

FIVE-YEAR REVIEW REPORT

**BRUNO COOPERATIVE ASSOCIATION/
ASSOCIATED PROPERTIES SUPERFUND SITE
Bruno, Nebraska**

CERCLIS I.D. # NED981713829

Prepared by:

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Approved by:



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9/27/10
Date



EXECUTIVE SUMMARY

The Bruno Cooperative Association/Associated Properties Superfund Site is located in rural Butler County, Nebraska, in the small farming community of Bruno with an approximate population of 150 individuals. 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. The responsible parties are also performing operation and maintenance activities for the pump and treat system. The remediation time frame is estimated to occur over a 20 year time period.

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I. INTRODUCTION

This report is the initial five-year review for the Bruno Cooperative Association/Associated Properties Superfund Site (Site) in Bruno, Nebraska. The Site consists of one operable unit (OU) designated as OU-1. 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. This review was conducted by the U.S. Environmental Protection Agency (EPA) as the lead agency with support from the Nebraska Department of Environmental Quality (NDEQ), the support agency. The Site location and details are shown on Attachment A.

The purpose of the five-year review is to evaluate the adequacy of remedial response actions undertaken at the Site to protect human health and the environment. This policy five-year review 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.

This five-year review is supported by several field visits between the dates of July 11, 2007, and May 27, 2010, conducted to observe general conditions at the Site, including the construction and operation of the cleanup system in addition to sampling efforts and meetings with local officials. Multiple visits to the Site have been conducted by the following individuals in support of this five-year review: Dave Drake, EPA Region 7 Remedial Project Manager and Jim Borovich, NDEQ Project Manager.

This is the first five-year review of the Site. The triggering action for this policy review is the Preliminary Close-Out Report, which was signed on September 13, 2005.

II. SITE CHRONOLOGY

Groundwater impacts were initially discovered by the Nebraska Department of Health in the mid-1980s and were followed by an EPA removal action in 1989 to supply residents with a temporary source of clean drinking water pending the construction of new water supply wells in 1990. Site characterization activities were conducted by the Argonne National Laboratory on behalf of the U.S. Department of Agriculture (USDA) in 1994 and by the USDA in 1995. The USDA, Union Pacific Railroad Company, and the Bruno Co-op are responsible parties (RPs) at the Site and have conducted the majority of the work to date under a 2003 Consent Decree. The Site was placed on the National Priorities List in 1996.

EPA issued a Record of Decision (ROD) in 1998 for the Site followed by an Explanation of Significant Differences (ESD) in 2000 and a second ESD in 2005. The ROD called for the construction of a groundwater pump and treat system, the 2000 ESD provided a refinement of the cost estimate for the remedy, and the 2005 ESD provided an institutional controls framework for the remedy.

The remedy was designed in 2004 and constructed in 2004 and 2005 by the RPs under the terms of the 2003 Consent Decree. The pump and treat system became operational in December 2004 and was certified as complete on April 19, 2005. The operation and maintenance (O&M) of the remedy is also being conducted by the RPs. Recent groundwater plume maps for the three distinct portions of the aquifer (upper middle, and lower) are included in Attachment B.

The RPs conducted a vapor intrusion assessment at the Site in 2006 and 2007. This assessment did not show any impacts to Site residents. A Site chronology summary is provided in Attachment C.

III. BACKGROUND

The Site is located in east-central Nebraska within Butler County. The general area is sparsely populated with the predominant land use being agricultural. The Village of Bruno, Nebraska, 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.

The current and future land use is expected to remain agricultural. Groundwater is currently being utilized for drinking water and agricultural purposes and these uses are expected to continue into the future. 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 vicinity of the contaminant plume at the Site. Agricultural supply wells are located near the contaminant plume, but have not been found to be affected by Site contaminants.

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. A groundwater plume containing grain fumigant constituents (carbon tetrachloride, chloroform, and 1,2-dichloroethane) impacted the two municipal water supply wells for the Village of Bruno and necessitated that these wells be removed from service. 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 new wells were located in an area unaffected by the contaminated groundwater plume.

The EPA issued a ROD in 1998 that was subsequently modified by an ESD in 2000 and 2005. The selected remedy specified the construction of a groundwater pump and treat system to contain the groundwater plume and restore the aquifer in an approximate 20- year time frame. 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 treatment system removes Site contaminants to acceptable levels but the water is not potable due to the presence of nitrates related to agricultural practices in the area.

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 gallons per minute (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 reuse. Construction of the pump and treat system was completed in 2005.

The 2000 ESD was issued to describe the changes in the estimated cost of the remedy as compared to the 1998 ROD. The ROD estimated the remedy cost at \$1,057,000 while a subsequent reassessment of remedy costs yielded an estimate of \$1,694,209. 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, but worthy of description in an ESD.

Groundwater institutional controls are a legal method designed 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. The 2005 ESD provided a groundwater institutional controls framework for ensuring remedy protectiveness over time. The 1998 ROD did not contain any institutional controls provisions and thus required a subsequent modification. The goals of the groundwater institutional controls are to ensure that the remedy remains operational while avoiding human risks associated with the consumption of impacted groundwater.

Institutional controls under the 2005 ESD consist of restrictions on the placement and construction of new water wells in addition to 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 ordinance also includes controls for an additional one mile zoning limit beyond 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 a wellhead protection area and are subject to regulation by the Lower Platte North Natural Resource District (NRD). The NRD must be notified and their approval is required, for any new applications for high capacity wells (>50 gpm) within the wellhead protection area. The NRD added EPA to the wellhead notification protection 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 EPA on the notification list in 2005. The Village of Bruno also agreed in 2005 to notify EPA of any requested permits for domestic well construction within the zoned area. No requests have been received since the

prior 2005 five-year review. Layering of institutional controls is achieved 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 EPA, NRD, and the Village of Bruno.

The RPs conducted a vapor intrusion assessment from 2006 to 2007 pursuant to a request by 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 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.

IV. REMEDIAL ACTIONS

The remedial action was initiated in early 2004 by the RPs under the terms of the 2003 Consent Decree with EPA, and the pump and treat system became operational and functional in December 2004. The Consent Decree 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 remedy and are currently operating the clean-up system.

The primary element of the selected remedy in the 1998 ROD included construction of a groundwater pump and treat system to restore the aquifer by lowering the contaminants of concern to levels below drinking water maximum contaminant levels. The ROD also required that the impacted groundwater be treated by tray aeration air stripping methods and the discharge water be conveyed to a tributary to Skull Creek and also made available to the local public for beneficial reuse. A total of four extraction wells were constructed and each well operates at approximately 50 gpm; thus, the total pumping rate for the groundwater extraction system is approximately 200 gpm. The ROD also included the following two additional elements: abandonment of former Bruno Supply Well #36-1 following state guidelines; and returning Bruno Supply Well #65-1 to use as a source of drinking water for the Village by treating water from this well in times of high demand.

The single remedial action objective (RAO) for the Bruno ROD is to prevent human exposure to contaminated groundwater. Groundwater at the Site is estimated to be remediated within approximately 20 years from initiation of the remedial action. The following clean-up levels were established for Site contaminants of concern: carbon tetrachloride at 5 parts per billion (ppb); chloroform at 100 ppb; and 1,2-dichloroethane at 5 ppb.

Post-construction inspections were conducted in 2005 and these inspections indicated 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 inspection under the terms of the Consent Decree. Institutional controls were not a component of the selected alternative for the Site and the potential for redevelopment or new construction is remote given the demographics of the area; however, institutional controls were subsequently addressed in a 2005 ESD as described above.

The RPs are conducting all 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 EPA and NDEQ.

V. PROGRESS SINCE LAST FIVE-YEAR REVIEW

This is the first five-year review for the Site so there is no progress update from a prior five-year review.

VI. FIVE-YEAR REVIEW PROCESS

The five-year review 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 five-year review process is to evaluate selected remedies at a site and determine if the remedies remain protective of human health and the environment.

The five-year review team for the Site includes the following individuals: Dave Drake, EPA Project Manager; Jim Borovich, NDEQ Project Manager; Jim Stevens, EPA Attorney; Dan Nicoski, EPA Hydrogeologist; Jeremy Johnson, EPA Human Health Risk Assessor; Catherine Wooster-Brown, EPA Ecological Risk Assessor; and Debbie Kring, EPA Community Involvement Coordinator.

A recent Site inspection in preparation for the five-year review was conducted on May 27, 2010, by Dave Drake, EPA Project Manger; Jim Borovich, NDEQ Project Manager; and Eric Hoglund, RP Project Manager/Engineer. No issues were observed during this inspection.

Concentrations of Site contaminants in most wells have decreased significantly since the pump and treat system became operational in December 2004. A detailed discussion of data trends is included in Attachment D. Attachment E provides a listing of the documents reviewed in support of this five-year review and Attachment F provides recent Site monitoring data.

ICs were verified in discussions with Mr. Don Stara, a member of the Bruno Village Board and Mr. Bill Voboril, the Mayor of Bruno. A site interview was conducted with Mr. Stara on May 27, 2010.

The five-year review will be placed in the Site repository located at the U.S. Post Office in Bruno, Nebraska and at the EPA Region 7 records center. The availability of the five-year review report will be announced by a public notice in local Site newspapers.

VII. TECHNICAL ASSESSMENT

The in-place groundwater pump and treat system is considered to be protective and the institutional controls mechanisms are considered to be effective. The operating remedy is providing hydraulic containment of the impacted groundwater plume in the upper and middle aquifer zones at the Site and there are no known human exposures to groundwater. While hydraulic containment of the lower aquifer zone is probable, recommendations for additional data needs are provided in a subsequent section of this document.

The completed vapor intrusion assessment indicated no risks to Site residents. This historic study may require a reassessment given the changing criteria for this element of work. Specific recommendations are provided in a later portion of this document.

Ecological risks were historically evaluated by the Nebraska Department of Health and resulted in no threats to sensitive animal populations, vegetation near streams, ponds, or rivers. Recent recommendations for additional ecological assessment work are discussed in a subsequent portion of this document.

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 remedial action objectives (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?

Yes, the remedy is functioning as intended by the decision documents. The groundwater pump and treat system was constructed as designed and has been operational since December 2004. Effluent from the pump and treat system is being made available to the local community for non-potable uses.

Well 36-1 was abandoned; however, treatment was not placed on well 65-1 and it has not been abandoned pursuant to input by the Village of Bruno. The Village of Bruno is now being supplied with drinking water via a pipeline from David City, Nebraska, as part of a USDA rural water supply enhancement effort. The intent of placing treatment on well 65-1, as needed, was to ensure that the Village of Bruno had an adequate supply of drinking water in the event that the two new water supply wells failed to supply a sufficient quantity of water. With the advent of the construction of a permanent water supply line from David City, Nebraska to the Village of Bruno in 2007, there is no longer a potential issue with the two new supply wells which have been taken out of service. They are now available to supply the local community with additional

water in the future if necessary, thus well 65-1 was planned for abandonment; however, the Village of Bruno expressed a desire to keep the well operational for non-potable water use in the future. The availability of temporary treatment for well 65-1 as contemplated in the 1998 ROD is no longer needed. Groundwater data indicate that the remedy is achieving the RAO and institutional controls are deemed to be effective.

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 used at the time for the remedy still valid?

Yes, the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy are still valid. There are no changes in toxicity, cleanup standards, Site contaminants, and land use.

A new potential exposure pathway (vapor intrusion to indoor air) has been identified for further investigation. Historic vapor intrusion assessment investigations indicated no significant health risks to Site residents. The changing criteria for vapor intrusion characterization procedures suggest that a reassessment is warranted. Attachment D includes hydrogeologic and vapor intrusion technical reviews that provide additional information on these topics.

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

Yes, a hydrogeologic and vapor intrusion review of the Site was conducted to facilitate the five-year process. These reviews are included as Attachment D and a summary of the recommendations from this review include the following elements:

(1) Verification of Lower Aquifer Capture Zone and Downgradient Extent of Carbon Tetrachloride: The lower aquifer capture zone and carbon tetrachloride extent in the hydraulically downgradient area from monitoring well SB-39L should be field verified by the use of direct push methods (piezometers) in conjunction with an on-site mobile lab.

(2) Source Area Delineation of Carbon Tetrachloride: A potential on-site source area in the northeast portion of the Site may be responsible for elevated levels of carbon tetrachloride in well SB-03. Soil samples should be collected from this area to verify that vadose zone contaminants are below applicable groundwater soil protection standards.

(3) Additional Vapor Intrusion Assessment: Temporary, direct push methods are recommended for the collection of additional data in areas adjacent to the two homes located at 105 and 107 Railroad Street that overlie the contaminated groundwater plume. The additional data needs at each residence include the following: depth to groundwater; groundwater sample analyzed for Site constituents; and collection/analysis of soil gas samples from three intervals (above the water table, basal depth of the basement, and a point between the first two samples).

An ecological risk assessment review of the Site was also conducted as part of the five-year review process and is included as Attachment G. Recommendations from this review are provided below:

(1) **Sediment Identified as a Data Gap:** Sediment samples should be collected from silty, dark-colored, organic-rich deposits located in Skull Creek and the tributary to Skull Creek and analyzed for Site contaminants. A total of four sediment samples are recommended for collection in the following locations: two in the tributary to Skull Creek, one sample located upstream of the effluent discharge and one sample located downstream of the discharge; and two samples from Skull Creek, one sample located upstream of where the tributary enters Skull Creek and one sample downstream of where the tributary enters Skull Creek.

VIII. ISSUES

Issue	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Verification of hydraulic capture in the lower aquifer.	N	Y
Enhanced assessment of the vapor intrusion pathway.	Y	Y
Enhanced assessment of sediment impact potential.	Y	Y

An additional issue that does not affect current or future protectiveness is the verification that vadose zone soil contaminants are below groundwater protection standards. Protectiveness is not affected because the plume is contained and there are no users of impacted groundwater; however, the remediation time frame may be increased if soil source areas with elevated levels of Site constituents are found to be present.

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issue	Recommendations and Follow-up Actions	Parties Responsible	Milestone Date	Follow-up Action Affects Current Protectiveness (Y/N)	Follow-up Action Affects Future Protectiveness (Y/N)
Verification of hydraulic capture in the lower aquifer (lower zone of the upper unconsolidated aquifer).	Conduct field investigations in the down-gradient area of monitoring well SB-03 to verify hydraulic capture and characterize the downgradient extent of carbon tetrachloride.	RPs	12/31/11	N	Y
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, sub-slab, vapor intrusion assessment activities if necessary.	RPs	12/31/11	Y	Y
Enhanced assessment of sediment impact potential.	Collect and analyze four sediment samples from Skull Creek and its tributary.	RPs	12/31/11	Y	Y

In addition to items specified in the above table, it is recommended that the RPs conduct field investigations in the area of monitoring well SB-03 to characterize vadose zone soil contaminants and verify that levels are below applicable groundwater protection standards. This item does not affect current or future protectiveness but could result in an increase in the time frame for remediation which would also increase costs and be less efficient in terms of remedy implementation if an isolated vadose zone soil source area is present.

X. PROTECTIVENESS STATEMENTS

OU, Remedial Action Status, Level of Protectiveness	Protectiveness Statement
OU-1, Operating, Protective	The remedy at OU-1 is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled.

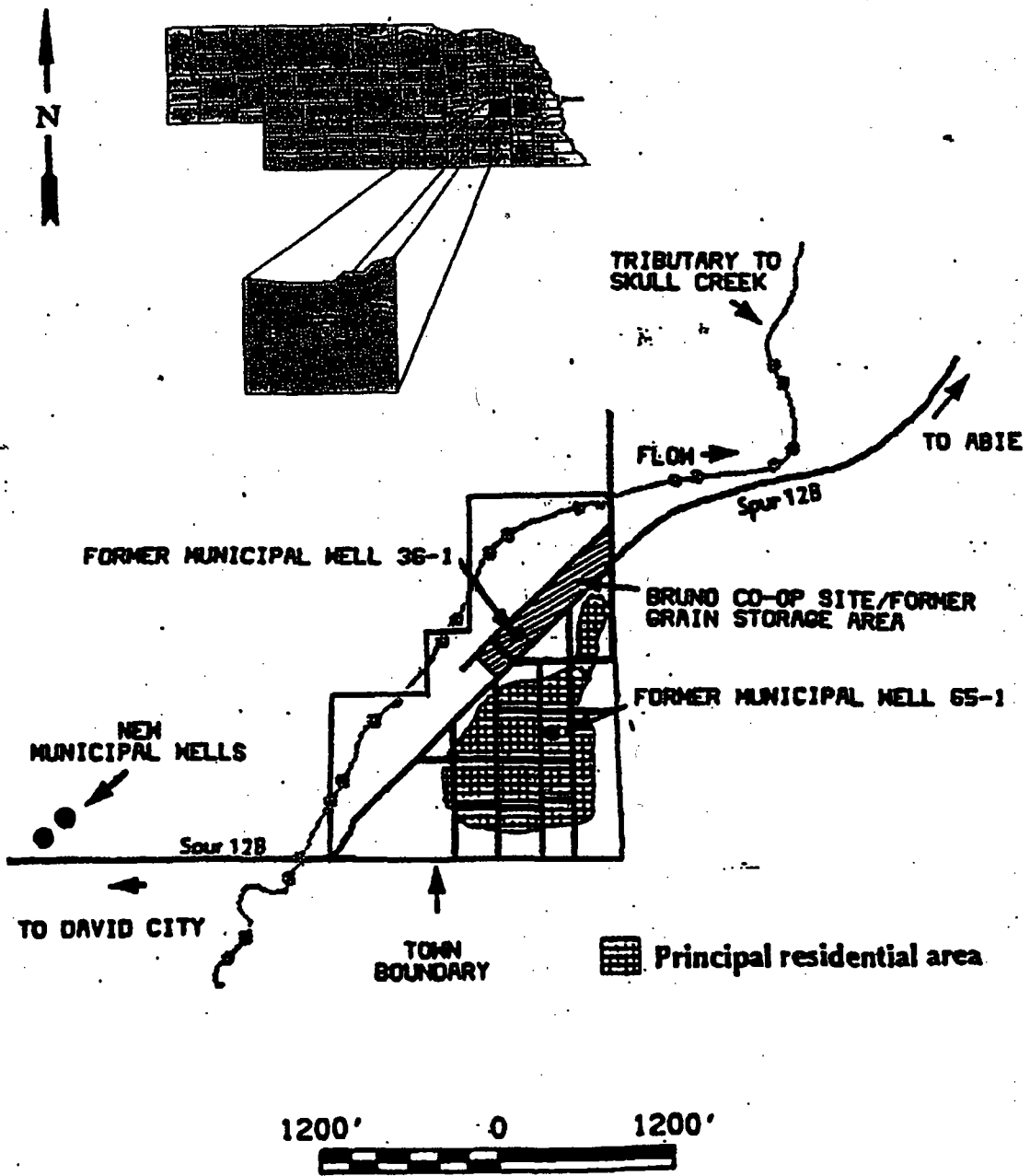
The remedy was constructed as designed, is fully operational, and is deemed to be protective of human health and the environment. There are relatively minor issues associated with hydraulic capture and extent of contamination in one portion of the lower aquifer plume (actually the lower portion of the upper unconsolidated aquifer), another lesser issue related to a potential soil source area, evolving criteria that suggest the need for additional vapor intrusion characterization work (all prior vapor intrusion investigation work has shown no risk), and an identified ecological risk data gap.

These issues require investigation but do not fundamentally affect the protectiveness of the remedy. No known individuals are being exposed to Site groundwater or vapor emanating from the containment plume. The results of the recommended follow-up actions will be reported in the next five-year review. The five-year review summary form is provided in Attachment H and includes an executive summary.

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, EPA will conduct additional statutory five-year reviews in the future. The next five-year review will be completed by September 2015.

ATTACHMENT A
SITE LOCATION MAP



ATTACHMENT A - SITE LOCATION MAP

ATTACHMENT B

GROUNDWATER PLUME MAPS

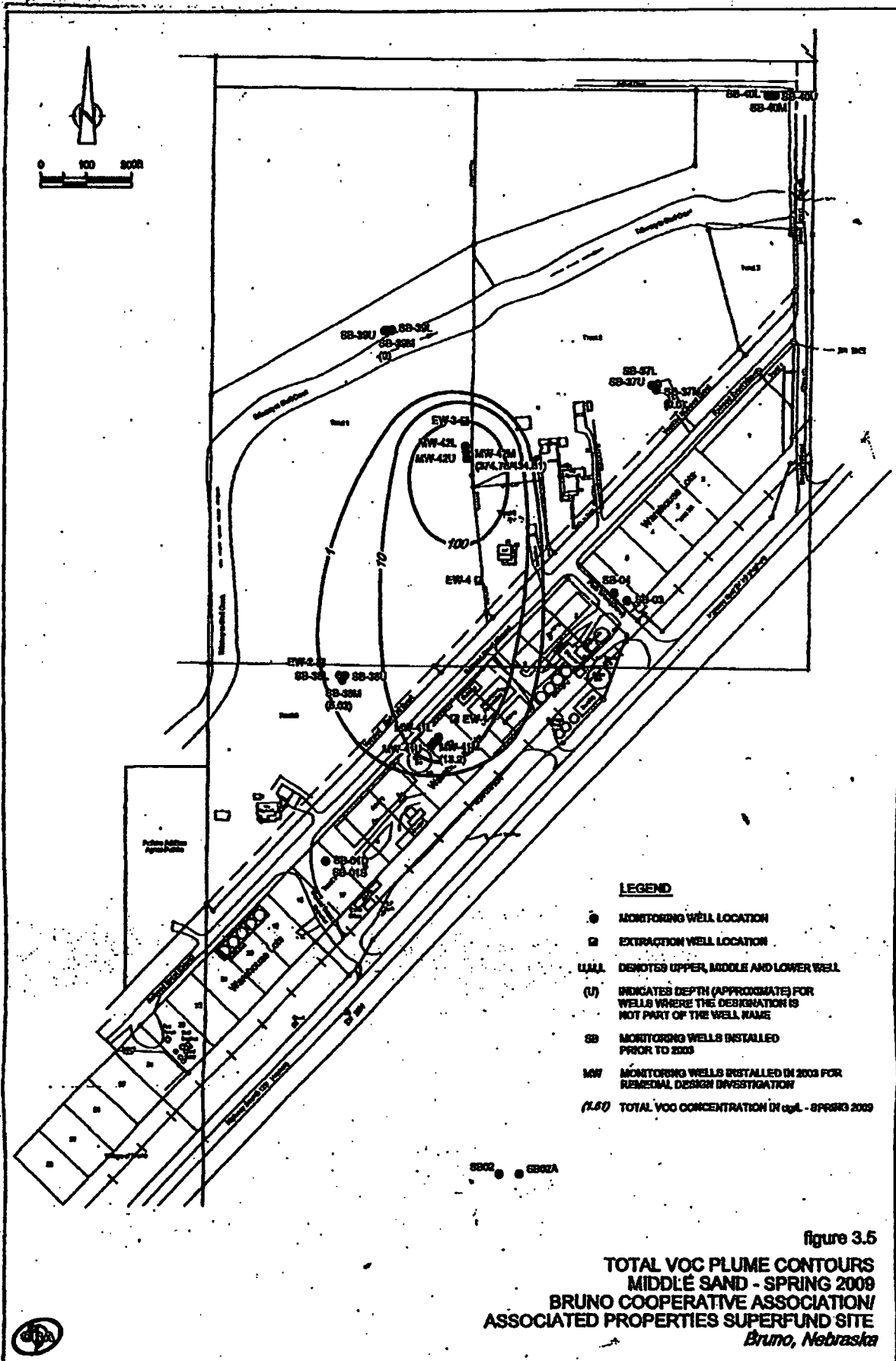
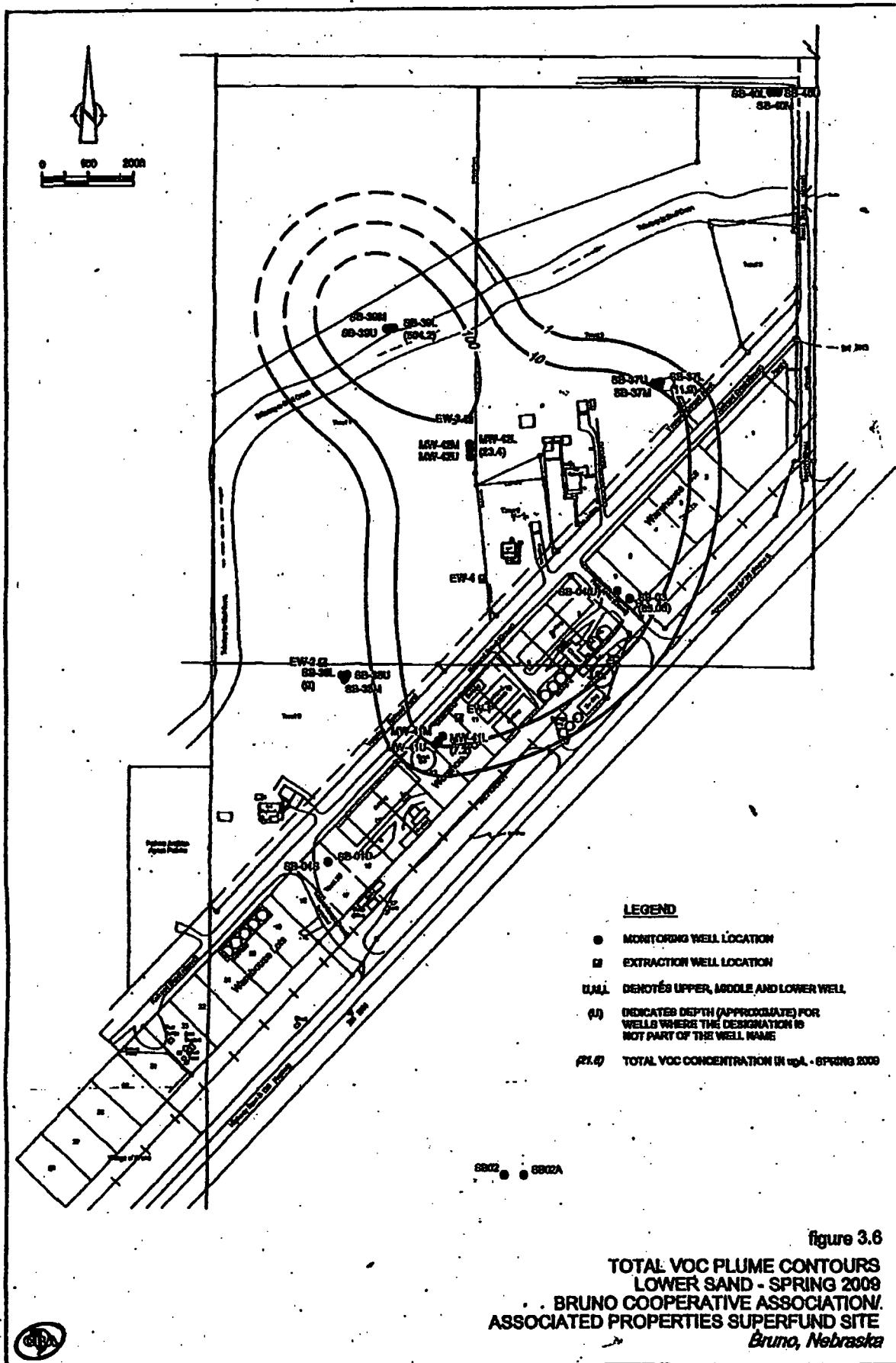


figure 3.5
**TOTAL VOC PLUME CONTOURS
 MIDDLE SAND - SPRING 2009
 BRUNO COOPERATIVE ASSOCIATION/
 ASSOCIATED PROPERTIES SUPERFUND SITE
 Bruno, Nebraska**





LEGEND

- MONITORING WELL LOCATION
- EXTRACTION WELL LOCATION
- U, M, L DENOTES UPPER, MIDDLE AND LOWER WELL
- (D) INDICATED DEPTH (APPROXIMATE) FOR WELLS WHERE THE DESIGNATION IS NOT PART OF THE WELL NAME
- (21.0) TOTAL VOC CONCENTRATION IN ug/L - SPRING 2009

figure 3.6
**TOTAL VOC PLUME CONTOURS
 LOWER SAND - SPRING 2009
 BRUNO COOPERATIVE ASSOCIATION/
 ASSOCIATED PROPERTIES SUPERFUND SITE
 Bruno, Nebraska**

ATTACHMENT C
SITE CHRONOLOGY

ATTACHMENT C
SITE CHRONOLOGY

<u>Event</u>	<u>Date</u>
NDOH identifies contaminants in drinking water	1985-1986
EPA Preliminary Assessment	1987
EPA Site Investigation	1988-1989
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
Record of Decision	9/30/98
EPA Explanation of Significant Differences (cost increase)	8/25/00
Consent Decree with EPA and RPs	2003
RP Remedial Design	2004
RP Remedial Action	2005
RP operation and maintenance of constructed remedy begins	2005
EPA Explanation of Significant Differences (institutional controls)	9/13/05
Preliminary Close-out Report (Construction Complete)	9/13/05
RP Vapor Intrusion Assessment	2006-2007
Water Pipeline constructed from David City, NE to Bruno, NE (new supply wells de-activated)	2007

<u>Event</u>	<u>Date</u>
Institutional Controls (EPA added to NRD notification list)	8/30/05
Institutional Controls (EPA added to Bruno notification list) (Village of Bruno New Well Prohibition Ordinance #126, 5/5/87)	9/8/05
First Five-Year Review Report	09/2010

ATTACHMENT D

HYDROGEOLOGIC and VAPOR INTRUSION REVIEW MEMOS

MEMORANDUM

SUBJECT: Draft Final Five-Year Review
Bruno Cooperative Association Site, Bruno, NE

FROM: Dan Nicoski, Geologist
ENSV/EAMB

TO: Dave Drake, Project Manager
SUPR/SPEB

A review of site related documents was conducted ahead of the Draft Final Five Year Review (5YR) to be prepared by you for the above referenced facility. The intent of this review is to provide a technical evaluation on the effectiveness of the remedy in attaining the cleanup goals. I offer the following comments for your consideration. Site geologic/hydrogeologic and technical assessment information was provided in site associated documents. Should you have any questions, please contact me at x7230.

According to the Record of Decision (ROD), the selected remedial action for the site was groundwater pump and treat system and as modified by an Explanation of Significant Differences (ESD) 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 primary contaminants of concern (COC) associated with this site are carbon tetrachloride (CT), chloroform (CF) and 1,2-dichloroethane (1,2-DCA).

Site geology consists primarily of a upper clay/silt zone (37 ft to 42 ft thick) overlying a middle sand unit (56 ft 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 ft to 42 ft thick); and, a lower sand unit of fine sand with trace amounts of silt at about 10 ft 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 ft to 45 ft. The saturated zone is approximately 55 to 60 ft thick.

There are currently 24 site associated monitoring wells that are nested in either the shallow/deep zones (3 well nests) or in the upper/middle/lower units (6 well nests). The COCs have not been detected or are less than their respective maximum contaminant levels (MCLs) at each of the upper or shallow 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) and SB-39L have increased since June 2003. The highest concentrations

of CT in 2009 were from well SB-39L. This well is located down-gradient of extraction well EW-3.

Comments

- 1) The groundwater contour figures from the Two-Year Summary Report (2007 – 2009) use water levels from the extraction wells that may exaggerate the extent of the capture zone. Monitoring points near (within about 15 ft) the extraction well would better represent aquifer conditions not affected by well inefficiencies. The cone of depression will only equal the capture zone if the hydraulic gradient is zero. The text indicated a capture width of 1.65 miles and a down-gradient capture of 0.53 miles. These distances may not reflect actual site conditions. Another portion of the text indicates the cone of depression is 1,300 ft from the center of pumping.
- 2) CT was detected in soil from samples collected during the FS in the area of the former grain storage bins. Each CT detection was above the risk/MCL-based Protection of Groundwater SSL (0.17 ug/kg/1.9 ug/kg, respectively). The samples were collected from the near surface (1ft – 2 ft) up to 34 ft bgs. The CT concentrations ranged from 8.2 ug/kg to 2,700 ug/kg. The persistence of the COCs may in part be due to the residual CT in the vadose zone. CT in groundwater from well SB-03 (lower zone) has steadily increased since June 2003. Confirmation of cleanup should include the collection of soil samples from this area to verify residual CT depletion below the protection of groundwater SSL.
- 3) A vapor intrusion (VI) study was conducted 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. Further assessment activities are warranted to adequately evaluate the VI potential at these residences. Direct-push technology (DPT) would be appropriate for this task. Proposed activities conducted adjacent to each residence could include the collection of a groundwater sample, a depth to water measurement, and collection of a soil gas samples from three intervals: the depth of the basement, above the water table and an interval between those two samples. The preferred EPA VI assessment approach would include the collection of sub-slab samples and indoor air samples in each residence. Should the RP choose to use the DPT approach and results are above levels on concern, they must conduct the sub-slab and indoor air sampling.

- 4) Monitoring well SB-39L is located north of and adjacent to the tributary to Skull Creek. This well is approximately 250 ft down-gradient of extraction well EW3. CT concentrations have increased in this well since June 2003 to 497 ug/L in May 2009; decreased to 305 ug/L in November 2009. There are no wells down-gradient of this location to verify capture of the CT. Determining the extent of CT down-gradient of this well would be appropriate. Modeling indicates well SB-39L is within the capture zone of extraction wells. The text indicates that higher further down-gradient concentrations are being drawn back by well SB-39L. Irrigation wells in the area that typically pump at much higher rates than the remedial system may impact groundwater flow and contaminant migration. The vertical/horizontal extent of CT and the capture zone should be field verified in the area of this well through use of DPT (piezometers) and an on-site mobile lab. As migration pathways are influenced by subsurface geology, identifying those zones would be appropriate (continuous soil cores, electrical conductivity probes, cone penetrometer, etc.).
- 5) The second ESD addresses institutional controls for drilling, construction and domestic use of new wells in the contaminated area of the plume. Figures in the FS depict numerous existing domestic wells. Are those domestic wells over the plume for lawn and garden use only (105 and 107 Railroad St.)? These wells may be a potential exposure pathway.
- 6) The Two Year Summary Report (2007 – 2009) indicates that the increased CT concentrations in groundwater from well SB-03 suggests that there was an impacted source area on the northeast side of the facility that is migrating through the well SB-03 area. The delineation of this other suggested on-site source area is appropriate.

Is the remedy 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. In addition, an adequate evaluation of the vapor intrusion pathway should be conducted at these residences. The second ESD provides for groundwater institutional controls as described above.

The primary COCs are CT and 1,2-DCA. These COCs were detected above their respective MCLs in 8 of 17 well locations during May 2009 and in 6 of 8 sampled wells in November 2009. CT concentrations were detected at 497 ug/L and 305 ug/L in May and November 2009 in well SB39L. Samples from each of the four extraction wells are above the CT MCL (6.35 ug/L to 28.5 ug/L). The down-gradient extent of CT in groundwater should be delineated to evaluate the potential impacts on the environment. This will verify the adequacy of the selected remedy for protection of the environment.

Is the selected remedy adequate for this site?

The selected remedy consists of a groundwater extraction system that treats impacted groundwater by air stripping of contaminants, groundwater monitoring, and institutional controls. CT concentrations have increased in down-gradient well SB-39L from non-detectable levels (May 2006) to 497 ug/L (May 2009); 305 ug/L in November 2009. This well is apparently within the capture zone of extraction well EW3. The distal portion of the plume should be delineated to verify capture of the CT. If adequately demonstrated, the remedy will prove to be adequate.

Groundwater monitoring should continue in the core network (8 sampled wells/4 EWs during the second and fourth quarters) and full network (17 monitoring and 4 extraction sampled during the second quarter) wells.

Is the plume stable?

There are 17 of 24 site associated monitoring wells and 4 extraction wells that are monitored in the second quarter. Eight of 24 monitoring wells and each extraction well are sampled in the fourth quarter. Six sets of nested wells monitor each of the three zones of the middle sand unit. Three sets of nested wells are screened in the upper and lower zone of this middle unit. The primary COCs are CT and 1,2-DCA.

Groundwater flows in a northwesterly direction. CT concentrations in wells SB-03 and SB-39L have increased significantly since operation of the extraction system began in December 2004. Well SB-03 (lower zone) is near or in a source area and well SB-39L is the down-gradient well for the lower zone. The Two Year Summary Report (2007 – 2009) indicates these increases are due to changes in groundwater flow patterns caused by the extraction wells. The text also indicates another source may be present on the northeast side of the Bruno Coop. Impacts from that source are apparently flowing by well SB-03. Impacts detected at well SB-39L are apparently being drawn back from an area down-gradient of this well. Further investigation is warranted in these areas to evaluate an apparent source and delineate the distal end of the plume. Plume stability may be affected by the distal end investigation results or prove stable if verified to be within the capture zone of EW-3.

Do contaminant trends indicate remedy is adequate?

COC concentrations in most site associated wells have decreased significantly since start-up of the remedial system in December 2004. Eight of the 24 monitoring wells and each extraction well have concentrations of either CT or 1,2-DCA above their respective MCL in 2009. Concentration of CT in wells SB-03 and SB-39L have continued to increase in concentration; however, SB-39L did decrease from 497 to 305 ug/L in November 2009. TVOCs in well MW42M have decreased from 2045.28 ug/L to 82.94 ug/L (CT 80.1 ug/L); this well is approximately 50 ft from EW-3. Well SB-03 is up-gradient of

extraction wells EW-3 and EW-4. TVOCs in well MW-42L were initially not-detectable at start-up, increased to 46.9 ug/L in May 2008 and have decreased to 23.4 ug/L (CT 21.4 ug/L) in May 2009. COCs in the remaining 5 wells have decreased since start-up. Concentrations of either CT or 1,2-DCA in these wells range from 5.48 ug/L to 8.74 ug/L.

Verification of the capture zone and CT concentrations in the area down-gradient of well SB-39L may indicate the remedy is adequate despite CT concentrations that remain significantly above the MCL.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

SEP 14 2010

MEMORANDUM

SUBJECT: Five-Year Review Technical Assessment, Bruno Cooperative Association/Associated Properties Superfund Site, Bruno, Nebraska

FROM: Jeremy Johnson
Toxicologist
ENSV/EAMB

TO: Dave Drake, Ph.D.
Remedial Project Manager
SUPR/SPEB

Per your request, we have conducted a technical assessment in support of the Five-Year Review for the Bruno Cooperative Association/Associated Properties Superfund Site. Our evaluation is limited to providing input on human health risk assessment issues. More specifically, we focused on answering Questions B and C from U.S. EPA'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 assessment, which is presented below, please let me know.

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

- *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, the cleanup levels (i.e., Maximum Contaminant Levels (MCLs)) are still valid.*
- *Are there newly promulgated standards that call into question the protectiveness of the remedy? We are not aware of any new groundwater or soil standards.*

- *Have TBCs used in selecting cleanup levels at the site changed in way that could affect the protectiveness of the remedy?* TBCs were not used in selecting cleanup levels for this site.

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)?* Land use has not changed at the site and we are not aware of any potential future land use 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?* The vapor intrusion to indoor air pathway has been identified as a new exposure pathway after the implementation of the remedy. The completed vapor intrusion assessment indicated no significant health risks to Site residents. However, this historic study may require a re-assessment given the changing criteria for this element of work. No other changes to previously identified receptors and routes of exposure have been identified that would affect the protectiveness of the remedy.
- *Are there newly identified contaminants or contaminant sources?* The available data do not demonstrate new contaminants or contaminant sources.
- *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 unanticipated toxic byproducts.
- *Have physical site conditions (e.g., changes in anticipated direction or rate of groundwater flow) or the understanding of these conditions (e.g., changes in anticipated direction or rate of groundwater flow) changed in a way that could affect the protectiveness of the remedy?* We have no information to show that site conditions or the understanding of these conditions has changed.

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?* Despite changes in the toxicity values for the contaminants of concern shown in Table 1 below, they are not expected to affect the protectiveness of the remedy. The cleanup levels for groundwater are based on MCLs. In regards to other media evaluated at the site (soil and vapor intrusion), Tables 2 and 3 depict the changes on health risk estimates for soil and the screening levels for the vapor intrusion pathway, respectively. Please note that in addition to accounting for new toxicity values, Tables 2 and 3 accounts for changes in risk assessment methods, which are discussed below. Notwithstanding the recommendations on the vapor intrusion pathway, the indoor air screening levels used to back-calculate vapor intrusion screening levels for the vapor intrusion pathway have not changed significantly (see Table 2

below). In regards to soils, the cancer and non-cancer risk estimates have decreased with the cancer risks falling within EPA's cancer risk range of 10^{-6} to 10^{-4} and below a hazard index of 1. Note that this evaluation does not take into any changes (i.e., decreases) in soil contaminant levels that have likely occurred since the 1995 Human Health Baseline Risk Assessment (HHBRA).

Table 1. Evaluation of Toxicity Values

	Type of Toxicity Value	1995 Human Health Baseline Risk Assessment ¹		Current Toxicity Values		Affects on Cancer Risk or Non-Cancer Hazard Quotient Estimates
Carbon Tetrachloride	RfDo	7E-04	I	4.0E-03	I	Decrease
	RfC	NA	-	1.0E-01	I	Increase
	SFo	1.3E-01	I	7.0E-02	I	Decrease
	IUR	1.5E-06	I	6.0E-06	I	Increase
Chloroform	RfDo	1.2E-02	I	1.0E-02	I	Increase
	RfC	NA	-	9.8E-02	A	Increase
	SFo	6.1E-03	I	3.1E-02	C	Increase
	IUR	2.3E-05	I	2.3E-05	I	No Change
1,2-Dichloroethane	RfDo	3.0E-02	EP	2.0E-02	P	Increase
	RfC	NA	-	2.4	A	Increase
	SFo	9.1E-02	I	9.1E-02	I	No Change
	IUR	2.6E-05	I	2.6E-05	I	No Change

I: Integrated Risk Information System (IRIS) (USEPA, 2010a).

EP: Provisional toxicity value that was available during the 1995 HHBRA.

P: Provisional Peer-Reviewed Toxicity Value (PPRTV) Database (USEPA, 2010b)

A: Agency for Toxic Substances and Disease Registry (ATSDR, 2009).

C: California EPA (CalEPA, 2010).

NA: Toxicity value not available.

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

RfC: Inhalation Reference Concentration (mg/m³).

SFo: Oral Cancer Slope Factor (mg/kg-day)⁻¹.

IUR: Inhalation Unit Risk (µg/m³)⁻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.

Table 2. Comparison of Health Risks for Soil Exposures (Residential Exposure Scenario)

Contaminants of Concern	1995 HHBRA ¹		Using Current Toxicity Values and Risk Assessment Methodology	
	Non-Cancer HI	Cancer Risk	Non-Cancer HI ²	Cancer Risk ³
Carbon Tetrachloride	3.4	9.8E-06	0.02	4.4E-06
Chloroform	- ²	- ²	- ²	- ²
1,2-Dichloroethane	- ²	- ²	- ²	- ²

¹ The 1995 HHBRA evaluate cancer and non-cancer risks for a child and adult resident separately. The risk assessment also evaluated a construction worker's exposure to soil. This table provides the highest risk estimates (i.e., the child resident health risks).

² These contaminants were not evaluated in soils because they were not detected in soil.

³ Risk estimates were derived by dividing the 1995 HHBRA's exposure point concentration for soil by the residential soil Regional Screening Level (RSL) based on cancer and non-cancer health risks (USEPA, 2010c). For

carcinogens, the result was multiplied by 10^6 in order to generate a cancer risk estimate. For non-cancer risks, the result equals the hazard index (HI). The exposure concentration for carbon tetrachloride was the maximum detection of 2.7 mg/kg detected in surface soil sample BHRA07-S-02641.

Table 3. Comparison of Indoor Air Screening Levels¹

Contaminants of Concern	Previously Used Screening Levels ² ($\mu\text{g}/\text{m}^3$)	Current Indoor Air Screening Levels ³ ($\mu\text{g}/\text{m}^3$)
Carbon Tetrachloride	1.6E-01	4.1E-01
Chloroform	1.1E-01	1.1E-01
1,2-Dichloroethane	9.4E-02	9.4E-02

¹ Vapor intrusion screening levels for soil gas and groundwater are derived from indoor air screening levels using applicable attenuation factors and conversions.

² Previous vapor intrusion pathway assessments used screening levels derived from USEPA's 2002 vapor intrusion guidance (USEPA, 2002). The screening levels for indoor air were obtained from that document and are based on a 10^{-6} cancer risk.

³ Current indoor air screening levels were derived from EPA's RSL table for residential indoor air.

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

Changes in Risk Assessment Methods

- *Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy? Although some standardized risk assessment methodologies have changed since the 1995 BRA and 1998 ROD, they have not changed in a way that could affect the protectiveness of the remedy. Risk assessment methods that have changed since the BRA include how dermal and inhalation exposures are assessed and characterized, which were updated with the issuance of the *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* in 2002, *RAGS Part E* in 2004, and *RAGS Part F* in 2009. These changes do not affect the protectiveness of the remedy as indicated in the discussion on changes to toxicity values.*

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ATTACHMENT E
LISTING OF DOCUMENTS REVIEWED

ATTACHMENT E

LISTING OF DOCUMENTS REVIEWED

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ATTACHMENT F
SITE MONITORING DATA

TABLE 3.2E

GROUNDWATER ANALYTICAL RESULTS
 DETECTED VOCs - SPRING 2009
 BRUNO COOP ASSOCIATION SITE
 BRUNO, NEBRASKA

Location	Date	1,2-Dichloroethane µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Methyl tert-butyl ether (MTBE) µg/L	TVOC May 2009 µg/L	TVOC June 2003 µg/L
SB-03	5/27/09	< 1	51	4.06	< 1	65.06	8.24
SB-04	5/27/09	< 1	< 2	< 1	< 1	0	0
SB-37L	5/27/09	< 1	11.9	< 1	< 1	11.9	45.95
SB-37M	5/27/09	< 1	< 2	< 1	< 1	0	5.3
SB-37U	5/27/09	< 1	< 2	< 1	< 1	0	0.73
SB-38L	5/27/09	< 1	< 2	< 1	< 1	0	327.68
SB-38M	5/27/09	5.03	< 2	< 1	< 1	5.03	979.14
SB-38U	5/27/09	1.03	< 2	< 1	< 1	1.03	0.91
SB-39L	5/27/09	< 1	497	7.52	< 1	504.52	0.52
SB-39M	5/27/09	< 1	< 2	< 1	< 1	0	64.7
SB-39U	5/27/09	< 1	< 2	< 1	< 1	0	10.22
MW41L	5/28/09	7.2	< 2	< 1	< 1	7.2	10.19
MW41M	5/28/09	13.2	< 2	< 1	2.73	13.2	217.68
MW41U	5/28/09	< 1	< 2	< 1	8.82	0	0.88
MW42L	5/27/09	< 1	21.4	2.0	< 1	23.40	0
MW42M	5/27/09	< 1	366	8.78	< 1	374.78	1208.59
MW42M	5/27/09 Dup	< 1	426	8.81	< 1	434.81	39.7
MW42U	5/27/09	< 1	< 2	< 1	< 1	0	-
EW1	5/28/09	1.91	9.8	< 1	< 1	11.71	126.42 ^(a)
EW2	5/28/09	1.18	7.54	< 1	< 1	8.72	210.84 ^(a)
EW3	5/28/09	< 1	48.5	2.55	< 1	51.05	244.83 ^(a)
EW4	5/28/09	< 1	34.8	1.74	< 1	36.54	202.41 ^(a)
EW4	5/28/09 Dup	< 1	33.0	1.73	< 1	34.73	202.41 ^(a)
Site Cleanup Criteria or USEPA MCL		5	5	100 ^(b)	NA		

Notes:

* - Excluding MTBE data.

⁽¹⁾ - USEPA MCL for Total Trihalomethanes.

⁽²⁾ - EW-1 sample collected at end of pumping test on 7/22/03.

⁽³⁾ - EW-2 sample collected at end of pumping test on 8/17/03.

⁽⁴⁾ - EW-3 sample collected at end of pumping test on 8/21/03.

⁽⁵⁾ - EW-4 sample collected at end of pumping test on 8/23/03.

⁽⁶⁾ Results are shown as reported by laboratory for SB-37M and SB-37L.

However, there is strong evidence that the sample bottles were accidentally switched during sample collection and the concentration for SB-37L is likely 11.1 µg/L and the concentration for SB-37M is <2 µg/L.

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

Shaded cells indicate concentrations exceeding the Site Cleanup Criteria.

TVOC - Total of detected VOC.

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

J - Estimated concentration.

TABLE 3.3

COMPARISON OF TOTAL VOCs
JUNE 2003 - MAY 2009
BRUNO COOPERATIVE ASSOCIATION/ASSOCIATED PROPERTIES SUPERFUND SITE
BRUNO, NEBRASKA

Location	TVOC June 2003 µg/L	TVOC May 2005	TVOC September 2005	TVOC December 2005	TVOC March 2006	TVOC May/June 2006	TVOC September 2006	TVOC December 2006	TVOC March 2007	TVOC May 2007	TVOC November 2007	TVOC May 2008	TVOC November 2008	TVOC May 2009
SB-01D	0	0	--	--	--	0	--	--	--	5.24	0	--	--	--
SB-01S	0	0	--	--	--	0	--	--	--	0	--	--	--	--
SB-02	3.79	0	--	--	--	0	--	--	--	0	--	--	--	--
SB-02A	0	0	--	--	--	0 (0)	--	--	--	0	--	--	--	--
SB-03	8.24	15.82	--	--	--	17.59	--	--	--	23.43	--	54.7	--	65.06
SB-04	0	0	--	--	--	2.37	--	--	--	2.21	--	0	--	0
SB-37L	45.95	56.48	35.15	51.6	54.86	35.65	34.27	18.51	13.68	13.45	7.1	11.1	14.3	11.9
SB-37M	5.3	0 (0)	--	--	--	0	--	--	--	0	--	0	0	0
SB-37U	0.73	0	--	--	--	0	--	--	--	0	--	0	--	0
SB-38L	327.68	20.4	12.6 (12.3)	8.94 (9.39)	4.37 (4.46)	3.14	2.85	2.95	3.14	2.84 (3.17)	0	2.68 (2.41)	0	0
SB-38M	979.14	803.8	788.9	643.2	520.7	337.2	265.0 (252.9)	217.3 (193.3)	184.2	179.79	43.33	118.9	23.54	7.03
SB-38U	0.91	0	--	--	--	0	--	--	--	1.54	--	1.42	--	1.03
SB-39L	0.82	4.29	--	--	--	0	--	--	--	24.23	--	251	--	504.52
SB-39M	64.7	51.24	32	18.11	8.19	3.04	4.36	4.23	3.9	0	1.15	0	0	0
SB-39U	10.22	3.95	0	0	0	0	0	0	0	0	--	0	--	0
SB-40L	0.42	0	--	--	--	0	--	--	--	0	--	--	--	--
SB-40M	0.79	0	--	--	--	0	--	--	--	0	--	--	--	--
SB-40U	0	0	--	--	--	0	--	--	--	0	--	--	--	--
MW41L	10.19	0	2.95	2.32	2.61	3.2 (3.26)	3.78	6.22	21.8 (20.8)	23.3	15.3 (16.9)	11.7 (11.6)	8.15	7.2
MW41M	217.68	35.03	28.57	25.73	7.24	1.51	1.34	4.93	6.31	9.89	7.85	15	11.9	13.2
MW41U	0.88	1.41	--	--	--	12.8	--	--	--	--	--	1.68	--	0
MW42L	0	2.11 (2.18)	--	--	--	11.18	--	--	--	44.4	--	46.9	--	23.4
MW42M	1208.59	944.92	971.5	1133.56	932.94	1338.06	2045.28	1862.51	1042.64	899.30 (837.02)	345.3	750	642	374.78 (334.81)
MW42U	39.7	112.2	345.8	431.6	165.76	70.13	50.02	34.92	37.66	20.99	4.21 (3.11)	2.08 (2.52)	0	0
EW1	126.42 ⁽¹⁾	50.4 (50.85)	33	46.39	44.32	37.54 (33.8)	34.69	28.24	26.9	30.14 (28.4)	14.60	14.73	10.21	11.71
EW2	210.84 ⁽²⁾	85.83	70.5 (73.7)	72.26	63.62	37.83	34.59 (33.07)	26.82	23.42 (20.87)	23.58	13.64	15.56	6.65	8.72
EW3	244.83 ⁽³⁾	323.3	280.4	294.7	273.2 (273.2)	260.1	262.1	224.6	223.37	200.6	96.42	73.3	28.13	51.05
EW4	202.41 ⁽⁴⁾	77.11	103.9	95.83 (96.38)	98.35	69.76	95.3	82.78 (79.75)	83.98	75.62	50.96	49.5	50.18	36.54 (34.73)

Notes:

(1) - EW-1 sample collected at end of pumping test on 7/22/03.

(2) - EW-2 sample collected at end of pumping test on 8/17/03.

(3) - EW-3 sample collected at end of pumping test on 8/21/03.

(4) - EW-4 sample collected at end of pumping test on 8/23/03.

TVOC - Total of detected VOCs that have Site Clean-up Standards.

TABLE 12

**CURRENT GROUNDWATER MONITORING PLAN
BRUNO COOPERATIVE ASSOCIATION SUPERFUND SITE
BRUNO, NEBRASKA**

Plume Restoration Monitoring

<i>Monitoring Event</i>	<i>Upper Sand Wells</i>	<i>Middle Sand Wells</i>	<i>Lower Sand Wells</i>	<i>Extraction Well Influent</i>	<i>Laboratory Analysis</i>	<i>Groundwater Elevations</i>
Spring 2nd Quarter	SB-04, SB-37U, SB-38U, SB-39U, MW-41U, MW-42U	SB-37M, SB-38M, SB-39M, MW-41M, MW-42M	SB-03, SB-37L, SB-38L, SB-39L, MW-41L, MW-42L	EW-1, EW-2, EW-3, EW-4	VOC (8260)	All Monitoring Wells and Extraction Wells (28 total)
Fall 4th Quarter	MW-42U	SB-38M, SB-39M, MW-41M, MW-42M	SB-37L, SB-38L, MW-41L	EW-1, EW-2, EW-3, EW-4	VOC (8260)	All Monitoring Wells and Extraction Wells (28 total)

Notes:

Semiannual reports due to USEPA 15th day of following quarter (July 15, January 15).

ATTACHMENT G

ECOLOGICAL RISK REVIEW MEMO



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

AUG 06 2010

SUBJECT: Five-Year Review Technical Assessment
Bruno Cooperative Association/Associated Properties Site
Bruno, NE
EPA ID# NED981713829

FROM: Catherine Wooster-Brown
Ecological Risk Assessor
ENSV/EAMB

TO: Dave Drake
Remedial Project Manager (RPM)
SUPR/MOKS

Per your request, we have conducted a technical assessment in support of the five-year review for the Bruno Cooperative Site (Bruno Co-op). Our evaluation is limited to providing input on ecological risk assessment issues. More specifically, we focused on answering Questions B and C from U.S. EPA's "Comprehensive Five-Year Review Guidance," dated June 2001. As part of our assessment, we reviewed all or parts of the documents listed in Attachment 1. If you need additional assistance or have any questions regarding our assessment, please contact me at #7425.

Background

The Bruno Co-op is a former U.S. Department of Agriculture grain storage site where carbon tetrachloride (CT) 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 (1,2-DCA) were also identified as chemicals of concern (COCs).

Recommendations

EPA Region 7 ecological risk assessors have reviewed several documents for the Bruno Co-op site including the screening level ecological risk assessment (SLERA). Please see Attachment 1 for a list of documents reviewed.

We find the risk to ecological receptors at the Bruno Co-op site is negligible. However, we did find a data gap. We recommend four sediment samples be collected. Two in the tributary to

Skull Creek, one sample site located upstream of the effluent discharge and one downstream of the discharge. Then, two samples in Skull Creek, one sample site upstream of where the tributary enters Skull Creek and one located downstream of where the tributary enters Skull Creek for a total of four samples. The samples should be analyzed for the three COCs (carbon tetrachloride (CT)), chloroform, and 1, 2-DCA). Sediments high in organic matter tend to have higher concentrations of carbon tetrachloride than sediments with lower organic matter (McConnell et al., 1975). Therefore, the sediment samples should be collected from silty dark organic rich sediment often found in streamside deposits. The sediment data should then be screened using Region 5 ecological screening levels (EPA, 2003).

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? Sediment is a data gap and needs to be ruled out as a newly identified ecological route of exposure.*
- *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, but we want to ensure that the sediment is not receiving COCs from the effluent discharge.*
- *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, but we are also unsure how the effluent discharge into a previously intermittent stream may be changing 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*

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 at this time.*
- *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? There was no remedy that addressed ecological risk.*

References

EPA, 1998. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final. Office of Solid Waste and Emergency Response. EPA 540-R-97-006. June 5.
Guidelines for Ecological Risk Assessment. EPA/630/R-95/002F, April 1998, Final.

EPA, 2003. Region 5 RCRA Ecological Screening Levels.
<http://www.epa.gov/reg5rcra/ca/ESL.pdf>

McConnell, G., Ferguson, D. M., Pearson, C.R. 1975. Chlorinated hydrocarbons and the environment, Endeavour, 34, 13-18.

Attachment 1

Site Name: Bruno Co-op
EPA ID#: NED981713829
Location: Bruno, NE
ROD date: 1998
5 yr review date: 2010

Was there an ERA? Yes, A SLERA was performed by Susan Dempsey of the Risk Assessment/Toxicology NE Department of Health & Human Services 301 Centennial Mall South Lincoln, Nebraska 68509.

Were any ecological receptors evaluated? Yes

Were sensitive habitats (per the NCP) evaluated? Yes, except the tributary was overlooked because it was intermittent. We now understand that intermittent streams act similar to wetlands and are habitats for unique organisms.

What contaminants are present at the surface? Carbon tetrachloride (CT), chloroform, and 1, 2-DCA)

Is a Section 7 (ESA) consultation letter or documentation of informal Section 7 consultation on file? Yes, information about this documentation is located in the SLERA.

Can the statement that the remedy is protective of the environment be supported? No ecological risk and therefore no remedy was determined at this site. Although a data gap has been identified and data should be collected, screened, and ruled out as an ecological risk.

List of eco-relevant documents reviewed for this technical assessment:

40093057 02-09-1994 DRAFT CONSENT ORDER AND SCOPE OF WORK FOR CCC TO CARRY OUT A REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

40115022 09-07-2002 CONSENT DECREE 40166552

06-02-2004 RE:NPDES PERMIT APPLICATION

40203874 GROUNDWATER MONITORING PLAN

04-21-2005 FIRST QUARTER 2005 MONITORING REPORT

07-22-2005 SECOND QUARTER 2005 MONITORING REPORT

07-14-2005 LAB REPORT: PROGRESS REPORT NO. 32 - SECOND QUARTER 2005

40081701 07-01-1998 DRAFT SCREENING - LEVEL ECOLOGICAL RISK ASSESSMENT

ATTACHMENT H

FIVE-YEAR REVIEW SUMMARY FORM

ATTACHMENT H

FIVE-YEAR REVIEW SUMMARY FORM

Site Identification:	
Site Name	Bruno Co-op Superfund Site
EPA I.D.	NED981713829
Region	07
State	NE
City/County	Bruno/Butler
Site Status:	
NPL Status	Final
Remediation Status	Complete
Multiple OUs	No
Construction Completion	Yes
Site in Reuse	Yes
Review Status:	
Lead Agency	EPA
Author Name	Dr. Dave Drake
Author Title	Project Manager
Author Affiliation	EPA
Review Period	September 2005 to September 2010
Date(s) of Site Inspections	Multiple
Type of Review	Policy, Post-SARA
Review Number	1 (first)
Triggering Action	Preliminary Close-out Report
Triggering Action Date	9/13/05
Due Date	9/13/10

ATTACHMENT H CONTINUED

Issues:

Verification of capture zone and down-gradient extent of carbon tetrachloride near monitoring well SB-39L.

Source area delineation of carbon tetrachloride in vadose zone near monitoring well SB-03.

Additional vapor intrusion assessment near two homes along Railroad Avenue.

Sediment data gap requires collection and analysis of sediment samples.

Recommendations and Follow-up Actions:

Conduct field investigations to verify hydraulic capture, characterize down-gradient extent of carbon tetrachloride, characterize vadose zone source area, investigate vapor pathway near two homes, and collect/analyze sediment samples.

Protectiveness Statements:

The remedy is protective; however, follow-up investigations are necessary.

Other Comments:

The remedy is constructed and fully operational. The recommendations do not fundamentally affect the protectiveness of the overall remedy.