FINAL PROPOSED PLAN

FORMER KIRKSVILLE AIR FORCE STATION MISSOURI

FUDS PROJECT NO. B07MO023204

Prepared by

U.S. Army Corps of Engineers
Kansas City District
Kansas City, Missouri

November 2008

CH2MHILL

1.0 INTRODUCTION

This **Proposed Plan** (PP)[1] identifies a **preferred alternative** for addressing the contaminated **groundwater** at the former Kirksville Air Force Station (KAFS) site (Figure 1). Previous studies identified risk associated with the groundwater at the site. The site is a **Formerly Used Defense Site** (FUDS). The FUDS program is carried out in compliance with the **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA), as amended in 1986 by the Superfund Amendments and Reauthorization Act, and the **National Contingency Plan** (NCP). The Department of Defense is the lead agency for the FUDS program, and the U.S. Army is its designated executive agency. The Army delegated management and execution of the FUDS program to the U.S. Army Corps of Engineers (USACE).

The purpose of this PP is to solicit public participation on the preferred alternative as required under Section 117a of CERCLA and Section 300.430(f)(2) of the NCP. The intent is to give citizens an opportunity to submit written or oral comments and to participate in a public meeting during the public comment period (Table 1). The USACE may modify the preferred alternative or select another if public comment or additional data indicate a more appropriate remedy.

A **remedial investigation** (RI) of the site identified small, sporadic spills of **trichloroethene** (TCE) as the source of groundwater contamination. TCE is a chlorinated solvent used mainly as a metal degreaser, but also in paint removers and adhesives. Over time, the TCE migrated downward through the soil and into the groundwater. Alternatives to address the contamination were developed and evaluated during a **feasibility study** (FS). The RI and FS reports are part of the **administrative record.**

[1]See page 10 for a glossary of terms indicated in **bold** and for a list of abbreviations and acronyms.

TABLE 1: UPCOMING EVENTS

PUBLIC COMMENT PERIOD: November 12 through December 12, 2008	The USACE will accept written comments on the PP during the public comment period.
PUBLIC MEETING: November 20, 2008 at 7:00 p.m. A public availability session will start at 6:30 p.m.	The USACE will hold a public meeting to explain the Preferred Alternative. The meeting will be held at the Student Union Building at Truman State University. The Student Union Building is located on Franklin Street, between Normal and Patterson streets. Truman State University is located at 100 East Normal Street, in Kirksville, MO.
For additional information, review the administrative record file at:	Adair County Public Library 1 Library Lane Kirksville, MO 63501 660-665-6038

2.0 THE COMMUNITY'S ROLE IN THE SELECTION PROCESS

A remedy will not be selected until USACE has considered comments received from the public. Environmental study reports and other supporting documentation contain background information regarding the project. Public comment may be made on this PP between November 12 and December 12, 2008. Reports and the PP can be viewed by visiting Missouri Department of Natural Resources' (MDNR) Web site:

http://www.dnr.mo.gov/env/fedfac/ffs-dod.htm#kirksville-p64

Written comments should be sent during the public comment period to:

USACE, Kansas City District
Attn: Ms. Kathy Baker
Project Manager Environmental Branch
601 East 12th Street
Kansas City, MO 64106
Kathy.T.Baker@usace.army.mil

A public meeting will be held at the Student Union Building at Truman State University on November 20, 2008, at 7:00 p.m. An availability session will start at 6:30 p.m. Comments received will be included in the

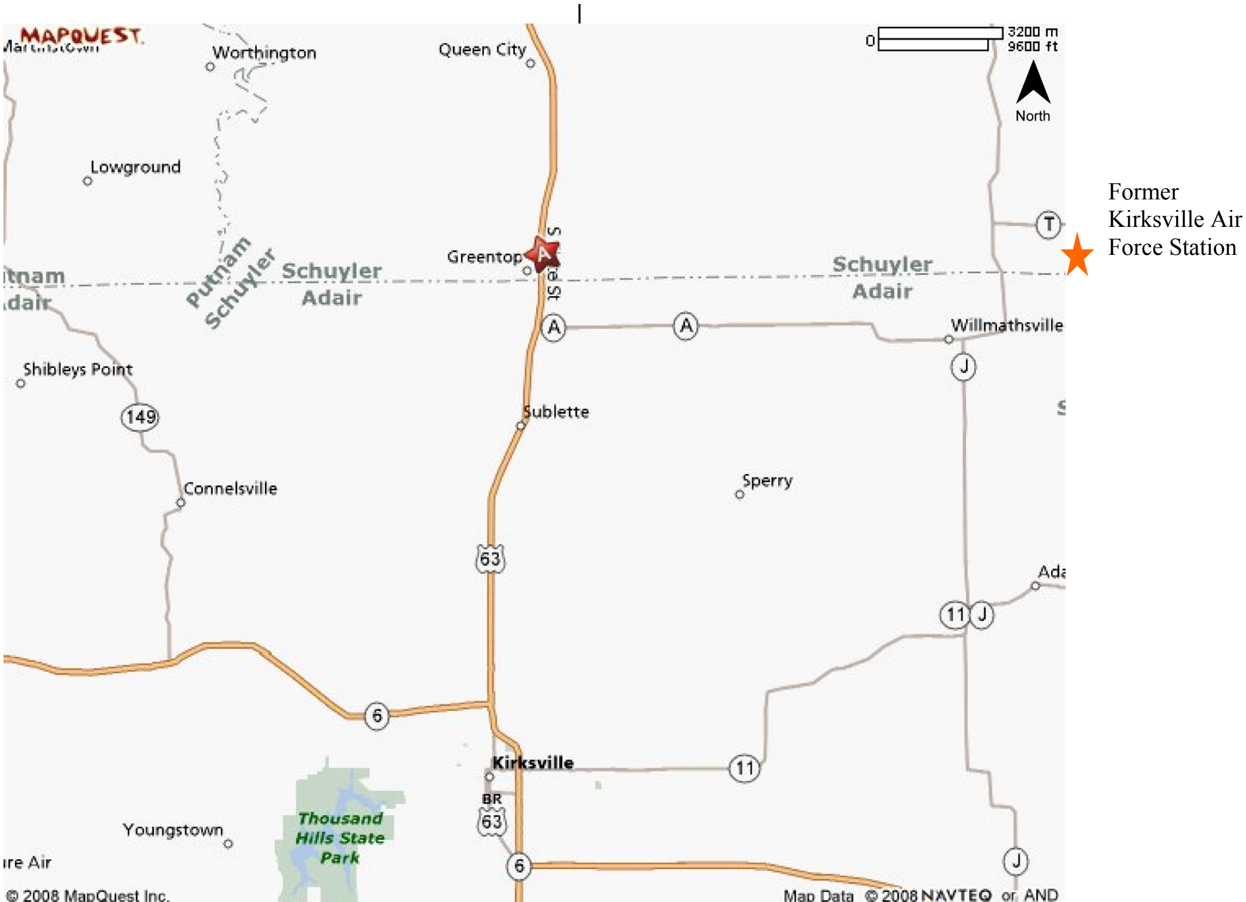

Figure 1: KAFS Site Location

administrative record and summarized in the Responsiveness Summary of the **Decision Document** (DD). The DD sets forth the selected remedy for the KAFS site.

3.0 SITE BACKGROUND

3.1 Site Location

The KAFS site is located in Adair County, about 6 miles north of Kirksville (Figure 1).

3.2 Site History

The U.S. Air Force operated the 78-5 acre site as a radar station from 1951 until 1968. The station was declared surplus on May 13, 1968, and on October 2, 1969, 1 acre was transferred to the Federal Aviation Administration (FAA), Central Region, Kansas City, Missouri. On October 21, 1970, the remaining property was transferred to Northeast Missouri State University of Kirksville, now Truman State University (TSU), for storage and agricultural research.

3.3 Current Property Use

TSU and the FAA use the KAFS site for industrial purposes (Figure 2). The FAA operates air route surveillance radar (ARSR-3), and TSU uses the property for storage and agricultural research.

3.4 Surrounding Land Use

Neighboring properties are agricultural and residential (Figure 3). Residential properties are located to the west, north and southeast, and farmland to east and south.

3.5 Environmental History

Environmental study and restoration work at the KAFS site began in 1991 and continue to this day (see chronology in Table 2). Previous studies of the site have given the USACE and MDNR a good understanding of the nature and extent of contamination.

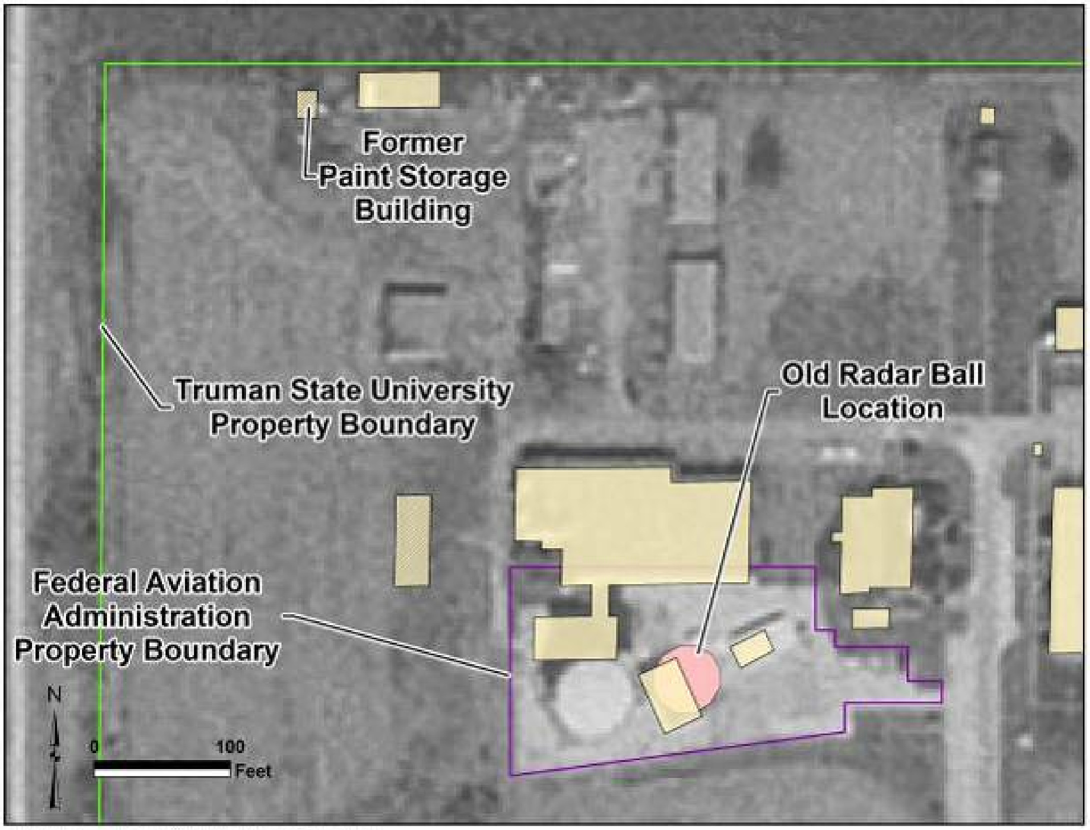

Figure 2: Current Property Use

Figure 3: Surrounding Land Use

TABLE 2: CHRONOLOGY OF INVESTIGATIONS AT THE SITE
Removal of Gasoline and Diesel Fuel USTs by USACE
Two underground storage tanks (USTs) and associated piping were removed some time before 1991. Records indicate that the USTs were installed and used by the U.S. Air Force. A 600-gallon tank held gasoline and the other, 6,000-gallon tank, contained diesel fuel. Petroleum contamination resulting from a leak in the larger tank was observed at the time of removal. Analytical results for groundwater and soil samples showed that concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) and total petroleum hydrocarbons were below MDNR soil and groundwater cleanup levels. In December 1995, MDNR approved closure of the 6,000-gallon tank, stating that no additional investigation or **remedial action** was warranted. A corrective action for the 600-gallon tank was not needed because associated leaks were not observed during removal.
1992 Transformer Removal by USACE
The USACE removed three transformers containing polychlorinated biphenyls from a concrete pad at the site. Samples collected from the pad and surrounding soil exceeded the Toxic Substance Control Act (TSCA) spill cleanup level (10 parts per million).
1993 UST Removal by USACE
A 3,000-gallon diesel UST was removed, and 43 cubic yards of contaminated soil were disposed of offsite. In 1995, MDNR approved closure of the 3,000-gallon tank, stating no additional investigation or remedial action was warranted with respect to BTEX. Because TCE contamination was detected in one of the **monitoring well**s during the investigation, additional study was required.
1995 Characterization Study by FAA
The FAA expanded the groundwater investigation to determine the extent of TCE contamination found in one of the monitoring wells as part of the investigation conducted before removal of the tank. Ten monitoring wells were installed. A groundwater sample and a soil sample were collected from each location and analyzed for **volatile organic compounds** (VOCs). TCE was detected in groundwater but not in the soil.
1996 Concrete Pad Removal Action by USACE
In 1996, the concrete pad for the transformers was removed and disposed of along with the affected soils, in accordance with the TSCA.
1999 Characterization Study by FAA and MDNR
MDNR and FAA performed a membrane interface probe investigation to further characterize the site, collecting groundwater and soil samples south of the FAA property based on the results. No VOCs were detected in soil. Elevated levels of TCE (250 to 2,000 µg/L) were found in the groundwater samples collected.
2005 Phase I RI by USACE
Beginning in 2002, the site was investigated for VOC contamination. Analytical results have identified VOCs present in groundwater at concentrations exceeding U.S. Environmental Protection Agency (USEPA) **maximum contaminant levels** (MCLs) for drinking water. USACE continued the Phase I RI until September 2005. There are two main areas of VOC contamination at the site: one to the north, associated with the former Paint Storage Building, the other to the south, associated with maintenance at the radar ball site. The soil above the groundwater table was studied to characterize soils associated with potential **source area**s. Additional study of the groundwater was needed to delineate the horizontal and vertical extent of contamination. High concentrations of chlorinated solvents were not observed in surface water or sediment.
2008 Phase II RI by USACE
The Phase II RI was conducted to perform the additional soil and groundwater characterization to fill the data gaps. It concluded that soil is not a source of TCE contamination in groundwater and that the horizontal and vertical extent of the chemicals in groundwater is now known.
2008 Feasibility Study by USACE
An FS was performed to evaluate ways to address the contaminated groundwater at the site. The FS evaluated three alternatives: No Action, Monitored Natural Attenuation with Alternative Water Supply, and Enhanced Biodegradation with Monitoring and Alternative Water Supply.

Groundwater flow and **recharge rates** are very slow because of the low **permeability** of the soils. The groundwater in the area of contamination is not used for consumption because it is unavailable in sufficient quantities, of low natural quality, or too deep to be a feasible public water supply. The Kirksville Water Supply District supplies water to the site and adjacent properties from two surface water reservoirs.

One residence adjacent to and downgradient of the site (Residence B) has a private well (RW5) that is 40 feet deep but not in use (Figure 3). Upgradient residences A and C (unaffected by groundwater contamination) also have private wells. Wells RW3 and RW4 at Residence A, 14 and 20 feet deep, are not used. Well RW6 at Residence C is sometimes used for watering the lawn.

Groundwater from the site discharges to surface water bodies to the west (Figure 3). Two ponds there receive drainage from the northern part of the site. The pond in the southwest corner of the County Road 37A and Glacier Road intersection was constructed in a low-lying area of Residence B in 2005 and drains the north part of the site. The southernmost pond at Residence B was breached by the resident in 2005 or 2006 by removing part of the western wall of the pond. The pond still holds about 1 foot of water. An unnamed tributary of Buck Branch Creek drains the southern part of the site. Buck Branch Creek is an intermittent stream that begins immediately west of the site and joins Hazel Creek about 2 miles west of the site. Hazel Creek is a tributary of the Chariton River.

4.2 Nature and Extent of Contamination

The RI identified potential risk associated with two main areas of groundwater contamination, specifically from TCE, **cis-1,2-dichloroethene** (cDCE), and **vinyl chloride** (VC). The north **plume** area is associated with the former Paint Storage Building. The south plume area is associated with the former radar ball area (Figure 3).

A **plume** is a volume of contaminated groundwater. The area of the northern groundwater plume (roughly 3 acres) extends northeast, northwest, and southwest of the original source area. In 2007, TCE was detected at concentrations ranging from 0 to 4,590 **micrograms per liter** (µg/L) at depths of less than 30 feet below surface in groundwater. TCE was found at a maximum concentration of 633 µg/L at a depth of 70 feet below surface, which was the deepest depth that TCE was observed. The concentrations decrease with depth, which is expected since the source of contamination was historical surface spills. The area for the southern groundwater plume is roughly 4.4 acres. The TCE contamination in the southern plume has moved west and southwest of the original source area. TCE was not detected within the south plume at concentrations exceeding the MCL at depths greater than 70 feet.

The source of contamination most likely was a former release of TCE near the former Paint Storage Building and radar ball. The USEPA MCL for a potential drinking water source is 5 µg/L for TCE. Figure 4 shows the extent of TCE contamination in groundwater at concentrations above 5 µg/L. Please note that the groundwater plume boundary shown is a general location. The plume is shown to include a portion of an existing home. However, samples collected adjacent to the home did not have TCE concentrations above the MCL.

As TCE degrades in the subsurface, cDCE and VC are generated. Both cDCE and VC are present at concentrations within the TCE plumes indicated in Figure 4 above their respective MCLs, which are 70 µg/L for cDCE, 2 µg/L for VC. The maximum concentrations of cDCE and VC detected in 2007 were 1,000 and 34.1 µg/L in

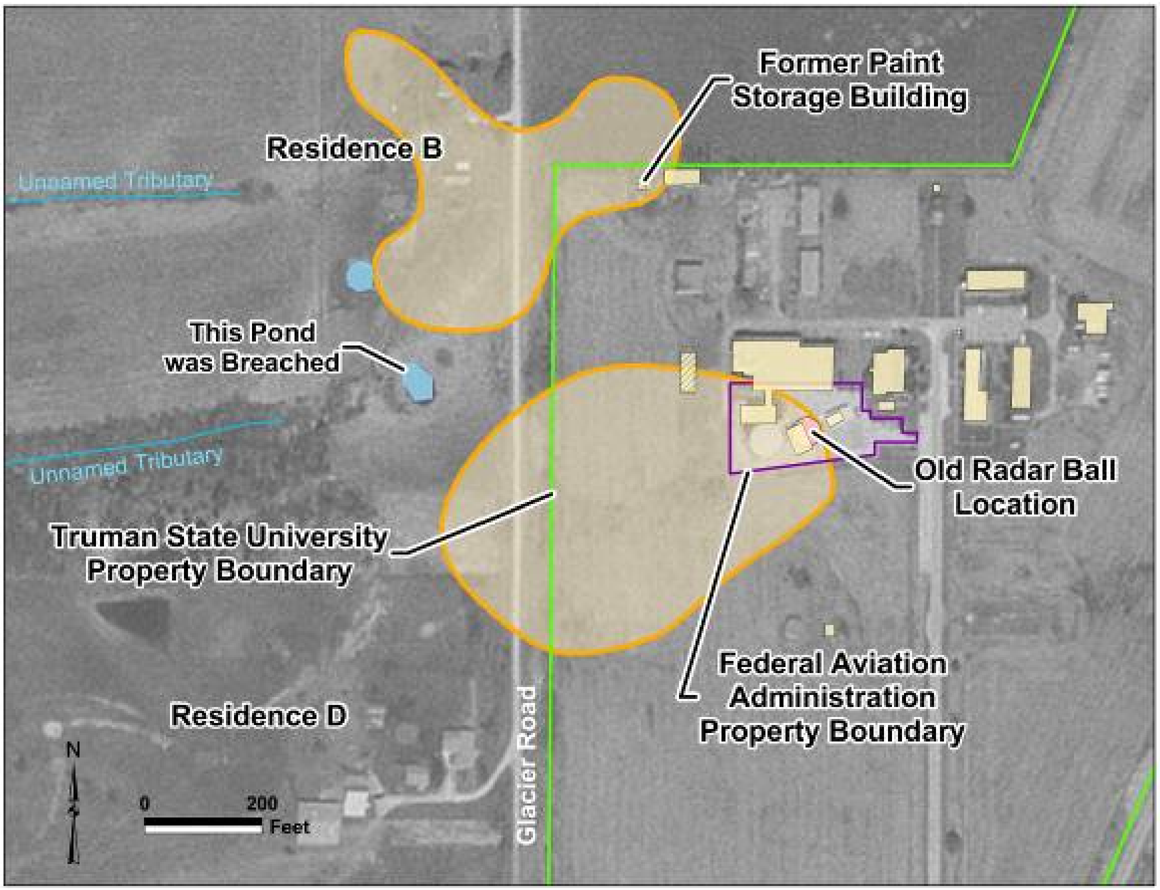

Figure 4: TCE in Groundwater at 5 µg/L or Greater

groundwater from depths of less than 30 feet below surface.

The two groundwater plumes were modeled to estimate the locations of discharge points, time for the plumes to reach the discharge points, and future concentrations. The model indicated that the migration rates for plumes are relatively slow (at or less than 10 feet per year) and the plumes are estimated to take decades to arrive at the most likely discharge zone west of the original source areas. The maximum detected concentration of TCE in groundwater anticipated at the nearest offsite existing residence downgradient of the north plume is 149 µg/L. Future concentrations of VC (a degradation product of TCE) are not expected to increase since soil is under aerobic conditions, which immediately degrade vinyl chloride as it is generated (a process termed "reductive dechlorination").

As noted, the groundwater discharges to surface water bodies to the west of the site, but TCE, cDCE, and VC were not detected in surface water samples collected offsite in 2007.

5.0 SCOPE AND PURPOSE OF THE RESPONSE ACTION

The response action for the KAFS site is to remediate the groundwater. The object is to eliminate the potential for exposure to contaminants in groundwater at concentrations that could put those who may use the groundwater at risk. The concentration considered acceptable to leave in place is called the **remediation goal**. Remediation goals will be determined in the DD for each contaminant at the site. **Preliminary remediation goals** (PRGs) were developed as part of the FS. Based on an evaluation of **Applicable or Relevant and Appropriate Requirements** (ARARs), the PRGs are equal to the MCLs for the **chemicals of concern** (COCs) present at the site.

The preferred method of groundwater remediation is enhanced biodegradation with monitoring and alternative water supply. Although wells on neighboring properties are not affected by the plumes or used to obtain water, the response action includes providing a water source for future residents.

6.0 SUMMARY OF RISKS

Potential risk to human health and the environment was also evaluated. This section presents the findings of the **human health risk assessment** (HHRA) and **ecological risk assessment** (ERA). As a conservative measure, the HHRA assumed that the groundwater is used as a source of drinking water.

6.1 Human Health Risk

The HHRA quantified risk posed by potential exposure of TCE, cDCE, and VC to soil, groundwater, and ambient air. The following exposure media and receptors were evaluated:

- Onsite industrial worker—South plume soil (no COCs were identified and therefore risk estimates were not quantified)
- Offsite residents—Surface water (no COCs were identified and therefore risk estimates were not quantified)
- Future offsite residents—Surface water and hypothetical potable use of offsite groundwater (for the South Plume, non-cancer hazard indices [HIs] of 0.4 [child] and 0.06 [adult], and an excess lifetime cancer risk [ELCR] of $3x10^{-5}$; for the North Plume, HIs of 10 [child] and 1 [adult], and an ELCR of $5x10^{-4}$).
- Future onsite residents—South and north plume soil, ambient air, and hypothetical potable use of groundwater (for the South Plume, HIs of 7 [child] and 0.8 [adult], and an ELCR of $3x10^{-4}$; for the North Plume, HIs of 50 [child] and 6 [adult], and an ELCR of $3x10^{-3}$).
- Future onsite/offsite construction workers—South or north plume soil, groundwater, and ambient air (for the onsite South Plume, a HI of 0.003 and an ELCR of $4x10^{-8}$; for the onsite North Plume, a HI of 0.002 and an ELCR of $1x10^{-8}$; for the offsite South Plume, a HI of 0.00003 and an ELCR of $3x10^{-10}$.

The HHRA considered TSU and FAA property to be onsite and the residences to the west to be offsite.

TCE, cDCE, and VC concentrations in the south and north plumes exceed their MCLs. Thus, human receptors both onsite and offsite are at risk if they ingest the groundwater. The risk to human health posed to future onsite residents, current/future offsite residents, and current onsite workers by other exposure media (e.g., soil, surface water) is within acceptable levels.

Soil gas samples could not be collected because of the low air movement in the soil, so soil gas concentrations were estimated conservatively from measured soil and groundwater concentrations. There is no vapor instruction risk for existing homes. The only current risk is the use of the shallow groundwater, but the shallow groundwater is not used because a public water supply is available. There is a potential vapor intrusion risk for homes constructed above the plumes in the future. USACE has notified property owners that there is a future potential for vapor intrusion risk if there are changes in land use (e.g., a home is built above a plume).

The only unacceptable risk posed by the contamination at the site is related to future use of the groundwater as a potable water supply. The need to conduct an FS to evaluate remedial alternatives to address the groundwater contamination was based on that supposition.

6.2 Ecological Risk

The first step in identifying the potential for risk is to determine if complete exposure pathways exist. Without exposure, there can be no risk. None of the potential exposure pathways for the site is complete, primarily because of the lack of site contaminants in media that can be contacted by ecological receptors, or because of lack of exposure opportunity to the affected media. In other words, contaminants probably are not present in surface soils where exposure is likely to occur; they may be present in deeper soil and in groundwater, but there is no opportunity for exposure to them. TCE, cDCE, and VC were not detected in surface water bodies, and modeling indicates that concentrations of them in surface water bodies will be less than the MCLs and that they will volatize rapidly into the atmosphere. Therefore, future pathways are also unlikely to be complete. Since there are no complete exposure pathways, there is no ecological risk.

7.0 REMEDIAL ACTION OBJECTIVE

Groundwater remediation is required to mitigate potential future risk to human health. The **remedial action objective** presented in the FS is to prevent unacceptable risk to human health from potable use of groundwater containing TCE, cDCE, or VC in concentrations exceeding PRGs. The PRGs for COCs in groundwater (based on the Federal Drinking Water Act) include the following MCLs:

- TCE 5 µg/L
- cDCE 70 µg/L
- VC 2 µg/L

TABLE 3: SUMMARY OF REMEDIAL ALTERNATIVES FOR GROUNDWATER

Alternative	Description
1	No Action—A “no action” alternative is evaluated to establish a baseline for comparison with the other alternatives.
2	**Monitored natural attenuation** and Alternative Water Supply—Relies on naturally occurring mechanisms such as **dispersion**, sorption, and reductive dechlorination, the primary attenuation pathways at the site.
3	Enhanced Biodegradation with Monitoring and Alternative Water Supply—TCE, cDCE, and VC in groundwater would be treated by injecting an emulsified vegetable oil or other slow-release product, to provide an electron donor supply for enhancing biological reductive dechlorination. Monitored natural attenuation will be used to remediate the rest of the groundwater contamination.

8.0 SUMMARY OF REMEDIAL ALTERNATIVES

Three remedial alternatives were considered for the site (Table 3). Additional details can be found in the FS, as part of the Administrative Record.

8.1 Alternative 1: No Action

*Estimated **Capital Cost**:* $0
*Estimated Total **Present Worth**:* $0
Estimated Time to Achieve MCLs: More than 100 years (based on groundwater modeling)

The CERCLA process requires that a No-Action Alternative be evaluated to establish a baseline for comparison with the other remedial alternatives. Under Alternative 1, no action would be taken to reduce contaminant concentrations and prevent exposure to groundwater contamination. The No-Action Alternative has no capital or operation and maintenance costs.

8.2 Alternative 2: Monitored Natural Attenuation and Alternative Water Supply

Estimated Capital Cost: $255,000
Estimated Total Present Worth: $1,814,000
Estimated Time to Achieve MCLs: More than 100 years (based on groundwater modeling)

Alternative 2 relies on **natural attenuation** processes—physical processes of nature that reduce the concentration of chemicals over time—to reduce contaminant concentrations. Groundwater monitoring of natural attenuation parameters is included to allow the progress of natural attenuation to be documented and evaluated over the long term. Natural attenuation is occurring as evidenced by reducing TCE concentrations in monitoring wells located in the original source areas (i.e, former paint storage building and former radar ball), the presence of TCE breakdown products (e.g., cDCE), and groundwater geochemistry information (e.g., low nitrate concentrations, elevated methane, ethane, and TOC concentrations, chloride, and low ORP readings). Natural attenuation is likely because of natural reductive dechlorination within the areas of the plume, with the highest detected TCE concentrations, dilution, and dispersion within areas of the plume with lower concentrations of TCE.

The COC concentrations in groundwater would be monitored by collecting groundwater samples at least every 5 years from new or existing monitoring wells.

The USACE would provide an alternative water supply for future residences in areas where groundwater contamination exceeds MCLs. Alternative water supply may consist of bottled water, a granular activated carbon system, public water supply, or a combination of these. The current residents use the public water supply for potable use.

The NCP requires 5-year site reviews as long as hazardous substances remain at the site at concentrations that do not allow unlimited use and unrestricted exposure. As part of the 5-year review, the USACE will evaluate the vapor intrusion pathway.

The time that natural attenuation takes to return groundwater to the drinking water MCLs was estimated using modeling and would be greater than 100 years. The estimated time of remediation should be viewed as general order-of-magnitude estimate that is useful for comparing alternatives, but should not be viewed as a definitive estimate of the actual time to achieve drinking water MCLs.

Administrative risk management tools that may be used to educate current and future land owners include the following:

- Inspections of land use in the area providing site-specific information to persons involved in new construction or changed land use.
- Visits to the County Assessor's office to update property ownership records in the affected area.
- Newsletters to land owners surrounding the site.

In addition, USACE will assist the Missouri Division of Geology and Land Survey to determine the feasibility of a well restriction area codified through legislative rulemaking.

8.3 Alternative 3: Enhanced Biodegradation with Monitoring and Alternative Water Supply

Estimated Capital Cost: $648,000
Estimated Total Present Worth: $1,814,000

Estimated Time to Achieve MCLs: More than 100 years (based on groundwater modeling)

TCE, cDCE, and VC concentrations in groundwater would be treated by injecting a substrate, such as emulsified vegetable oil, to provide an electron donor supply for enhancing **biological reductive dechlorination**. This technology has been implemented at numerous sites with cVOCs. At sites with low permeability clay, it is used in conjunction with fracturing to enhance distribution of the substrate.

The substrate would be applied to the area within the north plume defined by the 2,000-µg/L TCE groundwater contour. The target treatment area was chosen because it is the area of greatest TCE concentration in groundwater and has residual TCE in the soil in the area of water table fluctuation. Groundwater data suggest that biological reductive dechlorination is occurring based on the presence of TCE degradation products cDCE and VC. Substrate injection would accelerate that process in the shallow subsurface.

Hydraulic fracturing of the subsurface would facilitate delivery and distribution of the substrate in the low permeability subsurface. Fracturing is necessary because the tight clays would limit dispersion of the substrate.

In situ treatment of the north plume area is expected to reduce TCE concentrations in the onsite north plume within several years. Treatment probably will not significantly affect the areas with lower TCE concentrations in the downgradient parts of the TCE plume. It will not affect the TCE concentrations in the south plume. The offsite part of the plume would continue to migrate slowly and discharge to small discharge zones. Remediation goals would be achieved within the entire plume in more than 100 years after source treatment.

Although injection with fracturing has been successful at sites with similar characteristics, there is uncertainty about the effectiveness of this alternative because of the tight subsurface formation and disconnected sand lenses. The biggest concern for remedial actions involving injection under the hydrogeological conditions at the site is adequate distribution; i.e., will the substrate move throughout the treatment zone before the substrate is depleted? Fracture geometry and extent are difficult to predict and will have significant effect on the distribution of the substrate.

Following substrate injection, TCE, cDCE, and VC concentrations would be monitored for compliance with the cleanup objectives and for natural attenuation assessment purposes, since areas outside the treatment area will not be affected by the injection. Alternative water supply and 5-year site reviews would be completed until groundwater monitoring results indicate that concentrations have declined to below the remediation goals.

As with Alternative 2, 5-year site reviews, and evaluation of the vapor intrusion pathway, and administrative risk management tools would be completed per the NCP until groundwater monitoring results indicate concentrations have declined to below the PRGs.

9.0 EVALUATION OF ALTERNATIVES

To assist in the evaluation of alternatives and to make an orderly progression toward the selection of a preferred alternative, the USEPA employs nine criteria in decisionmaking (Table 4). Each alternative must first satisfy two **threshold criteria** to receive further consideration: overall protection of human health and the environment, and compliance with ARARs. Next the alternatives are evaluated using five **balancing criteria:** long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; and cost. Following the public comment period, the alternatives finally are evaluated using two **modifying criteria:** state acceptance and community acceptance.

This section profiles the performance of each alternative against the evaluation criteria, noting how it compares to the other options that pertain to the site. The "Detailed Analysis of Alternatives" can be found in the FS report in the administrative record.

9.1 Threshold Criteria

Overall Protection of Human Health
Alternatives 2 and 3 adequately protect human health, but Alternative 1 does not. Under Alternatives 2 and 3, alternative water supply would preclude exposure to groundwater, ensuring that the exposure pathway would remain incomplete. Under Alternative 3, active remediation of contaminated groundwater may reduce the contaminant concentrations in the onsite north plume. The estimated time for cleanup is more than 100 years.

Compliance with ARARs
MCLs are estimated to be met in more than 100 years. This is a reasonable time period, because future groundwater use as a potable water source is highly unlikely. Therefore, alternatives are compliant with ARARs.

9.2 Primary Balancing Criteria

Short-Term Effectiveness

Alternatives 2 and 3 would be effective immediately because of the alternate water supply for future residents. No additional risk is expected as a result of implementing Alternatives 2 or 3.

Long-Term Effectiveness
Alternatives 2 and 3 include monitored natural attenuation to ensure the site is protective in the long term. Each alternative

TABLE 4: NINE EVALUATION CRITERIA FOR REMEDIAL ALTERNATIVES UNDER CERCLA
Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified. No waivers have been identified for the site.
Long-Term Effectiveness and Performance considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-Term Effectiveness considers the time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual operation and maintenance costs, as well as present worth cost. Present worth is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
State/Support Agency Acceptance considers whether the state/support agency agrees with the lead agency's analyses and recommendations, as described in the RI report, FS report, and PP.
Community Acceptance considers whether the community agrees with the lead agency's recommendations, as described in the PP.

has roughly the same remediation time—more than 100 years. Risk within most of the onsite north plume following completion of remediation for Alternative 3 (if successful) are expected to be diminished within several years. However, the substrate injection may mobilize naturally occurring iron and potentially manganese and reduce these chemicals to their soluble forms. Iron in groundwater will migrate and discharge to the nearby creek, where it could have both toxic and indirect physical effects on aquatic life. Most of the iron would oxidize rapidly following discharge to form ferric oxides and iron-humus colloids, and physical effects are expected to have the greatest potential to impact aquatic life by accumulating on fish gills, reducing invertebrate access to food, and altering the structure and quality of the benthic habitat. The remediation times are only estimates for comparison purposes.

Reduction of Toxicity, Mobility, or Volume
The alternatives would reduce mobility, toxicity, and volume by achieving MCLs. Alternative 3 offers faster reduction of toxicity and volume within most of the onsite north plume, as it involves active treatment of the groundwater. However, treatment will likely not significantly affect areas with lower TCE concentrations in the downgradient parts of the TCE plume, nor will it affect TCE concentrations in the south plume.

Implementability
Alternatives 1 and 2 would be easiest to implement, as they involve no active remedy. Uncertainty is associated with the effectiveness of Alternative 3 because of the tight subsurface formation and disconnected sand lenses. The fracture extent and geometry, which are difficult to predict, will significantly affect the distribution of the substrate.

Cost
The cost for Alternative 1 is the lowest, followed by Alternative 2. The cost of Alternative 3 is the highest of the three alternatives and is almost 20 percent higher than Alternative 2. The present worth of the three alternatives is presented above.

9.3 Modifying Criteria

State/Support Agency Acceptance
The MDNR supports the preferred alternative, but final acceptance is contingent upon community acceptance..

Community Acceptance
Community acceptance of the preferred alternative will be evaluated after the public comment period ends and documented in the DD for the site.

10.0 PREFERRED ALTERNATIVE

Alternative 1 will not meet ARARs or the remedial action objective. Alternative 2 meets the threshold criteria of protectiveness and compliance with ARARs and was evaluated following CERCLA criteria. Alternative 3 is proposed as the preferred alternative based on the anticipated modifying criteria.

11.0 COMMUNITY PARTICIPATION

The public is encouraged to participate in the decisionmaking process by providing comments on the PP or attending the public meeting.

11.1 Public Comment Period

The public comment period extends from November 12 to December 12, 2008. The purpose of the public comment period is to give citizens an opportunity to provide their views on the PP and the preferred alternative to the USACE, which will be documented in the Responsiveness Summary of the DD. A final decision on a remedial action will not be made until review of the comments received during the comment period. Comments must be postmarked no later than December 12, 2008.

11.2 Public Meeting

A public meeting will be held at the Student Union Building at Truman State University on November 20, 2008, at 7:00 p.m. A public availability session will start at 6:30 p.m. The USACE and MDNR officials will discuss the PP and answer questions. Questions will be recorded and responded to in writing, and be considered by the remedy selection official for the USACE. At the meeting, the public can submit written or present spoken comments on the PP.

DATE: November 20, 2008
LOCATION: Student Union Building at Truman State University
TIME: 7:00 p.m.

11.3 Administrative Record

The Administrative Record contains the RI and FS reports, and other materials relied upon in reaching a decision on the selection of the preferred alternative. The Administrative Record is maintained at:

Adair County Public Library
1 Library Lane
Kirksville, Missouri, 63501

The Feasibility Study Report and the Proposed Plan can also be viewed by visiting MDNR's Web page at:

http://www.dnr.mo.gov/env/fedfac/ffs-dod.htm#kirksville-p64

11.4 Contacts

If you have any questions about the PP or the public comment period, please contact the following USACE personnel:

U.S. Army Corps of Engineers
Attn: Kathy Baker
Project Manager Environmental Branch
601 East 12th Street
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This document contains a mail-in form for submitting written comments or information to USACE.

LIST OF ACRONYMS

ARARs—Applicable or Relevant and Appropriate Requirements

BTEX— benzene, toluene, ethylbenzene, and xylenes

CERCLA—Comprehensive Environmental Response, Compensation, and Liability Act

COC—chemical of concern

cDCE—cis-1,2-dichloroethene

DD—Decision Document

ERA—ecological risk assessment

FAA— Federal Aviation Administration

FS—Feasibility Study

FUDS—Formerly Used Defense Sites

HHRA—human health risk assessment

KAFS— Kirksville Air Force Station

MCL—Maximum Contaminant Level

MDNR—Missouri Department of Natural Resources

μg/L—micrograms per liter

NCP—National Oil and Hazardous Substance Pollution Contingency Plan

PRG—Preliminary Remedial Goal

PP—Proposed Plan

RI—Remedial Investigation

TCE—trichloroethene

TSCA—Toxic Substance Control Act

TSU—Truman State University

USACE—United States Army Corps of Engineers

USEPA—United States Environmental Protection Agency

UST—underground storage tank

VC—vinyl chloride

VOC—volatile organic compound

GLOSSARY OF TERMS

This glossary defines the technical terms used in the PP. The terms and abbreviations contained in this glossary are defined in the context of hazardous waste management and apply specifically to work performed under the CERCLA program. They may have other meanings when used in different contexts.

cis-1,2-Dichloroethene (cDCE)—cDCE is a VOC used to make certain types of plastic and flame-retardant clothing. It is also a breakdown product of TCE. The USEPA classifies cDCE as a possible cancer-causing agent in humans.

Administrative Record—The body of documents that forms the basis for the selection of a particular response action at a site.

Applicable or Relevant and Appropriate Requirements (ARAR)—Any federal and state standards, requirements, criteria, or limitations that CERCLA remedial actions must meet.

Balancing Criteria—Five of the nine CERCLA criteria used to further evaluate remedial alternatives. They are long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; and cost.

Bedrock—The native consolidated rock underlying the ground.

Biological Reductive Dechlorination—A biological process for remediation of groundwater that degrades TCE with microorganisms.

Capital Cost—The actual cost to install equipment, including the construction costs.

Chemical of Concern (COC)—Chemicals at a site that present an unacceptable threat to human health or the environment and require response action.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)—CERCLA as amended by the Superfund Amendments and Reauthorization Act, and other amendments, 42 U.S.C. 9601 et seq., is also referred to as "Superfund."

Decision Document—A legal document issued following the RI and FS that sets forth the selected remedy for cleanup of a site as decided by the authorized decisionmaker for the lead federal agency.

Dispersion—The spreading and mixing of chemical constituents in groundwater as a result of groundwater flows.

Ecological Risk Assessment (ERA)—A study of the actual or potential danger to the environment from hazardous substances at a specific site. The ERA estimates nonhuman health risk if no response action is taken.

Feasibility Study—A comprehensive evaluation of potential alternatives for remediating contamination. It identifies general response actions, screens potentially applicable technologies and process options, assembles alternatives, and evaluates alternatives in detail.

Formerly Used Defense Sites (FUDS): FUDS are properties previously owned by the Department of the Army. The FUDS program was established by Section 211 of the Superfund Amendments and Reauthorization Act of 1986 by establishing the Defense Environmental Restoration Program. The Department of Defense is the lead agency for the FUDS program, and the U.S. Army is the Department's executive agency. The U.S. Army delegated the management and execution of the FUDS program to the USACE.

Groundwater—Water found below ground that fills pores between such materials as sand, silt, gravel, or rock.

Groundwater Divide—The boundary between two adjacent groundwater basins, represented by a high point in the water table.

Human Health Risk Assessment (HHRA)—A study of the actual or potential danger to human health from hazardous substances at a specific site. The HHRA estimates the risk to human health at a site if no response action is taken.

Lens—a permeable, irregularly shaped sedimentary deposit surrounded by impervious rock.

Maximum Contaminant Level (MCL)—The maximum allowable concentration of a chemical in drinking water established by the USEPA.

Micrograms per Liter—Units of concentration corresponding to 1 part per billion.

Modifying Criteria—Two of nine CERCLA criteria used to evaluate remedial alternatives: namely, state and community acceptance.

Monitored Natural Attenuation—Periodic or recurring sampling to observe and record the physical processes of nature, which reduce the concentrations of chemicals over time.

Monitoring Well—A groundwater well installed in an aquifer for measuring the water table elevations, collecting groundwater samples for detection of contaminants, and observing contaminant movement.

National Contingency Plan (NCP)—Federal regulations specifying the methods and criteria for cleaning up sites under CERCLA, codified at 40 Code of Federal Regulations Part 300.

Natural Attenuation—Physical processes of nature that reduce the concentration of chemicals over time.

Permeability—Ability of porous rock, sediment, or soil to transmit water; the rate at which water moves through rocks or soil.

Plume—A volume of groundwater affected by a contaminant source. Typically an elongated, mobile volume representing the extent of contaminated groundwater. A plume looks similar to a drop of paint on a sloped surface.

Preferred Alternative—The cleanup approach proposed by the lead agency based on the information contained in the FS. The preferred remedial alternative, as presented in this Proposed Plan, is subject to change or revision based on public comment.

Preliminary Remediation Goals (PRG)—Draft cleanup concentrations or levels based upon federal and state environmental laws and regulations or the health risk on a given site.

Present Worth—The amount of money that would need to be invested today to fund a stream of expenditures at given points in time. Operations and maintenance expenses are often calculated for their present worth, in order to compare different alternatives. Present worth is not just an addition of the yearly costs, but takes into account interest rates.

Proposed Plan—The document in which the preferred alternative for a site as selected by the lead agency (USACE) is presented to the public for review and comment. The PP summarizes relevant project information documenting the decisionmaking process.

Recharge Rate—The quantity of water per unit of time that replenishes or refills an aquifer.

Remedial Action Objectives—Statements describing the goals to be achieved in protecting human health and the environment.

Remedial Action—The course of action taken at a CERCLA site to eliminate or reduce site contamination and protect human health and the environment.

Remedial Investigation (RI)—The first part of a two-part study that determines the type and quantity contamination present at a site. An RI involves collecting and analyzing samples of groundwater, surface water, soil, sediment, and air. The second part of the study is an FS.

Remediation Goal —Specific cleanup concentrations or levels based upon federal and state environmental laws and regulations or the health risk on a given site.

Response Action—An action taken to mitigate a threat to human health or the environment. The action may be temporary in nature while a final action is developed.

Restoration—Depending on context, the return of the site as closely as possible to pre-contamination conditions (removal of the contamination).

Source Area—An area or sources of pollution that emits a chemical of concern.

Threshold Criteria—The first two of the nine CERCLA criteria: overall protection of human health and the environment, and compliance with ARARs.

Trichloroethene (TCE)—A chlorinated solvent used mainly as a metal degreaser, but also in paint removers and adhesives. TCE is not assessed for carcinogenicity under the Integrated Risk Information System, but is considered as a carcinogen by the California Environmental Protection Agency.

Unsaturated Zone—The layer of soil between the surface and top elevation of groundwater.

Vinyl Chloride (VC)—A simple vinyl halide. It is an important industrial chemical used chiefly to produce its polymer, polyvinyl chloride (PVC). VC is also a breakdown product of TCE. The USEPA classifies VC as a possible cancer causing agent in humans.

Volatile Organic Compound (VOC)—An organic compound that tends to change readily from a liquid to a gas.

REQUEST FOR COMMENTS

Your input on the PP for the KAFS site is important to the USACE. Comments provided by the public are valuable in selecting a final cleanup remedy for the site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by December 12, 2008. If you have any questions about the comment period, please contact Kathy Baker at 816-389-3906. Those with electronic communications capability may submit comments to Kathy Baker at the following electronic mail address: **Kathy.T.Baker@.usace.army.mil**.

COMMENT PROVIDED BY:

Name: ________________________________ **Address:** __________________________________
City: ____ **State:** _____ **Zip:** ______________________

SUBMIT COMMENTS AND FURTHER INFORMATION TO:

United States Army Corps of Engineers
Attn: Kathy Baker
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COMMENTS

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