to manage treatment residuals or untreated waste that remains at the Site.

A common element of Alternatives S1—S4 is the ICs that are already in place. This adequately addresses the risk to a hypothetical future on-site resident through vapor intrusion. In the absence of the IC, the residual risk to a future resident, as well as the risk of contaminant leaching to groundwater, would not be reduced by Alternative S1. Alternative S4 reduces the risk to a future on-site resident to an acceptable level and eliminates the risk of contaminants leaching to groundwater at levels causing an exceedance of the MCL. Alternative S3 is as effective as Alternative S4 in reducing risk to the future on-site resident, but is not as effective at removing contaminants from the unsaturated zone, so some contaminant leaching could continue. Alternative S2 is not as effective as either Alternatives S3 or S4 because the actions would only reduce risk in both areas, but not necessarily reduce it to acceptable levels.

Alternatives G2, G3, and G4 are similar in that residual contamination at the Site would be at levels less than the MCLs and the magnitude of residual risk at the conclusion of remedial activities would be reduced to acceptable levels. Unrestricted groundwater use would be restored. The "no-action" Alternative G1 does not include remedial actions to address groundwater contamination, and, therefore, this criterion would not be met.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants; the degree of expected reduction in toxicity, mobility

or volume; the type and quantity of treatment residuals; the degree to which the treatment will be irreversible; and the amount of residuals.

Alternatives S3 and S4 satisfy all the requirements of this criterion by irreversibly treating the entire volume of contaminated soils and not leaving treatment residuals above ***cleanup levels***. Alternative S2 uses irreversible treatment but may leave residual contamination in the deep soils in the vicinity of the former AST. The "no-action" Alternative S1 does not satisfy this criterion, since it involves no engineering controls.

Alternatives G2, G3 and G4 satisfy all the requirements of this criterion equally well. All apply treatment technologies. Each alternative destroys approximately the same contaminant mass, employs irreversible treatment and leaves residuals below levels of concern. Alternative G1 does not satisfy any of the requirements of this criterion, as no treatment technology is applied.

5. Short-term Effectiveness considers the length of time needed to complete remedial actions (i.e., achieve RAOs) and the risks the alternative poses to workers, residents and the environment during implementation.

The "no-action" Alternative S1 does not employ engineering controls, and, therefore, is not expected to achieve RAOs. Alternatives S2 and S4 are expected to achieve RAOs within five years and Alternative S3 is expected to take 10 years. It is recognized that any construction activity poses a risk to workers. Alternatives S2 and S4 have a greater increased short-term risk than does Alternative S3, due to their excavation component. Safety measures can reduce but not eliminate this risk. The construction of the two additional SVE wells poses increased short-term risk, but less than that posed by the excavation. Alternatives S2-S4 each poses only a minimal risk to the community and grain elevator workers.

The "no-action" Alternative G1 does not employ engineering controls, and, therefore, is not expected to achieve RAOs. Alternative G2 is expected to achieve RAOs in 100 years and Alternatives G3 and G4 are expected to achieve RAOs in 75 years. Although the quantity of the different constructed elements for Alternatives G2-G4 may differ, there is some risk to workers due to the construction of monitoring, extraction, and injection wells, buried piping runs, and the treatment building. There is additional risk for Alternative G4 since chemical oxidants used in injections pose significant potential hazards during handling as they are highly corrosive and reactive. There is a risk of accidental exposure that could cause burns as well as potential explosive hazard. There is not a significant risk to the community as the area of construction is rural. The transport of the chemical oxidants for Alternative G4 slightly increases this risk.

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

Alternative S1 is highly implementable as it involves no engineering controls. Technically, Alternatives S2-S4 are feasible. However, Alternatives S2 and S4 require additional considerations due to the excavation in an area near the main grain elevator. The installation of the two additional SVE wells is highly implementable. Administrative feasibility of Alternatives S2—S4 is high since regulatory approvals for the soils excavation are implementable and approvals for SVE operation are already in place for the existing SVE system.

Alternative G1 is highly implementable because it involves no engineering controls. Alternatives G2-G4 are technically feasible but Alternative G4 would require additional bench- and pilot-scale studies to optimize full-scale implementation of the chemical oxidant injections. Administratively, the implementation of Alternatives G2-G4 involves entering into easement agreements with property owners to locate buildings, piping and wells. Alternatives G3 and G4 involve greater effort than G2 due to the greater number of locations where equipment would be installed.

7. Cost evaluates the estimated capital and ***O&M costs*** of each alternative in comparison to other, equally protective measures.

Cost estimates are expected to be accurate within a range of +50 to -30 percent.

Alternative (time frame in years)	Capital[(a)]	O&M and Periodic[(a)]	PV[(a)]
OU 1 Soil			
S1 (30)	$53	$528	$298
S2 (5)	$345	$870	$929
S3 (10)	$336	$1,132	$1,168
S4 (5)	$407	$578	$883
OU 2 GW			
G1 (30)	$312	$1,386	$852
G2 (100)	$4,715	$34,591	$11,485
G3 (75)	$7,199	$33,093	$15,550
G4 (75)	$7,525	$54,670	$36,651

[(a)] Costs presented in $1,000s.

The FS contains the breakdown of the costs for each alternative presented as well as the assumptions used to develop cost figures. The cost for conducting the five-year reviews is included in the O&M category for each of the alternatives presented.

8. State Acceptance considers whether the state agrees with, opposes, or has no comment on the ***Preferred Alternative***.

The state of Nebraska supports the EPA's selection of Alternatives S4 and G3.

9. Community Acceptance considers whether the local community agrees with the EPA's analyses and ***Preferred Alternative***. Comments received on the ***Proposed Plan*** are an important indicator of community acceptance.

Community acceptance of the ***Preferred Alternatives*** will be evaluated after the public comment period ends and will be described in the Interim ROD for the Site.

SUMMARY OF THE PREFERRED ALTERNATIVE

The ***Preferred Alternatives*** for OU 1 Soils, amending the 2010 Interim ROD, is Alternative S4 – Excavation, Treatment and Disposal of Contaminated Soil and Expansion and Operation of Existing SVE System. This alternative would excavate and treat the soils in the vicinity of the known release, expand the SVE system and operate the expanded SVE system. This alternative will prevent further leaching of contaminants to the groundwater. This alternative includes periodic monitoring of the soil vapor to determine the effectiveness of the remedy.

Alternative S4 was selected over the other alternatives because it meets RAOs in the shortest amount of time, uses proven and reliable technologies, and best addresses OU 1 contaminated soils.

The ***Preferred Alternatives*** for ***interim remedial action*** for the OU 2 Groundwater is Alternative G3 – Groundwater Recovery, Treatment, and Discharge at Mid-plume and Leading Edge of Plume. This alternative would prevent the further spread of the OU 2 contaminated groundwater plume and would restore the ***aquifer*** to its beneficial use. The alternative would prevent exposures through implementation of ICs on domestic use of the groundwater.

Alternative G3 was selected over the other alternatives because it employs a proven and reliable technology that has the ability to meet RAOs in the shortest amount of time, and is more implementable from a feasibility standpoint.

Based on the information currently available, the EPA believes the ***Preferred Alternatives*** would be protective of human health and the environment, would comply with media-, action-, and chemical-specific ARARs, would be cost effective, and would use permanent solutions to the maximum practical extent. NDEQ concurs on the EPA's ***Preferred Alternatives***.

The ***Preferred Alternatives*** can be changed in response to public comment or new information.

COMMUNITY PARTICIPATION

The EPA and NDEQ are providing information regarding the ***interim remedial action*** for the Site to the public through public meetings, the ***Administrative Record*** file for the Site, and announcements published in the *Hastings Tribune*. The EPA and the state encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted. Oral or written comments may be submitted during the

public meeting, or written comments may be sent to the EPA Community Involvement Coordinator, Ben Washburn, postmarked or emailed no later than 30 days from the ***Proposed Plan*** announcement.

Once the public comments are received, the EPA, in consultation with the state, will make its final decision. The EPA will then publish an Interim ROD, a document that provides the rationale for its decision and responds to the public comments.

The dates for the public comment period, the date, location, and time of the public meeting, and the location of the ***Administrative Record*** file are provided on the front page of this ***Proposed Plan***.

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ABBREVIATIONS

AGP	Ag Processing Inc.
AOC	Administrative Order on Consent
ARAR	applicable or relevant and appropriate requirement
AST	above ground storage tank
bgs	below ground surface
CCl_4	carbon tetrachloride
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
$CHCl_3$	chloroform
COC	contaminant of concern
DPT	Direct-push technology
EPA	U.S. Environmental Protection Agency
FS	feasibility study
GET	groundwater extraction and treatment
HHRA	human health risk assessment
ICA	Institutional Control Area
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MW	monitoring well
NCP	National Oil and Hazardous Substances Contingency Plan
NDEQ	Nebraska Department of Environmental Quality
NPL	National Priorities List
O&M	operation and maintenance
OU	operable unit
PA/SI	preliminary assessment / site investigation
PCB	polychlorinated biphenyl
PRP	potentially responsible party
RAO	remedial action objective
RAPMA	Remedial Action Plan Monitoring Act
RD	Remedial Design
RI	remedial investigation
ROD	Record of Decision
SCGs	Standards, Criteria, and Guidances
SVE	soil vapor extraction
ug/l	micrograms per liter
VCP	voluntary cleanup program
VOC	volatile organic compound

GLOSSARY

Administrative Record: The body of documents the EPA uses to form the basis for selection of a response.

Applicable or relevant and appropriate requirements (ARARs): Federal and state requirements for cleanup, control and environmental protection that a selected remedy for a site will meet.

Aquifer: A formation, or group of formations, that yields water to a well of sufficient quality and quantity for drinking and/or other purposes.

Aquitard: A layer within an aquifer that is composed of material less permeable than the aquifer materials located above and below it.

Capital Cost: Expenses related to the labor, equipment, and material costs of construction.

Cancer Risk: Cancer risks are probabilities usually expressed in scientific notation (e.g., $1x10^{-6}$). A cancer risk of $1x10^{-6}$ indicates that an individual experiencing the reasonable maximum

exposure estimate has a 1 in 1 million chance of developing cancer as a result of a site-related exposure.

Cleanup Levels: Medium- and contaminant-specific goals set to achieve as a result of the RAOs (e.g., treatment of contaminated groundwater to MCLs).

Contaminant of Concern (COC): The chemical substances found at the site at concentrations that pose an unacceptable risk to human health and the environment.

Contaminant of Potential Concern (COPC): The chemical substances detected above screening levels and are investigated during the HHRA.

Feasibility Study (FS): The report that presents the identification and evaluation of the most appropriate technical approaches to address contamination problems at a Superfund site.

Fund-financed: Activities financed by the Hazardous Substance Superfund established by section 9507 of the Internal Revenue Code of 1986.

Groundwater Extraction and Treatment (GET): A groundwater remediation technology that uses extraction wells and systems that treat the discharge from the extraction wells (commonly referred to as pump and treat).

Hazard Ranking System: The method the EPA uses to evaluate the relative potential of hazardous substances releases to cause health or safety problems, or ecological or environmental damage.

Interim Remedial Action: A remedy that is performed before the RI/FS for the site or operable unit has been completed and is performed to mitigate immediate threats.

Maximum Contaminant Level (MCL): Established by the Safe Drinking Water Act as the maximum permissible contaminant level in water that is delivered to any user of a public water system.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to human health.

National Priorities List (NPL): The EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response.

Operable Unit (OU): A distinct portion of a Superfund site or a distinct action at a Superfund site. An OU may be established based on a particular type of contamination, contaminated media (e.g., soil, water), source of contamination and/or some physical boundary or restraint.

Operation and Maintenance Costs: The cost and time frame of operating labor, maintenance, materials, energy, disposal and administrative components of the remedy.

Preferred Alternative: Of all the alternatives considered, the preferred alternative is the alternative that is proposed by the EPA to address the site.

Preliminary Assessment/Site Investigation (PA/SI): A Preliminary Assessment (PA) assesses readily available information to determine whether a site poses a threat and whether further investigation is necessary. A Site Investigation (SI) collects samples to determine whether hazardous substances have been released and assesses whether they have reached nearby targets. The PA and SI are typically performed simultaneously. They provide the data needed to apply the Hazard Ranking System.

Present Value: The amount needed to be set aside at the initial point at the start of remedial actions to assume that the funds will be available in the future as they are needed. Costs of goods or services are assumed to be unaffected by general price inflation.

Proposed Plan: A document requesting public input on a proposed remedial alternative.

Record of Decision (ROD): A document which is a consolidated source of information about the site, the remedy selection process, and the selected remedy for a cleanup under CERCLA.

Remedial Action: Action taken to clean up contamination at a site to acceptable standards.

Remedial Action Objective (RAO): General descriptions of what the cleanup will accomplish (e.g., restoration of groundwater to drinking water levels).

Remedial Investigation (RI): A detailed study of a site. The RI may include an investigation of air, soil, surface water, and groundwater to determine the source(s), types of contaminants, and extent of contamination at a site.

Screening Levels: Risk-based levels calculated using the latest toxicity values, default exposure assumption and physical and chemical properties. They are used to evaluate whether a chemical warrants further assessment. The EPA publishes these and updates them on a regular basis. http://www.epa.gov/region9/superfund/prg/

Soil Vapor Extraction (SVE): Typically used to remove VOCs from soil. A vacuum is applied to subsurface soil inducing an air stream through the soil, thereby transferring the VOC contaminants from the soil to the air. The contaminant-laden air, or soil vapor, is extracted from the subsurface with a vacuum blower, treated, and discharged to the atmosphere.

Volatile Organic Compound (VOC): An organic compound which evaporates readily to the atmosphere.

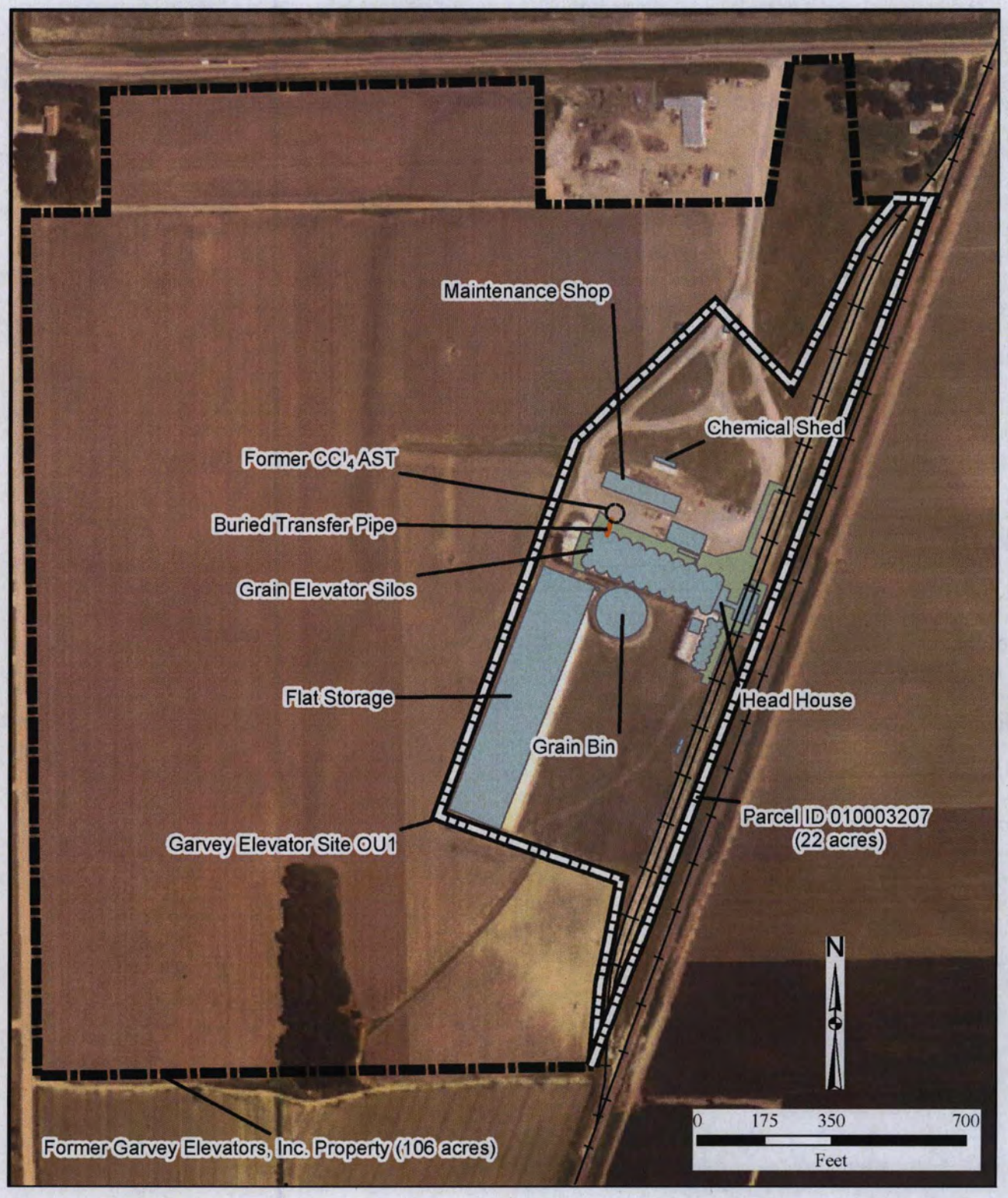

Figure 1—Site map.

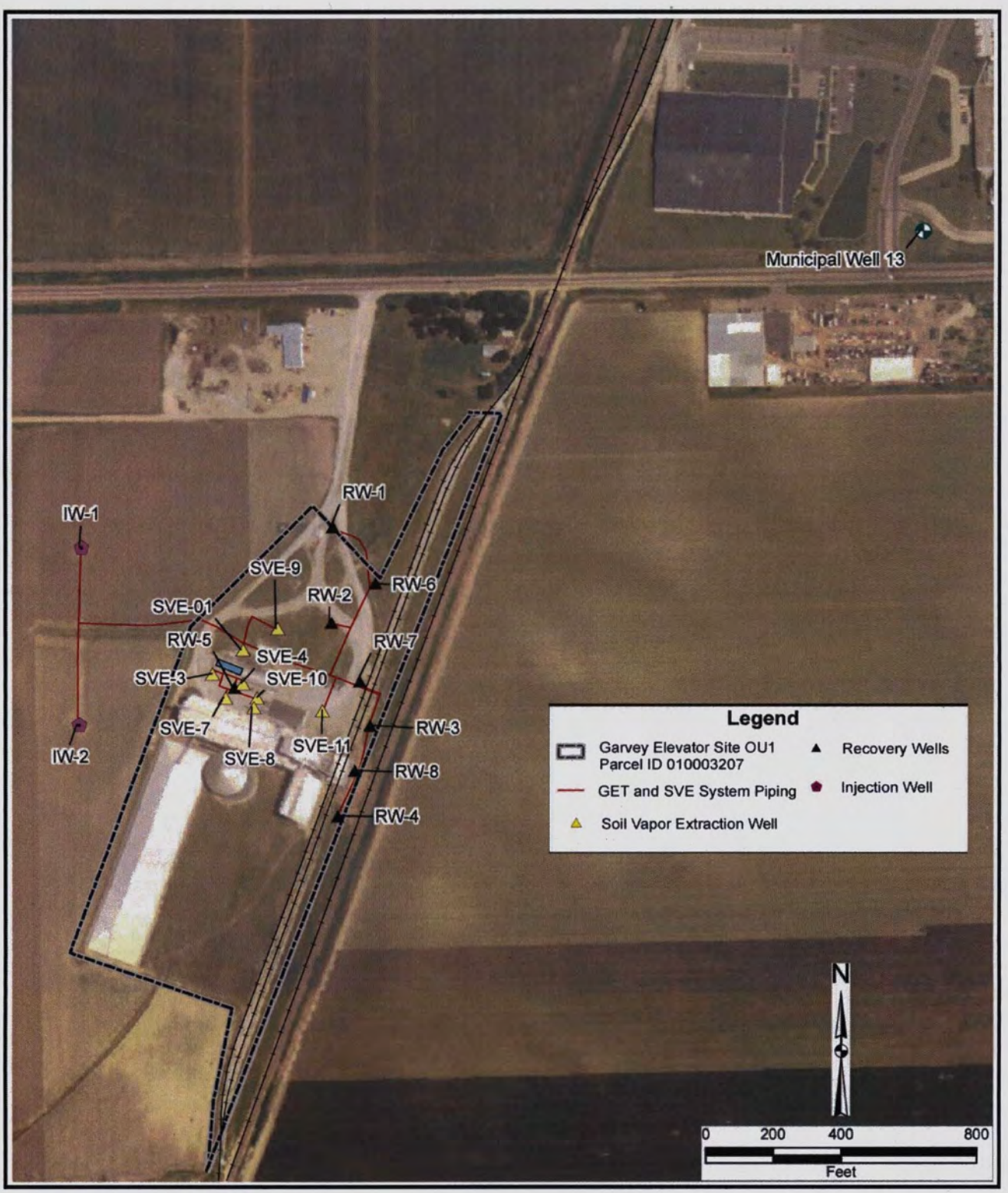

Figure 2 – Existing GET and SVE systems.

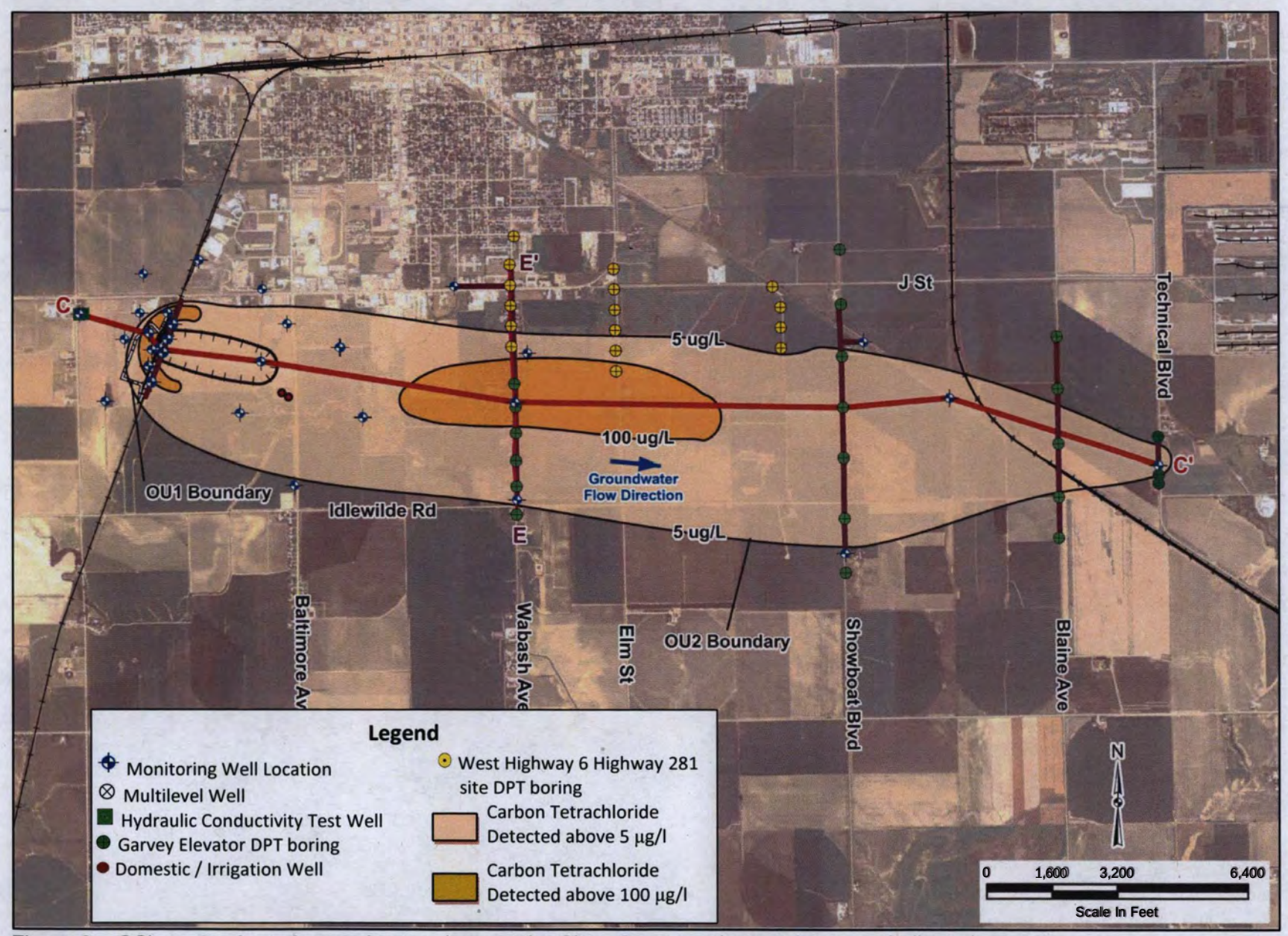

Figure 3 – CCl_4 contaminated groundwater plume at the Site. Cross section transects are indicated on map.

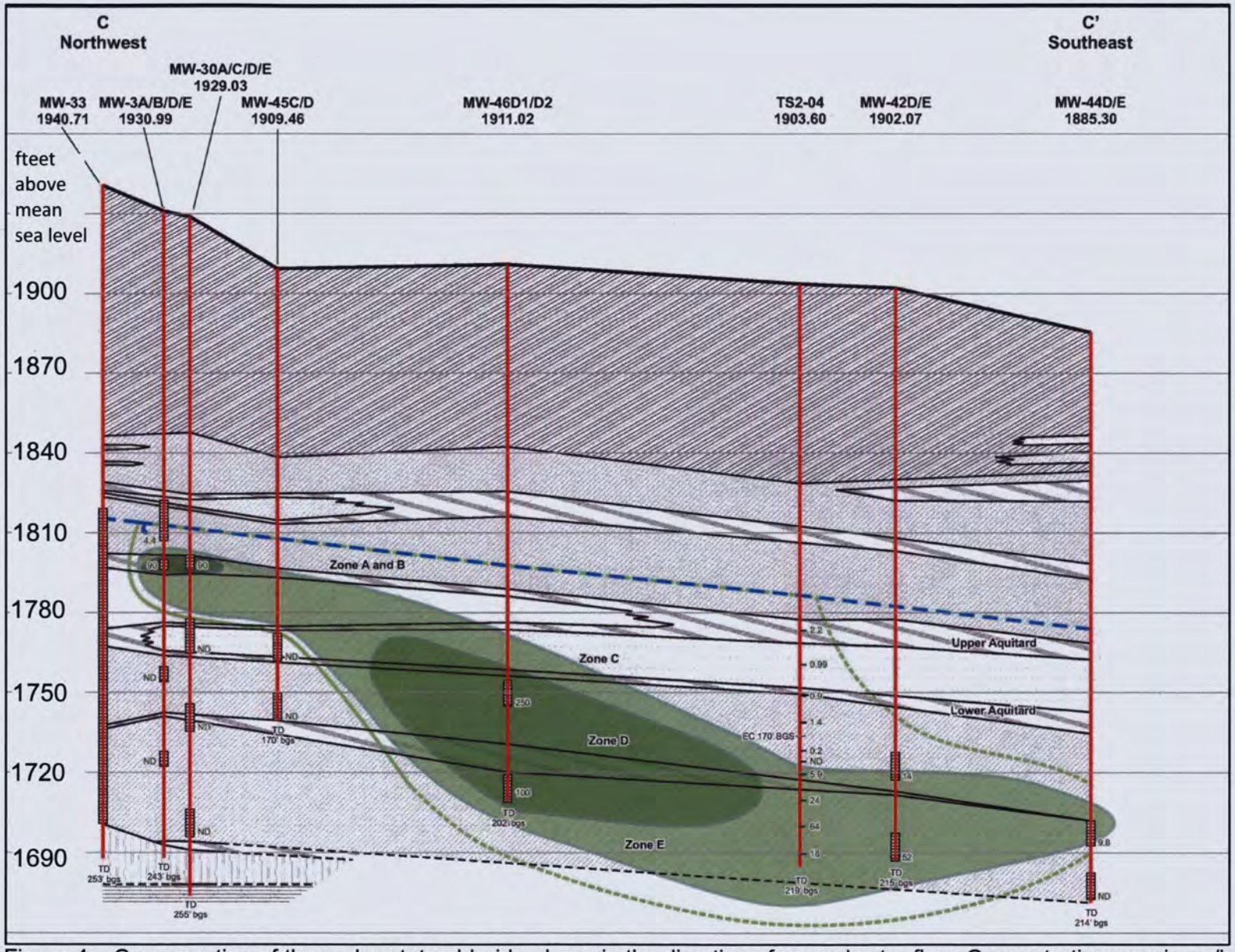

Figure 4 – Cross section of the carbon tetrachloride plume in the direction of groundwater flow. Concentrations are in µg/l.

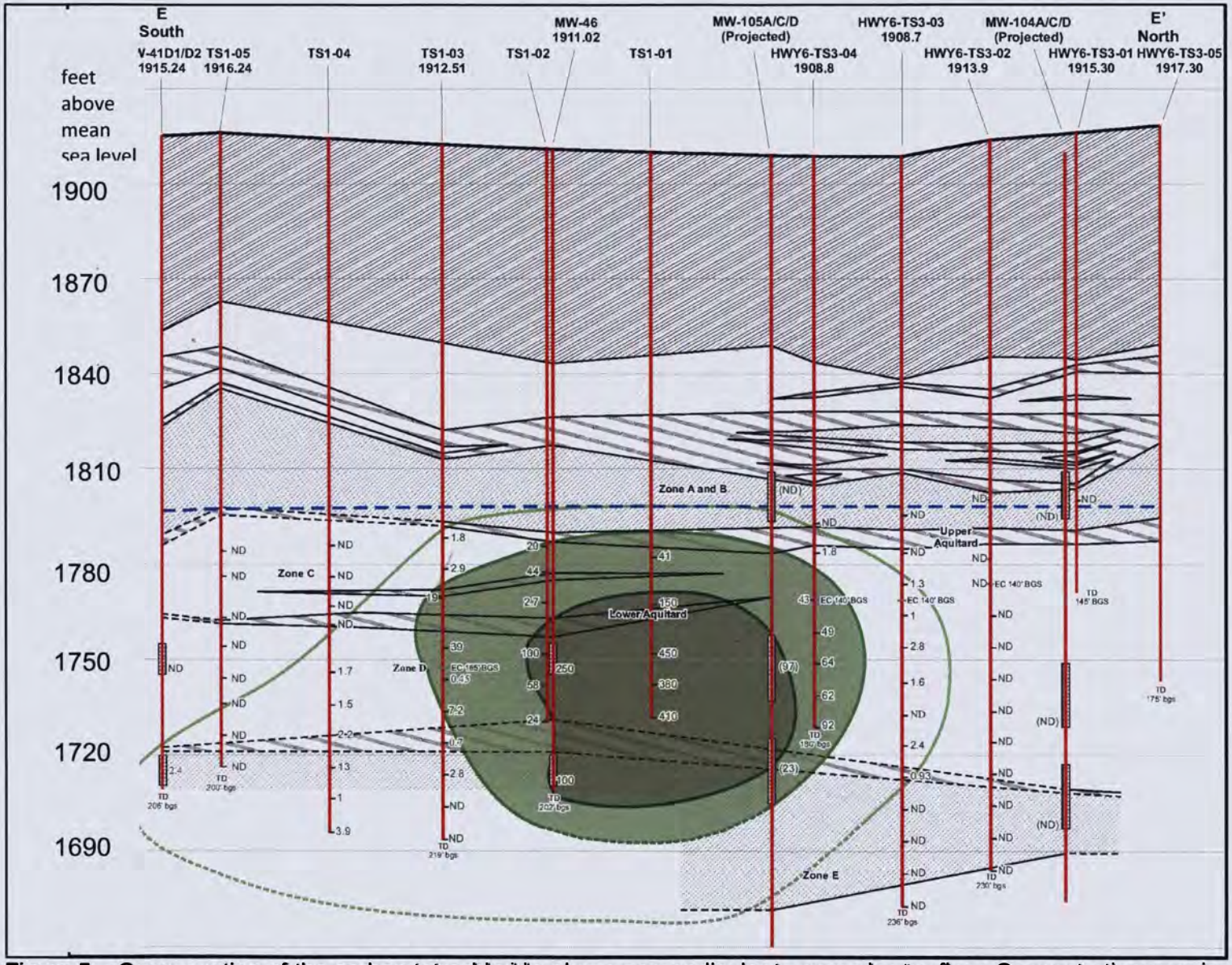

Figure 5 – Cross section of the carbon tetrachloride plume perpendicular to groundwater flow. Concentrations are in µg/l.