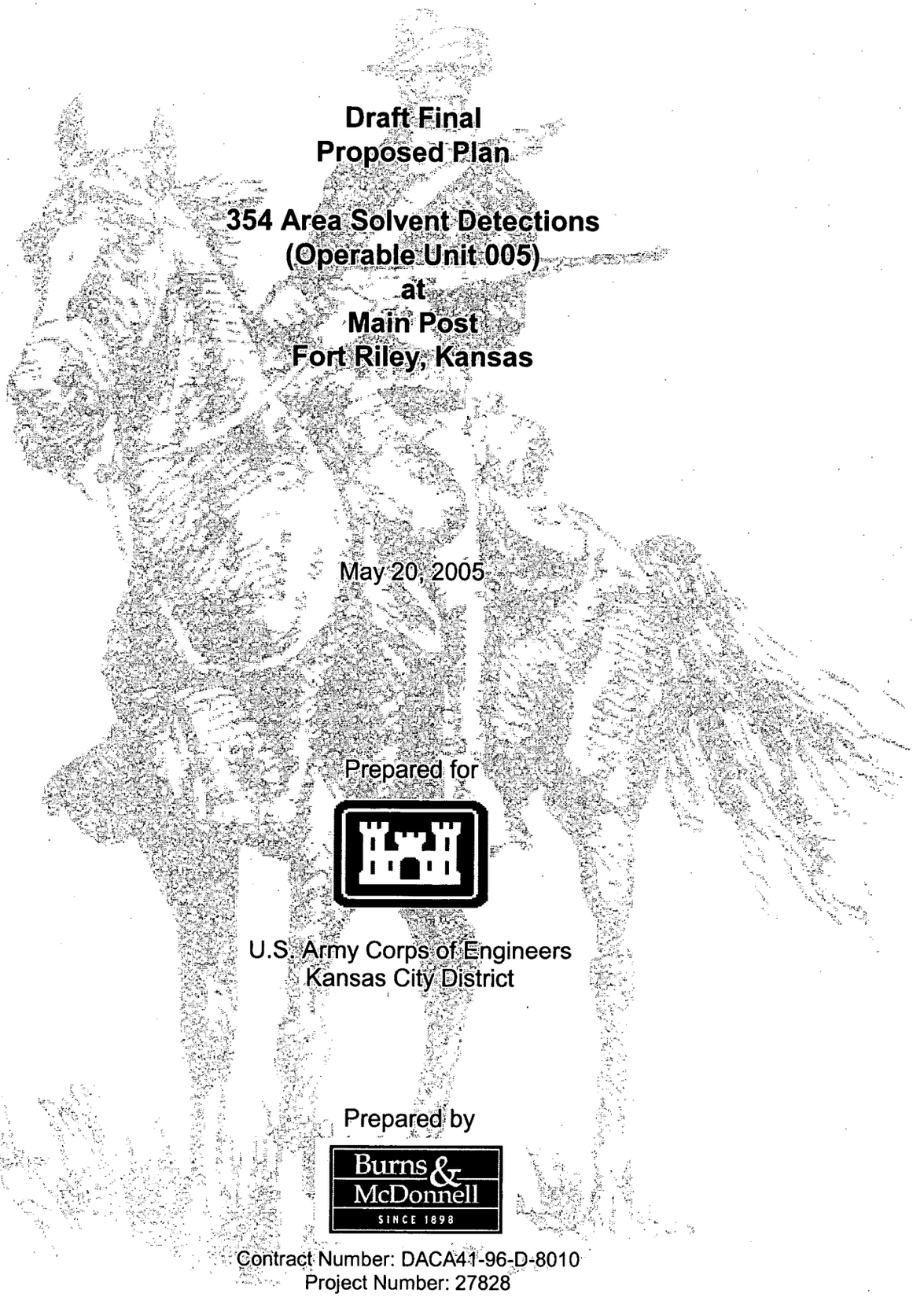


Draft Final
Proposed Plan

354 Area Solvent Detections
(Operable Unit 005)
at
Main Post
Fort Riley, Kansas

May 20, 2005

Prepared for

U.S. Army Corps of Engineers
Kansas City District

Prepared by

Burns & McDonnell
SINCE 1898

Contract Number: DACA41-96-D-8010
Project Number: 27828

354_6_1_001

Draft Final Proposed Plan
354 Area Solvent Detections, Main Post
Fort Riley, Kansas

UNITED STATES DEPARTMENT OF THE ARMY ANNOUNCES PROPOSED PLAN

This Proposed Plan, part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process (Figure 1), identifies the preferred alternative for cleaning up the contaminated groundwater associated with the 354 Area Solvent Detections at Main Post, Fort Riley, Kansas (Site), and provides the rationale for this preference. In addition, this Plan includes summaries of other cleanup alternatives evaluated for use at this Site. This document is issued by the United States Department of the Army (Army), the lead agency for Site activities, in consultation with the United States Environmental Protection Agency Region VII (EPA), and the Kansas Department of Health and Environment (KDHE), the support agencies. A final remedy will be selected for the Site after reviewing and considering all information submitted during the 30-day public comment period on the Proposed Plan. The Army, in conjunction with the EPA and the KDHE, may modify the preferred alternative or select another response action presented in this plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

Dates to Remember:

Public Comment Period: June 12 – July 12, 2005
The Army will accept written comments on the Proposed Plan during the public comment period.

Public Meeting: July 12, 2005
The Army will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at 407 Pershing Court, Fort Riley, Kansas at 7 p.m. in conjunction with the Restoration Advisory Board.

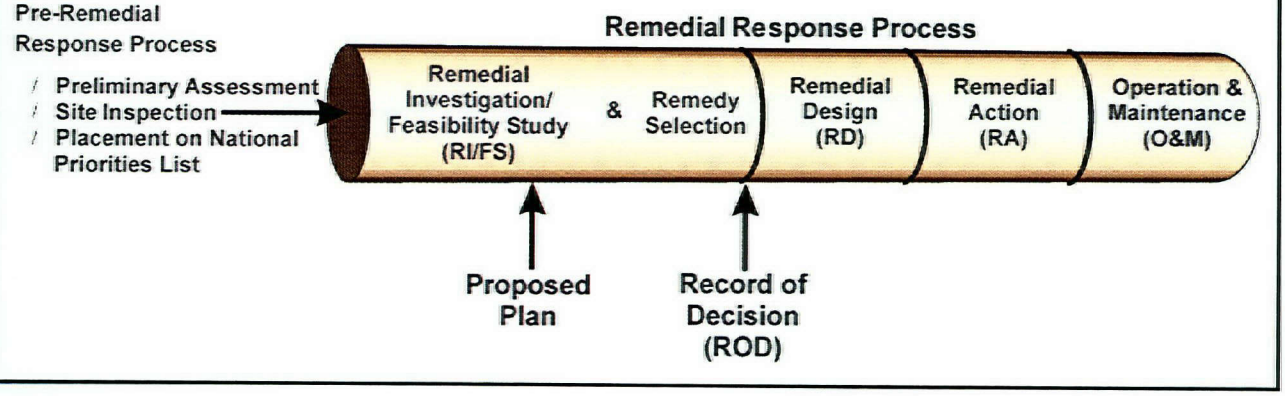
Copies of the RI and FS reports and Proposed Plan are available for viewing at the following locations:

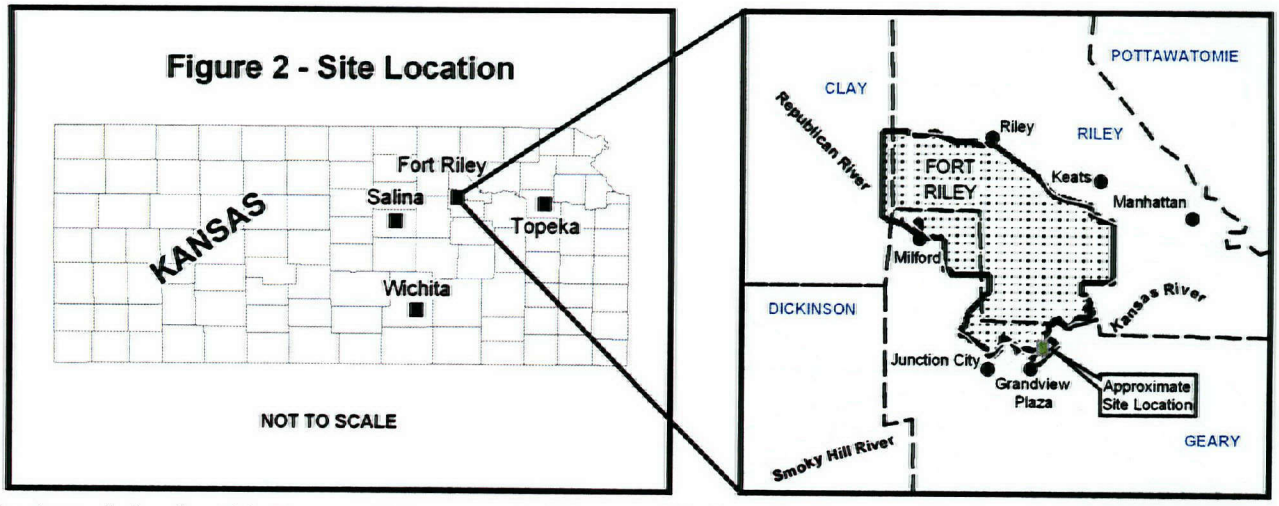
Dorothy Bramlage Public Library
230 West Seventh Street, Junction City, Kansas
(785) 238-4311
Hours: Mon-Thurs 9 a.m. – 9 p.m.
Fri 9 a.m. – 6 p.m.
Sat 9 a.m. – 5 p.m.
Sun 1 p.m. – 6 p.m.

Manhattan Public Library
629 Poyntz Ave, Manhattan, Kansas
(785) 776-4741
Hours: Mon – Thurs 9 a.m. – 9 p.m
Fri 9 a.m. – 8 p.m.
Sat 9 a.m. – 6 p.m.
Sun 1 p.m. – 6 p.m.

The Administrative Record can be viewed at:
Directorate of Public Works
Environmental Division
IMNW-RLY-PWE
407 Pershing Court
Fort Riley, Kansas 66442-6016
(785) 239-8619
Hours: Mon – Fri 9 a.m. – 4 p.m.

Figure 1
The CERCLA Process





The Army is issuing this Proposed Plan as part of its public participation responsibilities under Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation (RI) and Feasibility Study (FS) Reports, and other documents contained in the Administrative Record for this Site. The Army encourages the public to review these documents to gain a more comprehensive understanding of the Site and investigation activities that have been conducted at the Site.

SITE SETTING AND HISTORY

Fort Riley is located along the Republican and Kansas Rivers in Geary and Riley Counties (Figure 2). The 354 Area Solvent Detections Site is located at the Main Post cantonment area, in the southern part of the reservation. The Site extends from the Kansas River north approximately one mile into Main Post (Figure 3). The term Site is used in this report to refer to the general area encompassing portions of Main Post as far north as Godfrey Avenue, and virtually the entire Kansas River point bar, located to the south of the Union Pacific Railroad grade and east of Henry Drive.

Over the years, a variety of activities have been conducted at the 354 Site, which could have resulted in sources of both chlorinated solvent and hydrocarbon contamination. These include the operation of facilities for the storage and maintenance of motorized equipment, facilities for storing and dispensing fuel and oil for vehicles, and at least one area where fire fighting equipment may have been serviced or used for

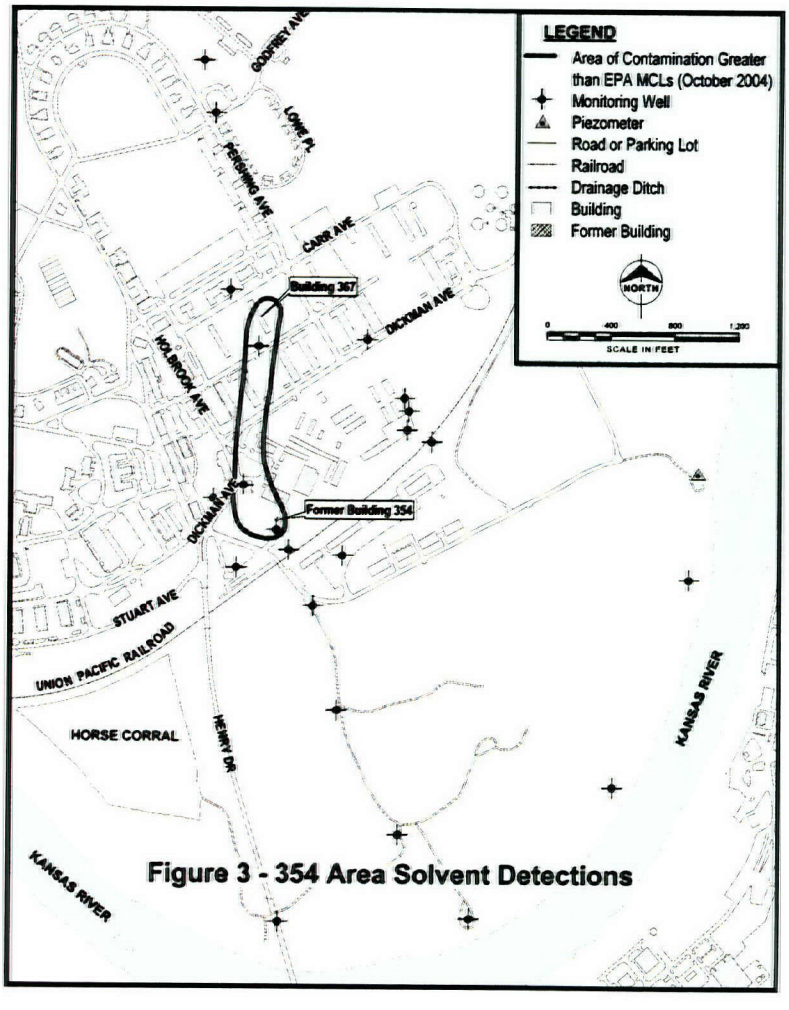


Figure 3 - 354 Area Solvent Detections

training. The former Building 354 was constructed in 1935 as a gasoline service station (Figure 3). In addition to gasoline and diesel fuel, it may have been used as a storage site for solvents and road oil. In 1990 and 1991, the five underground storage tanks (USTs) at this location were removed. Building 367 is located on Carr Avenue (Figure 3). This building was constructed in 1903 and has been used for a variety of purposes, including vehicle maintenance. Both former Building 354 and Building 367 are the locations of contaminant sources at the Site.

On July 14, 1989, the EPA proposed inclusion of Fort Riley on the National Priorities List (NPL) pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The EPA included the Site on the NPL in August 1990. Effective June 1991, the Army entered into a Federal Facility Agreement Docket No. VII 90-F-0015, with the EPA and KDHE to address environmental pollution subject to the Resource Conservation and Recovery Act (RCRA) and /or CERCLA. In 1998, the Army began a RI/FS to identify the types, quantities, and locations of the contaminants at this Site and to develop a plan to address the contamination problem. The EPA and KDHE approved of the RI and FS Reports in 2003 and 2005, respectively.

RESPONSE ACTIONS

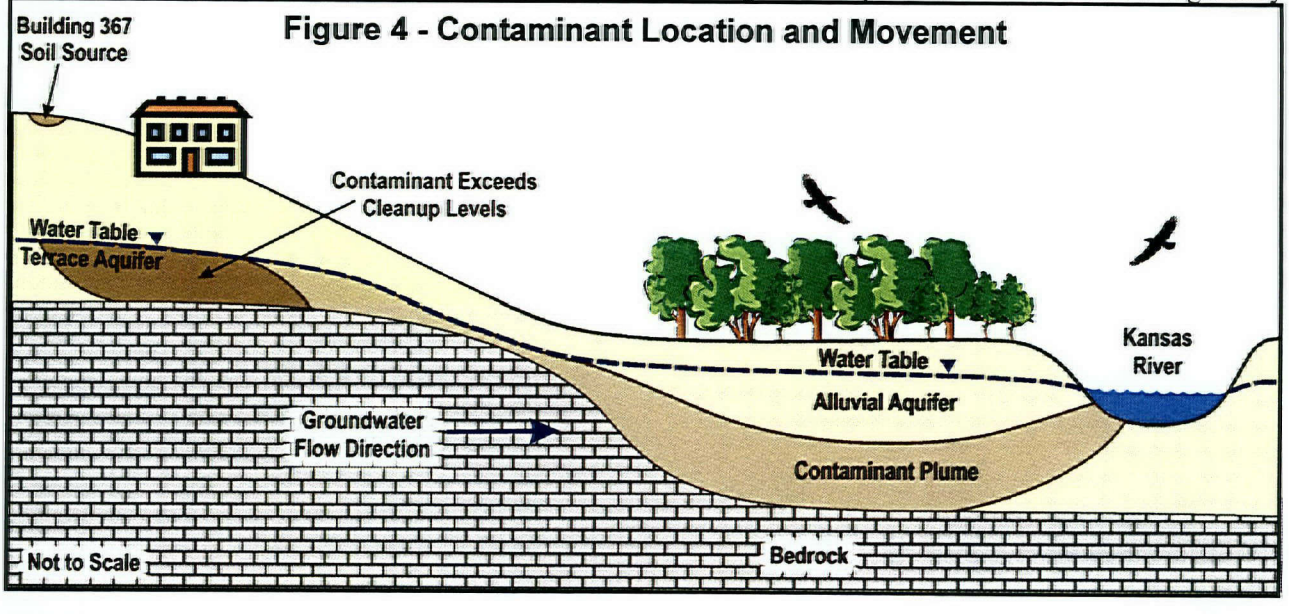
A soil source removal pilot test study was performed at the Building 367 location during 2004. This remediation effort was successful in treating and removing approximately 1000 cubic yards of soil that was contaminated with chlorinated solvents. This effectively eliminated the source of groundwater contamination, which should result in significant drops in future groundwater concentrations.

SITE CHARACTERISTICS

The major findings of the RI and FS Reports are as follows:

- Soil is not a medium of concern at the 354 Solvent Detections Site. The area of shallow soil contaminated with tetrachloroethene (PCE), located just east of Building 367, was remediated through the source removal pilot study.
- Groundwater is a medium of concern at this Site. PCE, trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and benzene are the chemicals of potential concern (COPCs). TCE and cis-1,2-DCE are degradation products of the primary PCE contamination at this Site.
- Aquifer contamination is present as a relatively narrow plume within the terrace aquifer, flowing to the south from the vicinity of Building 367 (Figure 3). Within the Kansas River alluvial aquifer, this plume increases in size although concentrations of PCE and its degradation products decrease below regulatory

Figure 4 - Contaminant Location and Movement



levels of concern. Analytical samples from the Kansas River were nondetect for the COPCs.

- Natural attenuation of contaminants is the dominant mechanism for the decrease in contaminant levels in groundwater at this Site. Natural attenuation was determined to be occurring at the Site due to the presence of degradation products of PCE and favorable natural attenuation parameters. Natural attenuation appears to be active mainly within the alluvial aquifer of the Kansas River.

Figure 4 presents a generalized depiction of the site geology, hydrology, and contaminant distribution.

SUMMARY OF POTENTIAL RISKS

As part of the RI/FS, the Army conducted a baseline risk assessment to determine the current and future effects of contaminants on human health and the environment. The baseline risk assessment at this Site consisted of a human health risk assessment and an ecological risk assessment.

Human Health Summary

The human health risk assessment focused on health effects for on-post populations through direct contact with soil and/or inhalation of chemical vapors from soil, soil gas, and groundwater. The on-post populations (those within the Fort Riley Army Reservation) included indoor workers, utility excavation workers, groundskeepers, and child residents.

The highest potential cancer risk posed by contamination for an on-post current child resident was 8×10^{-7} (or 8 in 10,000,000), which is below the EPA acceptable excess lifetime cancer risk of 1×10^{-4} to 1×10^{-6} (or 1 in 10,000 to 1 in a million). Excess lifetime cancer risk range means cancer risk posed by a contaminated site in excess of the lifetime probability of developing cancer from other causes. Potential risks for non-cancer adverse health affects were also found to be insignificant for the populations evaluated.

In the event that chemical concentrations and/or land use at the Site change in a manner that result in a greater exposure potential than that evaluated in the RI Report, the Army will conduct a comprehensive review of all factors related to the potential risk to ensure adequate protection of human receptors at the Site into the future.

Ecological Summary

The 354 Site was evaluated for the presence of ecological receptors (plants, animals, and aquatic organisms) and completed ecological exposure pathways. Potentially completed exposure pathways were identified at the 354 Site, and these pathways were evaluated. Potential risk to terrestrial receptors was assessed by comparing predicted chemical uptake from soil to published chemical benchmarks. Based on the results of this evaluation, ecological risks are minimal for

What is Risk and How is it Calculated?

A CERCLA human health risk assessment estimates the "baseline risk." This is an estimate of the likelihood of health problems occurring if no cleanup action were taken at a site. To estimate the baseline risk at a CERCLA site, EPA identifies a four-step process:

Step 1: Identify Chemicals of Potential Concern
Step 2: Estimate Exposure
Step 3: Assess Potential Health Effects
Step 4: Characterize Site Risk

In Step 1, the risk assessor compiles all the chemical data for a site to identify what chemicals were detected in each medium (i.e. soil and groundwater). Chemicals that are detected frequently, at high concentrations, or are considered highly toxic, are considered "chemicals of potential concern" and are evaluated in the risk assessment.

In Step 2, the risk assessor considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, the risk assessor calculates a "reasonable maximum exposure" (RME) scenario, which portrays the highest level of human exposure that could reasonably be expected to occur.

In Step 3, the risk assessor compiles toxicity information on each chemical, including numeric values for assessing cancer and non-cancer adverse health affects. The EPA identifies two types of risk: cancer risk and non-cancer risk. The likelihood of any kind of cancer resulting from a CERCLA site is generally expressed as an upper bound probability; for example, a "1 in 10,000 chance." In other words, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than would normally be expected to from all other causes. For non-cancer health effects, the risk assessor calculates a "hazard index." The key concept here is that a "threshold level" (measured usually as a hazard index of less than 1) exists below which non-cancer health effects are no longer predicted.

In Step 4, the risk assessor uses the exposure information from Step 2 and toxicity information from Step 3 to calculate potential cancer and non-cancer health risks. The results are compared to EPA acceptable levels of risk to determine whether site risks are great enough to potentially cause health problems for populations at or near the CERCLA site.

What are the "Chemicals of Potential Concern"?

The Army has identified four contaminants that pose the greatest potential risk to human health at this Site. COPCs were identified as contaminants in groundwater exceeding the Safe Drinking Water Act Maximum Contaminant Levels (MCLs). MCLs are set by the EPA to be protective of human health. Tetrachloroethene (PCE) has an MCL of 5 parts per billion (ppb). Trichloroethene (TCE) also has an MCL of 5 ppb. cis-1,2-Dichloroethene (cis-1,2-DCE) has an MCL of 70 ppb and benzene has an MCL of 5 ppb. Analytical results presented below were collected during the October 2004 groundwater sampling event. This event was completed prior to completion of the soil treatment and removal pilot study.

Tetrachloroethene (PCE): PCE is a halogenated organic compound historically used as a degreaser in many industries. PCE in groundwater at this Site ranges from non-detect to 79 ppb (October 2004). Exposure to this compound has been associated with deleterious health effects in humans, including anemia, skin rashes, diabetes, liver conditions, and urinary tract disorders. Based on laboratory studies, PCE is considered a probable human carcinogen.

Trichloroethene (TCE): TCE is a degradation product of PCE. TCE in groundwater at this Site ranges from non-detect to 3 ppb (October 2004). Exposure to this compound has been associated with deleterious health effects in humans, including anemia, skin rashes, diabetes, liver conditions, and urinary tract disorders. Based on laboratory studies, TCE is considered a probable human carcinogen.

cis-1,2-Dichloroethene (cis-1,2-DCE): cis-1,2-DCE is also a degradation product of PCE. cis-1,2-DCE in groundwater at this Site ranges from non-detect to 7 ppb (October 2004). Exposure to this compound has been associated with deleterious health effects in humans, including blindness, pulmonary hemorrhage, and skin rashes. Based on laboratory studies, cis-1,2-DCE is also considered a probable human carcinogen.

Benzene: Benzene is a major component of gasoline and various petrochemicals. Benzene in groundwater at this Site ranges from non-detect to 29 ppb (October 2004). Exposure to this compound has been associated with deleterious health effects in humans, including blood diseases, leukemia, and effects on reproductive organs. Based on laboratory studies, benzene is also considered a known human carcinogen.

terrestrial flora and fauna inhabiting the 354 Site.

The potential risk to aquatic and benthic organisms was also assessed using benchmarks. Concentrations of volatile organic compounds measured in river sediment and predicted in river water are unlikely to pose appreciable risk. Critical habitat for the bald eagle, piping plover, and interior least tern occurs along the Kansas River. There is minimal ecological risk to these species at the 354 Site.

In the event that conditions at the Site change in a manner that result in a greater exposure potential than that evaluated in the RI Report, ecological risk will be reviewed to ensure adequate protection of ecological receptors at the Site into the future.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are the cleanup objectives for protection of human health and the environment. The RAOs for this Site are to:

- Prevent the potential for degradation of the surface waters of the Kansas River by reducing levels or eliminating contaminants from the margin of the alluvial aquifer of the Kansas River.
- Reduce contamination levels to below the EPA Maximum Contaminant Levels (MCLs) within the alluvial aquifer of the Kansas River through the use of natural and/or active remedial processes.
- Reduce contaminant levels, to the extent practicable and appropriate, within the terrace aquifer, through natural and/or active remedial processes.

While other water sources are available and currently being used, a future beneficial use of groundwater at the Site may be as a drinking water source. The Preliminary Remediation Goals (PRGs) for groundwater would be the chemical-specific Applicable or Relevant and Appropriate Requirements (ARARs) for drinking water. The PRGs for groundwater at this Site are the following MCLs (levels considered safe by EPA for drinking water):

- PCE: 5 parts per billion (ppb)
- TCE: 5 ppb
- cis-1,2-DCE: 70 ppb
- Benzene: 5 ppb

SUMMARY OF REMEDIAL ALTERNATIVES

Common Elements

Many of the alternatives evaluated for this Site have common components, such as institutional controls. The purpose of institutional controls is to limit exposure to contaminants in the groundwater. Institutional controls at this Site will likely consist

of restrictions written into the Fort Riley Real Property Master Plan to restrict the installation of water wells for domestic or other purposes.

Other controls, including community awareness and groundwater monitoring, are also components of most alternatives. Groundwater monitoring provides a tool for ensuring that the remedial remedy is progressing as anticipated, as well as measuring this progress. Should conditions change from those anticipated, additional remedial actions could be implemented if such action is warranted.

Remedial alternatives considered for this Site are summarized below. The alternatives are numbered as presented in the FS Report.

Alternative 1 - No Action
CERCLA generally requires that the "no action" alternative be evaluated to establish a baseline for comparison with the other alternatives considered. Under this alternative, the Army would take no action at this Site to prevent exposure to the groundwater contamination.

Alternative 2 - Monitored Natural Attenuation with Institutional Controls (MNA)

Natural attenuation refers to naturally-occurring processes in soils and groundwater aquifers that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in those media. These in-situ processes include biodegradation, dispersion, dilution, adsorption, volatilization, and chemical or biological stabilization or destruction of contaminants. Microorganisms play a significant role in the degradation and destruction of toxic compounds. Monitored natural attenuation (MNA) refers to the periodic sampling and monitoring of geochemical and contaminant conditions at a site to verify that natural attenuation is ongoing. Contaminant concentrations and natural attenuation parameters would be monitored periodically to evaluate if the natural attenuation process is reducing contaminant concentrations at the Site.

Alternative 3 – In-Situ Chemical Oxidation with Institutional Controls and Monitored Natural Attenuation (Chemox)
This alternative consists of the injection of a chemical oxidation (chemox) agent into the groundwater at the origin of the plume. The chemox agent converts the hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert. Commonly used chemox agents include ozone, peroxide, and permanganate. The chemox agent to be used at this Site would be determined during the design phase of the project.

Remedial Alternatives Considered

No.	Short Name	Full Name
1	No Action	No Action
2	MNA	Monitored Natural Attenuation with Institutional Controls
3	Chemox	Chemical Oxidation with Institutional Controls and Monitored Natural Attenuation
4	EAB	Enhanced Anaerobic Bioremediation with Institutional Controls, and Monitored Natural Attenuation
5	Pump & Treat	Groundwater Extraction and Ex-Situ Treatment with Institutional Controls and Monitored Natural Attenuation

Alternative 4 - Enhanced Anaerobic Bioremediation with Institutional Controls and Monitored Natural Attenuation (EAB)
This alternative consists of the injection of a carbon source into the groundwater at several locations along the length of the plume. A carbon source will enhance the degradation of contaminants by microorganisms. A carbon source, such as lactate, molasses, or vegetable oil, will stimulate increased degradation of the contaminants. The carbon source to be used at this Site would be determined during the design phase of the project.

Alternative 5 Groundwater Extraction and Ex-Situ Treatment with Institutional Controls and Monitored Natural Attenuation (Pump & Treat)
This alternative consists of installing a groundwater extraction system (a.k.a., Pump & Treat) to remediate the most contaminated area(s) of the plume. This system removes the contaminated groundwater, treats it on site, and then discharges the clean water back to the environment. The extraction rate for this Site would be approximately 20 gallons per minute. The treated groundwater would be discharged to the Fort Riley sanitary sewer system and, ultimately, the Kansas River.

Table 1 - Comparative Evaluation Summary

Evaluation Criteria	Alternatives				
	1 - No Action	2 - MNA	3 - Chemox	4 - EAB	5 – P & T
Protection of Human Health and the Environment	No	Yes	Yes	Yes	Yes
Compliance with ARARs	No	Yes	Yes	Yes	Yes
Long-term Effectiveness and Permanence	NC	2	1	1	5
Reduction of Toxicity, Mobility, or Volume	NC	1	1	1	5
Short-term Effectiveness	NC	4	4	4	3
Implementability	NC	1	3	3	6
Cost	NC	1	3	3	7
Total of Rankings	NC	9	12	12	26
Overall Ranking	NC	1	2	2	4

Notes:

Ranking
- 1 Most favorable alternative
- 3 Good, generally favorable
- 5 Fair, potentially unfavorable
- 7 Poor, unfavorable
- 10 Completely fails the criteria

- Yes Meets the requirements of the threshold criteria.
- No Does not meet the requirements of the threshold criteria.
- NC Not considered. Does not meet the threshold criteria.

EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remedial alternatives individually and against each other in order to select a remedy. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed below. Two of the criteria (Overall Protection of Human Health and the Environment and Compliance with ARARs) are threshold criteria. These two criteria must be met in order for an alternative to be considered acceptable. Table 1 summarizes the comparative evaluation.

Overall Protection of Human Health and the Environment

Based on the risk assessments (human health and ecological) performed in the RI Report, all of the alternatives are protective of human health and the environment because the risk estimates for current and future reasonable maximum exposure (RME) scenarios do not exceed the USEPA accepted risk levels. However, for the purposes of this comparative analysis, Alternative 1 (No Action) will be considered as not protective of human health and the environment. This is not unreasonable if an unforeseen exposure scenario develops and there are no institutional controls in place to deal with it.

Compliance with ARARs

All of the remedial alternatives, except Alternative 1 (No Action), are anticipated to comply with preliminary chemical-specific ARARs (ARARs are regulatory requirements set by the state and federal governments). Alternative 1 does not comply with chemical-specific ARARs (i.e., MCLs) because contaminant levels are currently above MCLs and this alternative takes no action to address the ARAR. It is probable the Alternative 1 would eventually meet preliminary chemical-specific ARARs as a result of NA processes active within the aquifer. However, Alternative 1 provides no mechanism to document that ARARs have been met. Therefore, Alternative 1 is dropped from further consideration because it does not meet one of the threshold criteria.

Long-Term Effectiveness and Permanence

The soil treatment and removal under the pilot study have eliminated the soil hot spot at Building 367. Once RAOs are met, Alternatives 2 through 5 should all provide similar long-term effectiveness and permanence at the Site. However, due to the known rebounding effects associated with Alternative 5 (Pump & Treat), this alternative is considered less favorable in terms of long-term effectiveness and permanence than Alternatives 2 through 4. Rebounding effects occur when the system is shut down and contaminants diffuse out of the low permeability zones within the aquifer. Alternative 5 is also less desirable because contaminated water is removed from the aquifer and

brought to the surface. This increases chances for human exposure and adds risk.

Reduction of Toxicity, Mobility, or Volume

Alternatives 2 through 5 are anticipated to provide similar levels of reduction in toxicity, mobility, and volume of contaminants in the plume. Alternative 5 (Pump & Treat) transfers contaminants to another medium (i.e., air and carbon) rather than destroying them in-situ.

Short-Term Effectiveness

Because no quantitative modeling was performed at this Site, only a qualitative estimate can be made on the length of time required to achieve RAOs. This was done as a ranking of the four alternatives, with Alternative 5 (Pump & Treat) achieving RAOs most quickly, and Alternative 2 (MNA) taking the longest to achieve RAOs. Alternatives 3 and 4 (Chemox and EAB) would probably take an intermediate length of time.

Institutional controls address potential receptors during remedial actions by limiting or preventing exposure to contaminated groundwater. Alternatives 2 (MNA), 3 (Chemox), and 4 (EAB) all involve the treatment of the groundwater in-situ, which limits the potential for direct contact with contaminated media. Alternative 5 (Pump & Treat) involves pumping contaminated groundwater to the ground surface for treatment, which would increase the potential for contact.

There are construction and/or operation hazards associated with Alternatives 3, 4, and 5 (Chemox, EAB, and Pump & Treat). These include risks involved with working with heavy machinery including drilling, trenching, hauling, and erection equipment. There are also unique hazards associated with handling chemical oxidants in the field. A site-specific safety and health plan will minimize hazards associated with construction and/or operation.

The most reliable of the alternatives is 2 (MNA). Alternatives 3 and 4 do not require any O&M following the initial injection; however, it is possible that the injection of additional reagent might be required in the event contaminant levels do not decrease as predicted. The pump and treat system (Alternative 5) would likely be equipped with a remote telemetry system to notify key personnel in the event operational problems occur. A site visit would then be made to correct the problem(s). Pump and treat systems require frequent O&M visits to ensure they continue to function as designed. The inclusion of a groundwater monitoring program and institutional controls address short-term reliability in the event the selected remedial alternative does not reduce contaminant levels at the Site.

Implementability

Alternative 2 (MNA) would be the simplest alternative to implement because there are no activities associated with this alternative other than groundwater monitoring. Administrative implementability of the institutional controls

Evaluation Criteria for CERCLA Remedial Alternatives

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.

Long-term Effectiveness and Permanence 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 length of 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, periodic, and annual operations and maintenance (O&M) costs, as well as present worth cost. Present worth cost 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 agrees with the Army's analyses and recommendations, as described in the RI/FS and Proposed Plan.

Community Acceptance considers whether the local community agrees with Army's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

associated with this alternative would be the same as for the other alternatives.

Alternatives 3 and 4 (Chemox and EAB) would be fairly simple to implement since both require the use of direct-push equipment to inject treatment fluids into the aquifer. No permanent support infrastructure on the surface is required. Preferential pathways for the injected materials to move during injection may be an implementability issue with Alternatives 3 and 4. Administrative implementability of the institutional controls associated with this alternative would be the same as for the other alternatives.

Table 2 - Summary of Costs for Evaluations

Alternative		Total Capital Costs[1]	Total O&M Costs[2]	Total Periodic Costs[3]	Total Project Cost[4]	Total Present Value Cost at 3.2%[5]
1	No Action	$ -	$ -	$440,000	$440,000	$300,000
2	MNA	$48,000	$1,200,000	$110,000	$1,300,000	$1,000,000
3	Chemox	$650,000	$1,600,000	$130,000	$2,300,000	$1,900,000
4	EAB	$470,000	$1,200,000	$270,000	$1,900,000	$1,600,000
5	Pump & Treat	$590,000	$4,100,000	$130,000	$4,800,000	$3,700,000

Notes:
1 Includes costs for design, bench and pilot testing (if necessary), equipment/chemical costs, construction and implementation, and institutional controls.
2 Includes costs for groundwater monitoring, reporting (if necessary), electricity (if necessary), maintenance, and parts.
3 Includes costs for five-year reviews and closure reporting.
4 Total Capital Costs + Total O&M Costs + Total Periodic Costs
5 Present value cost for a 30-year period using a 3.2 percent discount rate.

Alternative 5 (Pump & Treat) would be the most difficult alternative to implement. This alternative would require an extensive surface support infrastructure and would likely require trenching during the construction phase. It would be difficult to perform these construction tasks because of the built-up nature of Main Post. Administrative implementability of the institutional controls associated with this alternative would be the same as for the other alternatives.

Cost Evaluation

A cost summary is provided in Table 2.

State/Support Agency Acceptance

The EPA and KDHE support the Preferred Alternative presented for this Site.

Community Acceptance

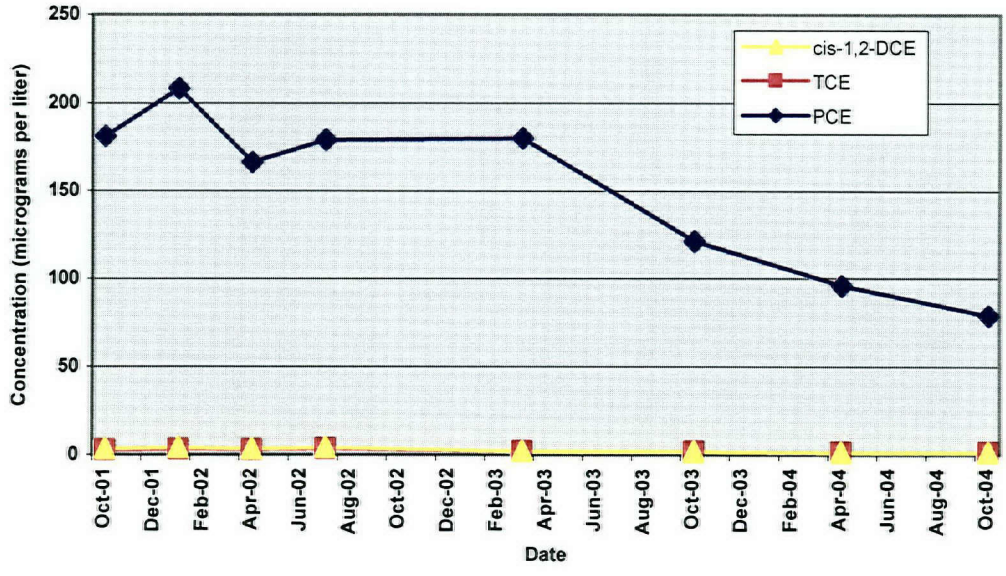
Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Record of Decision (ROD) for the Site.

SUMMARY OF THE PREFERRED ALTERNATIVE

The Preferred Alternative for remediation of the groundwater contamination at this Site is Alternative 2, Monitored Natural Attenuation (MNA) with Institutional Controls. This alternative relies on natural degradation processes occurring at the Site to further reduce contaminant concentrations to levels below the MCLs. Geochemical evidence from the Site and the presence of breakdown products indicate that natural attenuation is actively occurring. With this alternative, the Site will undergo groundwater sampling on an annual basis to monitor progress and institutional controls will be put in place to prevent exposure of receptors.

To prevent possible leaching of contaminants to groundwater, the most contaminated soil was eliminated through the soil treatment under the pilot study (using in-situ treatment and excavation). The treatment with potassium permanganate was conducted from March to April 2004. Natural attenuation combined with removal of the contaminated soils should yield a continuing decrease of contaminant levels in the ground water. Post-treatment ground water samplings conducted in April and October 2004 indicate that the levels are decreasing. As shown on Figure 5, the contaminants in Monitoring Well B354-01-27 have

Figure 5 - Monitoring Well B354-01-27



decreased since the fall of 2001. This well is located approximately 200 feet down the groundwater flow path from the former soil source area adjacent to Building 367.

The Preferred Alternative was selected over the other alternatives because it is expected to continue to provide risk reduction through degradation of contaminants in the groundwater and provides measures to prevent future exposure to contaminated groundwater. Based on the information available at this time, the Army, EPA, and KDHE believe the Preferred Alternative would be protective of human health and the environment, would comply with ARARs, would be cost effective, and would utilize permanent solutions to the maximum extent practicable.

COMMUNITY PARTICIPATION

The Army, EPA, and KDHE provide information regarding the cleanup of this Site to the public through public meetings; presentations and discussions at Restoration Advisory Board (RAB) meetings; the Administrative Record for the Site; and announcements published in the Junction City Daily Union and Manhattan Mercury newspapers. The Army, EPA, and KDHE will rely on public input to ensure that the concerns of the community are considered in selecting an effective alternative for this Site. The Preferred Alternative can changed in response to public comment or new information.

An Availability Session will be held during the public comment period to present the conclusions of the RI and FS Reports, to further elaborate on the selection of the preferred alternative, and to receive public comments. The dates for the public comment period and the date, location, and time of the public meeting as well as the locations of the Administrative Record are provided on Page 1 of this Proposed Plan.

For further information on the 354 Area Solvent Detections, Main Post, Fort Riley, Kansas, please visit the locations identified on Page 1 to view various site documentation or contact:

Dr. Richard Shields
Project Manager
(785) 239-3194

Mr. Craig Phillips
IRP Program Manager
(785) 239-8574.

Directorate of Public Works
Environmental Division
IMNW-RLY-PWE
407 Pershing Court
Fort Riley, Kansas 66442-6016

ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
Army	United States Department of the Army
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Chemox	Chemical oxidation
cis-1,2-DCE	cis-1,2-dichloroethene
COPCs	Contaminants of Potential Concern
EAB	Enhanced Anaerobic Bioremediation
EPA	United States Environmental Protection Agency, Region VII
FS	Feasibility Study
KDHE	Kansas Department of Health and Environment
MCL	Maximum Contaminant Level
MNA	Monitored Natural Attenuation
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NPL	National Priorities List
PCE	Tetrachloroethene
O&M	Operation and Maintenance
ppb	Part per Billion
PRGs	Preliminary Remedial Goals
RAB	Restoration Advisory Board
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
TCE	Trichloroethene

GLOSSARY OF TERMS

Specialized terms used in this Proposed Plan are defined below:

Administrative Record – The body of documents available to the public associated with characterization and remedy selection at a site.

Applicable or Relevant and Appropriate Requirements (ARARs) – The Federal and State environmental laws that a selected remedy must meet. These requirements vary among sites and alternatives.

Baseline Risk Assessment – An evaluation of the potential threat to human health and the environment in the absence of any remedial action.

Bioremediation – The use of microorganisms to transform or alter, through metabolic or enzymatic action, hazardous organic contaminants into non-hazardous substances.

Carcinogen – Capable of causing the cells of an organism to react in a manner to produce cancer.

Capital Costs – Expenditures initially incurred to build or install the remedial action.

Contaminant Plume – A visible or measurable discharge of a contaminant from a given point of origin.

Ecological Risk Assessment – Study that assesses risks to aquatic and terrestrial receptors posed by contaminant releases from a site.

Excess Lifetime Cancer Risk - Cancer risk posed by a contaminated site in excess of the lifetime probability of developing cancer from other causes.

Feasibility Study (FS) – Identifies and evaluates the appropriate technical approaches and treatment technologies to address contamination at a site.

Groundwater – Underground water that fill pores in soils or openings in rocks to the point of saturation. Groundwater is often used as a source of drinking water via municipal or domestic wells.

Groundwater Monitoring – On-going collection of groundwater information about the environment that helps gauge the effectiveness of a clean-up action.

Hazard Index - The total potential for noncancer health effects, such as organ damage, from chemical exposures.

Human Health Risk Assessment – A study that determines and evaluates risk that site contamination poses to human health.

In Situ – In the natural or original place or location.

Institutional Controls – Actions taken to limit unauthorized access to the site, control the way in which an area of the site is used, and monitor contamination migration.

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

Monitored Natural Attenuation (MNA) – refers to the periodic sampling and monitoring of geochemical and contaminant conditions at a site.

National Oil and Hazardous Substance Pollution Contingency Plan (NCP) – Regulations governing cleanups under EPA's Superfund program.

National Priorities List (NPL) – EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for cleanup under the Superfund program.

Natural Attenuation – The processes in soil and groundwater environments that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentrations of contaminants in those media. These in-situ processes include biodegradation, dispersion, dilution, adsorption, volatilization, and chemical or biological stabilization or destruction of contaminants.

Part per Billion (ppb) – A unit of measurement equivalent to one microgram of contaminant per liter of water.

Periodic Costs – Costs that occur only once every few years during the O&M period; may be either capital or O&M costs.

Pilot Study – Small-scale test to evaluate the success of a technology and potentially determine design criteria for a full-scale test.

Preferred Alternative – Final remedial alternative that meets NCP evaluation criteria and is supported by regulatory agencies.

Preliminary Remediation Goal – The desired end-point concentration that is believed to provide adequate protection for human health and the environment. These are usually quantitative, chemical-specific concentration targets for each contaminant.

Present Value Cost – A method of evaluation of expenditures that occur over different time periods. By discounting all costs to a common base year, the costs for different remedial action alternatives can be compared on the basis of a single figure for each alternative. When calculating present worth cost for Superfund sites, total O&M costs are included.

Reasonable Maximum Exposure (RME) – The highest exposure that is reasonably expected to occur at a site.

Remedial Action – Action(s) taken to correct or remediate contamination.

Remedial Action Objectives (RAOs) – Remediation objectives for protection of human health and the environment.

Record of Decision (ROD) – A formal document that is a consolidated source of information about a Superfund site, the remedy selection process, and the selected remedy.

Receptor – An organism that receives, may receive, or has received environmental exposure to a chemical.

Remedial Investigation (RI) – A study conducted to identify the types, amounts, and locations of contamination at a site.

Resource Conservation and Recovery Act (RCRA) – The Federal act that established a regulatory system to track hazardous wastes from the time they are generated to their final disposal. RCRA also provides for safe hazardous waste management practices and imposes standards for transporting, treating, storing, and disposing of hazardous waste.

Newspaper Ad

Fort Riley Proposes Cleanup Plan for Contaminated Groundwater

Proposed Plan Fort Riley, Kansas

The United States Department of the Army (Army), the lead agency for Site activities, with support from the Kansas Department of Health and Environment (KDHE) and the United States Environmental Protection Agency (EPA), will hold a Public Meeting to discuss the Remedial Investigation/Feasibility Study (RI/FS) Report and Proposed Plan for the cleanup of contaminated groundwater associated with the 354 Area Solvent Detections at Main Post, Fort Riley, Kansas (Site). The RI/FS Report discusses the risks posed by the Site and presents an evaluation of cleanup options. The Proposed Plan identifies a preferred cleanup alternative for the public to comment on along with the other options considered.

The Army, KDHE, and EPA evaluated the following options for addressing the contaminated groundwater at this Site:

- **Monitored Natural Attenuation with Institutional Controls**
- In-Situ Chemical Oxidation with Institutional Controls and Monitored Natural Attenuation
- Enhanced Anaerobic Bioremediation with Institutional Controls and Monitored Natural Attenuation
- Groundwater Extraction and Ex-Situ Treatment with Institutional Controls and Monitored Natural Attenuation

Based on all available information, the preferred alternative proposed for public comment at this time is **Monitored Natural Attenuation with Institutional Controls.** Natural attenuation refers to naturally-occurring processes in soil and groundwater aquifers that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in those media. These in-situ processes include biodegradation, dispersion, dilution, adsorption, volatilization, and chemical or biological stabilization or destruction of contaminants. Microorganisms play a significant role in the degradation and destruction of toxic compounds. Monitored natural attenuation refers to the periodic sampling and monitoring of geochemical and contaminant conditions at a site to determine whether natural attenuation is taking place within the aquifer.

In addition, institutional controls will be implemented. The purpose of institutional controls is to limit exposure to contaminants in the groundwater. Institutional controls at this Site will likely consist of restrictions written into the Fort Riley Real Property Master Plan to restrict drilling or using water wells for domestic or other purposes.

Although this is the preferred alternative at the present time, the Army, KDHE, and EPA welcome the public's comments on all of the alternatives listed above. The formal comment period ends on July 12, 2005. The Army, KDHE, and EPA will choose the final remedy after the comment period ends and may select any one of the options after taking public comments into account.

Public Comment Period:
June 12 – July 12, 2005
The Army will accept written comments on the Proposed Plan during the public comment period.

Public Meeting:
July 12, 2005
The Army will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at407 Pershing Court, Fort Riley, Kansas at 7 p.m.

Copies of the RI/FS reports and Proposed Plan are available for viewing at the following locations:

Dorothy Bramlage Public Library
230 West Seventh Street
Junction City, Kansas
(785) 238-4311
Hours: Mon – Thurs 9 a.m. – 9 p.m.
Fri 9 a.m. – 6 p.m.
Sat 9 a.m. – 5 p.m.
Sun 1 p.m. – 5 p.m.

Manhattan Public Library
629 Poyntz Ave
Manhattan Kansas 66502
(785) 776-4741
Hours: Mon – Thurs 9 a.m. – 9 p.m.
Fri 9 a.m. – 8 p.m.
Sat 9 a.m. – 6 p.m.
Sun 1 p.m. – 6 p.m.

The Administrative Record can be viewed at:

Directorate of Public Works
Environmental Division
IMNW-RLY-PWE
407 Pershing Court
Fort Riley, Kansas 66442-6016
(785) 239-8619
Hours: Mon – Fri 9 a.m. – 4 p.m.

For further information or to submit written comments, please contact:

Dr. Richard Shields
Project Manager
(785) 239-3194

Mr. Craig Phillips
IRP Program Manager
(785) 239-8574

Directorate of Public Works
Environmental Divison
IMNW-RLY-PWE
407 Pershing Court
Fort Riley, Kansas 66442-6016

C E R T I F I C A T I O N

The meeting was recorded and transcribed verbatim by Jennifer L. Gibson, court reporter, on Tuesday, July 12, 2005.

Jennifer L. Gibson

JENNIFER L. GIBSON

PROPOSED PLAN FOR 354 AREA SOLVENT DETECTIONS

[The meeting was called to order at 1900 hours, 12 July 2005.]

Mr. Craig Phillips: Have we any public comment documents?

Dr. Richard Shields: Yes, we do.

Mr. Craig Phillips: What have we, Dr. Shields?

Dr. Richard Shields: We have 354 Area Solvent Detection Proposed Plan.

Mr. Craig Phillips: Very well. And when would that public comment period close?

Dr. Richard Shields: It closes tonight as soon as this meeting terminates.

Mr. Craig Phillips: All right. So with that, shall we move right into your presentation on said Proposed Plan for the 354 Area Solvent Detection Site?

Dr. Richard Shields: We can do that.

Basically it's the one that we've been working on with our regulatory partners. We've gotten the approval of topical uses. Number 5 stretches from Building 430, which is the Main Post Fire Station all the way to the Kansas River on the 'Point Bar'.

From the Main Post Fire Station to the Point Bar on the Kansas River it's somewhere in the neighborhood of about 1800 feet long. Principal contaminants are tetrachloroethylene, trichloroethylene, cis-1, 2-dichloroethylene, and benzene. Benzene is principally down near where this was originally named for the Building 354 Area and was a Service Station back in the 1920's. The rest of these were primarily seen out back at Building 367 where we did a little bit of work. It's primarily ground water contamination.

The single soil 'hot spot' was adjacent to that building back there and it was a stable, then a motor pool, and it discharged probably several types of solvents back there, but

what we see is the PCE in very elevated levels. We did a pilot study treated with potassium permanganate that then allowed us to meet the requirements of KDHE and EPA's Monitored Natural Attenuation guidance. At this point we have a very low human heath risk and no evidence of ecological risks present as were demonstrated in the feasibility study and carried through for the proposed plan.

Our alternatives, as you can see here, Alternative 1 is a no action that is required. It just means that we aren't going to do anything, which unfortunately is inappropriate or is inappropriate because it doesn't meet the threshold criteria. Monitored Natural Attenuation with Institutional Controls is the preferred alternative. Alternative 3-In-Situ Chemox with Institutional Controls and Monitored Natural Attenuation. Enhanced Anaerobic Bioremediation was Alternative 4. Alternative 5-Ground-water extraction and exsitu treatment with, again, ICs and MNA.

Again, Alternative 1, no action, was not considered because it does not meet the two threshold criteria. Basically the protection of human heath on the environment and compliance with ARARs. Alternative 2, MNA, ranked number 1. Alternatives 2 and 3 turned out to be EAB, came out about the same, almost identically. And Alternative 5, which is Pump and Treat, was ranked last.

Here is just a breakdown of cost as presented in the proposed plan and in the feasibility study. The Alternative 1 still costs money because there are things you have to do with the site; MNA was $1,000,000; Chemox was $1,900,000; EAB was $1,600,000; P and T was $3,700,000. These were all predicated on those performance dates that were developed in the feasibility study. These all break down with the chemical constituents so that it turns into a

different substance and eventually becomes a non-hazardous material. This one has---one of its reasons for being a little more expensive is it has a tendency to rebound and that's because it comes off partitioned in the solid particles. So that you get it below the maximum contaminate levels and it can rise back above those as it comes out of---off partitions into those solid particles back into solution.

Preferred alternative was Monitored Natural Attenuation and that has Institutional Controls as part of it. The Institutional Controls in this alternative are based on the real property master plan, which is the installation's basic way to regulate land use and is developed within our directorate now since we are part of PW.

This is still a natural degradation process that continues to reduce contaminate levels. We had the 'hot spot' removed by the pilot study where we used potassium permanganate. The contaminate levels are still decreasing. They have on the point bar below the transition zone. Below the railroad tracks they are already below any of the MCLs. The only place that we have contaminate remaining above the MCL is the well right out south of us here on---Well 27, Well 9, and then one called TSO 29201, and that is PCE. Those three are still elevated, but right beyond---just to the south of it is TSO 29202 and it is all below. It is about 100 feet from 01. And then basically with the---we have KDHE and EPA's approval of the proposed plan and they concur that it is all protective of human health, the environment, and complies with ARARs, and is cost effective.

Done. Any questions?

Mr. Craig Phillips: Thank you, Doctor Shields for educating our public visitors.

All right. I say we officially begin the public comment period. Are there any comments from the public?

[There were no comments from the public.]

Mr. Craig Phillips: So, I guess we are officially done with our public comment period. Thank you very much.

[The public comment period ended at 1912 hours, 12 July 2005.]

Shields, Dick CIV PW

From: Paul.Robin@epamail.epa.gov
Sent: Wednesday, May 11, 2005 2:47 PM
To: dick.shields@us.army.mil
Cc: craig.phillips@us.army.mil; Burnett.Bryant@epamail.epa.gov
Subject: 354 Area Solvent Detections, OU005, Response to Comments

Dear Dr. Shields,

The Agency finds the responses to our comments emailed you on 4/26/05 regarding the Proposed Plan for the subject site acceptable. We understand that the draft final version of the Proposed Plan will reflect the information and changes discussed and distributed at the 5/10/05 Line Item Review meeting. Thank you for the opportunity to review the document and for the subsequent insightful discussions.

Robin E. Paul
Remedial Project Manager
U.S. Environmental Protection Agency, Region VII SUPR/FFSE
901 North 5th Street
Kansas City, KS 66101
(913) 551-7699

Burns & McDonnell
SINCE 1898

Rec'd 19 May 05

May 18, 2005

Directorate of Public Works
Environment Division
ATTN: Richard Shields
407 Pershing Court
Fort Riley, KS 66442-6016

Draft Final Proposed Plan
354 Area Solvent Detections
Fort Riley, Kansas
BMcD Project No. 27828
Contract No. DACA41-96-D-8010 Task Order #0036

Dr. Shields:

Please find enclosed seven copies of the draft final Proposed Plan for the subject site. Also find enclosed a copy of the distribution list and comment responses.

If you have any questions, please call me at (816) 822-3595.

Sincerely,

E. D. Lindgren
Senior Project Manager

EDL/shields.doc

Enclosures

9400 Ward Parkway
Kansas City, Missouri 64114-3319
Tel: 816 333-9400
Fax: 816 333-3690
www.burnsmcd.com

DISTRIBUTION LIST

Commander
U. S. Army Engineer District, Kansas City
ATTN: CENWK-PM-E (R. Van Saun)
601 E 12th Street
Kansas City, MO 64106-2896

1 copy, plus distribution list and comment responses

Directorate of Public Works
Environmental Division
ATTN: Richard Shields
407 Pershing Court
Fort Riley, KS 66442-6016

7 copies, plus distribution list and comment responses

Robin Paul
Federal Facilities, Special Emphasis Section
U.S. Environmental Protection Agency
901 North 5th Street
Kansas City, KS 66101

2 copies, plus comment responses

Jim Anstaett
Bureau of Environmental Remediation
Kansas Department of Health and Environment
1000 SW Jackson, Suite 410
Topeka, KS 66612-1367

1 copy, plus comment responses

Subject: Draft Proposed Plan
354 Area Solvent Detections (Operable Unit 005)
Main Post, Fort Riley, Kansas

Date: April 2005
Reviewer: Robin Paul, USEPA

No.	Page	Section	Comment:	Response:
General Comments				
1.			According to the Conceptual Site Model (*Draft Final Remedial Investigation Report, 354 Area Solvent Detections (Operable Unit 005) at the Main Post, Fort Riley, Kansas* dated November 3, 2003), advection/dispersion and adsorption appear to be the most significant natural attenuation processes on-going at the 354 Site. Although geochemical parameters indicate that conditions somewhat favorable for reductive dechlorination exist within the Kansas River alluvial aquifer, groundwater data show that complete dechlorination of PCE is not occurring and the process is stalled at the cis-1.2-DCE stage. Section 6.4, Conceptual Site Model, Page 6-18 of the Remedial Investigation states, "In this system, it appears that once the degradation pathway reaches cis-1,2-DCE, the dechlorination process slows, leaving cis-1,2-DCE to be further attenuated by nondestructive processes." Since it cannot been sufficiently demonstrated that biological degradation processes are responsible for the attenuation seen at this site, it is more appropriate for the document to emphasize the mechanical processes. With this in mind, please revise the text of the following sections: • Site Characteristics, Page 3, Fourth Bullet; • Alternative 2 – Monitored Natural Attenuation with Institutional Controls (MNA), Page 6; and,	**Noted.** The 354 Area Solvent Detections area is a two-aquifer system as defined by the Conceptual Site Model in the "Draft Final Remedial Investigation Report, 354 Area Solvent Detections (Operable Unit 005) at the Main Post, Fort Riley, Kansas dated November 3, 2003, in Section 6.4 on pages 6-17 to 6-19. The upper system is a low yield terrace aquifer (See also Section 6.3.3.1 pages 6-11 to 6-14). The other aquifer is the Kansas River alluvial aquifer (See also Section 6.3.3.2 pages 6-14 to 6-17). The terrace aquifer (page 6-17 last paragraph) was found to have limited biotransformation of the chlorinated solvents. The data found in the Data Summary Reports (DSRs) dated Sept/Oct 2001, January 2002, April 2002, July 2002, March 2003, Sept/Oct 2003, April 2004, and Oct 2004 indicate that dechlorination is occurring in the terrace aquifer. The exact nature is unclear but the data are clear. The levels of chloride in B354-01-27 range from 50 to 73 ug/L, while the concentrations in the next well down gradient (B354-99-09) are from 222 to 300 ug/L. This represents an increase of >70% in chloride concentration and a decrease of ~60% for PCE concentration. The concentration of PCE in B354-99-09 (mid-point of the plume) is decreasing & in TSO292-02 (at the transition to the Kansas River alluvial aquifer) is non-detect. The TCE concentrations are below the MCL at B354-99-09 & non-detect at TSO292-02. The cis-1,2-DCE is non-detect at B354-99-09 and below the MCL at

Date: April 2005
Reviewer: Robin Paul, USEPA

No.	Page	Section	Comment:	Response:
			• Summary of the Preferred Alternative, Page 9.	TSO292-02. Perhaps the reductive dechlorination is 'stalling' at the cis stage; however, non-destructive NA processes within the Kansas River alluvial aquifer continue to attenuate and lower the concentrations of cis. If the reaction is 'stalling', it isn't an issue as the cis concentrations within the Kansas River alluvial aquifer are a full order of magnitude below the MCL for that compound (70 ug/L). The Kansas River alluvial aquifer (page 6-18 1st full paragraph) has more conducive geochemical conditions. Section 6.3.3.2 page 6-14 states "geochemical conditions within the Kansas River alluvial aquifer are anaerobic and conducive for reductive dechlorination." Figure 3-5 in the DSRs presents a wide range of geochemical parameters that clearly illustrate that biodegradation is occurring as cited in the RI per Wiedemeier and Chapelle. The concentrations of all chlorinated solvents in the Kansas River alluvial aquifer are below the Maximum Contaminant Levels. It does not seem prudent or appropriate to include those technical details in this document as it is meant for the nonscientific general public. These issues were discussed at the LIR meeting on May 10, 2005. No changes will be made to the text of the Proposed Plan.
2.			Because the Building 163 Source Removal Action was completed in December, 2004, and the groundwater monitoring event discussed in the document took place in October, 2004, the statement "Natural attenuation combined with the source removal has been responsible for the continuing decrease of contaminant levels in groundwater" (Summary of the Preferred Alternative,	**Concur.** The Building 367 Pilot Study for Soil Remediation was conducted from March to April 2004 with the application and mixing of the potassium permanganate. The soil (which was too wet to permit compaction and re-covering with asphalt) with its remaining chlorinated solvents was excavated in October 2004 and placed in a land farm in Camp Funston to dry.

Date: April 2005
Reviewer: Robin Paul, USEPA

No.	Page	Section	Comment:	Response:
			Paragraph 2, Page 9) is not supported by the data that appears in the document. Instead, it may be beneficial to reiterate the appropriate Fate and Transport or Conceptual Site Model discussions found in the RI, and provide a statement that the Army expects to see a continuing decrease of contaminant levels in groundwater due to these mechanical mechanisms, aided by the Removal Action. Groundwater data collected subsequent to the Source Removal Action should continue to define these trends. Please revise this statement.	The excavation was then backfilled with clean soil in November 2004. The text in the Proposed Plan could be re-written as follows: *"To prevent possible leaching of contaminants to the ground water, the most contaminated soil was eliminated through the soil treatment under the pilot study (using in-situ treatment and excavation). The treatment with potassium permanganate was conducted from March to April 2004. Natural attenuation combined with removal of the contaminated soils should yield a continuing decrease of contaminant levels in the ground water. Post-treatment ground-water samplings conducted in April and October 2004 indicate that the levels are decreasing."*
3.			It is difficult to present a strong case for the efficiency and timeliness of Remedial Alternatives 2 - 4 since no quantitative modeling was performed at the site (Short-Term Effectiveness, Page 7). A quantitative estimate of the contaminant mass remaining in the groundwater with the percentage of each degradation product present is necessary to properly estimate these parameters. This information will also provide a firm baseline against which the effectiveness of each alternative can be judged, and form the basis for the performance monitoring program. Please see Implementation, Demonstrating the Efficacy of Natural Attenuation Through Site Characterization, Page 13 of OSWER Directive 9200.4-17-P, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective action, and Underground Storage Tank Sites*, (U.S. EPA, April 1999) for a more thorough discussion. Please perform the necessary calculations and present the data in the document. This information should directly affect the Short-Term Effectiveness discussion on Page 7 and may	**Noted.** An attempt has been made to generate a mass contaminant calculation but it must be understood that this number has many uncertainties affiliated with it. The mass values are approximately 9.6 pounds on Jan 02 and 3.7 pounds on Oct 04. The concentration values in the DSRs show a clear decreasing trend. The discussions presented in Section 6.4 and others of the "Draft Final Feasibility Study Report 354 Area Solvent Detections (Operable Unit 005) at Main Post Fort Riley, Kansas" dated December 20, 2004 contained detailed rationales for the costs, efficiencies, and effectiveness of the various alternatives. Alternative 2 – Monitored Natural Attenuation and Institutional Controls was selected as "the most favorable" on page 6-6. It does not seem prudent or appropriate to include those technical details (including the mass calculation results) in this document as it is meant for the nonscientific general public. These issues were discussed at the LIR meeting on

Date: April 2005
Reviewer: Robin Paul, USEPA

No.	Page	Section	Comment:	Response:
			affect Table 1 – Comparative Evaluation Summary.	May 10, 2005. No changes will be made to the text of the Proposed Plan. **<u>Mass calculation results follow:</u>** Data and Calculations for the Mass of Contaminants for the 354 Area Solvent Detections Operable Unit (OU005) Plume length 1,370' and was broken into three segments. The plume width of 200' was used. Segment 1 from B354-01-27 to 70' above B354-99-09 = 800' Segment 2 from 70' above B354-99-09 to 50' above TSO292-01 = 370' Segment 3 from 50' above TSO292-01 to TSO292-02 = 200' Date B354-01-27 B354-99-09 TSO292-01 Jan 02 208 ug/L 52.5 ug/L 27.9 ug/L Apr 02 166 ug/L 30.3 ug/L 33 ug/L Jul 02 179 ug/L 27.5 ug/L 39 ug/L Mar 03 180 ug/L 32.8 ug/L 32.6 ug/L Sep/Oct 03 121 ug/L 27.7 ug/L 21.6 ug/L Apr 04 95.9 ug/L 60 ug/L 32.1 ug/L Oct 04 78.8 ug/L 37.8 ug/L 24.8 ug/L Jan 02 was used as the T_0 for the concentration of 208 ug/L (highest level). The T_1 value was the last validated concentration. The porosity value utilized was .30.

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No.	Page	Section	Comment:	Response:
				A saturated thickness was determined for each segment. A saturated thickness was derived from the bottom of hole to top of the ground water for each sampling event. There were seven events used and an average value obtained. The averaged saturated thickness for Segment 1 was 15', for Segment 2 it was 2.48', and for Segment 3 it was 1.4'. The initial calculations were made as if the situation was an open channel and the derived values were then reduced by multiplying by the formation porosity value of .30. **<u>Using October 2004 Values</u>** **Segment 1** 800' x 200' x 15' = 2,400,000 ft^3 divided by 43,560 ft^2 = 55.1 ac ft x 325,851 gal/ac ft = 17,954,390 gal x 3.785 L/gal = 67,957,367 L x 78.7 ug/L = 5355 g or 11.8 # .30 x 5355 g = 1606.5 g or .30 x 11.8 # = 3.5 # **Segment 2** 370' x 200' x 2.48' = 183,520ft^3 divided by 43,560 ft^2 = 4.21 ac ft x 325,851 gal/ac ft = 1,371,832.7 gal x 3.785 L/gal = 5,192,386.8 L x 37.8 ug/L = 196.3 g or 0.43 # .30 x 196.3 = 58.9 g or .30 x 0.43 # = 0.13 # **Segment 3** 200' x 200' 1.4' = 56,000 ft^3 divided by 43,560 ft^2 = 1.29 ac ft x 325,851 gal/ ac ft = 420,347.8 gal x 3.785 L/gal =

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				1,591,016.4 L x 24.8 ug/L = 39.5 g or 0.09 # .30 x 39.5 g = 11.85 g or .30 x 0.09 # = 0.03 # Total Mass of Contaminant 3.5 # + 0.13 # + 0.03 # = 3.7 # **<u>Using Jan 02 Values</u>** **Segment 1** 800' x 200' x 15' = 2,400,000 ft^3 divided by 43,560 ft^2 = 55.1 ac ft x 325,851 gal/ac ft = 17,954,390 gal x 3.785 L/gal = 67,957,367 L x 208 ug/L = 14,135.1 g or 31.2 # .30 x 14,135.6 g = 4240.5 g or .30 x 31.2 # = 9.36 # **Segment 2** 370' x 200' x 2.48' = 183,520ft^3 divided by 43,560 ft^2 = 4.21 ac ft x 325,851 gal/ac ft = 1,371832.7 gal x 3.785 L/gal = 5,192,386.8 L x 52.5 ug/L = 272.6 g or 0.6 # .30 x 272.6 g = 81.8 g or .30 x 0.6 # = 0.18 # **Segment 3** 200' x 200' 1.4' = 56,000 ft^3 divided by 43,560 ft^2 = 1.29 ac ft x 325,851 gal/ ac ft = 420,347.8 gal x 3.785 L/gal = 1,591,016.4 L x 27.9 ug/L = 44.4 g or 0.10 # .30 x 44.9 g = 13.3 g or .30 x 0.10 # = 0.03 # Total Mass of Contaminant 9.36 # + 0.18 # + 0.03 # = 9.6

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No.	Page	Section	Comment:	Response:
				#
Specific Comments				
1.	Page 1	Paragraph 1	Since Figure 1 does not specifically refer to a 30-day public comment period, please remove "(Figure 1)" from the sentence that begins, "A final remedy will be selected for the Site after reviewing and considering all information submitted during the 30-day pubic comment period . . . ."	**Concur.** The first sentence of the Proposed Plan will be rewritten as follow: *"This Proposed Plan, part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process (Figure 1), identifies the preferred alternative....."* The reference to Figure 1 cited in the comment will be deleted.
2.	Page 3	Response Actions	Since the trend in future groundwater concentrations will be established by follow-on monitoring, please change "will" to "should" in the last sentence in this section.	**Concur.**
3.	Page 3	Figure 4	It is not clear exactly what Figure 4 is meant to represent since it is not referred to specifically in the text. Please provide a reference or clarification for this figure.	**Concur.** A sentence will be added to the end of the section titled 'Site Characteristics'. This will read as follows: *"Figure 4 presents are generalized depiction of the site geology, hydrology, and contaminant distribution."*
4.	Page 5	Remedial Action Objectives	Add the word "were" in the second to the last sentence in the sidebar titled "What are the "Chemicals of Potential Concern"? that currently reads "Analytical results presented below collected during the October 2004 groundwater sampling event."	**Concur.**
5.	Page 7	Overall Protection of HH&E	Please define "RME" in the text of this paragraph.	**Concur.** Reasonable maximum exposure (RME) will be defined in the text and will be added to the glossary to terms in the back of the document.

Date: April 2005
Reviewer: Robin Paul, USEPA

No.	Page	Section	Comment:	Response:
6.	Page 7	Long-Term Effectiveness and Permanence	If confirmation sampling data from the Source Removal Action supports the statement that soil hot spot at the 354 Site has been effectively eliminated, please delete the word "assumed" in the first sentence. Also, please revise the last sentence of this section to describe why the removal of contaminated water from the aquifer is not desirable.	**Concur.** We will change the sentence to read: *"The soil treatment and removal under the Pilot Study have eliminated the soil hot spot at Building 367."* We will change the last sentence to: *"Alternative 5 is also less desirable because contaminated water is removed from the aquifer and brought to the surface. This increases chances for human exposure and adds risk."*
7.		Table 2	Summary of Costs for Evaluations – It is not immediately obvious why the O&M costs for Alternative 3 should be higher than the O&M costs for Alternatives 2 and 4, nor is it obvious why the Total Periodic Costs for Alternative 4 should be higher than the Total Periodic Costs for Alternatives 3 and 5, while Alternative 2 is so much lower. Also, since it would presumably take Alternative 2 the longest to achieve remedial goals, it is surprising that the costs for this alternative are not much higher. Please provide a justification for these costs.	**Do Not Concur.** That table is taken from the FS (Table 6-1 Cost Summary) and the rationale was fully developed in that document. It does not seem prudent or appropriate to re-visit those discussions in this document as it is meant for the nonscientific general public. These issues were discussed at the LIR meeting on May 10, 2005. Alternative 2 will not take the longest to achieve the RAOs. The current levels in the Kansas River alluvial aquifer for all chlorinated solvents are below the MCLs and do not pose any significant risk.

End of Comment and Responses

Subject: Draft Proposed Plan
354 Area Solvent Detections (Operable Unit 005)
Main Post, Fort Riley, Kansas

Date: March 21, 2005
Reviewer: Dr. Richard Shields, Fort Riley DES

No.	Page	Section	Comment:	Response:
Specific Comments				
1.			Fill in dates in box on page 1 and in newspaper ad as follows: Public Comment Period: June 12 – July 12, 2005 Public Meeting: July 12, 2005	**Concur.**
2.	Page 4	Human Health Summary	In paragraph 2, remove the "0" from the exponential terms in the paragraph.	**Concur.**
3.			Change the Fort Riley contact phone number in the newspaper ad to 785-239-8619.	**Concur.**

End of Comment and Responses