SECOND FIVE-YEAR REVIEW REPORT
BRUNO COOPERATIVE ASSOCIATION/
ASSOCIATED PROPERTIES SUPERFUND SITE
BRUNO, BUTLER COUNTY, NEBRASKA

Prepared by:

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LIST OF ACRONYMS

1,2-DCA	1,2-dichloroethane
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	Chloroform
CFR	Code of Federal Regulations
COCs	Contaminants of Concern
CRA	Conestoga-Rovers & Associates
CT	Carbon Tetrachloride
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
EW	Extraction Well
FYR	Five-Year Review
FSI	Focused Site Investigation
GETS	Groundwater Extraction and Treatment System
gpm	gallons per minute
GWM	Groundwater Monitoring
HHBRA	Human Health Baseline Risk Assessment
ICs	Institutional Controls
LPNNRD	Lower Platte North Natural Resources District
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NDOH	Nebraska Department of Health (currently named Nebraska Department of Health and Human Services)
NDEQ	Nebraska Department of Environmental Quality
NPL	National Priorities List
NRD	Natural Resource District
O&M	Operation and Maintenance
OU	Operable Unit
PA	Preliminary Assessment
ppb	parts per billion
PRP	Potentially Responsible Party
PWS	Public Water Supply
RAO	Remedial Action Objectives
ROD	Record of Decision
RP	Responsible Party
RPM	Remedial Project Manager
SI	Site Investigation
Site	Bruno Co-op Association/Associated Properties NPL site
SLERA	Screening Level Ecological Risk Assessment
TVOC	Total VOCs
USDA	United States Department of Agriculture
UPRR	Union Pacific Railroad
VI	Vapor Intrusion
VOCs	Volatile organic compounds

EXECUTIVE SUMMARY

This is the second Five-Year-Review (FYR) for the Bruno Cooperative Association/Associated Properties Superfund site (Site) located in rural Butler County, Nebraska, in the small farming community of Bruno with an approximate population of 150 individuals. The purpose of this FYR is to review information to determine if the remedy is and will continue to be protective of human health and the environment. The triggering action for this policy review is the signature date of the previous FYR report of September 27, 2010. The Site contains historic soil and current groundwater contamination resulting from grain fumigation at the Bruno Cooperative.

The construction of the remedy for the Site has been completed. Groundwater is contaminated with volatile organic compounds resulting from the inappropriate use of grain fumigants at the co-op. Residents have been supplied with a new source of clean drinking water and the contaminated groundwater is currently being remediated by a pump-and-treat system that became operational in 2004. The remediation system consists of four pumping wells with a combined flow rate of 200 gallons per minute, and the impacted water is treated by conventional air stripping methods. The discharge water is being made available to the local public for beneficial re-use. The historic impacted water supply wells have been abandoned or are no longer in use, and institutional controls are in place to prohibit the construction of new private water wells in the contaminated plume area. The design and cleanup work was conducted by responsible parties under a 2003 Consent Decree (CD), *United States v. Union Pacific Railroad Company and Bruno Cooperative Association, Civil Action No. 8:02-cv-483*. The responsible parties are also performing operation and maintenance activities for the pump-and-treat system. The remediation time frame is projected to be 20 years.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Bruno Cooperative Association/Associated Properties Superfund site		
EPA ID: NED981713829		
Region: 7	**State:** NE	**City/County:** Bruno/Butler

SITE STATUS	
NPL Status: Final	
Multiple OUs? No	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA
Author name (Federal or State Project Manager): Steve Kemp
Author affiliation: U.S. EPA Region 7
Review period: 10/31/2014 – 8/2015
Date of site inspection: N/A
Type of review: Policy
Review number: 2
Triggering action date: 09/27/2010
Due date *(five years after triggering action date)*: 09/27/2015

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU 01

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): *01*	**Issue Category: No Issue**			
	Issue: N/A			
	Recommendation: N/A			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	No	N/A	N/A	N/A

Protectiveness Statement(s)		
Operable Unit: OU 01	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* N/A
Protectiveness Statement: The remedy at OU 01 is protective of human health and the environment.		

Sitewide Protectiveness Statement	
Protectiveness Determination: Protective	*Addendum Due Date (if applicable):* *N/A*
Protectiveness Statement: The remedy at the Site is protective of human health and the environment.	

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in Five-Year Review reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 and the National 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.*"

The EPA interpreted this requirement further in the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which 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 actions no less often than every five years after the initiation of the selected remedial action.*"

The EPA conducted a FYR on the remedy implemented at the Site in Bruno, Butler County, Nebraska. The EPA is the lead agency for developing and implementing the remedy for the Site. Nebraska Department of Environmental Quality (NDEQ), as the support agency representing the state of Nebraska, has reviewed all supporting documentation and provided input to the EPA during the FYR process.

This is the second FYR for the Site. This policy FYR is required because the remedial action, upon completion, will not leave hazardous substances, pollutants, or contaminants at the Site above levels that allow for unlimited use and unrestricted exposure, but requires five or more years to complete. The triggering action for this policy review is the signature date of the previous FYR.

The Site consists of one operable unit (OU) designated as OU-01, which is addressed in this FYR. The Site location and details are shown on Attachment A.

This FYR is supported by field visits between the dates of March 2014 and June 2015.

II. SITE CHRONOLOGY

A chronology of significant site events and dates is included in Attachment A.

III. BACKGROUND

Physical Characteristics

The Site is located in Bruno, Nebraska. Bruno is a small rural village located in Butler County in east central Nebraska. A site location map is provided in Attachment A. Butler County is rural and the general area is sparsely populated. The village of Bruno has an approximate population of 150 individuals, and trends indicate that the village, county, and state of Nebraska are continuing to experience a decrease in the number of residents over time.

Hydrology

Site geology consists primarily of an upper clay/silt zone (37 to 42 feet thick) overlying a middle sand unit (56 to 59 feet thick) atop a silt/clay unit at the base of the aquifer. The middle sand unit is composed of three zones: upper sand (fine to coarse gravel about 5 to 10 feet thick, shallow zone); middle sand zone (silty fine sand with silt and sandy clay about 32 to 42 feet thick); and, a lower sand unit of fine sand with trace amounts of silt at about 10 to 21 feet thick (deep zone). The basal clayey unit may not be present throughout the area. The unconsolidated units lie on shale and sandstone. Groundwater flow is primarily northwesterly. The depth to groundwater ranges from about 30 to 45 feet. The saturated zone is approximately 55 to 60 feet thick.

Land and Resource Use

The predominant land use around Bruno is agricultural crop production, and future land use is expected to remain agricultural. Groundwater in the area is used extensively as a source of drinking water and for agricultural purposes. These uses are expected to continue into the future. Agricultural irrigation water wells are located near the contaminant plume, but have not been found to be affected by site contaminants.

Residents of the village of Bruno consume municipal water from the nearby community of David City, Nebraska, located approximately ten miles west of Bruno. There are no known residents using private water supply wells in the immediate vicinity of the contaminant plume at the Site.

History of Contamination

The Site consists of the local Co-op and associated property where historic grain fumigation practices, and other non-prescribed uses of grain fumigants, resulted in impacts to the local groundwater system. Specifically, interviews with former employees indicated that grain fumigants were poured down holes in the ground to control rodents. This unapproved use of the fumigants is a likely cause of the observed groundwater contamination.

In 1984, the Nebraska Department of Health (NDOH) determined the public water supply for Bruno was contaminated with volatile organic compounds (VOCs), specifically constituents of grain fumigants (carbon tetrachloride [CT], chloroform [CF], and 1,2-dichloroethane [1,2-DCA]). At that time the Public Water Supply (PWS) for Bruno consisted of two wells installed in the local aquifer system.

The potential for redevelopment or new construction within the Site boundary is remote given the demographics of the area.

Initial Response

The EPA completed a Preliminary Assessment (PA) in April 1987. The EPA conducted a removal action by supplying bottled water to residents from 1989 to 1990 following the removal of the municipal supply wells from service, pending the construction of two new water supply wells in 1990. The two contaminated wells were removed from service, and in 1990 two new PWS wells were installed in an area up-gradient of the plume of contaminated groundwater. Argonne National Laboratory conducted additional site characterization activities on behalf of the U.S. Department of Agriculture (USDA) in 1994 and 1995. The USDA, Union Pacific Railroad (UPRR), and the Bruno Co-op are responsible parties (RPs) at the Site. The Site was placed on the National Priorities List (NPL) in 1996.

Basis for Taking Action

The contaminants of concern (COCs) at this Site are CT, CF and 1,2-DCA. CT, CF and 1,2-DCA are classified by the EPA as Group B2, probable human carcinogens. The single remedial action objective (RAO) for the Bruno Record of Decision (ROD) is to prevent human exposure to contaminated groundwater. The following clean-up levels were established for Site COCs: CT at 5 parts per billion (ppb); CF at 100 ppb; and 1,2-DCA at 5 ppb.

IV. REMEDIAL ACTIONS

Selected Remedy

- Active restoration of the aquifer by pumping out and treating the contaminated groundwater.
- Groundwater monitoring and a periodic analysis of the results.
- Treatment of contaminated groundwater by air stripping using tray aeration techniques.
- Discharge of treated groundwater to the nearby tributary of Skull Creek. At the option of state and local authorities, some of the water may be beneficially reused rather than discharged.

The initial remedy selected in the ROD specified the construction of a groundwater extraction and treatment system (GETS), consisting of groundwater pumping wells and a treatment system to contain the groundwater plume and restore the aquifer in an approximate 20-year time frame. The treatment system removes the Site contaminants to acceptable levels, but the water is not potable due to the presence of nitrates related to agricultural practices in the area. Additional remedy components included the following actions: abandonment of one of the formerly used, impacted municipal supply wells (well #36-1); placement of treatment on the other impacted municipal supply well (well #65-1) for use in times of high demand water shortages; and the provision of treated water from the pump-and-treat system to local citizens for non-potable, beneficial reuse.

The 2000 ESD was issued to describe the changes in the estimated cost of the remedy as compared to the 1998 ROD. An ESD is typically released to describe non-fundamental changes to a remedy with respect to scope, performance, or cost. An approximate cost increase of 60 percent was deemed to be a non-fundamental change in the remedy, and thus worthy of description in an ESD.

Remedy Implementation

In 2003, the EPA finalized a Consent Decree (CD) with the RPs to implement the remedy. The CD obligated the RPs to fund an engineering design and subsequent clean-up action for the impacted groundwater at the Site. The RPs successfully completed the design and construction of the initial remedy, and the remedial system began operation in December 2004.

The pump-and-treat system includes the following components: four groundwater recovery wells installed to a depth of approximately 100 feet with a combined capacity of approximately 200 gpm; construction of a treatment building housing a shallow tray air stripper; discharge of stripper effluent to a local tributary; and providing discharge water to the local public for beneficial use.

The GETS became operational in December 2004. Post-construction inspections conducted in 2005 documented that the remedial design had been fully implemented. The remedial action construction was certified as complete on April 19, 2005. The remedy was constructed in accordance with the final engineering design with no major modifications. The final inspection was considered the pre-certification under the terms of the CD.

Operation and Maintenance

The RPs are conducting all operation and maintenance (O&M) activities at the Site. These activities include periodic sampling and analysis of groundwater samples from monitoring wells, extraction wells, and discharge water, in addition to physical inspections of the wells, pumps, and treatment building.

O&M also includes the operation of the beneficial reuse system for discharge water during the approximate spring to fall time period in addition to reporting all elements of the O&M program to the EPA and NDEQ.

The ROD included two additional elements: abandonment of former Bruno Supply Well #36-1 in accordance with state guidelines; and returning Bruno Supply Well #65-1 to use as a source of drinking water for the Village in times of high demand by treating water from this well. Well #36-1 was abandoned, and Well #65-1 is available for non-potable uses.

In October 2006 the residents of the Village of Bruno were connected to the David City PWS, located approximately ten miles west of Bruno, via a pipeline. The residents of Bruno now use water from the David City PWS for all potable uses.

The RPs conducted a vapor intrusion assessment from 2006 to 2007 pursuant to a request by the EPA. The effort consisted of the installation of four permanent vapor monitoring wells in highly-contaminated areas of the groundwater plume in close proximity (60 to 200 feet) to two homes located in areas underlain by the groundwater plume. The four vapor monitoring wells consisted of two well nests of one shallow (approximately 11 feet deep) and one deep (approximately 17 feet deep) at each well nest location. The wells were sampled on multiple occasions and the results of the investigation indicated no potential for vapor impacts to Site residents.

Institutional Controls

The 1998 ROD did not contain any provisions for institutional controls (ICs). Institutional controls are non-engineered controls, such as administrative and legal controls, that help to minimize the potential exposure to Site contaminants associated with the consumption of impacted groundwater and ensure that the remedy remains operational.

In 2005, the EPA issued a second ESD addressing groundwater ICs to provide a framework for ensuring remedy protectiveness over time. The goal of the groundwater ICs at this Site is to control or prohibit the drilling, construction, and use of new domestic wells within the boundaries of the contaminant plume, and also to control or prohibit the placement of new irrigation or industrial wells that may hydraulically influence the operating groundwater pump-and-treat system.

Specifically, the ICs at this Site consist of restrictions on the placement and construction of new water wells and notification requirements. The Village of Bruno enacted an ordinance (Ordinance No. 126) that prohibits the construction of any new water wells within the city limits. The controls consist of a required majority approval by the Bruno Village Board for any wells proposed in the additional one mile limit area. This area encompasses the extent of the Site groundwater plume. Locations outside of the area encompassed by the Village of Bruno ordinance are within the wellhead protection area and are subject to regulation by the Lower Platte North Natural Resources District (NRD). The NRD must be notified, and its approval is required, for any new applications for high capacity wells (>50 gpm) within the wellhead protection area. The NRD added the EPA to the wellhead protection notification list of governmental organizations that receive notices of any new proposed wells in this area.

The most recent well permitted by the NRD in the area was in the 1970s. No new wells have been proposed since the inclusion of the EPA on the notification list in 2005. The Village of Bruno also

agreed in 2005 to notify the EPA of any requested permits for domestic well construction within the zoned area. No requests have been received since the 2010 FYR.

Layering of institutional controls is achieved for this Site by the requirements of the Nebraska Department of Water Resources. This state agency requires the registration of all domestic wells and this information is available to the EPA, NRD, and the Village of Bruno.

V. PROGRESS SINCE LAST FIVE-YEAR REVIEW

The protectiveness statement provided in the first FYR report is:

"The remedy at OU-01 is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled."

Three issues that were identified with recommended follow-up actions in the first FYR report are listed below with updates on the status of the actions.

Table 1: Status of Recommendations from the 2010 FYR

OU #	Issue	Recommendations / Follow-up Actions	Party Responsible	Oversight Party	Original Milestone Date	Current Status	Completion Date (if applicable)
01	Verification of hydraulic capture in the lower aquifer (lower zone of the upper unconsolidated aquifer).	Conduct field investigations in the downgradient area of monitoring well SB-03 to verify hydraulic capture and characterize the downgradient extent of carbon tetrachloride.	RPs	EPA/State	12/31/2011	Completed	1/28/2013
01	Enhanced assessment of the vapor intrusion pathway.	Conduct vapor intrusion field investigations in close proximity to the exterior of two homes on Railroad Street that overlie the groundwater plume. Conduct subsequent in-home, subslab vapor intrusion assessment activities if necessary.	RPs	EPA/State	12/31/2011	Completed	1/28/2013
01	Enhanced assessment of sediment impact potential.	Collect and analyze four sediment samples from Skull Creek and its tributary.	RPs	EPA/State	12/31/2011	Completed	1/28/2013

An additional issue that did not affect current or future protectiveness was the verification that concentrations of COCs in the soil in the vadose zone are below groundwater protection standards. This action was completed on January 28, 2013.

Conestoga-Rovers & Associates (CRA) completed a Focused Site Investigation (FSI) in January 2013. The FSI describes the work conducted to address the three issues identified in the first FYR and to address an additional issue that did not affect protectiveness. Four tasks were completed: groundwater

investigation downgradient of groundwater monitoring (GWM) well SB-39L; soil vapor investigation near two residences at 105 and 107 Railroad Street; collection of sediment samples from the tributary to Skull Creek and from Skull Creek; and collection of vadose zone soil samples near SB-03 to try to identify the cause of the increasing contaminant concentrations in the groundwater in the deep zone at the GWM well location SB-03.

Results of Task 1: Two additional GWM wells were installed in the deep zone northwest of GWM well SB-39L. Analysis of groundwater level data and groundwater samples indicates the extraction wells are capturing the contaminant plume. Plume migration is under control.

Results of Task 2: One of the two property owners denied access. Soil vapor samples collected outside the home from the second property and from near the first property indicate the concentrations of COCs were below the EPA's Regional Screening Levels. Therefore, there doesn't appear to be any completed soil vapor exposure pathway. This is consistent with the fact that the highest concentration of COCs detected in the groundwater have been observed in the medial and deep zones.

Results of Task 3: Sediment samples were collected from the Tributary to Skull Creek and from Skull Creek. The COCs for the Site were not detected in any of the sediment samples.

Results of Task 4: The concentration of COCs in the groundwater continue to increase at GWM well SB-03. The purpose for collecting soil samples was to evaluate whether there was a previously unidentified source of contamination in the vicinity of this GWM well. No COCs were detected in the soil samples collected during this task.

VI. FIVE-YEAR REVIEW PROCESS

Administrative Components

The RPs were notified of the initiation of the FYR on October 31, 2014. The FYR team for the Site includes the following individuals: Steve Kemp, EPA Project Manager; Ben Kittrell, NDEQ Project Manager; Jim Stevens, EPA Attorney; Dan Nicoski, EPA Hydrogeologist; Ann Durham Jacobs, EPA Human Health Risk Assessor; Catherine Wooster-Brown, EPA Ecological Risk Assessor; and Karim Dawani and Pam Houston, EPA Community Engagement Specialists.

The review, which began on October 31, 2014, consisted of the following components:

- Community Involvement,
- Document Review,
- Data Review,
- Site Inspection, and
- Five-Year Review Report Development and Review.

Community Notification and Involvement

Activities to involve the community in the FYR review process were initiated with a meeting in December 2014 between the Remedial Project Manager (RPM) and Community Engagement Specialist for the Site. A notice was published in the local newspaper, The Banner-Press, on February 12, 2015, stating that there was a five-year review of the Site and inviting the public to submit any comments to the EPA. The results of the review and the report will be made available at the Site information repository located at the Bruno Post Office, 205 2nd Street, Bruno, Nebraska 68014, and the EPA Region 7 Records Center, 11201 Renner Boulevard, Lenexa, Kansas 66219.

Document Review

This FYR consisted of a review of relevant documents including O&M records and monitoring data. Attachment E provides a listing of documents reviewed in support of this FYR and Attachment F provides recent Site monitoring data.

This FYR includes an assessment of any newly-promulgated or modified requirements of federal and state environmental laws, in addition to an evaluation of the effectiveness of response actions conducted, or planned for implementation, at the Site. The intent of the FYR process is to evaluate selected remedies at a Site and determine if the remedies remain protective of human health and the environment.

Data Review

Is the plume stable?

The boundary of the plume is stable. The plume is being captured by the GETS, and the concentrations of the COCs are decreasing in most of the wells. There are currently 26 Site-associated GWM wells that are nested in either the shallow/deep zones (three well nests), in the upper/middle/lower units (six well nests), or the two wells in the lower zone downgradient (NNW) of the Site. Water samples are collected from 16 of the 26 Site-associated GWM wells and four extraction wells in the second quarter of each

year. Water samples are collected from five of the 26 GWM wells and each extraction well in the fourth quarter of each year.

The highest concentrations of CT in 2009 were observed in well SB-39L. However, the concentration of CT in well SB-39L has been below the detection limit since November 2011. This well is located downgradient of extraction well EW-3. Because of the elevated concentrations downgradient of well EW-3, the RPs installed two GWM wells (MWs 43L & 44L) in August 2012 to delineate the downgradient extent of COCs and evaluate the capture zone. Water levels measured in these two wells in 2012 indicate the capture zone extends out to these wells. These GWM wells were sampled in 2013 and in 2014. The concentrations of the COCs were less than the detection limits (2.0 ppb for CT, 1.0 ppb for 1,2-DCA). The concentration of each of the COCs detected in the four extraction wells has been less than 10 µg/L since the November 2012 sampling event.

The COCs were detected above their respective Maximum Contaminant Levels (MCLs) at 7 of 17 monitoring well locations and three of four extraction wells (EWs) during this FYR period. Detected CT concentrations at four wells ranged from 2.47 µg/L (SB-38L, May 2013) to 53.6 µg/L (SB-03, Oct. 2014). Detected 1,2-DCA concentrations at three wells ranged from 1.49 µg/L (MW-41L, May 2013) to 6.95 µg/L (SB-38M, May 2011) but with no detections above the MCL since May 2013. Samples from each of the four extraction wells had detections of CT ranging from 2.35 µg/L (EW-3, May 2013) to 16.9 µg/L (EW4, Nov. 2010) during this reporting period. However, CT concentrations at each EW after November 2012 have been less than 10 µg/L. The hydraulic containment provided by the four Site EWs is adequate for plume capture. The plume is stable.

With the exception of wells SB-03 and MW-42M, concentrations of COCs in most of the GWM and GETS wells have decreased since system start-up. The COCs have not been detected or are less than their respective MCLs at each of the upper (i.e., shallow wells) and the downgradient wells. Detections above the respective MCLs are limited to the middle and lower units.

The contaminant concentrations (primarily CT) in well SB-03 (lower zone) have increased since June 2003 and continued to increase during this FYR period. The RPs conducted additional investigation in an attempt to determine whether there was an additional, previously unidentified source. The soil investigation, conducted in August 2012, did not identify a potential CT source near well SB-03.

Do contaminant trends indicate remedy is adequate?

Overall total VOC (TVOC) concentrations are generally stable or decreasing. However, TVOC concentrations at well SB-03, primarily CT, have increased since May 2013 to 55.92 µg/L. CT concentrations in the sample from well MW-42M are at a four year high (31.8 µg/L, Oct. 2014); although, until the October 2014 sampling event, TVOC concentrations during this review period ranged from 18.3 µg/L to 25.03 µg/L. TVOC concentrations at EW-1 are slightly increasing (five year high at 7.71 µg/L).

The pump-and-treat system enhances desorption of COCs from the aquifer matrix. This process, in general, has reduced COC concentrations throughout the Site area. Aside from the potential impacts in the area of well SB-03 and potential back diffusion concerns from the middle sands, contaminant trends in general indicate the remedy is adequate.

Site Inspection

A recent Site inspection in preparation for the FYR was conducted in March 2014 by Steve Kemp and Dan Garvey, EPA Project Managers. No issues were observed during this inspection.

Interviews

No Site interviews were conducted during the second FYR.

VII. TECHNICAL ASSESSMENT

The technical assessment includes an analysis of the following three questions regarding the completed remedy: (A) is the remedy functioning as intended by the decision documents; (B) are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid; and (C) has any other information come to light that could call into question the protectiveness of the remedy. These three questions are addressed below.

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

Remedial Action Performance

The primary COCs at the Site are CT and 1,2-DCA. There appears to be limited potential for human exposure to COCs in soil and groundwater. Based on figures from Site reports, there are at least two domestic wells within the plume boundary. The wells are located at residences at 105 Railroad Street and 107 Railroad Street. Based on a telephone conversation with Mr. Eric Hoglund with CRA on June 18, 2015, these residences are connected to the community water supply and therefore the residents are not exposed to the contaminated groundwater. Additionally an evaluation of soil vapor samples adjacent to one of the two residences and at two other locations on-site indicate it is unlikely the vapor intrusion pathway is complete. Therefore the remedy is protective of human health.

The second ESD described groundwater institutional controls to regulate drilling, construction and domestic use of new wells in the plume area. Therefore, it is unlikely there will be any new points of exposure without notification to the EPA.

The remedy implemented at the Site consists of: 1) a groundwater extraction and treatment system consisting of 4 groundwater extraction wells (EW-1, EW-2, EW-3 and EW-4) that pump groundwater to a treatment system consisting of a tray stripper that treats groundwater by removing the contaminants and discharges the treated water to Skull Creek; 2) a GWM system consisting of 26 GWM wells; and 3) institutional controls.

A FSI was conducted in the fall of 2012 to address the recommendations in the 2010 FYR concerning, in part, hydraulic capture and distal plume delineation. GWM wells MW-43L/44L were installed in the lower zone downgradient of the EWs and well SB-39L. Step drawdown pump tests and constant-rate discharge pumping tests were performed during this review period on each extraction well to evaluate pumping rates, and to determine aquifer properties and well performance. Based on the drawdown measured in 2012, it appears the downgradient extent of capture is at least 1,000 feet from EW-3 (i.e., between wells MW-43L & MW-44L). Groundwater measurements and a capture zone analysis verified hydraulic control of the plume.

With the exception of two GWM wells discussed below, the concentration of the COCs in the groundwater at the Site are decreasing and expected to become asymptomatic in the future. The mass removal rates from the GETS continue to decrease as the plume is remediated. The COCs are apparently limited to the middle and lower sands. The middle sands contain silty fine sand with lenses of silt and sandy clay. Dissolved contaminant concentrations may rebound through matrix back diffusion from this media if pumping is discontinued at the Site.

The GETS system has demonstrated the ability to hydraulically contain the COCs and is adequate for this Site. Groundwater monitoring should continue on a semi-annual basis (second and fourth quarters) to adequately demonstrate plume capture and to evaluate contaminant trends in network wells. Additional groundwater sample collection and data analysis may be necessary to further evaluate the effectiveness of the GETS.

Implementation of Institutional Controls and Other Measures

The groundwater institutional controls are functioning as planned by the 2005 ESD. There are no known humans being impacted by contaminated groundwater.

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

Changes in Standards and To Be Considereds

- *Have there been changes to risk-based cleanup levels or standards identified as Applicable or Relevant and Appropriate Requirements (ARARs) in the Record of Decision (ROD) that call into question the protectiveness of the remedy?* There have been minor changes in the toxicity values, but none that would reach the level of calling into question the protectiveness of the remedy.

- *Are there newly promulgated standards that call into question the protectiveness of the remedy?* No, there have not been any newly promulgated standards that would call into question the protectiveness of the remedy.

Changes in Exposure Pathways

- *Has land use or expected land use on or near the site changed (e.g., industrial to residential, commercial to residential)?* We are not aware of any land use changes with respect to this Site.

- *Have any human health or ecological routes of exposure or receptors changed or been newly identified (e.g., dermal contact where none previously existed, new populations or species identified on site or near the site) that could affect the protectiveness of the remedy?* We are not aware of any new routes of exposure. The vapor intrusion pathway was explored in 2012 and the pathway does not appear complete. The data from the soil gas sampling did not indicate COCs at concentrations that exceed human health risk screening levels.

- *Are there newly identified contaminants or contaminant sources?* We are not aware of any new contaminants found at the Site. Some VOCs were detected, but their concentrations did not exceed any screening levels.

- *Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents (e.g., byproducts not evaluated at the time of remedy selection)?* We are not aware of any toxic byproducts found at the Site.

- *Have physical site conditions or the understanding of these conditions changed in a way that could affect the protectiveness of the remedy?* We are not aware of any changes in Site conditions that would call into question the protectiveness of the selected remedies.

Changes in Toxicity and Other Contaminant Characteristics

- *Have toxicity factors for contaminants of concern at the site changed in a way that could affect the protectiveness of the remedy?* There have been some changes to the toxicological factors for the three contaminants of interest and some changes to the EPA's default exposure factors; however, those changes are relatively minor and do not affect the protectiveness of the chosen remedy.

Table 2. Evaluation of Toxicity Values

	Type of Toxicity Value	1995 Human Health Baseline Risk Assessment[1]	Current Toxicity Values	Change in Parameter from First Five Year Review
Carbon Tetrachloride	RfDo	7E-04	4.0E-03	No Change
	RfC	NA	1.0E-01	No Change
	SFo	1.3E-01	7.0E-02	No Change
	IUR	1.5E-06	6.0E-06	No Change
Chloroform	RfDo	1.2E-02	1.0E-02	No Change
	RfC	NA	9.8E-02	No Change
	SFo	6.1E-03	3.1E-02	No Change
	IUR	2.3E-05	2.3E-05	No Change
1,2-Dichloroethane	RfDo	3.0E-02	6.0E-03	Increase
	RfC	NA	7.0E-03	Decrease
	SFo	9.1E-02	9.1E-02	No Change
	IUR	2.6E-05	2.6E-05	No Change

I: Integrated Risk Information System (IRIS) (USEPA, 2015a).
RfD: Oral Reference Dose (mg/kg-day).
RfC: Inhalation Reference Concentration (mg/m^3).
SFo: Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$.
IUR: Inhalation Unit Risk $(\mu g/m^3)^{-1}$.
[1] Toxicity values were obtained from the 1995 Human Health Baseline Risk Assessment (HHBRA). IURs have been converted from inhalation slope factors. Note that the dermal contact pathways were evaluated using oral toxicity values. This is consistent with current risk assessment practices.

- *Have other contaminant characteristics changed in a way that could affect protectiveness of the remedy?* We are not aware of any changes to contaminant characteristics.

Changes in Risk Assessment Methods

- *Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?* The default EPA exposure factors have changed, however those changes do not rise to the level that would affect the protectiveness of the remedy. In general the changes have led to an increase in the Regional Screening Levels (EPA, 2014).

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

- *Have newly found ecological risks been found?* No new ecological risks have been found.

- *Are there impacts from natural disasters (e.g., a 100-year flood)?* We are not aware of any flooding at this Site.

- *Has any other information come to light which could affect the protectiveness of the remedy?* No, there is no new information that affects the protectiveness for ecological receptors.

Vapor Intrusion Pathway

Are the COCs of sufficient volatility and toxicity to warrant a vapor intrusion (VI) investigation?

Yes; carbon tetrachloride and chloroform are of sufficient volatility and toxicity to present potential VI risks in overlying structures.

Has a VI Investigation been conducted at this site? Soil gas samples were collected in the summer of 2007. Two nested soil gas probes were installed at the Site; one nest adjacent to extraction well EW-4 and another nest adjacent to well MW-42U. The nested probes consisted of one shallow probe and one deeper probe. The screened portion of each probe was either 10-11 feet bgs or 16–17 feet bgs. Well EW-4 is about 60 feet southwest from a residence at 107 Railroad Street. Well MW-42U is at least 200 feet from this home and the home located at 105 Railroad Street. These residences are located above the plume. No COCs were detected in the soil gas samples.

A soil gas probe nest was installed in August 2012 adjacent to the residence at 105 Railroad Street. The one-foot screens were installed at 7–8 feet, 15–16 feet and 23–24 feet. Two rounds of soil gas samples were collected for COC analysis. The COCs were not detected above screening levels in these samples.

Is the VI pathway complete? If complete, has the VI concern been adequately mitigated to insure protectiveness?

No indoor air samples were collected during either sampling event. Because soil vapor concentrations did not exceed the EPA screening levels, it is unlikely that the VI pathway is complete. The results indicate that Site conditions are protective of human health.

Technical Assessment Summary

In 1998, a Screening Level Ecological Risk Assessment (SLERA) was performed by NDEQ. The SLERA found negligible risk to ecological receptors at the Site. The EPA Region 7 ecological risk assessors agreed with the SLERA conclusions, but found that lack of sediment sampling data for Skull Creek and its tributaries was a data gap. Therefore, in 2012 four sediment samples were collected in Skull Creek and its tributaries and analyzed for the Site COCs. All samples were non-detect for the COCs.

The GETS and the groundwater ICs are functioning as planned by the 2005 ESD. There are no known humans being impacted by contaminated groundwater. Although there have been minor changes to the toxicological factors for the three contaminants of interest and some changes to the EPA's default exposure factors the changes do not affect the protectiveness of the remedy. There hasn't been any new information that has come to light that indicates the remedy is not protective. The EPA will continue to monitor the increasing contaminant concentrations in two groundwater monitoring wells to assure the remedy remains protective.

VIII. ISSUES

No issues or deficiencies were identified during this FYR period that would prevent the remedy from being protective.

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

No significant issues were identified that would affect current or future protectiveness and, therefore, no recommendations/follow-up actions have been provided. However, the increasing concentration of COCs at GWM well SB-03 warrant further evaluation. The EPA will be requesting additional evaluation by the RPs.

X. PROTECTIVENESS STATEMENTS

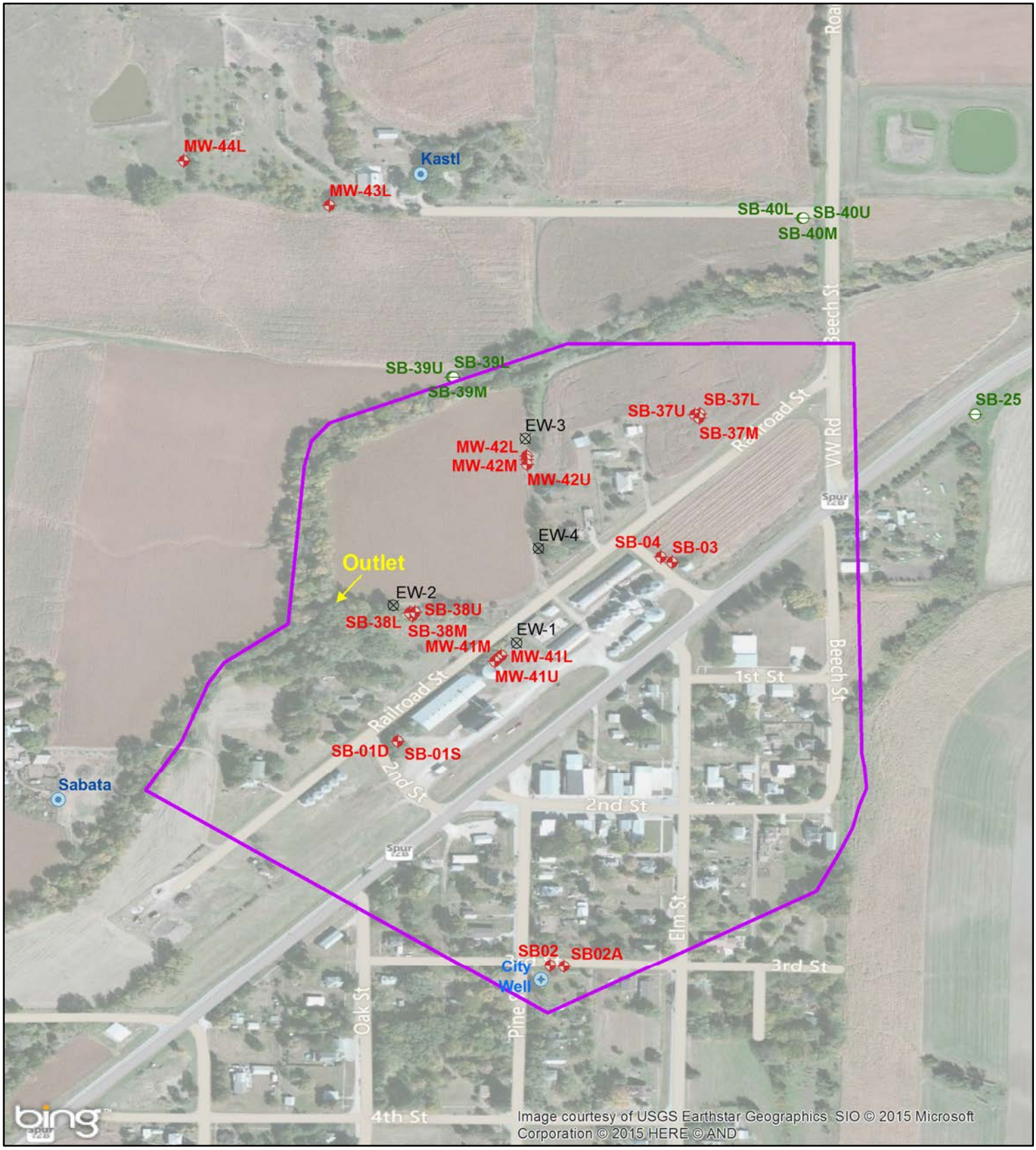
The remedy at the Site is protective of human health and the environment.

XI. NEXT REVIEW

Since hazardous substances, pollutants, or contaminants remain at the Site at levels above cleanup standards in certain locations, and all areas of the Site have not yet been addressed, or have been addressed but do not allow for unlimited use, the EPA will conduct additional policy FYRs in the future. The next FYR will be completed by September 2020.

ATTACHMENT A

SITE LOCATION MAP



NOTE: The Environmental Protection Agency does not guarantee the accuracy, completeness, or timeliness of the information shown, and shall not be liable for any injury or loss resulting from reliance upon the information shown.
6/17/2015 CjM
Bruno Coop, Bruno, Nebraska Site Map.mxd

DATA SOURCES:
Bing Maps
Background Imagery
Conestoga-Rovers and Associates, 2015
Wells Near Bruno Superfund Site
Region 7 US EPA 2009
Est. Bruno Coop Site Boundary

N W E S

0 250 500
Feet

Est. Bruno Coop Site Boundary
Extraction Well
Monitoring Well
Piezometer
Private Supply Well
Public Supply Well

Site Map

Bruno Coop
Bruno, Nebraska
EPA ID# NED981713829

ATTACHMENT B

GROUNDWATER PLUME MAPS

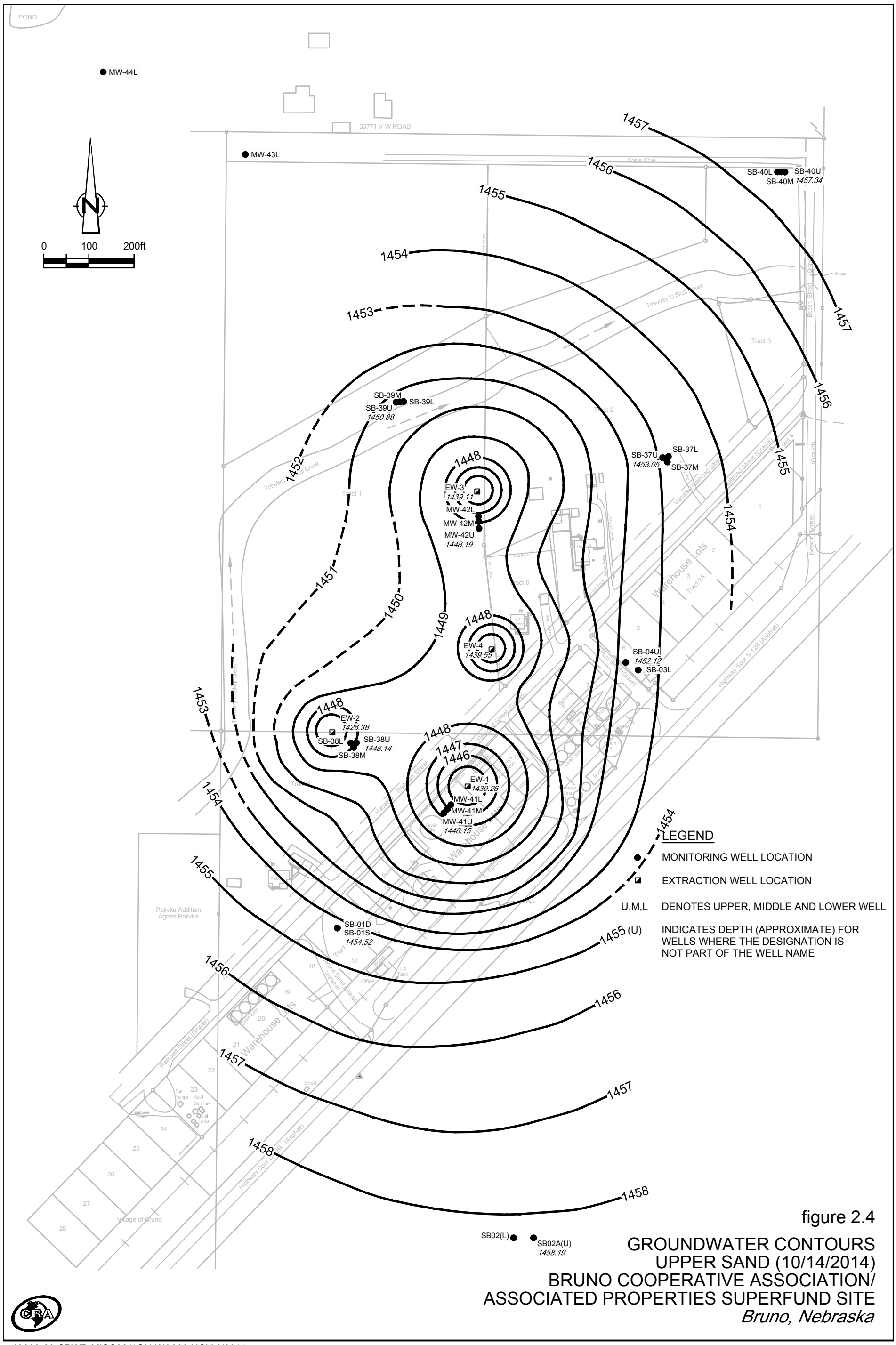


figure 2.4

GROUNDWATER CONTOURS
UPPER SAND (10/14/2014)
BRUNO COOPERATIVE ASSOCIATION/
ASSOCIATED PROPERTIES SUPERFUND SITE
Bruno, Nebraska

19020-20(SPWP-MISC021)GN-WA003 NOV 6/2014

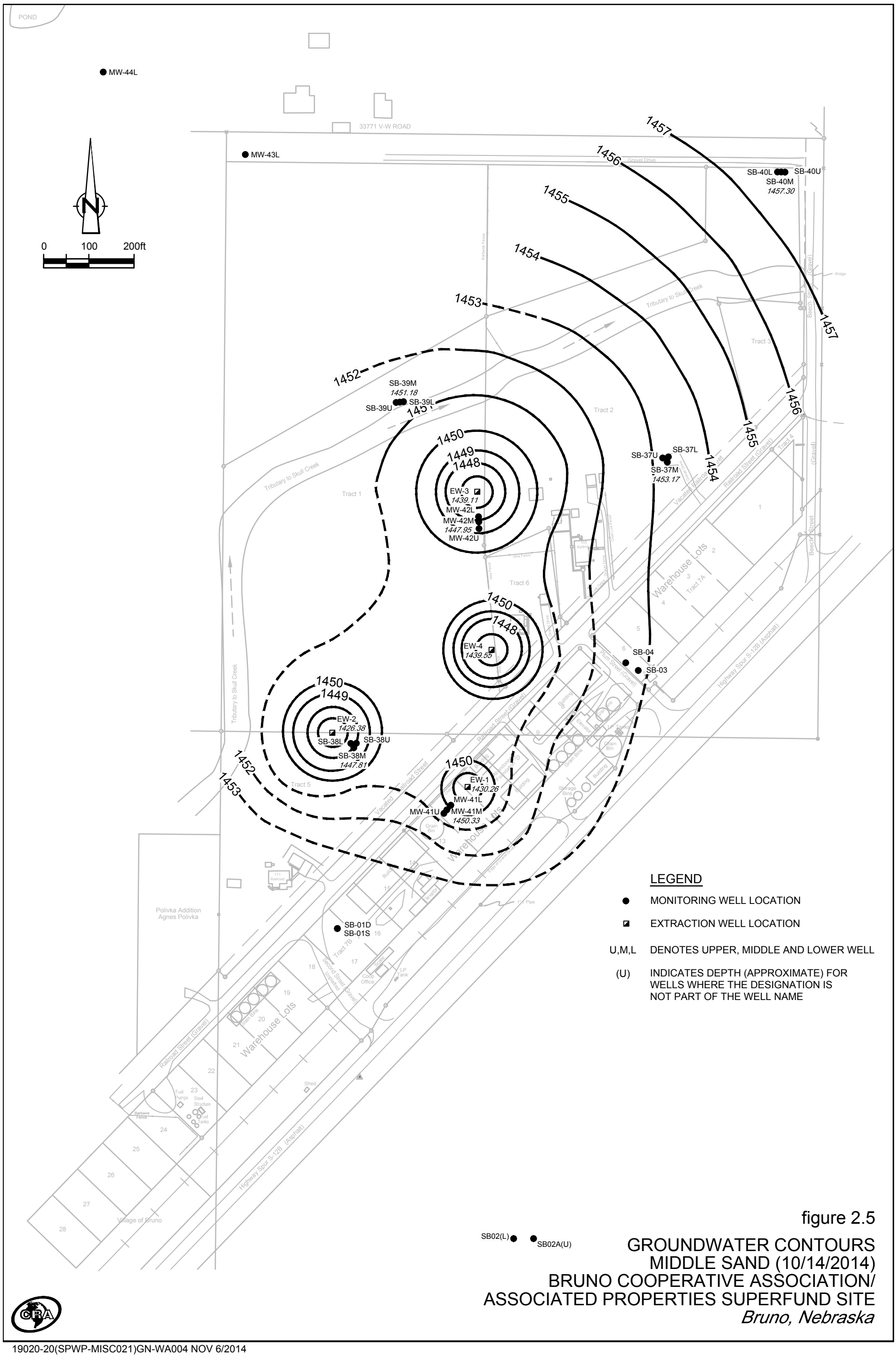


figure 2.5

GROUNDWATER CONTOURS
MIDDLE SAND (10/14/2014)
BRUNO COOPERATIVE ASSOCIATION/
ASSOCIATED PROPERTIES SUPERFUND SITE
Bruno, Nebraska

19020-20(SPWP-MISC021)GN-WA004 NOV 6/2014

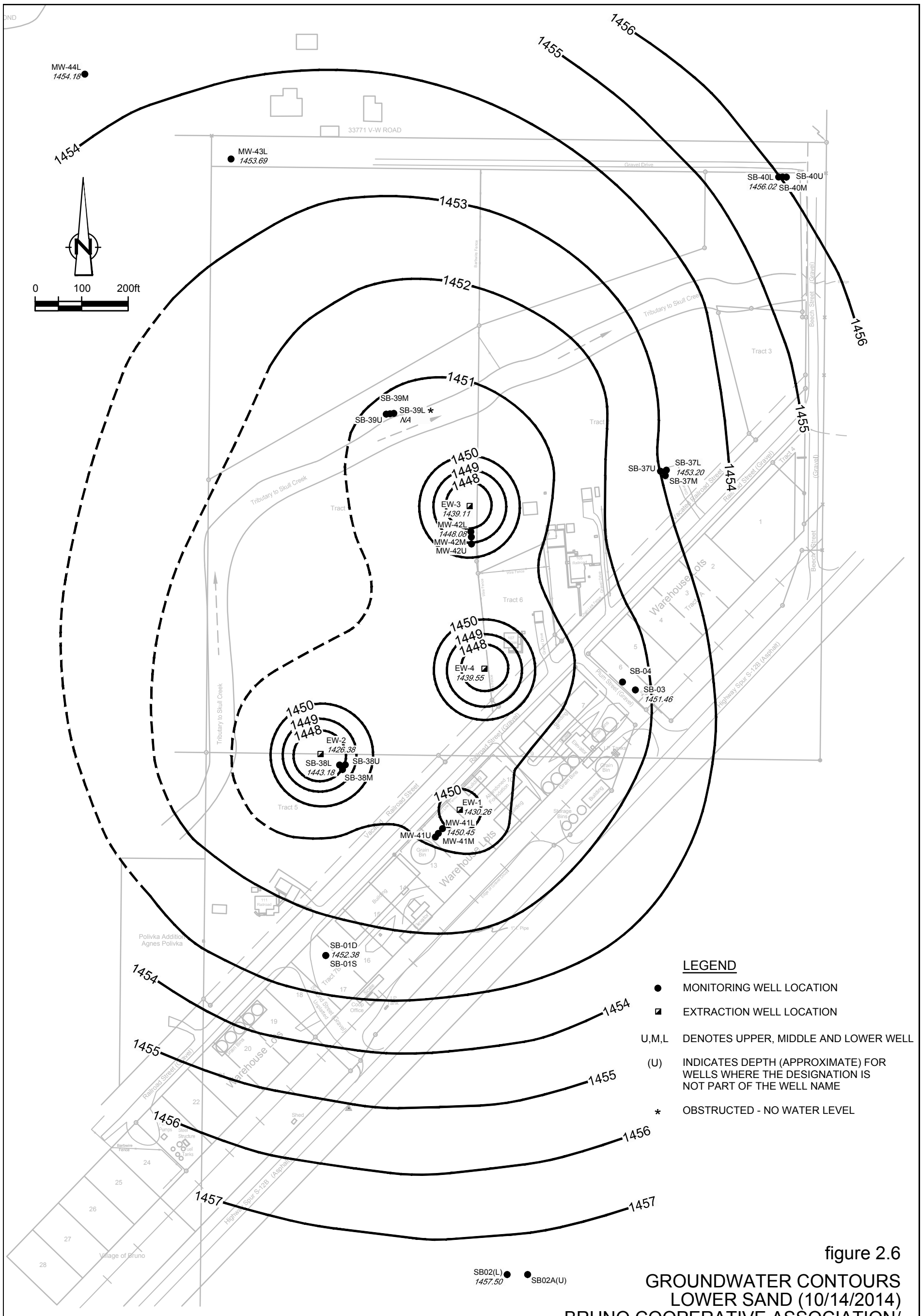


figure 2.6

GROUNDWATER CONTOURS
LOWER SAND (10/14/2014)
BRUNO COOPERATIVE ASSOCIATION/
ASSOCIATED PROPERTIES SUPERFUND SITE
Bruno, Nebraska

19020-20(SPWP-MISC021)GN-WA005 NOV 6/2014

ATTACHMENT C

SITE CHRONOLOGY

ATTACHMENT C
SITE CHRONOLOGY

Event	Date
NDOH identifies contaminants in drinking water	1984
EPA Preliminary Assessment	4/30/1987
EPA Site Investigation	5/8/1989
EPA supplies bottled water	1989
New supply wells constructed to replace impacted wells	1990
RPs conduct Site Investigations	1994-1995
Site placed on National Priorities List	1996
EPA Feasibility Study	1998
EPA Proposed Plan and Public Meeting	1998
NDEQ conducted a SLERA	1998
Record of Decision	9/30/1998
EPA Explanation of Significant Differences (cost increase)	8/25/2000
Consent Decree between EPA and the RPs, *United States v. Union Pacific Railroad Company and Bruno Cooperative Association, Civil Action No. 8:02-cv-483*	2003
RPs Remedial Design	2004
RPs Remedial Action	2005
RPs operation and maintenance of constructed remedy begins	2005
EPA Explanation of Significant Differences (institutional controls)	9/13/2005
Preliminary Close-Out Report (Construction Complete)	9/13/2005
RPs Vapor Intrusion Assessment	2006-2007
Water Pipeline constructed from David City, NE to Bruno, NE (new supply wells de-activated)	2007
Institutional Controls (EPA added to NRD notification list)	8/30/2005
Institutional Controls (EPA added to Bruno notification list) (Village of Bruno New Well Prohibition Ordinance #126, 5/5/87)	9/8/2005
First Five-Year Review Report	9/27/2010
Focused Site Investigation Completed	1/28/2013
Second Five-Year Review Report	9/2015

ATTACHMENT D

ECOLOGICAL and HUMAN HEALTH RISK/HYDROGEOLOGIC and VAPOR INTRUSION REVIEW MEMO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas 66219

JUN 0 5 2015

MEMORANDUM

SUBJECT: Comments on the Second Five-Year Review Report for the Bruno Cooperative Association/Associated Properties Superfund Site, Bruno, Nebraska
EPA ID NED981713829

FROM: Ann Durham Jacobs
Human Health Risk Assessor
ENST/EDAB

Catherine Wooster-Brown
Ecological Risk Assessor
ENST/EDAB

Dan Nicoski
Hydrogeologist
ENST/EDAB

TO: Steve Kemp
Remedial Project Manager

As requested, we have conducted a technical assessment in support of the five-year review for the Bruno Cooperative Association/Associated Properties, located in Bruno, Nebraska. Our evaluation is limited to providing input on human health, ecological risk, and groundwater issues. More specifically, we focused on answering Questions B and C from the U.S. Environmental Protection Agency's "Comprehensive Five-Year Review Guidance," dated June 2001. However, we did not provide input on whether the remedy is meeting the Remedial Action Objectives because we believe that is primarily a Superfund program decision based on our technical assessment and other relevant information. If you need additional assistance or have any questions regarding our comments, which are provided below, please contact Human Health Risk Assessor, Ann Jacobs at x7930, Ecological Risk Assessor, Catherine Wooster-Brown at x7425, and Hydrogeologist, Dan Nicoski at x7230.

Human Health Risk Assessor Comments

Technical Assessment

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?
Changes in Standards and TBCs

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- *Have there been changes to risk-based cleanup levels or standards identified as Applicable or Relevant and Appropriate Requirements (ARARs) in the Record of Decision (ROD) that call into question the protectiveness of the remedy?* There have been minor changes in the toxicity values, but none that would reach the level of calling into question the protectiveness of the remedy.

- *Are there newly promulgated standards that call into question the protectiveness of the remedy?* No, there have not been any newly promulgated standards that would call into question the protectiveness of the remedy.

Changes in Exposure Pathways

- *Has land use or expected land use on or near the site changed (e.g., industrial to residential, commercial to residential)?* We are not aware of any land use changes with respect to this site.

- *Have any human health or ecological routes of exposure or receptors changed or been newly identified (e.g., dermal contact where none previously existed, new populations or species identified on site or near the site) that could affect the protectiveness of the remedy?* We are not aware of any new routes of exposure. The vapor intrusion pathway was explored in 2012 and the pathway does not appear complete. The data from the soil gas sampling did not indicate contaminants of concern at concentrations that exceed human health risk screening levels.

- *Are there newly identified contaminants or contaminant sources?* We are not aware of any new contaminants found at the site. Some VOCs were detected, but their concentrations did not exceed any screening levels.

- *Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents (e.g., byproducts not evaluated at the time of remedy selection)?* We are not aware of any toxic byproducts found at the site.

- *Have physical site conditions or the understanding of these conditions changed in a way that could affect the protectiveness of the remedy?* We are not aware of any changes in site conditions that would call into question the protectiveness of the selected remedies.

Changes in Toxicity and Other Contaminant Characteristics

- *Have toxicity factors for contaminants of concern at the site changed in a way that could affect the protectiveness of the remedy?* There have been some changes to the toxicological factors for the three contaminants of interest and some changes to the EPA's default exposure factors; however, those changes are relatively minor and do not affect the protectiveness of the chosen remedy.

Table 1. Evaluation of Toxicity Values

	Type of Toxicity Value	1995 Human Health Baseline Risk Assessment[1]	Current Toxicity Values	Change in Parameter from First Five Year Review
Carbon Tetrachloride	RfDo	7E-04	4.0E-03	No Change
	RfC	NA	1.0E-01	No Change
	SFo	1.3E-01	7.0E-02	No Change
	IUR	1.5E-06	6.0E-06	No Change
Chloroform	RfDo	1.2E-02	1.0E-02	No Change
	RfC	NA	9.8E-02	No Change
	SFo	6.1E-03	3.1E-02	No Change
	IUR	2.3E-05	2.3E-05	No Change
1,2-Dichloroethane	RfDo	3.0E-02	6.0E-03	Increase
	RfC	NA	7.0E-03	Decrease
	SFo	9.1E-02	9.1E-02	No Change
	IUR	2.6E-05	2.6E-05	No Change

I: Integrated Risk Information System (IRIS) (USEPA, 2015a).

RfD: Oral Reference Dose (mg/kg-day).

RfC: Inhalation Reference Concentration (mg/m^3).

SFo: Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$.

IUR: Inhalation Unit Risk $(\mu g/m^3)^{-1}$.

[1] Toxicity values were obtained from the 1995 HHBRA. IURs have been converted from inhalation slope factors. Note that the dermal contact pathways were evaluated using oral toxicity values. This is consistent with current risk assessment practices.

- *Have other contaminant characteristics changed in a way that could affect protectiveness of the remedy?* We are not aware of any changes to contaminant characteristics.

Changes in Risk Assessment Methods

- *Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?* The default EPA exposure factors have changed, however those changes do not rise to the level that would affect the protectiveness of the remedy. In general the changes have lead to an increase in the Regional Screening Levels (EPA, 2014).

Specific Comments/Recommendations

No additional comments at this time.

Ecological Risk Assessor Comments

Background

The Bruno Co-op is a former U.S. Department of Agriculture grain storage site where carbon tetrachloride was used as a grain fumigant (pesticide). A routine screening in the 1980's for VOCs in the town of Bruno's public ground-water supply well was the first indication of contamination. Chloroform and 1, 2-dichloroethane were also identified as chemicals of concern.

In 1998, a screening level ecological risk assessment was performed by the Nebraska Department of Environmental Quality. The SLERA found negligible risk to ecological receptors at the Bruno Co-op Site. The EPA Region 7 ecological risk assessors agreed with the SLERA conclusions, but found that sediment in Skull Creek and its tributaries was a data gap. Therefore, in 2012 four sediment samples were collected in Skull Creek and its tributaries and analyzed for the sites contaminants of concern (COCs). All samples were non-detect for the COCs.

Technical Assessment

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?

- *Have there been changes to risk-based cleanup levels or standards identified as Applicable or Relevant and Appropriate Requirements (ARARs) in the Record of Decision (ROD) that call into question the protectiveness of the remedy?* No, not at this time.

- *Are there newly promulgated standards that call into question the protectiveness of the remedy?* No, not at this time.

Changes in Exposure Pathways

- *Has land use or expected land use on or near the site changed (e.g., industrial to residential, commercial to residential)?* We are not aware of any changes.

- *Have any human health or ecological routes of exposure or receptors changed or been newly identified (e.g., dermal contact where none previously existed, new populations or species identified on site or near the site) that could affect the protectiveness of the remedy?* No, no new ecological exposures have been identified.

- *Are there newly identified contaminants or contaminant sources?* We are not aware of any new contaminants.

- *Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents (e.g., byproducts not evaluated at the time of remedy selection)?* We are not aware of any toxic byproducts.

- *Have physical site conditions or the understanding of these conditions changed in a way that could affect the protectiveness of the remedy?* We are not aware of any changes in site conditions.

Changes in Toxicity and Other Contaminant Characteristics

- *Have toxicity factors for contaminants of concern at the site changed in a way that could affect the protectiveness of the remedy?* No, we are not aware of toxicity factors changing for the COCs in question at this site.
- *Have other contaminant characteristics changed in a way that could affect protectiveness of the remedy?* We are not aware of any changes to contaminant characteristics.

Changes in Risk Assessment Methods

- *Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?* No, methodologies for ecological risk have not changed.

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

- *Have newly found ecological risks been found?* No new ecological risks have been found.
- *Are there impacts from natural disasters (e.g., a 100-year flood)?* We are not aware of any flooding at this site.
- *Has any other information come to light which could affect the protectiveness of the remedy?* No, there is no new information that affects the protectiveness for ecological receptors.

Hydrogeologist Comments

Technical Assessment

General Comments

According to the Record of Decision, the selected remedial action for the site was groundwater pump and treat system and as modified by an Explanation of Significant Differences in August 2000. This modification did not alter the selected remedy. A second ESD, issued in 2005, addressed groundwater institutional controls to prohibit the drilling, construction, and use of domestic wells within the plume boundary as well as prohibit placement of irrigation or industrial wells that may hydraulically influence the pump and treat system. The remedial system began operation in December 2004. The contaminants of concern associated with this site are carbon tetrachloride, chloroform and 1,2-dichloroethane.

Site geology consists primarily of an upper clay/silt zone (37 to 42 ft thick) overlying a middle sand unit (56 to 59 ft thick) atop a silt/clay unit at the base of the aquifer. The middle sand unit is composed of three zones; upper sand (fine to coarse gravel about 5 to 10 ft thick, shallow zone); middle sand zone (silty fine sand with silt and sandy clay about 32 to 42 ft thick); and, a lower sand unit of fine sand with trace amounts of silt at about 10 to 21 ft thick (deep zone). The basal clayey unit may not be present

throughout the area. The unconsolidated units lie on shale and sandstone. Groundwater flow is primarily northwesterly. The depth to groundwater ranges from about 30 to 45 ft. The saturated zone is approximately 55 to 60 ft thick.

There are currently 26 site-associated monitoring wells that are nested in either the shallow/deep zones (3 well nests), in the upper/middle/lower units (6 well nests) or two wells in the lower zone down-gradient (NNW) of the site. There are 16 of 26 site-associated monitoring wells and 4 extraction wells that are monitored in the second quarter. Five of 26 monitoring wells and each extraction well are sampled in the fourth quarter. These latter two wells (MWs 43L & 44L) were installed in August 2012 to delineate the down-gradient extent of COCs and evaluate the capture zone. The down-gradient extent of capture appears to be at least 1,000 ft from EW-3 (i.e. – between wells MW-43L & MW-44L). The COCs have not been detected or are less than their respective maximum contaminant levels at each of the upper (i.e. - shallow wells) and the down-grade wells. Detections above the respective MCLs are limited to the middle and lower units. Concentrations of COCs in most of these wells have decreased since system start-up. Analytes (primarily CT) from wells SB-03 (lower zone) have increased since June 2003 and during this FYR period. A soil investigation conducted in August 2012 did not locate a potential CT source near well SB-03. The highest concentrations of CT in 2009 were from well SB-39L but have been non-detectable in this well since November 2011. This well is located down-gradient of extraction well EW-3. COC concentrations at the four extraction wells have been less than 10 µg/L after the November 2012 sampling event.

Specific Comment

Progress Report #55 (July 1, 2014 – December 31, 2014) indicates that wells MW-43L and MW-44L will be sealed and abandoned if site-related COCs are not detected over the first four semiannual sampling events. The EPA recommends monitoring wells MW-43L and MW-44L should remain in place to evaluate groundwater flow and plume capture.

Question A- Is the remedy functioning as intended by the decision document?
Is the remedy protective of human health and the environment?

Yes, the remedy is protective of human health and the environment. There appears to be limited human exposure potential to site COCs in soil and groundwater. Based on figures from site reports, there are at least two depicted domestic wells (105 and 107 Railroad St.) that are in the plume. This may present a potential exposure pathway to the residence. An evaluation of soil vapor samples adjacent to one of the two residences and at two other locals on-site indicate it is unlikely the vapor intrusion pathway is complete and, therefore, protective of human health. The second ESD provides for groundwater institutional controls for drilling, construction and domestic use of new wells in the plume area.

Is the selected remedy adequate for this site?

The selected remedy consists of a groundwater extraction and treatment system that treats impacted groundwater by air stripping of contaminants, groundwater monitoring, and institutional controls. A focused site investigation was conducted in the fall of 2012 to address FYR recommendations concerning, in part, hydraulic capture and distal plume delineation. Monitoring wells MW-43L/44L were installed in the lower zone down-gradient of the EWs and well SB-39L. Groundwater measurements and a capture zone analysis verified hydraulic control of the plume.

Step drawdown pump tests and constant-rate discharge pumping tests were performed during this review period on each extraction well to evaluate pumping rates, to determine aquifer properties and well performance. COC concentration reductions are becoming asymptotic and mass removal rates continue to decrease. The COCs are apparently limited to the middle and lower sands. The middle sands contain silty fine sand with lenses of silt and sandy clay. Dissolved contaminant concentrations may rebound through matrix back diffusion from this media if pumping is discontinued at the site.

The GET system remedy has demonstrated its ability to hydraulically contain the COCs and is adequate for this site.

Groundwater monitoring should continue on a semi-annual basis (second and fourth quarters) to adequately demonstrate plume capture and to evaluate contaminant trends in network wells.

Is the plume stable?

The primary COCs are CT and 1,2-DCA. These COCs were detected above their respective MCLs at 7 of 17 monitoring well locations and 3 of 4 extraction wells during this FYR period. Detected CT concentrations at 4 wells ranged from 2.47 µg/L (SB-38L, May 2013) to 53.6 µg/L (SB-03, Oct. 2014). Detected 1,2-DCA concentrations at 3 wells ranged from 1.49 µg/L (MW-41L, May 2013) to 6.95 µg/L (SB-38M, May 2011) but with no detections above the MCL since May 2013. Samples from each of the four extraction wells had detections of CT ranging from 2.35 µg/L (EW-3, May 2013) to 16.9 µg/L (EW4, Nov. 2010) during this reporting period; however, CT concentrations at each EW after November 2012 have been less than 10 µg/L. The hydraulic containment provided by the four site extraction wells is adequate for plume capture. The plume is stable

.

Do contaminant trends indicate remedy is adequate?

TVOC concentrations at well SB-03, primarily CT, have increased since May 2013 to 55.92 µg/L. CT concentrations in the sample from well MW-42M are at a four year high (31.8 µg/L, Oct. 2014); although, until the October 2014 sampling event TVOC concentrations during this review period ranged from 18.3 µg/L to 25.03 µg/L. TVOC concentrations at EW1 are slightly increasing (5 year high at 7.71 µg/L). Overall TVOC concentrations are generally stable or decreasing.

The pump and treat system enhances desorption of COCs from the aquifer matrix. This process, in general, has reduced COC concentrations throughout the site area. Aside from the potential impacts in the area of well SB-03 and potential back diffusion concerns from the middle sands, contaminate trends, in general, seem to indicate the remedy is adequate.

Vapor Intrusion Pathway

Are the COCs of sufficient volatility and toxicity to warrant a VI investigation?

Yes; carbon tetrachloride and chloroform are of sufficient volatility and toxicity to present potential VI risks in overlying structures.

Has a VI Investigation been conducted at this site? Soil gas samples were collected in the summer of 2007. Two nested soil gas probes were installed at the site; one nest adjacent to extraction well EW-4 and another nest adjacent to well MW-42U. The nested probes consisted of one shallow probe and one deeper probe. The screened portion of each probe was either 10 - 11 ft bgs or 16 – 17 ft bgs. Well EW-4

is about 60 ft southwest from a residence at 107 Railroad St. Well MW-42U is at least 200 ft from this home and the one located at 105 Railroad St. These residences are located above the plume. No COCs were detected in the soil gas samples.

A soil gas probe nest was installed in August 2012 adjacent to the residence at 105 Railroad Ave. The one foot screens were installed at 7 – 8 ft, 15 – 16 ft and 23 – 24 ft. Two rounds of soil gas samples were collected for COC analysis. The COCs were not detected above screening levels in these samples.

Is the VI pathway complete? If complete, has the VI concern been adequately mitigated to insure protectiveness?

No indoor air samples were collected during either sampling event. However, as soil vapor concentrations did not exceed the EPA screening levels, it is unlikely that the VI pathway is complete. The results indicate that site conditions are protective of human health.

References

Conestoga-Rovers, 2011. Progress Report No. 47 – July 1, 2010 to December 31, 2010, Bruno Agricultural Coop/Associated Properties Superfund Site, Bruno, Nebraska, January 2011.

Conestoga-Rovers, 2011. Progress Report No. 48 – January 1, 2011 to June 30, 2011, Bruno Agricultural Coop/Associated Properties Superfund Site, Bruno, Nebraska, July 2011.

Conestoga-Rovers, 2012. Progress Report No. 51 – July 1, 2012 to December 31, 2012, Bruno Agricultural Coop/Associated Properties Superfund Site, Bruno, Nebraska, January 2012.

Conestoga-Rovers, 2013. Focused Site Investigation Report, Bruno Agricultural Coop/Associated Properties Superfund Site, Bruno, Nebraska, January 2013.

Conestoga-Rovers, 2013. Two-Year Summary Report (2011 – 2013), Bruno Agricultural Coop/Associated Properties Superfund Site, Bruno, Nebraska, July 2013.

Conestoga-Rovers, 2013. Progress Report No. 53 – July 1, 2013 to December 31, 2013, Bruno Agricultural Coop/Associated Properties Superfund Site, Bruno, Nebraska, January 7, 2014.

Conestoga-Rovers, 2014. Progress Report No. 54 – January 1, 2014 to June 30, 2014, Bruno Agricultural Coop/Associated Properties Superfund Site, Bruno, Nebraska, July 1, 2014.

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ATTACHMENT E

LIST OF DOCUMENTS REVIEWED

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ATTACHMENT F

SITE MONITORING DATA

GROUNDWATER LABORATORY RESULTS - DETECTED COMPOUNDS - FALL 2013
BRUNO COOPERATIVE ASSOCIATION/ASSOCIATED PROPERTIES SUPERFUND SITE
BRUNO, NEBRASKA

Location	*Sample ID*	*Date*		*1,2-Dichloroethane* ug/L	*Carbon tetrachloride* ug/L	*Chloroform* ug/L	*Methyl tert butyl ether (MTBE)* ug/L	*TVOC November 2013*[2] ug/L	*TVOC June 2003* µg/L
MW-41M	WG-1130-01-20131107-NF	11/7/2013		3.01	< 2.00	< 1.00	2.49	3.01	217.68
MW-42M	WG-1130-02-20131107-NF	11/7/2013		< 1.00	18.7	1.01	< 1.00	19.71	1208.59
MW-42M	WG-1130-03-20131107-NF	11/7/2013	FD	< 1.00	17.7	1.05	< 1.00	18.75	1208.59
MW-43L	WG-1130-05-20131107-NF	11/7/2013		< 1.00	< 2.00	< 1.00	< 1.00	0.00	--
MW-44L	WG-1130-01-20131112-NF	11/12/2013		< 1.00	< 2.00	< 1.00	< 1.00	0.00	--
SB-03	WG-1130-06-20131107-NF	11/7/2013		< 1.00	48.1	2.27	< 1.00	50.37	8.24
EW1	WG-1130-07-20131107-NF	11/7/2013		< 1.00	5.58	< 1.00	< 1.00	5.58	126.42
EW1	WG-1130-08-20131107-NF	11/7/2013	FD	< 1.00	5.14	< 1.00	< 1.00	5.14	--
EW2	WG-1130-09-20131107-NF	11/7/2013		< 1.00	3.48	< 1.00	< 1.00	3.48	210.84
EW4	WG-1130-10-20131107-NF	11/7/2013		< 1.00	9.60	< 1.00	< 1.00	9.60	244.83
EW3	WG-1130-11-20131107-NF	11/7/2013		< 1.00	< 2.00	< 1.00	< 1.00	0.00	202.41
Site Cleanup Standard or USEPA MCL				5	5	100[1]	NA		

Notes:

[1] - USEPA MCL for Total Trihalomethanes.

[2] - Does not include MTBE detections.

Site Cleanup Criteria based on USEPA Maximum Contaminant Level (MCL)

Shaded cells indicate concentrations exceeding the Site Cleanup Criteria.

NA - There is no MCL for MTBE. The Nebraska Tier 1 Risk Based Screening Level is 20 µg/L.

FD - Field Duplicate

J - Estimated concentration.

GROUNDWATER LABORATORY RESULTS - DETECTED COMPOUNDS - SPRING 2014
BRUNO COOPERATIVE ASSOCIATION/ASSOCIATED PROPERTIES SUPERFUND SITE
BRUNO, NEBRASKA

Location	*Sample ID*	*Date*		*1,2-Dichloroethane* *ug/L*	*Carbon tetrachloride* *ug/L*	*Chloroform* *ug/L*	*Methyl tert butyl ether (MTBE)* *ug/L*	*TVOC May 2014*[2] *ug/L*	*TVOC June 2003* *µg/L*
MW-41U	WG-1130-01-20140501-NF	5/1/2014		< 1.00	3.34	< 1.00	9.50	3.34	0.88
MW-41U	WG-1130-02-20140501-NF	5/1/2014	FD	< 1.00	3.09	< 1.00	8.38	3.09	0.88
EW1	WG-1130-06-20140501-NF	5/1/2014		< 1.00	6.81	< 1.00	< 1.00	6.81	126.42
EW2	WG-1130-07-20140501-NF	5/1/2014		< 1.00	2.37	< 1.00	< 1.00	2.37	210.84
EW3	WG-1130-08-20140501-NF	5/1/2014		< 1.00	7.98	< 1.00	< 1.00	7.98	244.83
EW4	WG-1130-09-20140501-NF	5/1/2014		< 1.00	< 2.00	< 1.00	< 1.00	0.00	202.41
Site Cleanup Standard or USEPA MCL				5	5	100[1]	NA		

Notes:

(1) - USEPA MCL for Total Trihalomethanes.

(2) - Does not include MTBE detections.

- Site Cleanup Criteria based on USEPA Maximum Contaminant Level (MCL).
- Shaded cells indicate concentrations exceeding the Site Cleanup Criteria.

NA - There is no MCL for MTBE. The Nebraska Tier 1 Risk Based Screening Level is 20 µg/L.

FD - Field Duplicate.

GROUNDWATER LABORATORY RESULTS - DETECTED COMPOUNDS - FALL 2014
BRUNO COOPERATIVE ASSOCIATION/ASSOCIATED PROPERTIES SUPERFUND SITE
BRUNO, NEBRASKA

Location	*Sample ID*	*Date*		*1,2-Dichloroethane* ug/L	*Carbon tetrachloride* ug/L	*Chloroform* ug/L	*Methyl tert butyl ether (MTBE)* ug/L	*TVOC October 2014*[2] ug/L
SB-03	WG-1130-01-20141016-KB	10/16/2014		< 1.00	53.6	2.32	< 1.00	55.92
MW-41M	WG-1130-01-20141014-KB	10/14/2014		< 1.00	< 2.00	< 1.00	2.39	0.00
MW-42M	WG-1130-02-20141014-KB	10/14/2014		< 1.00	31.5	1.44	< 1.00	32.94
MW-42M	WG-1130-03-20141014-KB	10/14/2014	FD	< 1.00	31.8	1.39	< 1.00	33.19
MW-43L	WG-1130-02-20141017-KB	10/17/2014		< 1.00	< 2.00	< 1.00	< 1.00	0.00
MW-44L	WG-1130-01-20141017-KB	10/17/2014		< 1.00	< 2.00	< 1.00	< 1.00	0.00
EW-1	WG-1130-04-20141014-KB	10/14/2014		< 1.00	7.71	< 1.00	< 1.00	0.00
EW-2	WG-1130-05-20141014-KB	10/14/2014		< 1.00	2.98	< 1.00	< 1.00	2.98
EW-3	WG-1130-06-20141014-KB	10/14/2014		< 1.00	< 2.00	< 1.00	< 1.00	0.00
EW-4	WG-1130-07-20141014-KB	10/14/2014		< 1.00	8.21	< 1.00	< 1.00	8.21
EW-4	WG-1130-08-20141014-KB	10/14/2014	FD	< 1.00	8.37	< 1.00	< 1.00	8.37
Site Cleanup Standard or USEPA MCL				5	5	100[1]	NA	

Notes:

(1) - USEPA MCL for Total Trihalomethanes.

(2) - Does not include MTBE detections.

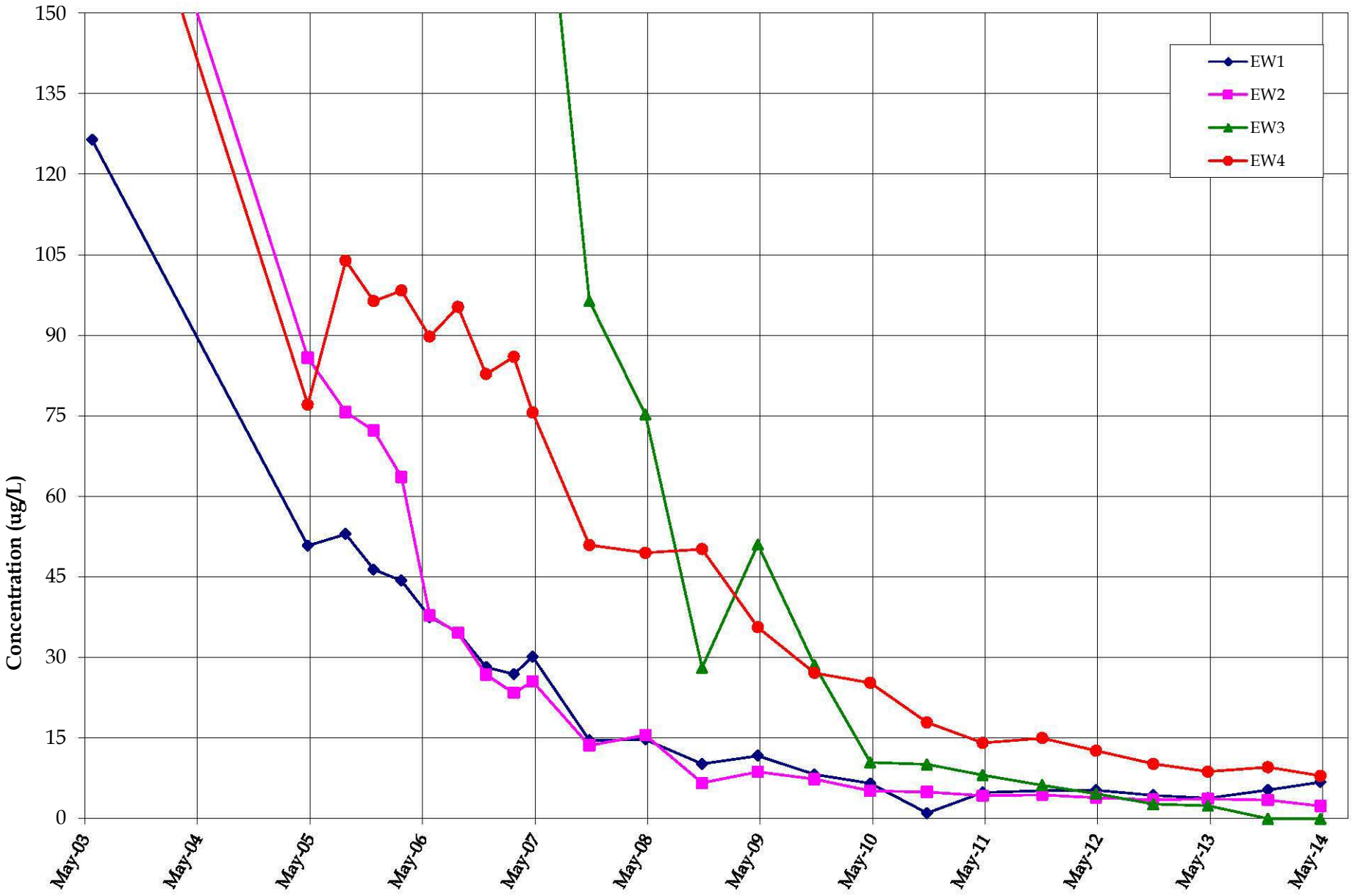
NA - There is no MCL for MTBE. The Nebraska Tier 1 Risk Based Screening Level is 20 µg/L.

FD - Field Duplicate.

J - Estimated concentration.

Site Cleanup Criteria based on USEPA Maximum Contaminant Level (MCL).

Shaded cells indicate concentrations exceeding the Site Cleanup Criteria.



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TOTAL VOC TREND - EW1, EW2, EW3, EW4
BRUNO COOPERATIVE ASSOCIATION/
ASSOCIATED PROPERTIES SUPERFUND SITE
Bruno, Nebraska