Third Five-Year Review Report
for

Hastings Ground Water Contamination Site

Adams County

Hastings, Nebraska

July 2007

Prepared by

City of Hastings
Hastings, Nebraska

and

Region VII
United States Environmental Protection Agency
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Date:

7/17/07

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List of Abbreviations

AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
BNSF	Burlington Northern Santa Fe Railroad
BTEX	Benzene, toluene, ethylbenzene, and xylene
CCl_4	Carbon Tetrachloride
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMS	Community Municipal Services
COCs	Contaminant(s) of Concern
1,2-DCA	1,1-Dichloroethane
1,1-DCE	1,1-Dichloroethylene
Cis-1,2-DCE	Cis-1,2-Dichloroethane
Trans-1,2-DCE	Trans-1,2-Dichloroethane
DOD	Department of Defense
EDB	Ethylene Dibromide
EE/CA	Engineering Evaluation/Cost Analysis
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
HEIP	Hastings East Industrial Park
HGWCS	Hastings Ground Water Contamination Site
Risk Assessment	Human Health Baseline Risk Assessment
IC	Institutional Control
ICA	Institutional Control Area
ISCO	In Situ Chemical Oxidation
IWA	In-well Aeration
LUST	Leaking Underground Storage Tank
MCL	Maximum Contaminant Level established under the Safe Drinking Water Act
MW	Monitoring Well
NAD	Former Naval Ammunition Depot
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDEQ	Nebraska Department of Environmental Quality
OSWER	Office of Solid Waste and Emergency Response
O&M	Operation and Maintenance
OU	Operable Unit(s)

List of Abbreviations

PAH	Polynuclear Aromatic Hydrocarbon
PCE	Tetrachloroethylene
PRP	Potentially Responsible Party
RA	Remedial Action
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SD	Settling Defendant (a party who entered into a Consent Decree with EPA)
SOW	Statement of Work
SVE	Soil Vapor Extraction
TBCs	To Be Considered
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
µg/l	Microgram/Liter
USACE	United States Army Corp of Engineers
VOCs	Volatile Organic Compounds

Executive Summary

This document presents the U.S. Environmental Protection Agency's (EPA) third Five-Year Review of the Hastings Ground Water Contamination Site (HGWCS), located in and adjacent to the city of Hastings, Nebraska. The results of this Five-Year Review indicate that some of the actions taken to date continue to provide protection to the public health and the environment. For the actions which have not yet been fully implemented, a protectiveness determination cannot be made at this time until further information is obtained. Several responsible parties continue to be active in the implementation of response actions at various locations across the site. For the most part, the ownership of involved properties and the list of responsible parties have not changed since the last Five-Year Review. These parties, EPA and the state of Nebraska, have conducted and continue to conduct actions at the site to address contamination in the site soils and ground water.

The HGWCS was divided into seven subsites for investigative and remediation purposes on the basis of geographic and contaminant source area characteristics. The subsites include Well No.3, Colorado Avenue, Second Street, North Landfill, FAR-MAR-CO, South Landfill, and the Former Naval Ammunition Depot (NAD). Most subsites consist of multiple operable units (OUs), designated as such to facilitate the identification and implementation of remedial actions. A non-subsite specific OU, the Area-Wide Ground Water Action OU19, was created to integrate information from the individual subsites, with the exception of the NAD, to protect potential receptors from unacceptable risks posed by the multiple contaminated ground water plumes emanating from the various subsites. EPA has worked closely with the state of Nebraska, the United States Army Corp of Engineers (USACE), and a number of potentially responsible parties (PRPs), including the city of Hastings, to address the issues that have affected the public health and environment at this site. These actions are briefly described below.

Area-Wide Ground Water Action - The Agency has taken an Area-Wide approach to protect the public from exposure to the contaminated ground water emanating from the six subsites located within or directly adjacent to the City limits of Hastings. This approach integrates information collected at each subsite and is intended to protect potential receptors from unacceptable risks posed by contaminated ground water. In 2001, EPA, in consultation with Nebraska Department of Environmental Quality (NDEQ), signed an Interim Action Record of Decision (ROD) that selected an interim action remedy. The Interim Action ROD provides for establishing an institutional control area (ICA), alternate water supply for affected users, well inventory and ground water monitoring program. EPA and the PRPs signed a Consent Decree (CD) which requires the PRPs to implement the selected interim action remedy. On behalf of the Area-Wide PRPs, the city prepared a Remedial Design/Remedial Action (RD/RA) Work Plan in August 2004 to satisfy the requirements of the CD and Statement of Work (SOW). The city had previously passed and implemented Ordinance No. 3754 in November 2000 that established the ICA identified in the 2001 ROD. The city initiated further work efforts in 2004, completed ground water quality sampling and other actions, and submitted annual ground water monitoring reports in early 2005, 2006 and 2007. Ground water monitoring and compliance monitoring of the ordinance continues. The NAD was not included in the Area-Wide Ground Water Action because it is located outside the City limits and the USACE is conducting a separate ground water action.

Well No.3 Subsite - EPA completed one interim action addressing the contamination present in the soils (OU07), one soil removal action (OU17), one interim action addressing the ground water contamination (OU 13) and one final action selected to address the downgradient Trichloroethylene (TCE) ground water contamination (OU18). EPA released its final ROD for

the subsite on May 17, 2001, selecting no further action for OUs 07, 13, and 17. The remedial action for OU13 was completed in 2002 when ground water monitoring indicated that the carbon tetrachloride present in the aquifer had been remediated to the maximum contaminant level (MCL) established under the Safe Drinking Water Act. For OU18, the final ROD selected the continuation of the operation of the former municipal supply well M-3 with MCLs as the cleanup level for the TCE and related volatile contaminants. EPA and Dutton-Lainson Company (Dutton-Lainson) signed an agreement CD to continue performing the OU18 work. Dutton-Lainson began operating the system at M-3 in May 2003 and initiated ground water monitoring in June 2003; Dutton-Lainson samples the ground water twice yearly.

Colorado Avenue Subsite - The PRPs installed an intermediate/deep level (e.g., 60 to 100 feet below ground surface) soil vapor extraction (SVE) system for OU09 (source control) and continue to operate it on a periodic basis. Construction and implementation of a shallow level (generally less than 50 feet below ground surface) SVE system originally planned for the summer of 2002 is now expected to be installed in 2007. For OU01 (ground water), EPA completed an interim action ROD in 1991 and amended this ROD in 1998 to permit an expanded range of technologies including air sparging and in-well-aeration (IWA). Dravo Corporation (Dravo) installed the IWA ground water treatment systems for Phase II in 1999. In 2002, four additional IWA wells were installed one mile east of the contaminant source areas. These treatment wells are known as Phase III and began operation in November 2002. While ground water treatment activities continue, the remedy has not been fully implemented. Dravo has signed a Consent Order requiring a complete delineation of the downgradient Colorado Avenue contaminant plume. This work to sample areas beyond the Phase III treatment system is known as the Phase IV work.

Second Street Subsite - The EPA initiated a ground water and soils SVE removal action at the source area in 1996. These systems continue to operate with day-to-day operations performed by City employees. EPA initiated a second removal action for the Second Street Subsite downgradient ground water in September, 2000. Two in-well stripping wells located at Pine Avenue began operating in the summer of 2001. The remediation systems remove the benzene and other volatile contaminants from the soils and ground water. After completion of the Remedial Investigation/Feasibility Study (RI/FS) for OU20, EPA signed a ROD selecting in situ treatment combined with extraction and treatment of the ground water in July 2003. EPA implemented the OU20 remedy in 2005 with the installation of fourteen in situ treatment wells. These wells are needed to treat the remaining areas of ground water contamination identified to the east and south. Oxygen release chemicals are injected into the ground water to enhance naturally occurring biodegradation of the contaminants. The first two in situ bioremediation treatments were completed in November 2005 and November 2006. After completion of the RI/FS for the OU12 source area, on September 21, 2006, EPA signed a ROD selecting excavation and thermal treatment of readily-accessible contaminated soils and source materials; and treatment of contaminated areas below the surface throughout the subsite by using in situ chemical oxidation (ISCO). ISCO will be conducted in phases, with monitoring, as the work progresses.

North Landfill Subsite – The PRPs implemented the source control (OU10) remedial action consistent with the 1991 ROD and completed construction of a landfill cap in 1999. The PRPs monitored the levels of contamination present in the soil-gas for eight quarters (from 1999 to 2001) to determine if the landfill continued to be a source of volatile organic compounds (VOCs) to the aquifer. The results of this monitoring indicated that the landfill was not a major source of contamination.

In March 1995, the responsible parties requested that EPA delay the implementation of the ground water extraction and treatment remedy selected in the 1991 ROD in order to determine if the remediation system implemented at the FAR-MAR-CO Subsite would address the North Landfill plume. EPA agreed to a 5-year suspension for the implementation of the remedial action as long as quarterly ground water monitoring was performed to verify the performance of the FAR-MAR-CO system. The FAR-MAR-CO extraction system was implemented in 1997. The 5-year performance period ended in July 2002 and the report evaluating the FAR-MAR-CO remediation system (the Well D Report) was submitted to EPA in December 2002. The PRPs' report concluded that the North Landfill plume was contained. EPA has not accepted this conclusion. The PRPs completed a final FS for ground water remediation under EPA oversight in 2005. Additional ground water monitoring wells (MW) have been installed and monitored by the responsible parties; these monitoring results indicated that an upgradient source of ground water contamination is migrating into the subsite plume. After approval of the FS for OU02, EPA signed a final action ROD on August 25, 2006. This ROD is addresses the final response action for this subsite and includes monitoring to confirm the conclusion in the Well D Report that the North Landfill ground water contamination is contained. The remedy also consists of natural attenuation (NA), ground water use restrictions, hydraulic containment using vertical extraction wells, and use of the pumped water as non-contact cooling water.

FAR-MAR-CO Subsite – EPA issued the ROD for the FAR-MAR-CO OU03 (source control) in 1988, selecting SVE as the remedy. In August 1995, EPA amended the ROD by extending the SVE operation for two years beyond the time which the soils had reached their cleanup levels. This extension was implemented to remove the contamination present in the upper zone of the aquifer, thereby facilitating the restoration of the aquifer. The work was conducted by Farmland Industries, Inc. (Farmland) under a CD. The SVE system began its operation on November 19, 1997. The extended operation and maintenance (O&M) phase of the system began in May 2000 and was completed in May 2002. Farmland collected soil vapor samples in November 2002 and in May 2003 to determine if any rebounding of the contamination had occurred. After verifying that rebounding had not occurred, Farmland undertook restoration activities in mid-2003 and completed restoration of the subsite in December 2003.

EPA identified a threat from the FAR-MAR-CO Subsite to the drinking water supply provided by the Community Municipal Services (CMS) in 1995 and in response, issued an Action Memorandum in December 1995 which determined that a ground water removal action (OU06) was necessary. Morrison Enterprises (Morrison), a former owner and operator of the subsite, installed the extraction well, Well D, in the summer of 1997. Morrison submitted to EPA the Well D Report documenting the first five years of operation. EPA evaluated the performance of the system based upon the information presented in that report. EPA continues to receive ground water monitoring results from Morrison for the contaminants of concern (COCs) (carbon tetrachloride {CCl_4} and ethylene dibromide {EDB}) on a quarterly basis. System operation information is also included in the quarterly reports.

In 1999, the city extended a water line to CMS users, which removed the immediate threat of exposure to contaminated drinking water. To evaluate alternatives to address the long-term threat, EPA invited Morrison to perform an FS. Morrison agreed and performed the work under EPA oversight in 2005 and 2006. Final revisions were completed in June 2007. In July 2007, EPA issued a Proposed Plan which evaluated alternatives for remediating contaminated ground water at the subsite and choosing one as the proposed alternative, subject to public comment. All alternatives envision a 50 year period for the Performance Goals, which are MCLs for the COCs, to be attained.

South Landfill Subsite - EPA issued its final ROD for OU05 (source control and ground water) in September 2000. The selected remedy for the South Landfill includes upgrading the landfill cap and monitored natural attenuation to address ground water contamination. EPA negotiated a CD with the PRPs who then began work in late 2004. The landfill cap was installed in 2005, and a methane investigation was also conducted. Additional methane sampling is planned and ground water sampling activities are in progress. The RD for ground water will be prepared in 2007.

NAD Subsite - The USACE is performing the work for the following OUs: 04, 08, 14, 15, and 16. The USACE is in the process of performing its third Five-Year Review for OUs 04, 08, 14, 15 and 16 separately. The transmittal memorandum of a draft copy of the report is included as Appendix 1. The USACEs evaluation for OU04, OU08, and OU15 concluded the remedies to be protective in human health and the environment in the short and long term. The remedy for OU14 is expected to be protective upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The remedy for OU16 currently protects human health and the environment because exposure pathways that could result in unacceptable risks are being controlled. However, in order for the remedy to be protective in the long-term, institutional controls on future land use are necessary to ensure long-term protectiveness.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Hastings Ground Water Contamination		
EPA ID (*from WasteLAN*): NED980862668		
Region: 7	**State:** NE	**City/County:** Hastings / Adams
SITE STATUS		
NPL status: ☒ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): ☒ Under Construction ☒ Operating ☐ Completed		
Multiple OUs?* ☒ YES ☐ NO		**Construction completion date:** N/A
Has the site been put into reuse? ☒ YES ☐ NO		
REVIEW STATUS		
Lead agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency		
Author name: Brian Zurbuchen, Ph.D		
Review period:** 09 / 05 / 2006 to 07/16/07		
Date(s) of site inspection: 02 / 28 / 2006 – 02 / 29 / 2006		
Type of review: ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☐ 1 (first) ☐ 2 (second) ☒ 3 (third) ☐ Other (specify)		
Triggering action: ☐ Actual RA On-site Construction at OU #__ ☐ Actual RA Start at OU #__ ☐ Construction Completion ☒ Previous Five-Year Review Report ☐ Other (specify)		
Triggering action date (*from WasteLAN*): 07 / 02 / 2002		
Due date (*five years after triggering action date*): 07 / 02 / 2007		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

Well 3 (OU18): the OU18 ground water contaminant plume is not well defined; EPA will discuss this matter with Settling Defendants (SDs).

Colorado Avenue: the OU09 remedy has not been fully implemented; the 2006 CD requires SDs to implement the OU01 SVE remedy. The OU01 remedy has not been fully implemented; the downgradient plume (known as Phase IV) is being investigated by Dravo under terms of the Administrative Order on Consent (AOC) signed in 2007; a ROD is planned for a final ground water RA.

Second Street: EPA will implement the OU12 RD/RA, remedy is for source control; OU12 ROD is final ROD for the subsite; OU12 RD began June 2007. EPA is implementing the OU20 remedy in phases; RA began in 2005.

North Landfill (OU02): Final Action ROD issued in August 2006; CD negotiations with PRPs still ongoing; employment of Well D for extraction of contaminated ground water will continue.

FAR-MAR-CO (OU06): EPA issued the Proposed Plan in July 2007; operation of Well D for extraction of contaminated ground water is ongoing.

Area-Wide Ground Water Action (OU19): Interim Action ROD issued in 2001; CD entered February 26, 2004; all components of remedy implemented; COCs have been consistently detected in industrial wells located near the eastern boundary of the institutional control area; 1,4-dioxane to be added to COC list.

Recommendations and Follow-up Actions:

Continue the actions as specified in the Interim RODs or Action Memoranda for the respective subsites and the Area-Wide Ground Water Action. Develop and implement a monitoring plan to ensure ICA is broad enough to encompass ground water contaminant plumes.

Protectiveness Statement(s):

The combination of the subsite and area-wide remedies currently protects human health. In addition to the remedies that established engineering controls at the subsites, a remedy identifying institutional controls (ICs) was selected for the Area-Wide Ground Water Action (OU19). The Area-Wide Ground Water Action is not a subsite, but was established to prevent the public from exposure to the contaminated ground water emanating from the six city subsites. The IC prohibits property owners from domestic use of ground water within the ICA unless it is demonstrated through sampling that the ground water is suitable for use. However, in order for the remedy to be protective in the long-term, the IC currently in place must continue to be implemented over the lateral extents of all migrating contaminant plumes.

Other Comments:

There are several parties involved with the cleanup of these 20 OUs. Some RAs are fund-lead and require a state match. Response actions at the NAD are being conducted by USACE. Other response actions are fully funded by the city and private responsible parties. Cooperation and coordination among all the entities is crucial for the successful cleanup of the source areas and restoration of the aquifer.

Third Five-Year Review Report
Hastings Ground Water Contamination
Hastings, Nebraska

The purpose of the Five-Year Review is to determine whether the remedy at a site is protective of human health and the environment. The method, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

I. Introduction

EPA is preparing this Five-Year Review pursuant to Section 121 of the Comprehensive Environmental Response Compensation and Liability Act as amended (CERCLA), 42 U.S.C. §9621 and the National Oil and Hazardous Substances Contingency Plan (NCP). CERCLA § 121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with Section 104 or 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

EPA interpreted this requirement further in the NCP; 40 CFR §300.430(F)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

EPAs involvement in Hastings began in 1984, when high levels of VOCs were found in three municipal wells. EPA designated the contaminated area as HGWCS. The HGWCS covers the central industrial area of the city of Hastings, Adams County, Nebraska, and adjacent areas outside of the City limits.

The HGWCS was placed on the National Priorities List in 1986. The National Priorities List is a nationwide list of hazardous waste sites eligible for long-term RA financed under the Superfund program, in the event a viable responsible party cannot be identified.

The HGWCS was divided into seven subsites for investigative and remediation purposes on the basis of geographic and constituent source area characteristics. The subsites are Well No.3, Colorado Avenue, Second Street, North Landfill, South Landfill, and the NAD. Most subsites consist of multiple OUs, designated as such to facilitate the identification and implementation of RA. A non-subsite specific OU, the Area-Wide Ground Water Action OU19, was created to integrate information from the individual subsites, with the exception of the NAD, into a comprehensive strategy to protect potential receptors from unacceptable risks posed by the multiple contaminated groundwater plumes emanating from the various subsites.

EPA and the city of Hastings, in cooperation with the NDEQ, have conducted this Five-Year Review of the Superfund RA implemented at the HGWCS, with the exclusion of the NAD. The USACE, with oversight by EPA and NDEQ, conducted their Five-Year Review for the NAD subsite.

This Five-Year Review Report was completed pursuant to Section 121 (c) of CERCLA, Section 300.430(f)(4)(ii) of the NCP and pursuant to EPA/Office of Solid Waste and Emergency Response (OSWER), Comprehensive Five-Year Review Guidance (OSWER Directive 9355.7-03B-P, June 2001).

This is the third Five-Year Review for the HGWCS. The initial Five-Year Review was triggered by the initiation of the actual on-site construction at the Well No.3 Subsite, OU07 (October 1992). The first Five-Year Review was issued in May 1997. The second Five Year Review covered the period from May 1997 to May 2002 and was completed July 2, 2002.

This current Five-Year Review covers the period from May 2002 through April 2007. Review activities were conducted between September 2006 and June 2007. As the HGWCS is made up of 20 OUs, several informational sources contributed to this report. EPA and the city of Hastings collected and condensed this information to fit the format required for Five-Year Review Reports.

Information for the Well No.3 Subsite was provided by EPA (analytical data), the city of Hastings, and Hydro-Trace, Inc., the contractor for Dutton-Lainson (a responsible party at the subsite). At the Colorado Avenue Subsite, the analytical information was provided by Michael Baker, Jr., Inc. (Baker), the contractor for Dravo Corporation, (a responsible party at the subsite) and EPA's contractors. At the Second Street Subsite, analytical data was provided by EPA's contractor. At the North Landfill Subsite, the analytical information was provided by the city of Hastings and Hydro-Trace, Inc., the contractor for the North Landfill responsible parties. At the FAR-MAR-CO Subsite, analytical data was provided by Hydro-Trace, Inc., the contractor for Morrison (a responsible party at the subsite). At the South Landfill Subsite, analytical information was provided by EPA's contractor, the city of Hastings and its contractor, Hydro-Trace, Inc., and Olsson Associates (See Appendix 4). At the NAD, the information was provided by the USACE. The information for the Area-Wide portion of the site was provided by the city of Hastings. This Five-Year Review Report documents the status of construction activities and the inspections of response actions conducted by EPA and the NDEQ. The NDEQ and EPA inspections determined that the contractors constructed the remedies in accordance with the RD plans and specifications. The inspections also clarified the status of additional construction work needed. The subsite updates below identify the activities which were initiated since the 2002 review and any additional activities necessary to achieve the RODs performance standards, protectiveness, and site completion.

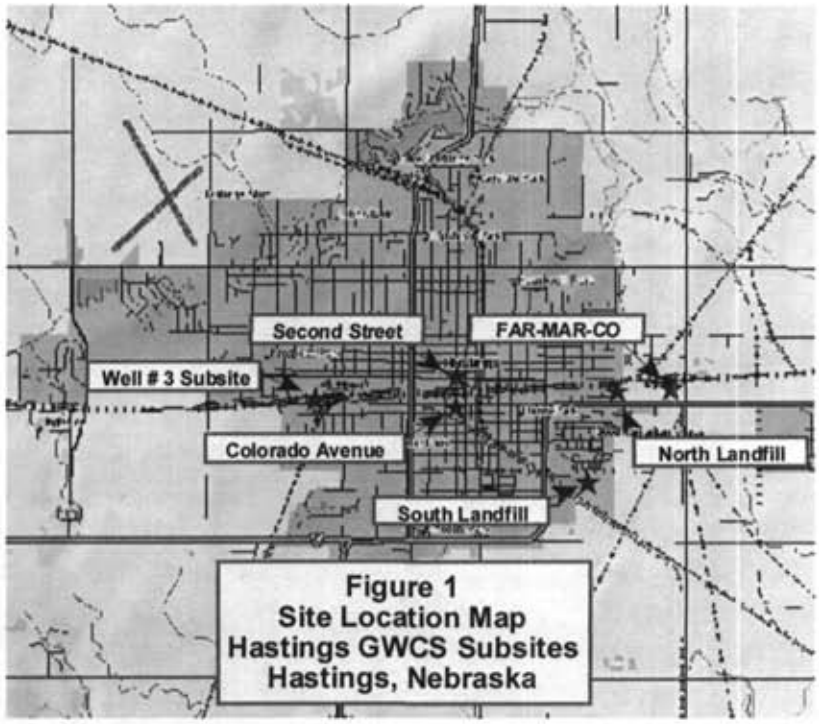

Figure 1
Site Location Map
Hastings GWCS Subsites
Hastings, Nebraska

The USACE is in the process of performing its third Five-Year Review for OUs 04, 08, 14, 15 and 16 separately. The transmittal

memorandum of a draft copy of the report is included as Appendix 1.

EPA's third Five-Year Review will become part of the site file and will be included in the site Administrative Record located in the Hastings Public Library, Hastings, Nebraska, and in the EPA's Region VII site file.

II. Site Chronology

Table 1 summarizes the chronology of subsite activities.

III. Background

A. Physical Characteristics

The city of Hastings is located in the south-central part of Nebraska and the northeastern part of Adams County. Hastings is the largest city in the county and the county seat. The city is in the Central Loess Plains section of the Great Plains. Most of the area is nearly level to low rolling loess plains that are dissected by small drainageways. Nearly all soils are deep and are formed in calcareous loess, eolian sands, or mixed silty and sandy alluvium.

The city of Hastings, Nebraska, lies above the surface water divide between tributaries to the Little Blue River and tributaries to the West Fork Big Blue River. Several naturally occurring wetlands lie within 10 miles of Hastings. The climate is continental and marked by wide seasonal fluctuations in temperature and precipitation. Temperatures below 0°F in winter and above 100°F in summer are common. The mean annual temperature is 50.7°F, and the 30 year annual average rainfall is 27.94 inches. The average growing season is 163 days.

B. Land and Resource Use

The city of Hastings, Nebraska, is the center of agricultural, industrial, and commercial activities for Adams County. The population of approximately 24,000 has been stable in recent decades. Farming is important in the area and is based mostly on growing cash grain crops and raising livestock. More than 75 percent of the acreage in the county is cultivated, and 16 percent is in rangeland. Less than 1 percent of the county is in woodland and windbreaks. The lack of seasonal rainfall makes irrigation from deep wells important in the area. About 25 percent of the acreage in the county is irrigated.

Four of the six city subsites are located within the Hastings city limits. The FAR-MAR-CO Subsite and the South Landfill Subsite are located outside of, but adjacent to the east and southeast city boundary. Residential communities are located adjacent to the six subsites. The Colorado Avenue, Well No.3, and Second Street Subsites are located in the central-industrialized area of Hastings. The NAD is located approximately 1 mile east of the city.

Table 1
Chronology of Site Events

Subsite Operable Unit/Event		Date
Hastings Ground Water Contamination Site and Area Wide OU19		
	Initial Discovery of Problem	7/1/1984
	Special Notice Issued	9/23/1985
	Final listing on EPA National Priorities List	6/10/1986
	Area-Wide FS	4/2000
	Area-Wide Interim Action ROD	6/24/2001
	Special Notice to PRPs	12/28/2001
	Second Five-Year Review Public Availability Session & Site Inspection	3/20/2002
	Second Five Year Review Completed	7/2/2002
	Consent Decree	2/26/2004
	Interim RD/RA Work Plan received by EPA	8/3/2004
	EPA conditionally approves Interim RD/RA Work Plan	9/3/2004
	Revised Interim RD/RA Work Plan received by EPA	11/15/2004
	2004 Annual Report, Hastings Institutional Control Area, received by EPA	3/3/2005
	2005 Annual Report, Hastings Institutional Control Area, received by EPA	4/1/2006
	Third Five-Year Review Site Inspection	2/28 – 3/1/2007
	Fact Sheet: announces start of Third Five Year Review	4/2007
	2006 Annual Report, Hastings Institutional Control Area, received by EPA	4/2/2007
FAR-MAR-CO - OU03 and OU11		
	RI/FS Completion	9/30/1988
	ROD Signature - FAR-MAR-CO Soils	9/30/1988
	Removal Action OU11	10/26/1989 – 12/23/1989
	Explanation of Significant Differences (ESD) for FAR-MAR-CO (SVE Plus Phase)	8/22/1995
	Consent Decree, Farmland Ind.	5/7/1997
	SVE Construction, Inspection	11/19/1997
	RA Report	12/19/1997
	O&M Start	12/19/1997
	Certification of Completion	2003
FAR-MAR-CO - OU06		
	EE/CA	10/20/1995
	Action Memorandum	12/6/1995
	AOC for PRP Removal Action	9/16/1996
	Initiation of Removal Action	7/17/1997, Operational
	5 year report on Well D	12/5/2002
	Revised Feasibility Study submitted by PRP	7/2007

Colorado Avenue - OU09		
	ROD Signature	9/28/1988
	PRP RD, Phase I	1/17/1995
	PRP RA	9/27/1995, Ongoing
	Carbon canisters removed from SVE System	7/2004
	Soil-gas Investigation at Phase I Area	7/2004
	EPA approves OU09 Work Plan and Revised Phase II Design	9/29/2006
	Phase II SVE addition construction began	12/2006 and ongoing
Colorado Avenue - OU01		
	ROD Signature	9/30/1991
	ROD Amendment	5/25/1998
	PRP RD, Phase I and Phase II	3/12/1999
	PRP RA	3/12/1999
	IWA Phase III system placed into operation	11/2002
	IWA 1 and 2 were put into resting mode	4/2005
	CD signed between Dravo and EPA	5/2006
Well No.3 Soils - OU07		
	ROD	9/26/1989
	Fund-Lead RD	12/13/991
	Fund-Lead RA	12/10/1991 – 8/17/1993
	Final Inspection	4/21/1993
	RA Report	8/17/1993
	Certification of Completion	11/1994
	First Five-Year Review	5/27/1997
Well No.3 Plume 2 Soils - OU17		
	EE/CA	5/11/1995
	Action Memorandum	7/20/1995
	PRP Removal	3/25/1996 – 4/15/1997
	SVE Plus Phase	4/16/1997 – 6/10/1998
	Certification of Completion	12/8/1999
Well No.3 Ground water - OU13 and OU18		
	ROD	6/30/1993
	ESD, OU13	12/14/1994
	ESD Phase II, OU13	7/23/1996
	ROD Amendment, Select MCLs for CCl_4	11/19/1999
	RD, Fund-Lead, OU13	9/29/1994 – 7/25/1996
	RA, Fund-Lead, OU13	9/24/1994 – 7/30/1996
	Interim RA Report, Fund-Lead, OU13	12/11/1998

	Final ROD for *Well No.3* Subsite, All OUs	5/17/2001
	Certification of Completion OU13	5/2001
	Special Notice to PRPs, OU18	9/28/2001
	CD signed	10/11/2002
	Final Remediation Action Work Plan OU18	4/10/2003
North Landfill - OU02 and OU10		
	ROD	9/30/1991
	RD Complete, OU10	1/12/1996
	Consent Decree, Pilot Allocation	8/14/1998
	RA Start, OU10	2/6/1998 – 6/22/1998
	Inspection of Landfill Cap, OU10	9/1/1999
	RA Report, OU10	11/23/1999
	Vadose Zone Sampling (First of 8 Quarters)	12/1999
	Final Feasibility Study (FS) Report for groundwater completed OU02	5/20/2005
	Revised Final FS for groundwater completion OU02	5/1/2006
	Proposed Plan for Final groundwater remedy.	4/17/2006
	ROD final groundwater remedy OU20	8/25/2006
Second Street - OU12 and OU20		
	EE/CA released by EPA	8/10/1995
	Removal Action Memorandum	9/20/1995
	Fund-Lead Removal Action Start	9/18/1996
	Source Area System Startup	1/1997
	EE/CA Addendum for Downgradient Ground Water	6/1999
	Downgradient GW System Startup	5/2001
	Second Fund-Lead Removal, OU20	9/1999
	FS Completion Downgradient Plume, OU20	9/25/2002
	Proposed Plan, OU20	10/2002
	Record of Decision, OU20	7/18/2003
	Soil boring investigation in MGP gas holders, OU12	12/5 – 12/12/2003
	Catalytical Oxidizer discontinued	3/2004
	Field Investigation Ground Water Contamination	3/2004
	Replacement of Equalization Tank	8/2004
	Soil Boring investigation eastern perimeter OU12	4/2 – 4/19/2005
	Remedial Design Completed to Implement RA	5/2005
	Polymer Addition system (6 month trial) Installed	5/2005
	In Situ Bioremediation Treatment construction	5/2005 – 9/2005
	Bioremediation Activity Event, 1st Injection	11/2005
	Soil boring investigation east of City property	12/5 – 12/10/2005

	Polymer Addition System Removed	12/2005
	RI/FS Completion, OU12	7/2006
	O&F Inspection, OU20	10/18/2006
	Record Of Decision OU 12	9/21/2006
	Bioremediation Activity Event, 2nd Injection	11/2006
	RA components were deemed O&F by NDEQ	2/2007
	Interim Remedial Action Report approved, OU20	6/4/2007
South Landfill - OU05		
	ROD	9/2000
	Pre-design for Landfill Cap	2003
	RAWP and Construction Plans Completed	5/5/2004
	Landfill Cap Construction Began	7/26/2004
	Landfill Cap Construction Completed	2/28/2005
	Completion of Baseline Assessment	9/19/2005
	Methane Gas Investigation Completed	1/2006
	Ground Water Investigation Plan (GWIP) Approved	6/21/2006
	Land Access Agreement for GWIP	4/2007
	GWIP conducted	4/2007 – ongoing
Naval Ammunition Depot		
Soils, Operable Units 04, 15, 16		
	Final Remedial Action Report OU04	01/2000
	Final Proposed Plan PAH Contamination in Surface Soils, OU04, 15, 16	06/2000
	Field Investigation Report, Residential Sampling and OU15 Resampling	09/2002
	Record of Decision, Carcinogenic Polycyclic Aromatic Hydrocarbons in Surface Soils (Residential Properties OU03, 15, 16)	07/2002
	Final Remediation Report, cPAHs in Surface Soils (Residential Properties) OU04, 15, and 16	01/2004
	Explanation of Significant Differences (Mod of 2002 ROD) OU04, 15, 16 (Nonresidential Soils)	07/2004
	Final Remedial Action Completion Report, PAHs in Surface Soil (Nonresidential), OU04, 15, 16	10/2005
	Final Removal Action Report Explosives Disposal Area, OU16	01/2000
	Final Action Memorandum Bomb and Mine Complex, OU16	10/2000
	Final Removal Action Report Bomb and Mine Complex, OU16	
	Final Engineering Evaluation/ Cost Analysis Bomb and Mine Complex, OU16	02/2000
Vadose Zone, Operable Unit 8		
	Removal Action Report, OU08, Phase I	04/2002
	Final Removal Action Report, Phase II Soil Vapor Extraction, OU08	01/2003
Ground Water, Operable Unit 14		
	Draft final Field Investigation Report, OU14 and 15	07/2000
	Final Action Memorandum for Alternate Water Supply, OU14	11/2002
	Final Removal Action Report Alternate Water Supply, OU14	10/2004
	Final Groundwater Feasibility Study Report, OU14	03/2004

C. History of Contamination

The HGWCS was discovered in 1983 through investigations by the Nebraska Department of Health and the Nebraska Department of Environmental Control (subsequently known as the NDEQ). EPA began investigations of the ground water contamination in 1984. Releases of industrial chemicals traveled through the soils into the ground water resulting in a number of contaminant plumes traveling eastward with the natural movement of the ground water. Several city public water supply wells were taken out of service after ground water contamination was discovered.

Well No.3 Subsite - The Well No.3 Subsite is located in the central industrial area of Hastings between B Street and Second Street in the north-south direction and between Maple Avenue and Denver Avenue in the east-west direction. The subsite is named for the former municipal water supply well M-3 which was decommissioned due to the presence of CCl_4 in the well water.

Figure 2
Site Location Map
Well #3 Subsite

The source area was located in an area where a grain storage facility operated from 1959 to 1975. A second plume (Plume 2) was identified in 1993 and was found to contain TCE, 1,1,1-Trichloroethane (TCA), 1,1-dichloroethylene (1,1-DCE) and Tetrachloroethylene (PCE). One source for Plume 2 was found at the Dutton-Lainson Property located at 1601 West Second Street. Figure 2 is a location map of the Well No.3 Subsite.

Colorado Avenue Subsite - The source area is located south of the downtown Hastings business district between the Burlington Northern Santa Fe Railroad (BNSF) right-of-way and South Street in the north-south direction and between Kansas Avenue and Sixth Avenue in the east-west direction. EPAs soil-gas, soil, and ground water investigations indicated the presence of chlorinated VOCs in the soil and ground water. Ground water impacts were discovered in 1983 when the city of Hastings attempted to put municipal well M-18, located about ½ mile east of the source area, back into service. NDEQ analyzed the samples from M-18 in 1983 and 1984 and found elevated concentrations of chlorinated organics, including TCA, TCE, and PCE. The EPA's investigation revealed that a vapor degreasing process at 108 South Colorado Avenue operated for many years releasing solvent chemicals into the environment. Figure 3 is a location map of the Colorado Avenue Subsite.

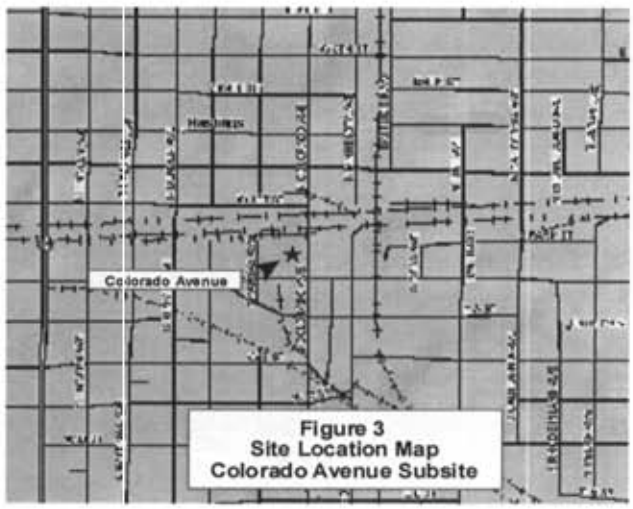

Figure 3
Site Location Map
Colorado Avenue Subsite

Second Street Subsite - The source area is located in the central business district of Hastings where a manufactured gas plant was in operation from 1894 to 1931. The source area is bounded by the BNSF to the south, the former Union Pacific right-of-way to the east,

Second Street to the north, and Minnesota Ave to the west. The city is the current owner of the property. EPAs investigations identified benzene, toluene, ethylbenzene, xylene and polycyclic-aromatic hydrocarbons (PAH) in subsite soils and in the ground water beneath and to the east of the subsite. Figure 4 is a location map of the Second Street Subsite.

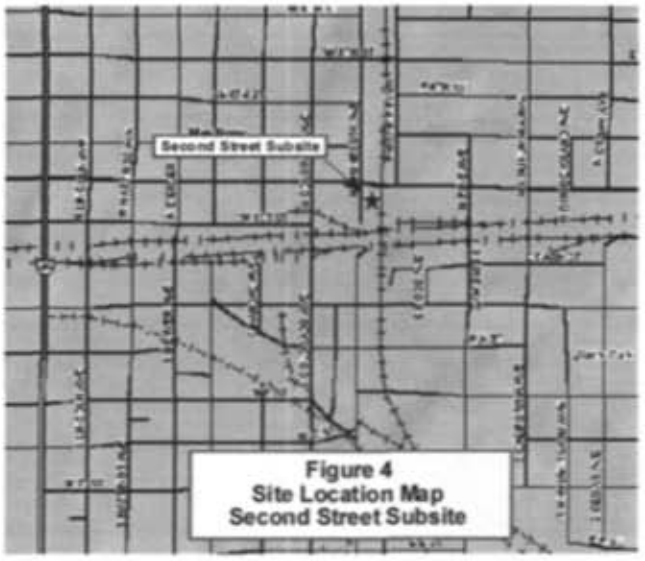

Figure 4
Site Location Map
Second Street Subsite

North Landfill Subsite - The source area is bounded by the BNSF right-of-way to the north and U. S. Highway 6 to the south. The landfill is situated on land that was formerly used as a clay source for local brick makers. From August 1961 to 1964 the city leased the land and operated a landfill at the subsite. The landfill received both municipal and industrial waste. The subsite is relatively flat and occupies 13.4 acres. Investigations at the North Landfill Subsite began in 1984. Soil-gas surveys were conducted by EPA in 1985 and 1986 which revealed VOCs in the vadose zone. There is a ground water plume migrating from the source area down gradient from the subsite. Figure 5 is a map of the North Landfill Subsite.

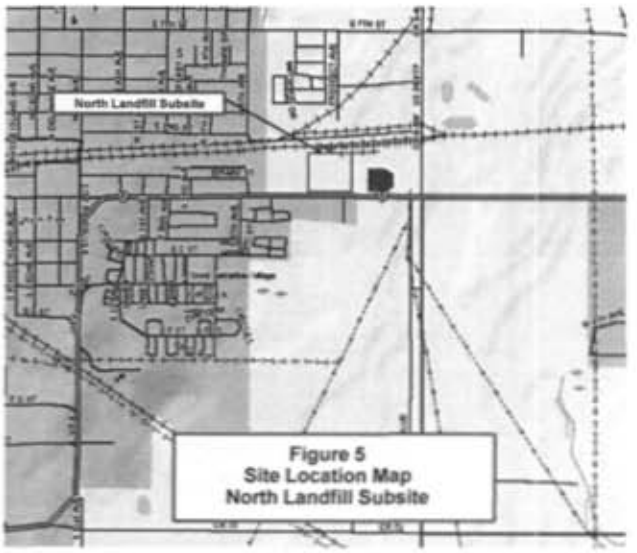

Figure 5
Site Location Map
North Landfill Subsite

FAR-MAR-CO Subsite - The subsite is located east of the Hastings city limits in an industrial enterprise zone served by the BNSF. In general, the area has been used for the storage and handling of agricultural products for over 50 years. Investigations performed at the subsite found VOCs related to grain fumigants in the soils and ground water. The subsite consists of industrial properties having several owners on about 70 acres. CCl_4 and EDB, ingredients of a liquid grain fumigant used during grain elevator operations, was found in the soils and ground water. In 1983, VOCs were first detected in the Community Municipal Services (CMS) water distribution system east of the subsite. Ground water data collected by EPA indicated that a ground water plume containing CCl_4 and EDB was migrating from the source area in the direction of a CMS well which had been providing drinking water to the Hastings East Industrial Park (HEIP) and the Hastings Community College (prior to a hook-up to the city water supply system). Soils surrounding a group of buildings converted from grain storage to manufacturing use were contaminated with TCA. The owner of the manufacturing facility cleaned up the soils under an Administrative Order on Consent.

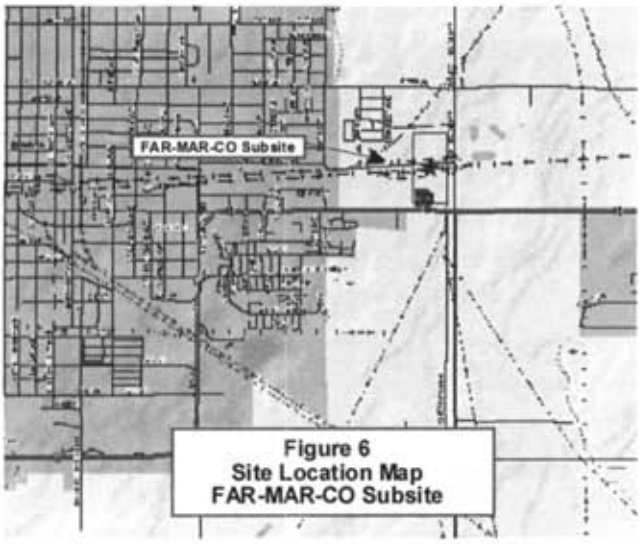

Figure 6
Site Location Map
FAR-MAR-CO Subsite

South Landfill Subsite - The subsite is located near the southeast border of Hastings. It is bounded by the abandoned Union Pacific Railroad right-of-way tracks on the south, the Good Samaritan Village retirement complex on the north, and U.S. Highway 6 on the west. The South Landfill was originally a clay pit. The landfill was constructed with two main disposal cells with a drainage ditch between the cells. The landfill was operated by the city from the mid-1960s to the early 1980s and received both municipal and industrial waste.

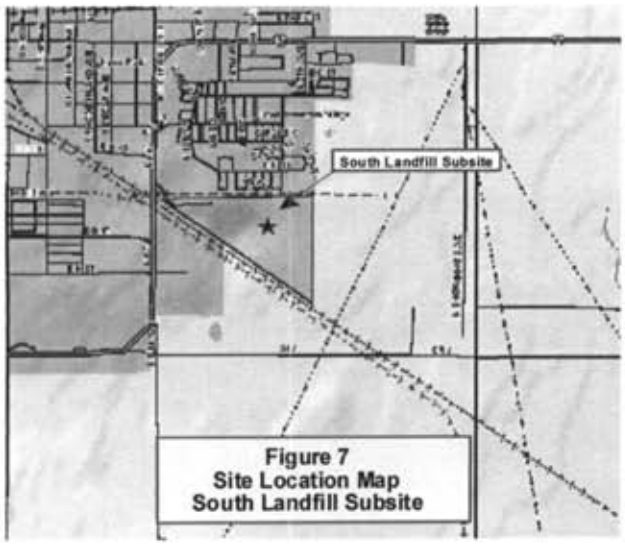

Figure 7
Site Location Map
South Landfill Subsite

Several chlorinated VOCs are present in the soils and ground water at the subsite. Figure 7 is a map of the South Landfill Subsite.

Area-Wide Ground Water Action - The ground water contamination associated with the HGWCS is known to extend west to east from the Well No.3 Subsite, through the central business district, and approaching the eastern boundary of Adams County. The Area-Wide Ground Water Action is not a subsite, but was established to integrate information collected at the subsites to protect potential receptors from unacceptable risks posed by the contaminated groundwater emanating from the six city subsites.

The interim RA selected by the June 24, 2001, ROD included a comprehensive survey of all existing ground water wells (domestic, irrigation, industrial, and monitoring) and collection of data such as well logs, well location, well depth, well use, and analytical results. The CD provides for the installation of additional MWs, as needed, and periodic monitoring of these wells to determine if VOC contamination is present above the MCLs. In the event that contaminant levels were found to exceed the MCLs in a drinking water well, an alternative water supply would be provided.

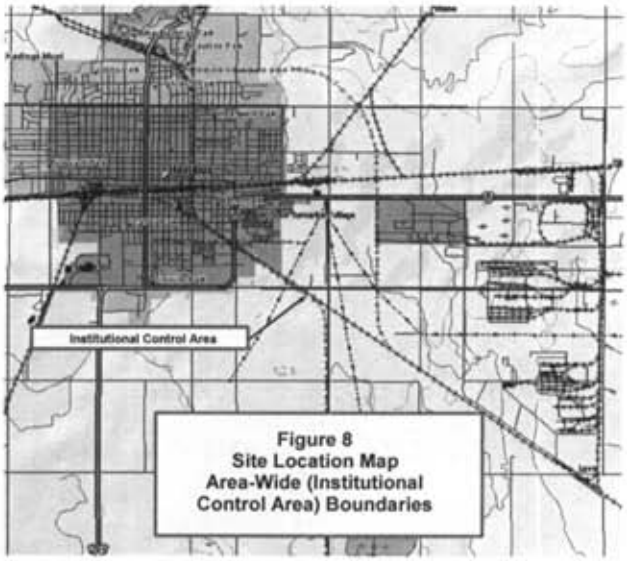

Figure 8
Site Location Map
Area-Wide (Institutional Control Area) Boundaries

The city has enacted an ordinance establishing an ICA. Under provisions of the ordinance, the city established a well registration process to assure new wells are not installed in areas of contamination and samples numerous existing private wells on a regular basis. Figure 8 is a map of the ICA of the HGWCS.

D. Initial Response

The HGWCS was discovered in 1983 when several municipal supply wells were discovered to be contaminated with VOCs. Subsite response actions will be discussed under the specific subsite.

E. Basis for Taking Action

A Human Health Baseline Risk Assessment (Risk Assessment) was prepared by the Nebraska Health and Human Services System for the HGWCS (NHHSS, 1997). Exposures to ground water are associated with significant human health risks, due to the exceedance of EPA's risk management criteria for the reasonable maximum exposure scenarios in both the noncarcinogenic and carcinogenic categories.

Table 2 presents the COCs and the maximum concentrations found in the ground water beneath and/or downgradient of each of the city subsites, as described in the Risk Assessment. These contaminants are also present in the soils at the specific subsites.

The Risk Assessment evaluated the potential area-wide risk associated with hypothetical human exposure to residual ground water concentrations after the interim remedial/removal actions have been completed at each of the subsites. The risk determinations are summarized in Table 3. The receptors were considered to be private well owners located downgradient of the respective subsite. For noncarcinogenic effects, a hazard index greater than 1.0 indicates the possibility that adverse health effects may occur. For carcinogenic effects, RA is generally required at a site when the excess cancer risk level exceeds 1 in 10,000 (1×10^{-4}).

The Nebraska regulations administered by NDEQ define the aquifer beneath the HGWCS as RAC-1. Ground water in the principal aquifer beneath Hastings is of drinkable quality and is extensively utilized as a source of drinking, irrigation, and industrial water. For these reasons, protecting ground water, especially for drinking water use, is important

IV. Remedial Actions

A. Well No.3 Subsite – OUs 07, 13, 17, and 18

The subsite was discovered in 1983 when the Nebraska Department Of Health detected CCl_4, an ingredient of a grain fumigant, in municipal supply well M-3. EPA has addressed two plumes and associated soils, and identified each as separate OUs.

Remedy Selection

Plume 1 and Associated Soil Contamination

EPA identified as OU13 the ground water contaminant plume related to a former grain elevator operation where CCl_4 was believed to have been used. In 1993, EPA issued an interim action ROD which selected extraction and treatment as the remedy for Plume 1.

EPA identified as OU07 the contaminated soils associated with Plume 1. In 1989, EPA issued a ROD for OU07. The selected remedy for the cleanup of the CCl_4 contaminated soils was SVE.

Plume 2 and Associated Soil Contamination

Further investigation at the subsite led to the discovery of an additional plume in 1993, identified as Plume 2 (OU18), characterized primarily by TCE and PCE. Soil-gas survey results indicated that Plume 2 was emanating from the north side of the BNSF tracks on the property of Dutton-Lainson.

EPA included a remedy selection for Plume 2 in the 1993 interim ground water ROD and selected ground water extraction and treatment as the remedy for OU18 as well as OU13.

EPA identified as OU17 the contaminated soils associated with the Plume 2. EPA issued an Action Memorandum in 1995 for OU17, selecting SVE as the response action. In

March 1996, Dutton-Lainson began implementing SVE, under EPA oversight.

In April 1997, EPA determined that the OU17 SVE system had attained the removal action goals for the cleanup of the soils. Dutton-Lainson requested to extend the operation of the SVE system in order to reduce the contamination present in the aquifer. Quarterly ground water monitoring was conducted during this period. The operation of the SVE system was terminated in June 1998.

EPA completed a final ROD for OU07, 13, 17, and 18 on May 17, 2001. For OU07, 13, and 17, no further actions were determined to be necessary. For OU18, Plume 2, EPA selected the continued operation of the OU13 extraction system installed at former municipal supply well M-3 at 200 Gallons Per Minute until MCLs for the COCs, TCE, TCA, 1-1, DCE, and PCE, would be achieved and verified with semi-annual monitoring at locations CW-7, CW-8, CW-9, CW-10, M-3 and the outfall from the street drain. EPA negotiated a CD with Dutton-Lainson to perform the final ground water remedial action in 2002.

Remedy Implementation

Plume 1 OU13

EPA implemented the ROD for Plume 1 in 1993. In 1995, a ground water treatment system to treat CCl_4 using air-stripping was installed. The system utilized reinjection wells to reuse the water after it was treated. A second extraction system was installed in October 1996 which released the extracted water into the storm sewer. In response to a request by the city to allow the reuse of the extracted ground water as irrigation water at Lincoln Park, in 1996, EPA issued an Explanation of Significant Differences for OU13. EPA installed an irrigation system at the park in 1997 for beneficial reuse of this extracted water, and in 1998, the city began utilizing the extracted ground water as irrigation water at Lincoln Park.

In November 1999, EPA amended the ground water interim action ROD by selecting the MCLs as the performance standard for Plume 1.

In September 2000, EPA initiated restoring the subsite with the abandonment of three MWs that were free of contamination based upon quarterly ground water monitoring.

In 2002, EPA abandoned three MWs, the reinjection wells and the extraction and treatment equipment at CW-05 (Phase I).

OU07:Plume 1 Associated Soil Contamination

In 1992, EPA implemented SVE, selected in the OU07 ROD, and in 1993, EPA and NDEQ determined that remediation of the OU07 soils was complete, allowing unlimited use and unrestricted access.

Plume 2 OU18

The interim remedial action for Plume 2 OU18, was not implemented. Instead, Dutton-Lainson implemented the final remedy for Plume 2, OU18, which EPA selected in the 2001 final ROD. Consistent with the ROD, Dutton-Lainson used the extraction and treatment system that was installed for OU13. Figure 9 is a picture of the extraction well at the Well No.3 Subsite taken during the third Five-Year Review site visit. The extracted water continued to be reused as irrigation water. The performance standard was to treat the Plume 2 COCs to MCLs. Dutton-Lainson began semi-annual ground water monitoring in June 2003. MW data reviewed by EPA for this Five Year Review indicates that OU18 may have migrated beyond the area originally believed. This matter requires further investigation.

Plume 2 OU17 Associated Soil Contamination

Dutton-Lainson implemented the soils cleanup for OU17 as a removal action and completed the work in June 1997. Dutton-Lainson extended operations after soil cleanup was complete in order to draw contaminant vapors off of the ground water and thereby facilitate ground water cleanup. The extended period of operation of the SVE lasted through 1998.

By September 1999, the EPA and NDEQ determined that no additional response action was needed for OU17. Dutton-Lainson proceeded to abandon the SVE extraction and monitoring probes. EPA determined that the removal action was complete in December 1999.

Table 2
COCs and Maximum Concentrations

COCs	South Landfill (µg/l)	Well No.3 (µg/l)	FAR-MAR-CO (µg/l)	North Landfill (µg/l)	Second Street (µg/l)	Colorado Avenue (µg/l)
Acenaphthylene	-	-	-	-	37	-
Benzene	-	-	-	-	25,000	-
CCl_4	-	1,400	2,800	8	-	1
Chloroform	-	120	19	1,900	52	3.6
1,2-Dibromoethane	-	0.088	220	8.8	-	-
1,2-DCA	26	110	-	27	1,700	-
1,1-DCE	29	150	13	60	-	1,400
cis-1,2-DCE	340	-	-	650	-	310
Trans-1,2-DCE	-	-	41	2,000	-	81
total-1,2-DCE	-	24	-	1,900	-	200
Ethyl Benzene	-	-	-	-	19,000	-
Methylene Chloride	-	23	90	150	-	2,200
Naphthalene	-	-	-	-	7,900	-
Phenanthrene	-	-	-	-	550	-
Styrene	-	-	-	-	12,000	-
Tetrachloroethylene	12	200	19	48	530	1,300
1,1,1-TCA	11	200	200	99	2,000	2,100
Trichloroethylene	300	990	1,200	2,400	16,000	55,000
Toluene	-	-	-	-	28,000	
1,3,5-Trimethylbenzene	-	-	-	300	-	
Vinyl Chloride	44	-	-	87	-	
Xylenes	-	-	-	-	11,000	

Table 3
Summary of Human Health Baseline Risk Assessment

Health Risk	*Receptor #1*	*Receptor #2*	*Receptor #3*	*Receptor #4*
	Well No.3 Subsite	*Colorado Avenue and Second Street Subsites*	*North Landfill and FAR-MAR-CO Subsites*	*South Landfill Subsite*
Noncarcinogenic Residential Risk (Hazard Index), Child	14.2	56.3	31.1	3.8
Noncarcinogenic Residential Risk (Hazard Index), Adult	5.7	22.5	12.9	1.6
Carcinogenic Residential Risk, Child	4.68×10^{-4}	4.31×10^{-4}	7.70×10^{-4}	9.08×10^{-5}
Carcinogenic Residential Risk, Adult	9.22×10^{-4}	8.50×10^{-4}	1.22×10^{-3}	1.74×10^{-4}

System Operations/Operation and Maintenance

The operation of the SVE systems for OU07 and OU17 were completed during the timeframes covered by the first and second Five-Year Reviews, respectively. The first Five-Year Review contained EPA's determination that the contamination was removed from the OU07 soils allowing unlimited use and unrestricted access. All required work for OU17 was completed prior to EPA's issuance of the second Five-Year Review. The OU07 and OU17 actions will not be discussed further in this review.

EPA installed the Phase II system to capture remnants of the OU13 plume downgradient from the area addressed by the Phase I system.

The Phase II system was installed in former municipal supply well M-3 and extracts ground water at a rate of approximately 200 gallons per minute. The extracted ground water is released into a storm sewer and, during the growing months, the water is used as park irrigation water at Lincoln Park.

The operation of the ground water extraction system for OU13 was completed prior to the second Five-Year Review and will not be discussed further in this review.

From May 2003 when operation of former municipal supply well M-3 by the PRP commenced for OU18 through 2006, the system extracted approximately 365,000,000 gallons of contaminated ground water estimated to contain approximately 3 pounds of TCE. It is important to note that TCE in the extraction well remained below the reporting limit of 1 μg/l since 2003.

This finding may indicate dilution effects or incomplete capture of the OU18 plume.

MWs with contaminant concentrations at or below MCLs for a period of four successive semi-annual samplings were abandoned by agreement between Dutton-Lainson and EPA. Having met the above criteria, CW-7 was abandoned in August 2005, and CW-10 was abandoned in November 2006. TCE concentrations in CW-9 have been near or at the 5 μg/L MCL for the past year. TCE

concentrations in CW-8 are well below the 10^{-5} health risk levels.

The Well No.3, OU18 costs are summarized in Table 4a. The PRP costs shown for 2002 include payment of EPA's past costs including the RI extraction system in connection with the Consent Decree plus O&M costs operating the extraction well, collection of the semi-annual ground water monitoring samples and O&M of the underground irrigation system at Lincoln Park.

The total costs paid by Dutton-Lainson are set forth in Table 4a below.

Table 4a
Annual System O&M Costs
Well No.3, OU18

Dates		Estimated Cost** ($1,000s)		Actual Cost ($1,000s)	
From	To				
		EPA	PRP	EPA	PRP
1-02	1-03	–	–	–	$343***
1-03	1-04	N/A	$16	*	$3
1-04	1-05	N/A	$32	*	$37
1-05	1-06	N/A	$32	*	$21
1-06	1-07	N/A	$32	*	$14

* EPA costs reimbursed by PRP
** OU18 O&M began in mid-year 2003
*** Includes October 2002 settlement of EPA past costs for RI/FS, etc.

Progress Since the Last Five-Year Review

EPA completed the final ROD for all the Well No.3 OUs in 2001. Work at OU17 and OU13 including site restoration was completed in 2002. The RA goals for OU07, OU13 and OU17 have been attained and verified. The RA goals for OU18 are projected to take 15 years to attain.

EPA negotiated with Dutton-Lainson to take over the operation of extraction well 3 for OU18. Semi-annual ground water monitoring will continue until the MCLs have been attained and verified for Plume 2. The CD for OU18, signed August 7, 2002, defined work that Dutton-Lainson would perform to meet the selected remedy goals of MCLs target cleanup levels for the OU18 COCs. Semi-annual ground water monitoring will continue until the contaminants are reduced to the levels defined by the ROD and verified.

This review determined that the remedies selected for the Well No.3 Subsite (OUs 07, 13, and 17) are complete and protective. At the time of this review, there is insufficient information to determine the fate of the OU18 plume.

B. Colorado Avenue Subsite – OUs 01 and 09

Remedy Selection

The Colorado Avenue Subsite is located just south of the BNSF tracks along Colorado Avenue. The COCs include TCE, DCE, PCE, and TCA, which have been found in the soils on the west side of Colorado Avenue and in the soil and ground water along and beneath a storm sewer at the subsite.

In 1988, EPA issued an Interim Action ROD (OU09) in which it selected SVE as the technology to clean up approximately 800,000 cubic yards of contaminated soil.

EPA completed a study into the nature and extent of ground water contamination at this subsite in 1991 for OU01. Also in 1991, an Interim Action ROD was signed selecting extraction and treatment as the ground water remedy.

In 1998, EPA amended the OU01 ROD by expanding the range of acceptable alternatives to include in situ water treatment technologies (i.e., air sparging and in-well stripping).

Remedy Implementation

Dravo performed RD/RA work for both OUs under Unilateral Administrative Orders issued by EPA until a CD was completed in 2006.

Construction of the SVE system for Phase I (i.e., deep and intermediate wells only) was initiated in 1995. The system began operating in 1996. The SVE system is operated and soil-gas samples are collected to verify progress of the soils cleanup. In 2007, the SVE system is resting pending completion of installation of the Phase II SVE wells. Construction of the shallow SVE wells Phase II began in December 2006. Installation of two extraction wells and four vent wells inside the former Marshalltown Instruments building was completed in December 2006. The construction work was interrupted while Dravo completes an agreement with BNSF for access. EPA estimates the SVE remediation will be completed by 2011.

In January 1996, Dravo, proposed a plan to install a small-scale air sparging pilot test. EPA agreed to allow this pilot to go forward before requiring implementation of the pump and treat system. After completion of this work, Dravo requested an amendment to the OU01 ROD.

The remedy for the ground water (OU01) is also being implemented in phases. Phase I, consisting of three air sparging wells, was installed at Minnesota Avenue. These wells would utilize the SVE system to capture VOCs released from the ground water. To date, this system has not operated.

The second phase of the interim action involved installation of treatment wells IWA-1 and IWA-2 located at Pine Street and IWA-3 located north of East Park Street at Cedar Avenue. The treatment wells began operation in December 1999. Phase I and Phase II treatment systems were designed to treat the most contaminated areas of the ground water contaminant plume.

Dravo installed four additional IWA treatment wells at Sixth Avenue immediately west of the North Landfill Subsite. These wells IWA – 4, -5, 6, and 7 began operation in November 2002.

Figures 9 and 10 are photographs of the buildings housing the Phase III in-well aeration water treatment systems installed at the Colorado Avenue Subsite.

Figure 9 – Colorado Avenue Subsite – Phase III, 6th Avenue IWA System.

Figure 10 – Colorado Avenue Subsite – Phase III, East Highway 6 IWA system.

The performance goal for the interim action remedy for the ground water is the containment of the 10^{-4} risk range for TCE which is the 290 μg/l concentration level. The available ground water monitoring results do not demonstrate that the capture of the 290 μg/l TCE plume is occurring. This indicates that the remedy is not yet protective. In addition, as noted in the

OU01 ROD, the ultimate goal for the Colorado Avenue plume is attainment of MCLs for the ground water.

System Operations/Operation and Maintenance

The Phase I SVE system for source control has been installed but is not currently operating, pending completion of construction for the Phase II SVE wells. One Phase II ground water treatment well IWA – 3 and the four IWA Phase III treatment wells continue to operate.

Total expenditure for the third Five Year review period, as provided by Dravo, is $9,590,000. The cost data provided by Dravo includes settlement for $7.3 million representing the EPA's past costs dating back to 1984 as defined in the Consent Decree. The EPA's costs include direct, indirect, state of Nebraska's oversight costs, and contractor support costs. Dravo's and EPA's costs are summarized in Table 4b.

Table 4b
Annual System O&M Costs
Colorado Avenue, OU01 & OU09

Dates		Estimated Cost** ($1,000s)		Actual Cost ($1,000s)	
From	To				
		EPA	PRP	EPA*	PRP***
1-02	1-03	N/A	–	$203	$1024
1-03	1-04	N/A	–	$105	$329
1-04	1-05	N/A	–	$72	$349
1-05	1-06	N/A	–	$79	$261
1-06	1-07	N/A	–	$193	$7,627

* EPA bills PRP for interim costs based on CD settlement and for O&M oversight costs

** OU09 and OU01 O&M began in 1996 and 2000, respectively

*** PRP costs include settlement costs for EPA RI/FS and past costs.

Progress Since the Last Five-Year Review

In 1999, EPA modified the interim action ROD for OU01. The ROD Amendment permitted implementation of the air sparging and in-well stripping technologies. Dravo installed three in-well aeration wells in 1999. These systems are known as Phase II; one well continues to operate. Dravo installed the Phase III system, consisting of four in-well aeration wells in 2002. All four Phase III IWA wells continue to operate.

Ground water monitoring conducted by the North Landfill and FAR-MAR-CO Subsite parties indicates that the contamination emanating from Colorado Avenue continues to migrate. Additional response actions are needed to control and contain this contaminant plume. EPA anticipates that the remedies, when fully implemented, will be protective. The issues remaining are the installation and operation the full scale SVE system to address contamination in the soils, continued operation of the ground water treatment systems and completion of the Phase IV ground water investigation. During conduct of the Phase IV investigations, EPA expects that continued operation of Well D will capture a significant part of the Colorado Avenue TCE contaminant plume.

C. Second Street Subsite – OUs 12 and 20

Remedy Selection

The Second Street Subsite is located on the southeast corner of Second Street and Minnesota Avenue, bounded on the south by the BNSF tracks and on the east by the former Union Pacific Railroad right-of-way. A coal gas plant operated on this property in the late 1800s until about 1931. Releases to the environment from this operation resulted in contamination of soils and ground water.

EPA completed a RI in 1994 and an Engineering Evaluation/Cost Analysis (EE/CA) in 1995. In 1995, EPA issued a Removal Action Memorandum. The EPA

selected SVE to remove contamination from the vadose zone and ground water extraction and treatment to remove contaminants from ground water.

EPA found that oil was entering the ground water treatment system and installed an oil/water separator. The system has been operating continuously since July 1998. The treatment system processes approximately seven million gallons of water per year. Figure 11 is a picture of the ground water treatment and SVE systems at the Second Street Subsite taken during the second Five-Year Review site visit.

The city of Hastings, the current owner of the subsite (and the potentially responsible party), entered into an Administrative Order on Consent with EPA in 1996 in which it agreed, among other things to: provide hookups for electricity, gas, water, and sewer; assist EPA in obtaining necessary permits; and conduct O&M of the removal action systems.

In 1999, a second removal action (OU20) was initiated to address down gradient ground water contamination emanating from the source area. This second removal action consisting of an IWA and treatment system was installed at Pine Avenue located 700 feet east of the subsite source area. The IWA system includes two treatment wells; it began operation in 2001 and continues to operate. (see Figure 12).

During 2002, EPA completed an FS to analyze RA alternatives for the ground water contaminant plume. A ROD for OU20 was completed on July 18, 2003, to address the ground water contamination emanating from the subsite. The two earlier response actions initiated by EPA using its removal authority have been transitioned to components of the OU20 RA.

The Final Action ROD for OU12 was signed in September 2006. The selected RA for OU12 consists of limited excavation and treatment/disposal of accessible contaminated soils/materials from the Subsite, along with in situ chemical oxidation in those contaminated zones that are less accessible. An RD will be completed for OU12 in 2007 or 2008.

Figure 11 – Second Street Subsite – Ground water treatment and SVE system.

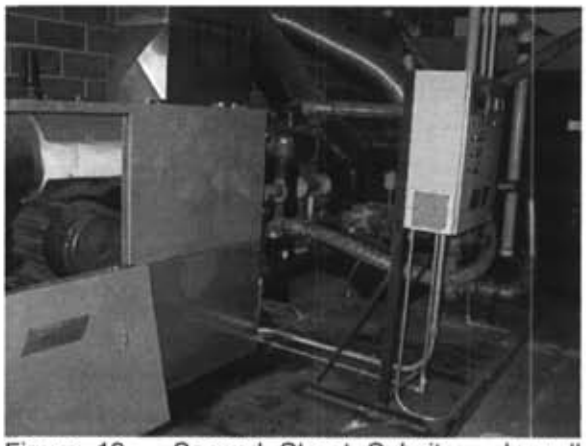

Figure 12 – Second Street Subsite – In-well stripping system.

Remedy Implementation

The first removal action, consisting of an SVE and ground water extraction and treatment system, has been in operation since 1997. In 1998, EPA installed an oil/water separator in the ground water treatment system. In an effort to reduce maintenance, a polymer system was added to the main system for a six month trial in May 2005 and was removed in December 2005 as it created too much mass and clogged the air stripper and pumps.

EPA completed the RD for in situ bioremediation in May 2005. The in situ bioremediation treatment and monitoring network consisting of fourteen injection points was completed in September 2005. EPA performed injection of oxygen release chemicals in November 2005 and November 2006 and continues to monitoring the effectiveness of treatment.

Because the OU12 remedy has not been implemented, O&M costs have not been incurred yet.

System Operations/Operation and Maintenance

EPAs annual O&M costs for the Second Street Subsite are shown in Table 4c. The costs shown include EPA's contractor and the state of Nebraska's cost share. In addition to providing in-kind services for the day-to-day operation of the source treatment systems, the city is also providing support for the second removal action by leasing the building which houses EPA's Pine Avenue IWA treatment system. Expenditures by the city of Hastings in the operation of these systems are also included in Table 4c.

Table 4c
Annual System O&M Costs
Second Street, OU20

Dates		Estimated Cost* ($1,000s)		Actual Cost ** ($1,000s)	
From	To				
		EPA	PRP	EPA	PRP**I
1-02	1-03	–	–	–	–
1-03	1-04	–	–	–	–
1-04	1-05	–	–	–	–
1-05	1-06	$548	N/A	$391	$48
1-06	1-07	$586	N/A	$570	$49

* Annual O&M costs are expected to decrease after year 3.
** EPA O&M costs began in early 2005. Prior costs were Removal Action costs.
*** City provides operator and related in-kind services.

Progress Since the Last Five-Year Review

The first removal action addressing the ground water continues to operate and has removed seven million gallons of contaminated ground water per year from the aquifer during the past five years of operation. More than 30,000 pounds of VOCs have been removed throughout the operation of the SVE system. A fourth extraction well has been installed and upgrades to the transfer pumps have been installed to increase the flow rate so that two extraction wells can pump simultaneously.

The Pine Avenue IWA ground water treatment system is removing more than one half pound of total volatiles per day.

After completing the ROD for the ground water (OU20) in 2003, EPA negotiated with NDEQ for a Superfund cost-sharing contract to allow implementation of a RA to proceed. The remedy selected by the ROD includes: (1) continuing to operate the source area SVE and water treatment systems; (2) continuing to operate the Pine Avenue IWA system; and (3) in situ bioremediation consisting of 14 injection wells, nine points at Pine Avenue and five points east of California Avenue. The 14 in situ bioremediation wells and associated MWs were installed in 2005. Implementation of the OU20 remedy includes ground water sampling conducted twice yearly to measure effectiveness of the remedy and to collect data used to direct future soils and water treatment activities for the subsite.

EPA completed a soil boring investigation on the eastern perimeter of the OU12 source area and the adjoining city property in April, 2005. EPA completed the FS for the OU12 source area in July 2006. EPA signed a ROD on September 21, 2006, selecting a two-part remedy: (1) excavation and thermal treatment of readily-accessible contaminated soils and source materials; and (2) treatment of contaminated areas below the surface throughout the subsite by using ISCO. EPA is preparing the RD.

D. North Landfill Subsite – OUs 02 and 10

Remedy Selection

The North Landfill Subsite is located north of Highway 6 just east of the city of Hastings. The city had operated a landfill at the subsite from 1962-1964. In 1991, EPA issued an Interim Action ROD which addressed both the source control (OU10) and the ground water (OU02). The RA for the source control consisted of improving the landfill cap and restricting public access and future land use. The selected RA for the ground water was extraction and treatment.

OU10 Source Control

The PRPs entered into an Administrative Order on Consent with EPA which required, among other things, that they design the landfill cap. EPA approved the design for the landfill cap in 1995.

OU02 Ground Water

In December 2002, the PRPs provided EPA a report of five years of well data associated to demonstrate the effect that pumping of Well D was having on the North Landfill plume, OU02. EPA concluded that Well D did affect the North Landfill plume, but more data was necessary to determine its extent and to evaluate remedial alternatives to address the plume. The PRPs agreed to perform an FS under EPA oversight. EPA issued a final ground water ROD for OU02 in August 2006. The North Landfill final ground water ROD requires the pumping of Well D, hydraulic containment, and monitored natural attenuation.

CD negotiations with the PRPs commenced in late 2006 and are near conclusion as of the date of this Five-Year Review Report.

Remedy Implementation

OU10 Source Control

Pursuant to the 1998 CD, the Settling Parties constructed the cap in 1999 and performed vadose zone monitoring. By December 2001, eight quarters of soil-gas sampling were completed. Quarterly ground water monitoring has been conducted since June 1995.

OU02 Ground Water

The pumping of Well D is a requirement of a response action at the adjacent FAR-MAR-CO Subsite and will be required in a final remedial action for the North Landfill Subsite. The remaining actions required by the OU02 ROD are the subject of the CD negotiations now underway.

Total expenditures for the North Landfill Subsite were $591,000 during this 5-year period. Table 4d summarizes subsite costs.

Table 4d
Annual System O&M Costs
North Landfill

Dates		Estimated Cost ($1,000s)		Actual Cost ($1,000s)	
From	To				
		EPA	PRP	EPA	PRP
1-02	1-03		$28		$343
1-03	1-04		$28		$3
1-04	1-05		$28		$37
1-05	1-06		$28		$21
1-06	1-07		$28		$14

System Operations/Operation and Maintenance

The city of Hastings performs the maintenance at the North Landfill. It monitors the condition of the landfill cap monthly and mows the subsite during the growing season. The third Five-Year Review inspection included the inspection of the condition of the landfill cap.

Figure 13 shows a photo of the landfill cap taken during the second Five-Year Review site visit.

Figure 13 – North Landfill Subsite – Completed landfill cap and fence surrounding property. The FAR-MAR-CO Subsite grain elevators are in the background.

Progress Since the Last Five-Year Review

The North Landfill source control remedy is functioning as designed. Since the last report, EPA has issued a final ground water remedial action ROD that took into account five years of quarterly sampling results that were submitted as part of the Well D Report (1997 to 2002.) The Well D Report indicated that 1,213 million gallons of water were extracted from Well D and approximately 1,529 pounds of TCE were removed and treated at the Whelan Energy Center. The ground water results indicated that TCE concentrations were decreasing for a period of time and then began increasing, suggesting the presence of an upgradient source of TCE. These findings caused re-evaluation of the remedial alternatives proposed in the Feasibility Study. On April 17, 2006, Hydro-Trace, Inc., on behalf of the city of Hastings and Dutton-Lainson, presented data from downgradient shallow wells indicating the cause and effect of the TCE excursions. The EPA evaluated the data and ultimately agreed with Hydro-Trace's conclusion. In a Technical Memorandum for the final CD for Remedial Action, EPA (April 2007) agreed that a calculation could be performed which would indicate the time it would take the TCE originating from the North Landfill to reach Well D at the MCL level. This calculation, which indicated the North Landfill ground water plume would be cleaned by 2017, served as the basis for the agreement in principle.

E. FAR-MAR-CO Subsite – OUs 03, 06, and 11

Remedy Selection

The FAR-MAR-CO Subsite is located east of the North Landfill Subsite on the north side of Highway 6. EPA has concluded that the contamination found in the soils and ground water is the result of numerous spills of grain fumigants, including one which occurred as a result of a grain dust explosion in 1959. A second source of contamination TCA was identified at the Hastings Irrigation Pipe Company portion of the subsite. A removal action addressed this source in 1992 and the owner removed 43 cubic yards of soils contaminated with 1,1,1-TCA. No further action, other than ground water monitoring, was required by EPA to address any TCA contamination after the removal action was completed as subsequent monitoring indicated that 1,1,1-TCA was not present in the ground water at levels of concern.

A ROD was signed in 1988 for the source control (OU03) which selected SVE and included ground water monitoring. In August 1995, an Explanation of Significant Differences to the ROD was issued to extend the SVE operation beyond the time when cleanup levels for the soils were met in order to extract contamination beneath the source to address the contamination in the ground water. A CD was entered on May 6, 1997, which required the Settling Defendants to perform SVE.

An Action Memorandum was signed in December 1995 authorizing the performance of the ground water removal action (OU06). EPA determined that a removal action was necessary to protect the

only remaining CMS well from contamination. The CMS wells had provided drinking water to HEIP and the Hastings Community College. All but one had been decommissioned due to contamination. After the system became operational, the city of Hastings extended a water main east of town to the HEIP and the Hastings Community College and both are now on city water. EPA determined the immediate threat to well users was removed by the new waterline but a long term threat remained due to the migration of the FAR-MAR-CO plume. Morrison Enterprises, the former owner and operator of the subsite, agreed to perform a ground water FS under EPA's oversight. In 2007, EPA approved the FS and its addendum, and issued a Proposed Plan for a Ground Water Remedial Action in July 2007.

Remedy Implementation

OU03 Source Control

The SVE system was installed for the source control (OU03) during the fall of 1997 with the startup in November 1997. The period of extended operation was initiated in May 2000 and was completed in 2003. Verification of attainment sampling was conducted and the SVE system was removed once sampling verified the attainment of the performance standards.

OU06 Ground Water

Installation of the ground water extraction system began in December 1996 and became operational in July 1997. This action includes related ground water monitoring. The ground water extraction and treatment system became operational in July 1997 for the ground water (OU06). The ground water system continues to operate as a removal action and is proposed by EPA as a component of the final ground water remedy. The PRPs continue to perform quarterly ground water monitoring.

System Operations/Operation and Maintenance

The ground water extraction and treatment system for the ground water (OU06) was installed by Morrison Enterprises in the summer of 1997. The system was online in August 1997 and continues to operate as designed. The system, Well D, extracts ground water at a rate of approximately 450 gallons per minute and has extracted over two billion gallons of ground water since startup. From 2002 through 2006, an additional 908 million gallons of water were extracted at Well D. The extracted ground water is used as non-contact cooling water at the Hastings Energy Center. Since 2002, this action removed approximately 240 pounds of CCl_4, 1529 pounds of TCE, and 15 pounds of EDB from the aquifer.

Costs were provided by the Hastings Utilities, the city of Hastings, Dutton-Lainson, and Morrison Enterprises who are part of this ground water removal action. Table 4e summarizes costs associated with ground water treatment actions.

Table 4e
Annual System O&M Costs
FAR-MAR-CO, OU06

Dates		Estimated Cost ($1,000s)		Actual Cost ($1,000s)	
From	To				
		EPA	PRP	EPA	PRP[1]
1-02	1-03	–	$109	$4	$72
1-03	1-04	–	$109	$6	$34
1-04	1-05	–	$109	$8	$39
1-05	1-06	–	$109	$7	$48
1-06	1-07	–	$109	$6	$45

Progress Since the Last Five-Year Review

OU03 Source Control

Performance levels for the source control remedial action, OU03, were achieved in May 2002. By removing contamination from the soils, this source control remedy, in conjunction with the ICs required by the Area-Wide CD, is protective of human health and the environment.

OU11 HIPCO

Performance levels for the source control remedial action, OU11, were achieved in 1992. By removing contamination from the soils, this source control remedy, in conjunction with the ICs required by the Area-Wide CD, is protective of human health and the environment.

OU06 Ground Water

The extraction well (Well D) for OU06 has been operating since 1997 and functioning as designed. Quarterly ground water monitoring and reporting continues. The document discussing the first Five-Years of operation of Well D was presented to EPA on December 5, 2002. This document evaluates the effectiveness of Well D in extracting contaminated ground water and whether additional extraction wells are needed to capture the plumes from both the North Landfill and FAR-MAR-CO Subsites.

EPA approved a FS which evaluates ground water remedies EPA's selection of a remedy will occur after the conclusion of the public comment period on EPA's Proposed Plan, which began in July 2007.

F. South Landfill Subsite – OU 05

Remedy Selection

The South Landfill Subsite is located in the southeast section of Hastings. During the 1960s and 1970s, industrial waste was disposed at the city operated landfill. Contamination at the subsite consists primarily of VOCs. EPA completed a soil-gas investigation of this subsite in 1994. The sampling results confirmed the presence of industrial solvents in the landfill. Seven MWs were installed during early 1995. Ground water sampling was conducted through 1996. EPA developed the RI report based on the findings of the remedial investigation and the PRPs wrote the FS. EPA released the Proposed Plan and issued the ROD for the South Landfill on September 29, 2000. The selected remedy is surface water controls and a landfill cap for soil and landfill contents, and ground water use restrictions and monitored natural attenuation for ground water remediation.

The major components of the selected remedy include:

- regrading of surface areas, installation of a geosynthetic clay liner or other cap.
- implementation of surface water management controls.
- installation of a fence.
- imposition of deed restrictions.
- ground water monitoring.
- bio-chemical evaluation of the ground water regime to determine the effectiveness and dynamics of natural-attenuation processes.

Remedy Implementation

The PRPs petitioned EPA and NDEQ to consider use of an evapotranspiration cap for the landfill in lieu of the infiltration control system described by the ROD. EPA and NDEQ agreed to the alternate design resulting in significant cost savings.

The landfill cap was completed in February 2005. Baseline assessment was completed September 15, 2005. The methane gas investigation was completed in January 2006. A groundwater investigation plan was approved June 21, 2006, and is currently being conducted to collect data needed for the RD and may be useful to determine if natural attenuation is occurring.

Preliminary indications suggest that natural attenuation may be reducing concentrations of chlorinated VOCs, which are the primary COCs, as ground water migrates away from the landfill. Chemical concentrations of the contaminants and their degradation byproducts will be measured to evaluate effectiveness of the selected remedy.

As discussed in the following section concerning Area-Wide OU19, the city enacted an ordinance which provides for ground water use restrictions including the registration of all existing wells and permits for new wells within the ICA. The area defined for the ICA includes the landfill and the property affected by the downgradient plume. The city monitors private wells and alternate drinking water is required to be provided whenever drinking water wells are contaminated above the MCLs by the plume.

Figure 14 is a photo of the South Landfill taken during the third Five-Year Review site inspection.

Figure 14 – South Landfill Subsite – completed landfill cap and fence surrounding subsite.

System Operations/Operation and Maintenance

As discussed in the following section concerning the Area-Wide OU19, the city ordinance restricting ground water use is in effect and the protective measures have been implemented. Costs for the South Landfill subsite are summarized in Table 4f below. Cost data provided by the PRPs reflects Consent Decree Settlement cost for EPAs past costs (2003) and capital costs for construction of the landfill cap and fencing the subsite to protect the cap (2005).

Table 4f
Annual System O&M Costs
South Landfill, OU05

Dates		Estimated Cost** ($1,000s)		Actual Cost*** ($1,000s)	
From	To				
		EPA	PRP	EPA	PRP
1-02	1-03	–	–	–	$48
1-03	1-04	–	–	–	$837
1-04	1-05	–	–	–	$65
1-05	1-06	N/A	$10	*	$679
1-06	1-07	N/A	$20	*	$56

* EPA costs reimbursed by PRPs
** O&M for source control began June 2005
*** PRP costs include capital costs and settlement costs for EPA past costs for RI/FS etc.

Progress Since the Last Five-Year Review

EPA released the South Landfill subsite Proposed Plan in June 2000 and completed the ROD September 2000.

The PRPs completed the FS and in 2003, a CD to implement the remedy was completed. The PRPs prepared the RD for the landfill cap and completed installation of an evapotranspiration cap in 2005. The PRPs are collecting off-site ground water data to enable preparation of the RD for ground water. A need for ground water MWs is anticipated to allow evaluation of the monitored natural attenuation remedy. EPA will evaluate the protectiveness after completion of the RD/RA for ground water and full implementation of the ground water remedy.

G. Area Wide Ground Water Action – OU 19

Remedy Selection

The selected interim remedy for the Area-Wide Ground Water Action, as set forth in the June 2001 Interim ROD, is intended to protect the public from exposure to the contaminated groundwater emanating from the six city subsites by integrating information from the subsites and implementing institutional controls. Specifically, these actions include:

- Implementing domestic ground water use restrictions through institutional controls to prevent the installation of drinking water wells in the contaminated area.
- Installing warning signs to advise the public that the water in the area may not meet public drinking water standards.
- Monitoring compliance with ground water use restrictions to prevent unacceptable exposures.
- Conducting an inventory of all existing ground water wells to identify all domestic, irrigation, industrial, and MWs in the ICA.
- Providing an alternate source of water for impacted private well users within the ICA. This may include hooking users up to the city's public water supply system, providing bottled water, and/or an in-house water treatment system.
- Implementing a ground water monitoring program for periodic sampling of domestic, irrigation, industrial and MWs.
- Submitting an annual report that summarizes activities conducted under the ordinance and evaluates effectiveness of the institutional controls.

Remedy Implementation

In August 2004, the PRPs submitted the Interim Remedial Action Remedial Design, Area-Wide Work Plan. EPA approved the work plan in September 2004. The city had previously enacted City Ordinance No.3754 in November 2001. The ordinance provides for ground water use restrictions, compliance monitoring, and well inventory and monitoring. The city began implementing the ICA in 2004 and completed the first Annual ICA Report in February 2005. The city submitted the second and third Annual ICA Reports in March 2006 and March 2007, respectively. Analytical results from the latest annual report are included in Appendix 2. The other components of the remedy have been implemented.

System Operations/Operation and Maintenance

The city ordinance restricting ground water use is in effect. EPA has confirmed that the other components of the interim ROD are operational through review of annual reports submitted by the PRPs. Expenditures by the PRPs in the preparation of the FS were provided to EPA during the third Five-Year Review process. The Area-Wide costs are summarized in Table 4g.

Table 4g
Annual System O&M Costs
Area-Wide Ground Water Action, OU19

Dates		Estimated Cost ($1,000s)**		Actual Cost ($1,000s)***	
From	To	EPA	PRP	EPA	PRP***
1-02	1-03	-	-	-	$33
1-03	1-04	-	-	-	$2,262
1-04	1-05	N/A	$267	*	$33
1-05	1-06	N/A	$35	$18*	$82
1-06	1-07	N/A	$35	$5*	$65

* EPA costs reimbursed by PRPs
** PRP estimated costs from June 2001 ROD
*** O&M for began September 2004
*** PRP costs include settlement of $2,250,000 for EPA past costs in 2003.

Progress Since the Last Five-Year Review

Since the last Five-Year Review was conducted, negotiations between EPA and the PRPs were completed for the Interim RD/RA CD which was entered by the court in February 2004. The RD/RA Work Plan was submitted and approved by EPA and was implemented by the PRPs. All of the components of the remedy, excluding the provisions for installation of additional MWs on an as-needed basis, have been implemented.

H. Naval Ammunition Depot Subsite – OUs 04, 08, 14, 15, and 16

The USACE is in the process of performing its third Five-Year Review for OUs 04, 08, 14, 15 and 16 separately. The transmittal memorandum of a draft copy of the report is included as Appendix 1.

V. Progress since the Last Five-Year Review

The Second Five-Year Review Report completed July 2002 identified eight recommendations and associated follow-up actions related to the protectiveness of the remedies at the various subsites of the HGCWS, excluding the NAD. The Table 6 presented below summarizes the issue and the recommended follow-up action and protectiveness assessment related to each issue. All eight recommendations were indicated to affect the future protectiveness and two of the eight affected the current (as of the date of the second five-year review) protectiveness. As of the time of this third five-year review, seven of the eight have been accomplished. The recommendation not yet accomplished is addressed below.

Implementation of the Phase II SVE remedy was expected to occur in 2002. Dravo challenged the OU09 remedy as part of the cost recovery litigation. The CD was signed in 2006. EPA expects Dravo to complete construction for the OU09 remedy in 2007.

Table 5
Actions Taken Since the Last Five-Year Review

Issues from Previous Review	Recommendations / Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Well No.3 – CD Negotiations	Sign CD	EPA and Dutton-Lainson	Summer 2002	CD entered by the court	10/11/2002
Colorado Avenue – Complete SVE System	Install Phase II equipment	Dravo	Summer 2002	EPA approved SVE Phase II Design	09/29/2004
				CD entered by the court	05/24/2006
Colorado Avenue – Ground Water System	Install Phase III and Phase IV	Dravo	Summer 2002	Phase III ~~and IV~~ IWA systems installed	Startup Date: 11/13/2002
Second Street – Complete FS	Publish Proposed Plan and ROD	EPA	Summer 2002	FS completed	09/2002
				ROD completed	07/18/2003
North Landfill – Ground Water Report	Complete Ground Water Report	City of Hastings, Dutton-Lainson, and Dravo	Summer 2003	Approved by EPA	12/2002
FAR-MAR-CO – Ground Water Report	Complete Ground Water Report	Morrison Enterprises	Summer 2003	Submitted to and approved by EPA	12/2002
South Landfill – Remedial Design	Complete the Remedial Design	City of Hastings	Summer 2003	RD for landfill cover completed	05/05/2004
				Landfill cover and fence installed	05/05/2005
Area-Wide – Complete CD Negotiations	Sign CD	Area-Wide PRPs	Fall 2002	CD entered by the court	02/26/2004

VI. Five-Year Review Process

A. Administrative Components

In January 2007, members of the HGWCS team began coordination and outreach activities for the third Five-Year Review in a manner consistent with EPA guidance. Efforts were coordinated through meetings and e-mail to all parties who serve as EPA Remedial Project Managers (RPMs) for the various subsites of the HGWCS. Those RPMs are Darrell Sommerhauser - Well No.3, Colorado Avenue, South Landfill, and Second Street OU20 Subsites; Bill Gresham - FAR-MAR-CO, North Landfill, and Second Street OU12 Subsites; Brian Zurbuchen - Area-Wide Ground Water Action OU19 Subsite and lead for the Five-Year Review.. The HGWCS team also includes EPA RPM Tom Lorenz – NAD (OU04, OU08, OU14, OU15, & OU16) Subsite. The following team members assisted in the HGWCS review:

- Audrey Asher, CNSL, EPA's Regional Counsel responsible for the legal review of the document (913-551-7255),
- Glenn Curtis, Branch Chief, Iowa/Nebraska Branch, Superfund Division, Region VII, EPA (913-551-7726),
- Rebecca Himes, EPA Community Involvement Coordinator (913-551-7253).

In addition, the following representatives from the NDEQ lead the states effort to assist in the process:

- Ed Southwick, Project Manager, NDEQ, (402-471-3388),
- Steve Kemp, Project Manager, NDEQ, State Technical Reviewer (402-471-3388).

In January 2007, a schedule was determined that included the following components:

- Community Involvement
- Document Review
- Data Review
- Site Inspections
- Five-Year Review Report Development and Review

The Five-Year Review for the NAD Subsite was conducted independently by USACE under the direction of Mr. Lorenz.

B. Community Notification and Involvement

Activities to involve the community in the Five-Year Review process were initiated with a conference call in early January 2007, between the site RPMs and the Community Involvement Coordinator for the HGWCS.

On February 19, 2007, the state, the city of Hastings, community members, responsible parties, and their contractors were notified of EPA's plans to conduct the Five-Year Review site inspection set for February 28, 2007. The attendees included the PRPs technical representatives, the city of Hastings, Hastings Utilities, NDEQ, and EPA. The subsite inspections were conducted at Well No.3, Colorado Avenue, Second Street, North Landfill, FAR-MAR-CO, and South Landfill. Well D and the secondary and tertiary containment wells that function as the remedy for multiple subsites was also inspected. During the inspections, EPA examined information concerning the current operational status and attempted to identify areas where operations could be improved. EPA inspection team also reviewed on-site information and activities related to the Area-Wide Ground Water Action (OU19) on March 1.

In April 2007, EPA mailed a Fact Sheet containing an announcement that the Third Five-Year Review was in progress. EPA announced in the Fact Sheet there would be a Public Availability session after the Five-

Year Review report has been completed and placed in the administrative record.

The completed Five-Year Review Report will be available in the information repository at the Hastings Public Library, Hastings, Nebraska. The notice of completion of this report will be placed in the local newspaper and local contacts will be notified by letter or phone. A brief summary of this report will also be included in EPA's website information.

C. Document Review

This Five-Year Review consisted of a review of relevant documents including O&M records and monitoring data (See Appendix 3). Applicable performance standards and ground water cleanup standards, as listed in the RODs and an Action Memorandum for the subsites were reviewed.

D. Data Review

Well No.3 – OU18, Ground Water
A review of the ground water data was presented in EPA's Final Well No.3 ROD (2001). The Final ROD addressed all four OUs at the subsite and was developed with concurrence by NDEQ. As stated in the Final ROD Declaration, no additional work is needed for OU07. OU13 and OU17. Information presented in the Final ROD indicates that MCL based performance levels have been attained and verified for ground water Plume 1 (CCl_4). The Final ROD listed five contaminants of concern for the Well No.3 Subsite; CCl_4, 1,1-DCE, 1,1,1-TCA, TCE and PCE. During the course of this Five-Year Review, no instances of CCl_4 exceeding the MCL (5 μg/l) were noted.

The Final ROD established MCLs as the cleanup standard for Plume 2 (TCE, TCA, PCE, and 1,1-DCE),. According to the Final ROD, three COCs, TCE, 1,1-DCE and PCE were found to exceed the MCL in 2001.

To update earlier reviews, EPA collected the reports provided by the Dutton-Lainson for OU18 and consulted available data for other MWs located downgradient from the source area of the OU18 plume. Reports with tabulated data showing concentrations of the COCs at the Well No.3 Subsite OU18 monitoring locations are presented in Appendix 4e of this Five-Year Review Report. The referenced reports present the concentration levels from the quarterly and semi-annual ground water sampling efforts from May 2002 through January 2007.

MWs CW-01, CW-06, and CW-03R were abandoned in June 2000. MWs CW-05, CW-04, CW-11, and CW-12 were abandoned in 2002. The last reported sampling of well CW-7 was December 2005. The last reported sampling of CW-10 was December 2006. As of 2007, from the data it appears that only two Well No.3 Subsite MWs are available to monitor progress of the RA. Results for the December 2006 sampling show TCE in well CW-8 at 13 μg/l. The reported value for TCE in CW-9 was 5 μg/l. Under terms of the Consent Decree, Dutton-Lainson will continue sampling of the two remaining Well No.3 monitoring locations semi-annually for the Well No.3 COCs.

Also contained in Appendix 4e are data tables from Annual RA Reports provided by Dravo for two MW nests identified as BW - 17 and BW -18. For reference, well BW-17 is about 300 feet west of MW-1d. Dravo reported sampling wells MW-1 (129 ft.) and MW-1d (169 ft.) in April 2005. Well No.3 COCs were not found in well MW-1, but TCE was found in MW-1d at 0.6 μg/l.

The most recent results for the Well No.3 MWs show that concentrations of 1,1,1-TCA and 1,1-DCE are below their respective MCLs (cleanup levels). The MCL based cleanup level was exceeded for TCE and PCE. Review of Dravo's data for BW -17 and BW-18 show no results above the MCL for 1,1,1-TCA. Dravo's data show samples above the MCL for 1,1-DCE (2002), for TCE

(2002, 2004 & 2005), for PCE (2002 & 2004).

Data contained in the HTI reports include results for sampling the untreated water produced by extraction well 3 and show only one detection of TCE for the 2002 – 2006 period. TCE was reported for extraction well 3 in December 2003 at 1.3 μg/l. Based on existing ground water data (see Appendix 4e), there is some question about the ability of extraction well 3 to completely capture Plume 2 and remove the residual TCE contamination from the aquifer.

Colorado Avenue – OU09, Source Control
To date, SVE activities performed by the PRPs have removed more that 2000 pounds of volatile organic chemicals from the soils at the Colorado Avenue Subsite. Ground water samples collected from MWs in the vicinity of the contaminant source areas have shown significant reductions in the contaminant concentrations. These declines can be directly attributed to the activities performed by the PRPs. A May 1999 shallow soils investigation performed by EPA confirmed the need for the Phase II (shallow) SVE system. EPA approved Dravo's work plan and revised RD in September 2006 for the Phase II activities. Dravo initiated the Phase II SVE construction activities in December 2006.

EPA will evaluate the SVE data after the Phase II SVE wells are installed, operated and sampled.

Colorado Avenue – OU01, Ground Water
Dravo's Phase II, IWA systems began operation in December 1999. In addition, Dravo's Phase III IWA ground water treatment systems began operation in November 2002. Results from 2002 to January 2007 operations and ground water sampling are available and contained in Dravo's Annual RA Reports. To demonstrate mass removal from the ground water, Dravo collects influent and effluent vapor samples from the IWA systems.

Evaluation of the information contained in Dravo Annual RA Reports, when combined with EPA's sampling results, provides confirmation that Dravo's IWA treatment systems when properly maintained are removing significant amounts of contamination from the aquifer. Based on Dravo's most recent Annual RA Report (2007) provided to EPA, it appears that Dravo is monitoring the status of the granular activated carbon treatment systems and replacing the spent carbon to make the systems functional.

However, with respect to the ROD goal of plume containment, areas of the Colorado Avenue TCE plume located beyond the Phase III system are not being treated by Dravo's water treatment system. A Consent Order was completed in May 2007 requiring Dravo to perform the Phase IV ground water investigation work. Data from this investigation is expected to enable Dravo and EPA to define work needed to complete the OU01 Final RD/RA. The Phase IV work will include evaluating information related to the capture of Colorado Avenue plume contaminants by the Well D ground water extraction system installed by the PRP for the FAR-MAR-CO Subsite.

EPA will evaluate the potential need for additional ground water treatment actions to fully comply with the goals contained in the 1991 ROD, as amended.

Second Street – OU20, Ground Water
The first Second Street removal action consisted of source area SVE and extraction and treatment of the groundwater. These systems have operated for the past ten years (1997 – present). The second removal action involved operation of an IWA ground water treatment system. This system has operated from 2001 through the present. All three existing treatment systems were transitioned to be components of the OU20 remedial action. EPA initiated injection of oxygen release chemicals for the in situ treatment phase of the RA in November

2005. All components of the remedy are monitored to evaluate their effectiveness. Ground water, treated water and air samples are collected twice-yearly.

The SVE system continues to show removal of significant amounts of VOCs, benzene, toluene, ethylbenzene, and xylene (BTEX) compounds from the soils. Monitoring results for the ground water pump and treat system are also available. The recent results (Fall 2006) indicate that significant reduction of BTEX and PAH concentrations have been achieved at the source area and in the vicinity of the IWA treatment system. Data Evaluation Reports are prepared twice-yearly and reviewed by EPA and the NDEQ. Continued operation of the remediation systems will be needed to attain the cleanup levels established by the 2003 OU20 ROD. The ability to attain ground water based remediation goals is heavily dependent on successful implementation of the OU12 source area remedial action.

North Landfill

The final action ROD, which was signed in 2006, called for natural attenuation, extraction of contaminated ground water, and treatment at the Whalen Energy Center, as well as monitoring of the contaminant plume. Cleanup goals established for the COCs are the MCLs or 1 x 10^{-6} cancer risk level. Ground water monitoring data indicate that the source area contamination is being reduced by natural attenuation processes and that the levels of contamination migrating from the landfill have decreased. It was accepted by all parties that MCLs would have been reached immediately downgradient of the subsite, as measured in wells MW-6 and MW-7, by the year 2007, with an uncertainty of plus or minus 1 year. However, a plume having significantly higher concentrations of TCE, from an upgradient source, impacted the subsite. These higher concentrations overwhelmed the natural attenuation processes which were previously acting to reduce concentrations of the North Landfill plume.

The CD will require installation of additional MWs and continued monitoring of the ground water downgradient of the subsite. This continued monitoring will provide additional data with which to evaluate whether the remedy is operating successfully. The CD will also require continued operation of Well D for extraction of North Landfill-related contamination until September 30, 2017, or earlier if monitoring data indicate earlier termination is appropriate.

FAR-MAR-CO

The performance standards were attained in May 2000 for the source control OU. The extended period of operation concluded in May 2002. Periodic verification sampling was performed for the next year and subsite restoration activities were performed afterwards. The PRPs are performing quarterly ground water monitoring for the ground water OU. The results show some success in the capture of the plume migrating from the source area. The FS prepared by the PRPs reports that the plume migrating from the source area is being captured by the remediation system and will attain MCLs within 50 years.

Cleanup goals established for the COCs are the MCLs or 1 x 10^{-6} cancer risk level. Ground water monitoring data indicate that the source area contamination is being reduced by natural attenuation. However, based on residual contamination in the ground water, continued operation of Well D for extraction of subsite-related contamination will be required until cleanup goals are met.

South Landfill – OU05 Source Control

The ROD was completed in 2000. The SDs petitioned EPA and NDEQ to allow an alternative design for the landfill cap. A design for the envirotranspiration landfill cap was approved and the SDs completed installation of the landfill cap in 2004.

Subsite fencing was completed in 2005. The SDs have conducted some ground water sampling of on site MWs since the CD was signed in 2003. The SDs have performed sampling of landfill gas and have initiated work on ground water sampling needed to prepare the RD for ground water portion of the subsite. The new data is expected to define the extent of the off-site plume and help with evaluation of the selected remedy, monitored natural attenuation. Upon submittal and approval of the ground water RD, EPA expects the SDs to implement the RA.

Cleanup levels established for the COCs are the MCLs or 1 x 10^{-6} cancer risk level. Additional goals for the subsite action include prevention of further ground water quality degradation by eliminating further leaching of contaminants into the ground water via infiltration of surface water through the landfill contents.

EPA will evaluate the subsite data upon completion of the ground water RA.

Area-Wide Ground Water Action – OU19
EPA's Area Wide Interim Action ROD was released in 2001. The city implemented the ICA beginning in 2004.

As discussed above, the Colorado Avenue, FAR-MAR-CO and South Landfill plumes have traveled beyond their respective MW networks. Private wells are being sampled to assist with defining ground water quality in areas beyond the existing MWs.

Private parties are being notified if their wells are contaminated and will be offered options to consider in order to receive safe drinking water. EPA performs or oversees the monitoring of ongoing subsite actions to determine progress toward achieving MCLs in accordance with subsite-specific RODs.

Since the selected remedy does not achieve Applicable Relevant and Appropriate Requirements (ARARs), the Area-Wide remedy was implemented as an interim action, consistent with 40 CFR 300.430(f)(1)(ii)(C). The interim action will remain in place until MCLs are achieved at each subsite.

The city of Hastings passed a city ordinance establishing an ICA restricting the use of the ground water within the Area-Wide project area. The selected remedy is implemented with extensive monitoring and full implementation of the city ordinance. Annual ICA reports are submitted to the EPA.

E. Site Inspection

Inspections at the site were conducted on February 28, and March 1, 2007, by the EPA RPMs and representatives of NDEQ, the city of Hastings and several responsible parties. The purpose of the inspections was to visually confirm and document the conditions of the remedies, the site, and surrounding areas. Brief descriptions of the inspections and issues identified are presented below. The completed inspection checklists for each of the subsites, excluding the NAD, are included in Appendix 5. The EPA will follow up with the responsible parties to resolve the issues that were identified during the site inspection.

Well No.3
Two MWs, the extraction well No. 3, and the storm water outfall comprising the OU18 project were inspected on February 28, 2007. No deficiencies related to these items were noted.

Colorado Avenue
The Phase I SVE system consisting of equipment inside the treatment building and 5 shallow/deep SVE well pairs, one horizontal SVE well plus the associated monitoring probe protectors were inspected on February 28, 2007. Two items needing attention were noted. Monitoring Probe MP-7D is missing the identification tag and all monitoring probes should be checked to verify they can be correctly identified by the

field sampling team. All well head enclosures (6 each) were delivered in primer and were never painted. After 11 years weathering at the subsite, the enclosures are rusted and unsightly.

The Phase I ground water treatment system was not placed into operation and therefore was not inspected. The Phase II and Phase III ground water treatment systems were inspected on February 28, 2007.

Two MWs cap were not secured. This item was corrected by Dravo in March 2007. Two MWs, MW -1d and BW-12 do not have identification tags visible on the exterior. The air sample ports were not identified for the east Park Ave. IWA system (IWA-3).

Second Street
The SVE and ground water treatment systems at the former police station, the in-well aeration system at Uncle Neal's Car Wash, the bioremediation wells and subsite MWs were inspected on February 28, 2007. Two newly installed wells, EX -3 and SW -16 did not have identification tags as of the date of the inspection.

North Landfill
The North Landfill Subsite was visually inspected to evaluate the condition of the landfill cap; a low spot was observed due to slight standing water. A walk around the perimeter revealed the fence to be in good condition, with signage present. MWs 5, 6 and 7 were observed. It appeared that the concrete pads at MWs 6 and 7 were either gone or had been buried in soil.

FAR-MAR-CO
The FAR-MAR-CO Subsite inspection occurred by visually inspecting the ground water contaminant plume capture network consisting of Well D; Wells A, B, and C at the Whelan Energy Center; and wells IN-05 and IN-11 at Chief Ethanol. All appeared to be operational. Also, MWs arrayed around the actual subsite were inspected. The manhole cover for MW-16 was damaged and in need of repair/replacement.

South Landfill
The landfill cap, the vegetation and the perimeter security fence with locked gate were inspected on February 23, 2007. Some minor observations related to routine maintenance items were noted during the inspections.

Area-Wide Ground Water Action – OU19
Institutional controls were evaluated by visiting the Hastings Utilities Power Plant building, 1228 North Denver Avenue, Hastings, Nebraska, to review water well registration records and sampling and analytical results for water wells in the ground water monitoring program. An inspection of the site boundaries was also conducted to confirm the presence of warning signs put in place to advise the public of the ground water institutional control area (see map in Appendix 2)

A partial examination of the water well registration records indicated water well registry was being maintained and appeared to be up-to-date. This information is necessary to implement the ground water monitoring program, monitor compliance with the city of Hastings Ordinance No.3754, and provide alternate water to impacted users, as documented in the ROD. The examination of the signage along the site boundaries revealed that signage had been damaged or removed at four of the six locations specified in the Area-Wide Work Plan (city of Hastings, 2004).

F. Interviews

The following city of Hastings officials were contacted by telephone or in person as part of the Five-Year Review:

- Jeremy Groves, city of Hastings 402-461-2339
- Jack Newlun, Solid Waste Superintendent for Hastings
- Marty Stange, Hastings Utilities, 402-463-1371, extension 251
- Mike Sullivan, City Attorney, 402-462-2119
- Jenny Sidlo, Engineer, Hastings Utilities, 402-461-3664

During the site inspection on March 1, 2007, EPA conducted an informal meeting with certain city staff at City Hall. Employees from the city had previously expressed concerns regarding the proposed remedy during the public meeting for the Proposed Plan and ROD for the Second Street source area (OU12). The city staff again expressed similar concern during our March 1, 2007 meeting. The EPA noted these concerns and determined that they were adequately addressed in EPA's Responsiveness Summary to the Second Street OU12 ROD.

Hastings Utilities presented information concerning its ground water monitoring efforts and a map showing the locations of private well samples, the location of the ICA, the extent of the well head protection area, and the locations where signs identifying the protection areas had been posted (See Appendix 2).

On April 6, 2007, a Fact Sheet was distributed to public officials, PRPs, community leaders and residents near the HGWCS. The Fact Sheet announced the start of the five-year review process and solicited public comment and concerns on the HGWCS. The community was also made aware of the start of the five-year review through publication of a display ad in the local newspaper on April 10, 2007. The EPA did not receive any public comments outside of the concerns or issues expressed by the local officials and/or PRPs for the subsites.

VII. Technical Assessment

A. *Question A*: Is the remedy functioning as intended by the decision documents?

Remedial Action Performance
Area-wide and subsite response actions have been implemented. Active remediation is underway at Well No.3, Colorado Avenue, Second Street, North Landfill, and FAR-MAR-CO Subsites. All ground water treatment systems remained operational and functional during the five year review period with one exception. Numerous treatment interruptions occurred at the Colorado Avenue Subsite. These were related to failure to change out the spent carbon for the IWA systems. Dravo's submittal contained in Appendix 4b addresses the intent to change out the spent carbon as needed to minimize this problem in the future. The source control and ground water remedies in place will continue to operate until they reach performance goals.

EPA anticipates additional remedial work to be implemented at the Colorado Avenue, Second Street, North Landfill, FAR-MAR-CO, and South Landfill Subsites.

A final Area-Wide ROD will be issued to establish final clean up levels, subsequent to issuance of the Final RODs for each of the subsites.

System Operations / O&M
System operations procedures are consistent with subsite specific requirements.

Cost of System Operations / O&M
Some PRP costs provided to EPA were aggregate numbers including settlement for

historical RI/FS costs, etc. Cost information available to EPA is shown in Section IV. In some cases, a direct comparison to earlier cost estimates was not possible. The review found actual costs to be generally in agreement with estimates.

Institutional Controls
The ICA has been established by the city of Hastings in cooperation with Adams County. The ground water monitoring of the private wells within the ICA is being performed by Hastings Utilities with the private parties being notified of the sampling results. Some former agricultural properties have converted to commercial use. Some parcels of land within the ICA are owned by responsible parties. There are no current or planned changes in land use at any of the Hastings OUs that could increase risks to human health.

Monitoring Activities
For Well No.3, Colorado Avenue and Second Street, ground water monitoring has been conducted twice yearly.

For South Landfill, the available monitoring data is limited. Additional data is currently being collected by the SDs. Results from ground water monitoring conducted to date are contained in Appendix 4d.

Ground water monitoring at the North Landfill and FAR-MAR-CO Subsites was conducted quarterly during the past five years. Summaries of the past quarterly monitoring results are included in Appendix 4c. For the Colorado Avenue Subsite, monitoring for both the source control efforts and the ground water efforts was presented to EPA during the Five-Year Review and are in Appendix 4a

For Area-Wide, three Annual ICA Reports have been completed and provided to EPA. The reports reflect actions taken to comply with requirements of the CD.

Opportunities for Optimization
Well No.3: No opportunities for optimization or improvement were identified.

Colorado Avenue: The Phase II and III ground water treatment systems are operating, however data is not conclusive and the Phase IV investigation is needed to determine the fate of the OU01 plume. Because the remedy has not been fully implemented, opportunities for improvement and optimization still remain. A final ROD is needed to fully comply with State ARARs.

Second Street: Implementation of the OU20 remedy began in 2005. Opportunities for optimization may exist at Second Street. The EPA and NDEQ are evaluating areas for improvement of the ground water remedy. While the SVE source control system continues to operate, additional source control measures are needed as reflected by the OU12 ROD.

North Landfill: The source control remedy remains protective and effective, no optimization opportunities were identified. The ground water remedy has not been implemented. Optimization opportunities will be employed as they are identified and deemed appropriate.

FAR-MAR-CO: Source control has been performed with no optimization opportunities identified. Work is being implemented on the ground water remedy. Optimization opportunities will be employed as they are identified and deemed appropriate.

South Landfill: The ground water remedy has not been fully implemented. Optimization opportunities will be discussed in the next Five-Year Review.

Area-Wide Ground Water. No opportunities for optimization were identified during the course of this Five-Year Review.

Early Indicators of Potential Remedy Failure
Although an expansion of the ICA may be needed in the near future, this is not viewed

as a remedy failure. The terms of the Consent Decree allow for the potential need to expand the ICA. O&M costs have deviated from early estimates, but are generally consistent with expectations. In some instances maintenance requirements have exceeded earlier expectations.

B. *Question B*: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considereds (TBCs)
Based on this review, EPA believes earlier assumptions, data inputs and RAOs are still appropriate for the HGWCS. As noted in this review, a number of actions remain to be implemented / completed.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics
The exposure assumptions used to develop the Risk Assessment include both current exposures (adult and children residents)

Earlier risk assessments remain valid. Except as discussed under question C, no changes were noted during this review, EPA will consider the significance of 1,4-dioxane when the final OU01 ROD is prepared.

C. *Question C*: Has any other information come to light that could call into question the protectiveness of the remedy?

1,4-dioxane is known to be a chemical stabilizer used in the formulation of 1,1,1-TCA industrial vapor degreasing products. Low levels of 1,4-dioxane have been detected at the Hastings site. Historically, the standard VOC laboratory methods did not yield reliable data for low-level analysis of 1,4-dioxane. Laboratory methods recently developed require that the analysis for 1,4-dioxane be a separate request and require a larger sample of water. This matter will need to be addressed. Appropriate action will be taken to ensure that current and future remedial actions are protective.

VIII. Issues

Table 6 summarizes site issues identified during the Five-Year Review.

IX. Recommendations and Follow-up Actions

At the **Well No.3** Subsite, the intent of the Plume 2 (OU18) RA is to remediate the TCE contamination to MCLs using the extraction system installed by EPA at former municipal supply well M-3. This action was anticipated to last for 15 years. Based on available data, the fate of the OU18 ground water contaminant plume is uncertain. This matter will be taken up through discussions with the Settling Defendant.

At the **Colorado Avenue** Subsite, there is insufficient data to conclude that the ground water contaminant plume is being effectively captured and controlled by the existing treatment systems. Additional ground water remediation systems may be needed. The PRP is in the process of conducting Phase IV ground water investigations. EPA will consider amending the list of COCs to include 1,4-dioxane. Additional monitoring results are needed to evaluate the effectiveness of the Colorado Avenue RA.

Table 7
Recommendations and Follow-Up Actions

Subsite/ Issue	Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency (Lead / Support)	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Well No.3 (OU18) - Plume Not Contained	Invoke additional work provisions of CD	Dutton-Lainson	EPA / NDEQ	2007	N	Y
Colorado Avenue (OU01) - Plume Not Contained	Perform Phase IV investigation	Dravo	EPA / NDEQ	2007 - 2009	N	Y
Colorado Avenue (OU01) – COC list incomplete	Amend list of COCs	EPA	EPA / NDEQ	2008	N	Y
Second Street (OU20)- COC list	Incorporate monitoring and treatment of EDB into remedy	EPA and NDEQ	EPA / NDEQ	2008	N	Y
Area-Wide Ground Water Action – ICA boundary	Continue to administer ICA	Area-Wide PRPs	EPA/NDEQ	Annually	Y	Y

Table 6
Summary of Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Available data are insufficient to conclude that the **Well No.3** OU18 plume is being captured by the system now operating	N	Y
Monitoring results indicate plume continues to migrate from the **Colorado Avenue** Subsite beyond the Phase III treatment systems	N	Y
1,4-dioxane, a stabilizer of 1,1,1-TCA and a probable human carcinogen, has not been identified as a COC and therefore has never been included in the list of analytes for **Colorado Avenue**	N	Y
Releases of EDB from former Foote Oil [a Nebraska Leaking Underground Storage Tank (LUST) site] are complicating the cleanup of **Second Street** ground water plume (OU20)	N	Y
Available ground water data suggest that contamination may have migrated beyond the boundary for the ICA (**Area-Wide Ground Water Action**)	Y	Y

At the **Second Street** Subsite, since the last five-year review, EDB has been detected in MWs at more than 100 times the MCL. EDB is now included in water sample analyses, however, it is not currently recognized as COC at the subsite. Although EDB is a contaminant associated with the former Foote Oil (a Nebraska LUST site), EPA will take steps to include EDB in the cleanup of the Second Street Subsite contaminant plume.

The **Area-Wide Ground Water Action** interim remedy has been implemented. Hastings Utilities provided Annual ICA reports to EPA. Ground water monitoring at the eastern, or leading, edges of the contaminant plumes is insufficient to conclude that contamination remains within the ICA. The characterization of the extent of the contaminant plumes in question will be performed as part of future RD/RA for Colorado Avenue, North Landfill and FAR-MAR-CO.

Table 7 summarizes recommendations and follow-up actions for the six city subsites and associated OUs.

X. Protectiveness Statement(s)

A. Well No.3

OU07, OU13, and OU17- the remedies employed at these OUs are protective of human health and the environment. The remedy at OU18 is considered protective in the short-term because there is no evidence that there is current exposure. Institutional Controls are in place restricting well drilling. The ICs can potentially provide long-term protection.

B. Colorado Avenue

OU01 and OU09 - the remedies at these OUs are expected to be protective of human health and the environment upon completion. However, additional systems will be required to meet the goals of the OU01 and OU09 RODs. There is insufficient data to demonstrate protectiveness for the OU01 and OU09 RAs. The partially implemented remedies may be considered protective in the short-term because there is no evidence that there is current exposure.

Currently, there is good reason to question the location of the leading edge of the Colorado Avenue ground water contaminant plume. Because the plume may have traveled beyond the boundary originally identified for the ICA monitoring area, additional work will be needed to define the extent of the plume. Evaluation of data to be collected over the next two years may be sufficient to answer the remaining questions about protectiveness for the long term. A final ROD is needed for the Colorado Avenue Subsite.

C. Second Street

OU12 and OU20 - In 2006 EPA selected a final remedy. The OU12 remedy is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The remedy at OU20 is considered protective in the short-term because there is no evidence that there is current exposure. Institutional Controls are in place restricting well drilling and can potentially provide long-term protection.

D. North Landfill

The remedy for OU10 (source control) is protective of human health and the environment. The remedy selected for OU02 is expected to be protective of human health and the environment upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled. EPA and the PRPs are negotiating a Consent Decree for implementation of the final remedy for OU02.

E. FAR-MAR-CO

The remedy for OU03 and OU11 (source control), is protective of human health and the environment. The remedy for OU06 is expected to be protective of human health and the environment upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled. Currently, the Final Action FS is being reviewed by EPA. The remedy at OU06 currently protects human health and the environment because there are institutional controls limiting further installation of ground water supply wells and the monitoring of the water of private residences down gradient of the subsite.

F. South Landfill

OU05, a protectiveness determination of this remedy cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions: completion of the work defined by the SDs ground water investigation work plan, installation of additional MWs and periodic sampling of the down gradient areas affected by the OU05 contaminant plume.

It is expected that these actions will be conducted by the SDs. EPA expects to have sufficient information to make a protectiveness determination after about 2 years of monitoring.

G. Area-Wide Ground Water Action

OU19 - the interim remedy at OU19 currently protects human health because current and future property owners are prohibited from domestic use of ground water unless it is demonstrated through sampling that the ground water is suitable for use. However, in order for the remedy to be protective in the long-term, the institutional controls currently in place must continue to be implemented over the lateral extents of all migrating contaminant plumes.

XI. Next Review

The next Five-Year Review for the HGWCS is required by July 2012, five years from the date of this review.

XII. Other Comments

Work continues at the site under both federal and responsible party leads. Ground water monitoring will continue at most subsites and the institutional controls (ground water monitoring, deed restrictions and security fencing, posting of the site, and domestic groundwater use restrictions) will remain in effect. Interim response actions being performed at the subsites are believed to be consistent with the final remedy for the HGWCS.

List of Documents Reviewed

FAR-MAR-CO

Record of Decision Initial Source Control OU, Hastings Ground Water Contamination Site, FAR-MAR-C0 Subsite, OU No.03 dated September 30, 1988

Administrative Order on Consent - VII-90-F0038, Hastings Ground Water Contamination Site, FAR-MAR-CO Subsite, OU No.03 remedial design with Farmland Industries, Inc. dated September 27, 1990

Record of Decision, Hastings Ground Water Contamination Site, FAR-MAR-CO Subsite, OU No.11, dated September 28, 1990

Administrative Order on Consent - VII-90-F-0001, Hastings Ground Water Contamination Site, FAR-MAR-CO Subsite, OU No.11 with Hastings Irrigation Pipe Company dated October 26, 1989, amended December 12, 1990

Administrative Order on Consent, VII-92-F0005, Hastings Ground Water Contamination Site, FAR-MAR-CO Subsite, OU No.06, RI/FS, dated November 20, 1991

Consent Decree,, Civil Action No. CV88-L-720, United States of America vs. Morrison-Quirk Grain Corporation dated April 19, 1993

Consent Decree, Civil Action No. 4:CV93-3315, United States of America vs . Hastings Irrigation Pipe Company dated November 11, 1993

Explanation of Significant Differences, Hastings Ground Water Contamination Site, FAR-MAR-CO Subsite, OU No.03 dated August 22, 1995

Action Memorandum, Hastings Ground Water Contamination Site, FAR-MAR-CO Subsite, OU No.06 dated December 6, 1995

Administrative Order on Consent, VII-96-F-0020, Hastings Ground Water Contamination Site, FAR-MAR-CO Subsite, OU No.06 with Morrison Enterprises dated June 14, 1996

Consent Decree, Civil Action No. 4:96CV3037, United States of America v. Cooperative Producers, Inc. and Farmland Industries, Inc. dated May 7, 1997

Construction Completion Report and Remedial Action Report for the FAR-MAR-CO Subsite, Hastings, Nebraska dated OU No.-3, source control dated December 19, 1997

Colorado Avenue

Record of Decision Initial Source Control OU, Hastings Ground Water Contamination Site, Colorado Avenue Subsite, OU No.09 dated September 28, 1988

Administrative Order on Consent, VII-88-F-0021, Hastings Ground Water Contamination Site, Colorado Avenue Subsite, OU No.09, SVE Pilot Study dated December 14, 1988

Unilateral Administrative Order, Docket No. VII-90-F-0040, Hastings Ground Water Contamination Site, Colorado Avenue Subsite, OU No.09, RD/RA, dated September 28, 1990

Interim Action Record of Decision, Hastings Ground Water Contamination Site, Colorado

Avenue Subsite, OU No.01 dated September 30, 1991

Administrative Order on Consent, VII-90-F-0025, Hastings Ground Water Contamination Site, Colorado Avenue Subsite, OU No.09, De Minimis Settlement, dated June 12, 1992

Administrative Order on Consent, VII-92-F0001, Hastings Ground Water Contamination Site, Colorado Avenue Subsite, OU No.09, dated October 1, 1992

Unilateral Administrative Order, Docket No. VII-93-F-0019, Hastings Ground Water Contamination Site, Colorado Avenue Subsite, OU No.01, RD/RA, dated March 8, 1993

Interim Action Record of Decision Amendment, Hastings Ground Water Contamination Site, Colorado Avenue Subsite, OU No.01 dated May 25, 1998

Explanation of Significant Differences, Hastings Ground Water Contamination Site, Colorado Avenue Subsite, OU No.01 dated September, 26, 1999

Consent Decree, Civil Action No. 8:01CV500, Colorado Avenue Subsite OU 01 and 09, Hastings Ground Water Contamination Site, Entered May 24, 2006

Draft Annual Remedial Action Report, July 2005 – January 2007, Colorado Avenue Groundwater Contamination Subsite, February 2007.

Well No.3

Interim Action Record of Decision, Hastings Ground Water Contamination Site, Well No.3 Subsite, OU No.07 dated September 26, 1989

Interim Action Record of Decision, Hastings Ground Water Contamination Site, Well No.3 Subsite, OU No.13 and OU No.18 dated June 30, 1993

Remedial Action Report for the Hastings Ground Water Contamination Site, Well No.3 Subsite, OU No.07, dated August 17, 1993

Administrative Order on Consent, VII-93-F0001, Hastings Ground Water Contamination Site, Well No.3 Subsite, OU No.17, RI/FS, dated October 21, 1993

Administrative Order on Consent, VII-94-F005, Hastings Ground Water Contamination Site, Well No.3 Subsite, OU No.17, Removal Site Evaluation, dated January 21, 1994

Explanation of Significant Differences, cord of Decision, Hastings Ground Water Contamination Site, Well No.3 Subsite, OU No.13 dated December 14, 1994

Action Memorandum, Hastings Ground Water Contamination Site, Well No.3 Subsite, OU No.17, dated July 20, 1995

Administrative Order on Consent, VII-95-F0033, Hastings Ground Water Contamination Site, Well No.3 Subsite, OU No.17, Removal Action, dated September 28, 1995

Explanation of Significant Differences, cord of Decision, Hastings Ground Water Contamination Site, Well No.3 Subsite, OU No.13 dated July 23, 1996

Remedial Action Report for the Hastings Ground Water Contamination Site, Well No.3 Subsite, OU No.13, dated December 11, 1998

Interim Action Record of Decision Amendment, Hastings Ground Water Contamination Site, Well No.3 Subsite, OU No.13 dated November 19, 1999

Final Record of Decision, Hastings Ground Water Contamination Site, Well No.3 Subsite, OUs No.07, 13, 17 and 18, dated May 17, 2001

Consent Decree for Remedial Action, Civil Action No. 8:02CV366, Hastings Ground Water Contamination Site, Well No.3 Subsite, OU 18, entered October 11,2002.

North Landfill

Administrative Order on Consent, VII-89-F0018, Hastings Ground Water Contamination Site, North Landfill Subsite, OUs No.02 and 10, FS, dated September 27, 1989

Interim Action Record of Decision, Hastings Ground Water Contamination Site, North Landfill Subsite, OUs No.02 and 10 dated September 30, 1991

Administrative Order on Consent, VII-92-F0028, Hastings Ground Water Contamination Site, North Landfill Subsite, OU No.02 and 10, Remedial Design dated June 12, 1992

Consent Decree, Civil Action No. 8:98CV265, United States of America vs. City of Hastings, Dravo Corporation, Dutton-Lainson Company and Bernice Edwards dated August 14, 1998

Final Remedial Action Report for the North Landfill Subsite OU No.10, Hastings Ground Water Contamination Site, Hastings, Nebraska dated November 23, 1999

Second Street

Administrative Order on Consent, VII-96-F0019, Hastings Ground Water Contamination Site, Second Street Subsite, OU No.12, O&M for removal action, dated September 16, 1996

Action Memorandum, Hastings Ground Water Contamination Site, Second Street Subsite, OU No.12, dated June 5, 1997

Interim Remedial Action Report, Second Street subsite OU20, Hastings Ground Water Contamination Site, May 2007.

South Landfill

Administrative Order on Consent, VII-98-F0022, Hastings Ground Water Contamination Site, South Landfill Subsite, OU No.05, RI/FS, dated October 23, 1998

Record of Decision, Hastings Ground Water Contamination Site, South Landfill Subsite, OU No.05, dated September 2000

Consent Decree, Civil Action No. 8:03CV321, Hastings Ground Water Contamination Site, South Landfill Subsite, OU 05, entered November 12, 2003.

Final Remedial Action Report for the South Landfill Subsite Evapotranspiration Cap OU No.5, Hastings Ground Water Contamination Site, September 2005.

Area Wide

Human Health Baseline Risk Assessment, Hastings Area-Wide Groundwater Contamination Site, Hastings, Nebraska, Nebraska Health and Human Services System, November 1997.

Administrative Order on Consent, VII-98-F0022, Hastings Ground Water Contamination Site, Area Wide Subsite, OU No.19, RI/FS, dated October 23, 1998

Interim Action Record of Decision, Hasting Ground Water Contamination Site, Area-Wide Ground Water Action, OU No.19, June 25, 2001

Consent Decree, Civil Action No. 8:03CV531, United States of America versus City of Hastings, Concrete Industries, Inc., Cooperative Producers, Inc., Desco Corporation, Dravo Corporation, Dutton Lainson Company, and Morrison Enterprises, Entered February 26, 2004

Interim Remedial Action Design, Hastings Ground Water Contamination Site, Area Wide Work Plan, dated August 2004

Hastings Institutional Control Area, Annual Report, Reporting Year 2006, Hastings, Nebraska, March 29, 2007, Hastings Utilities.

Appendices and Attachments for this Five-Year Review are available by placing a request using the Customized CERCLIS/RODS Report Order Form.

http://www.epa.gov/superfund/sites/phonefax/rods.htm