PROPOSED PLAN

SOUTHWEST FUNSTON LANDFILL
Operable Unit 001

Fort Riley, Kansas

November 1994

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the Southwest Funston Landfill (SFL) CERCLA Federal Facility site, Operable Unit 001 at Fort Riley, Kansas, and identifies the preferred remedial alternative with the rationale for this preference. The preferred alternative is preliminary and could change in response to public comment or new information. The Proposed Plan was developed by the U.S. Department of the Army (DA), Fort Riley as lead agency, with support from the U.S. Environmental Protection Agency (EPA), Region VII, and the Kansas Department of Health and Environment (KDHE).

Fort Riley is issuing the Proposed Plan as part of the public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f) of the National Contingency Plan (NCP). Fort Riley was proposed for inclusion on the National Priority List (NPL) on July 14, 1989, and was finalized on the NPL on August 30, 1990. Following the NPL listing, the DA and Fort Riley, EPA, and KDHE entered into a Federal Facilities Agreement (FFA), effective June 28, 1991. The FFA provides the framework for EPA, KDHE, and the Army to work through the CERCLA process. The alternatives summarized in this plan are described in the Remedial Investigation and Feasibility Study (RI/FS) reports, which should be consulted for more detailed description of site characteristics and the alternatives.

The Proposed Plan is being provided as a supplement to the RI/FS reports to inform the public of Fort Riley's, EPA Region VII's, and KDHE's preferred remedy based on information included in the Administrative Record and to solicit public comments pertaining to the remedial alternatives evaluated, as well as the preferred alternative. The RI report addresses the nature and extent of contamination at the SFL site and the potential associated risk to human health and the environment while the FS report presents and evaluates alternatives available to address unacceptable risk identified in the RI report. The Administrative Record is the set of supporting information used to determine the preferred alternative and is made available to the public.

The remedy described in this Proposed Plan is the preferred remedy for the site. Changes to the preferred remedy, or a change to another remedy, may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after all public comments have been taken into consideration. Fort Riley is soliciting public comment on the alternatives considered in the detailed analysis of the RI/FS reports because Fort Riley, EPA Region VII, and KDHE may, if appropriate, select a remedy other than the preferred remedy.

See back page for more information concerning the Community Role in the Remedy Selection Process.

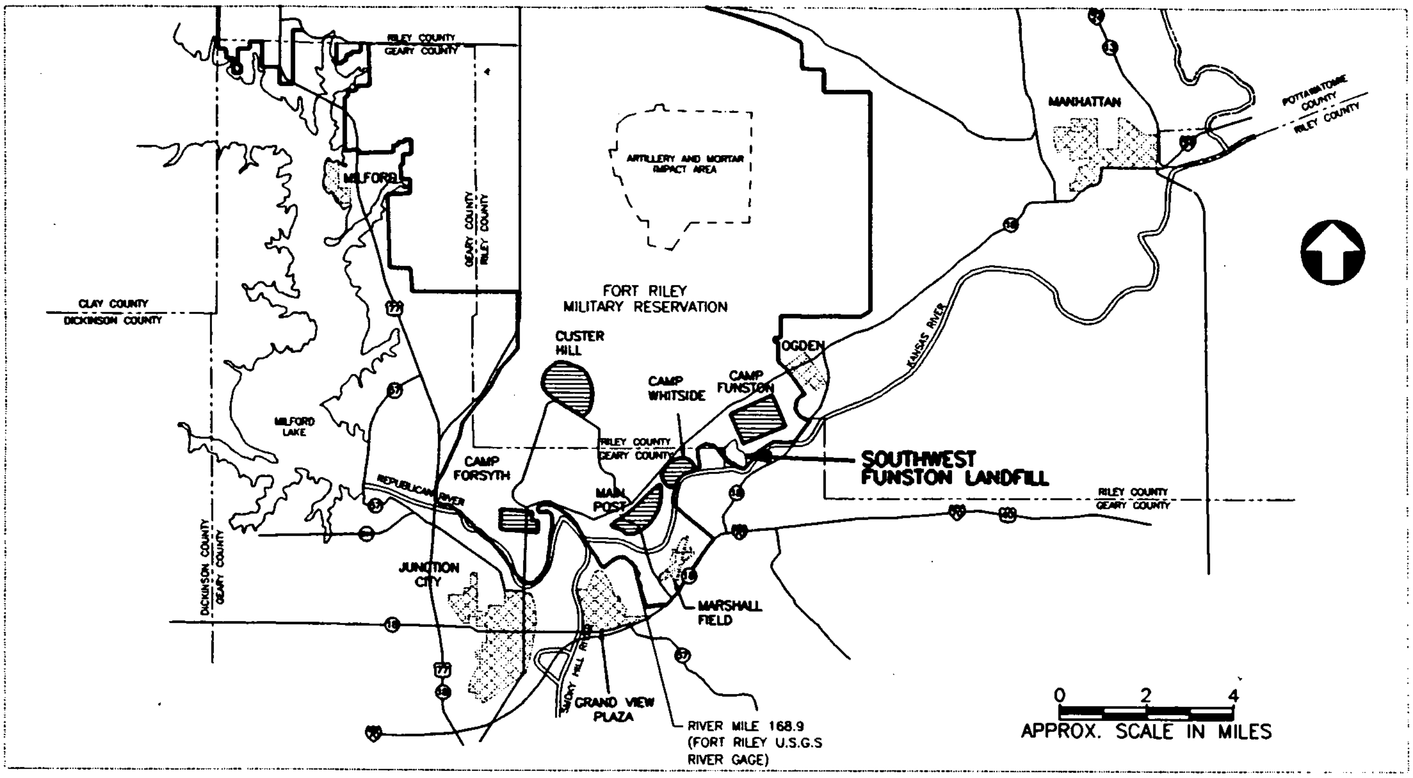

FIGURE 1. LOCATION MAP/SOUTHWEST FUNSTON LANDFILL

SITE BACKGROUND

Fort Riley is situated along the north bank of the Kansas and Republican rivers in Riley and Geary counties in north central Kansas. The SFL covers about 120 acres and is located in the southern portion of Fort Riley adjacent to the Kansas River, southwest of the Camp Funston Cantonment area (Figure 1). The landfill operated from the mid-1950s until 1981 receiving domestic refuse and industrial wastes from various activities at the installation. Some of these industrial wastes were suspected or reported to have contained hazardous substances and are thus potential sources of contamination. Types of materials disposed at the SFL, which are potential sources of contamination, include wastes generated by vehicle and aircraft maintenance shops, print shops, furniture repair shops, painting facilities, oil analysis laboratory, autoclaved biological waste, pesticide/herbicide storage and preparation, laundry and dry cleaning facilities, and wastewater treatment plants. Wastes from these sources may have included metal-laden oils, solvents, inks, paints and heavy metals, and dried wastewater treatment plant sludge.

The landfill was closed in 1983 in a manner approved by KDHE. The area was regraded and a continuous soil cover was constructed. Monitoring wells were also installed at the time of closure and monitored periodically between 1984 and 1990 for a total of 11 sampling events. These monitoring wells were used to monitor for potential contaminants in the groundwater, which may have been impacted by releases from the SFL. The SFL is currently covered with grass and other leafy vegetation (weeds, sunflowers, and saplings), with little change in elevation relative to the surrounding land surface.

The FFA specifically requires that the SFL be addressed through the RI and FS process. Fort Riley initiated planning of the RI/FS during the development of the FFA, and field activities related to the remedial investigation began in the fall of 1991. Results of these field activities are summarized in the following section.

REMEDIAL INVESTIGATION SUMMARY

Historic information reviewed during the RI indicates that wastes disposed at the SFL include dried wastewater treatment plant sludge, waste oil, and wastes containing chlorinated solvents and heavy metals. Based on the RI data, the site groundwater contamination has been characterized as isolated, sporadic detections of several volatile organic compounds (VOCs). Organics detected in groundwater which exceeded the Federal Maximum Contaminant Level (MCL) for drinking water include vinyl chloride, 1,2-dichlorethane, benzene, and 1,1,2-trichloroethane. Metals such as iron, manganese, and aluminum were also detected but have been attributed to background conditions.

The majority of samples analyzed during the surface soil investigation indicated that lead is present in cover soils at levels consistent with background conditions. Out of 114 samples analyzed using x-ray fluorescence for lead, copper, and zinc, only five were above the maximum detected background concentration for lead only. However, these levels of lead are below the maximum concentrations listed in the USEPA *Interim Guidance On Establishing Soil Lead Cleanup Levels at Superfund Sites*. Subsurface soil data indicate the isolated presence of several constituents including petroleum hydrocarbons, VOCs, and phthalates. The data from the surface water and sediment investigation indicate that the SFL is not contributing either organic or inorganic (i.e. metals) contaminants to the Kansas River and its tributary, Threemile Creek.

The nature and extent of contamination is discussed in the RI and summarized in the FS report (April 1994). The primary contaminant migration pathway at the SFL is for contaminants to leach or migrate from the landfill contents to the groundwater. Contaminants can be mobilized from the landfill by percolating rainwater that might carry contamination down to the water table. Contaminants can also be mobilized when the water table rises into the landfill and saturates the waste. The water table is influenced in part by the stage of the Kansas River. Groundwater from beneath the landfill is interpreted to primarily discharge to Threemile Creek (directly east of the SFL) and the Kansas River. Thus, once in the groundwater, the contaminants may be transported toward the Kansas River and Threemile Creek. The potential exists for the contaminants in the groundwater to migrate to the river or the creek as the groundwater recharges these surface water features. The Kansas River and Threemile Creek do not appear to be impacted by the landfill, based on the absence of site-related constituents above background concentrations. Also, because the groundwater flow conditions vary, it is theoretically possible for contaminated groundwater to pass under Threemile Creek and then flow to the Kansas River. VOCs are the predominant groundwater contaminants most likely to migrate in this manner at the site. The VOCs would be likely to evaporate once they are transported to the surface water.

SUMMARY OF SITE RISK

Based upon the results of the RI, a baseline risk assessment was conducted to estimate the risks associated with current and future site conditions. The baseline risk assessment consists of elements - a Human Health Risk Assessment and an Ecological Risk Assessment.

Traditionally, risk may be defined as the possibility of loss or injury. A baseline risk assessment is required by the NCP and is used to estimate the potential for adverse effects to human and ecological receptors that could result from site contamination if no remedial action were taken.

As discussed in the NCP, current federal guidelines for acceptable exposures call for a maximum Hazard Index equal to 1.0 for noncarcinogens and carcinogenic risk between 10^{-4} and 10^{-6}. A Hazard Index greater than 1.0 indicates that concern *may* exist for potential non-cancer health effects due to exposure to site-related contaminants. A carcinogenic risk greater than 10^{-4} indicates that potential exposures *may* result in an unacceptable increase in the probability of an individual developing cancer due to site-related contaminants. (A carcinogenic risk of 10^{-4} represents a probability of one in 10,000 that an individual would develop cancer as a result of site-related exposure to a carcinogen over a 70-year period.) Because risk assessments are conditional estimates for which uncertainty is typically large (factor of 10 to 100), the NCP provides for the consideration of uncertainty when examining what constitutes unacceptable risk.

Human Health Risk Assessment

The reasonable maximum human exposure was evaluated using the following four-step process to quantitatively assess site-related human health risks for a reasonable maximum exposure scenario:

Hazard Identification	- identifies the contaminants of concern at the site based on factors such as toxicity, frequency of detection and concentration.
Exposure Assessment	- estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and identifies the pathway by which human receptors are potentially exposed.
Toxicity Assessment	- examines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response).
Risk Characterization	- integrates the exposure and toxicity assessments to provide a quantitative measurement of site-related risks and presents a discussion or measure of the uncertainty associated with the risk estimate.

The baseline risk assessment began with selecting contaminants of concern, based on their potentially toxic properties, which would represent site risks. These contaminants included: antimony; arsenic; benzene; beryllium; cis-1,3-dichloropropene; 1,2-dichloroethane; 1, 1,2,2-tetrachloroethane; 1,1,2-trichloroethane; and vinyl chloride. With the exception of antimony, these contaminants are known or suspected to be human carcinogens.

The reasonable maximum exposure (RME) evaluation for the SFL site presents a scenario which includes consumption of groundwater from a well located within the site. *However*, consumption of groundwater from the site is a hypothetical scenario and is *not* anticipated because a sufficient water supply exists for the area, the site is located in the flood plain. Although the use of groundwater for drinking water purposes is considered unlikely to occur, this scenario was presented instead of modeling an exposure concentration at an off-site location because of the time, effort and additional data required for accurate modeling. It should be noted that the evaluation of risk based upon on-site groundwater use is considered to be *most* conservative -- in contrast to a more reasonable evaluation based on modeling contaminant migration to an off-site receptor.

The baseline risk assessment evaluated the health effects which could potentially result from exposure by ingestion, inhalation, and dermal contact with constituents detected at the site. Risks were estimated for 18 potential current and/or future exposure scenarios, including:

Current Land Uses - Occupational Scenarios (exposures that may occur during work on utility lines located adjacent to Threemile Creek, or other on-site activities)

1. Dermal contact with surface water
2. Dermal contact with sediments
3. Incidental ingestion of sediments

Current Land Uses - Hunter Scenarios (exposures that may occur as a result of present-day hunters on SFL)

4. Incidental ingestion of soil
5. Inhalation of fugitive dust
6. Dermal contact with soil

Future Land Uses - Occupational Scenarios (exposures that may be experienced by future maintenance/groundskeeping employees at SFL)

7. Dermal contact with surface water
8. Dermal contact with sediments
9. Incidental ingestion of sediments
10. Incidental ingestion of soil
11. Inhalation of fugitive dust
12. Dermal contact with soil

Future Land Uses - Recreational Hunter Scenarios (exposures that may occur as a result of future hunters at SFL)

13. Incidental ingestion of soil
14. Inhalation of fugitive dust
15. Dermal contact with soil

Future Hypothetical Land Uses - Groundwater Scenarios (exposures that may occur from hypothetical future residents using groundwater from the water-bearing zone beneath the SFL)

16. Ingestion of drinking water
17. Inhalation of volatiles during bathing and household water use
18. Dermal contact while showering

The results of the baseline risk assessment indicated that, of the media evaluated, only groundwater at the site poses potentially unacceptable risks to human health. Estimated site-specific (site-related) carcinogenic risks due to potential future household uses of groundwater obtained from within the site were 5×10^{-4} for ingestion and 3×10^{-4} for inhalation. Estimated total risk, including that risk due to background or naturally occurring levels of constituents, values was somewhat higher for ingestion at 1×10^{-3}. Due to the conservative nature of the risk assessment assumptions, these risk estimates represent upper-bound estimates. That is, it is reasonable to presume that the "true risks" will not exceed these estimated values. Estimated site-specific noncarcinogenic risks (Hazard Indices) due to potential future household uses of the ground water at the site were 16 for ingestion by adults and 29 for children. Hazard Indices for total risk for ingestion of site groundwater, including background levels, were 26 for Adults and 54 for children. Hazard Indices also represent upper-bound estimates. That is, it is reasonable to presume that the "true Hazard Indices" will not exceed these estimated values.

Conclusions. On the basis of the baseline risk assessment, the site does not currently present an imminent or substantial endangerment to public health. However, based on the carcinogenic and noncarcinogenic risk estimates for potential hypothetical exposures to ground water at the site, releases of hazardous substances from this site may present a future threat to public health if site groundwater is used for household purposes. Thus, the principal threat posed by the site pertains to hypothetical future domestic use of the groundwater immediately beneath the site. As indicated, this is considered unlikely to occur. Furthermore, it should be noted that the estimate of risk for groundwater pathways is very conservative, since it is based on the assumption that all of the drinking water ingested in a given day comes from a contaminated source. In actuality, it is highly improbable that the SFL site will ever be developed for residential use or as a residential water supply because it is in the flood plain and a public supply of potable water already exists in the area. Thus, the calculated risks due to consumption of on-site groundwater are likely to be overestimated.

Remediation Goals

Human health-based remediation goals were calculated for organic constituents of concern detected in the ground water at the site (Table 1). Remediation goals (RGs) are chemical-specific concentrations that can be used as an indication of the need for remedial action. As prescribed in the NCP, these goals were based on Maximum Contaminant Levels (MCLs) or non-zero MCL goals (MCLGs) where available. Where MCLs or non-zero MCLGs were not available, RGs were calculated for an acceptable risk range of between 1×10^{-4} and 1×10^{-6} for carcinogens and Hazard Indices of 1.0 for noncarcinogens. Table 1 presents the detection frequency (an indication of the extent of the constituent), the exposure concentration (an indication of potential concentration which could be encountered), the maximum concentration detected, the remedial goal, and the frequency at which the RG was exceeded. Note that for 56 sample analyses, individual contaminants of concern were detected a maximum of seven times and just a maximum of three times at levels exceeding the RG.

Table 1

GROUNDWATER CONTAMINATION DETECTION SUMMARY
and
GOVERNING REMEDIATION GOALS FOR GROUNDWATER [a]
Southwest Funston Landfill
Fort Riley, Kansas

Analyte	Detection Frequency[d]	Maximum Detection Concentration	Exposure Concentration[f]	Remediation Goal	Exceedance Frequency[e]
Benzene	7/56	14	1.4	5[b]	2/56
1,2-Dichloroethane	3/56	16	2.8	5[b]	3/56
cis-1,3-Dichloropropene	2/56	5.9	1.7	0.28, 2.8, 28[c]	2/56
1,1,2,2-Tetrachloroethane	2/56	15	3	0.042, 0.42, 4.2[c]	2/56
1,1,2-Trichloroethane	1/56	8.8	2.7	3[g]	1/56
Vinyl Chloride	2/56	18	5.4	2[b]	2/56

Note: All units are μg/L.

[a] The governing remediation goals are Maximum Contaminant Levels (MCLs) (if they exist); otherwise risk-based remediation goals are presented.

[b] Remediation goal is based on MCL (Drinking Water Regulations and Health Advisories, US EPA, Office of Water, May 1993).

[c] Remediation goals are based on carcinogenic risks of 1×10^{-4}, 1×10^{-5}, and 1×10^{-6}, respectively.

[d] The frequency of detection of the analyte above its respective laboratory detection limit. The detection (and exceedance) frequencies include Well Cluster 5 (which was omitted from the risk assessment).

[e] The frequency of detections exceeding the remediation goal (MCL, MCLG, or a concentration calculated using a carcinogenic target risk of 1×10^{-5}).

[f] 95% Upper confidence limit (UCL)

[g] Remediation Goal is based on MCLG.

Data set includes baseline (July 1992), first quarter (November 1992), second quarter (February 1993), and third quarter (May 1993) sampling events.

Ecological Risk Assessment

The following four-step process was used to qualitatively assess site-related ecological risks:

Receptor Identification	- identifies potential ecological receptors that may be exposed to site-related contamination.
Exposure Pathway Evaluation	- evaluates and selects relevant exposure pathways at the site.
Toxicity Assessment	- considers Applicable or Relevant and Appropriate Requirements (ARARs) to examine which of the site-related contaminants in the surface water, sediments, and soil may pose unacceptable risks to ecological receptors.
Risk Characterization	- examines the magnitude of potential impacts to the identified receptors due to exposure to site-related contaminants.

Contaminated media which could reach potential ecological receptors at the site include soil, surface water, and sediment. The ecological risk assessment also evaluated potential receptors in the vicinity of the SFL and potential pathways by which these receptors might be exposed to chemicals of concern present in surface soils, surface water, and sediments. Potential receptors include terrestrial vegetation, terrestrial wildlife, endangered species, and aquatic species. Exposure pathways of potential concern include: dermal contact with, ingestion of, and inhalation of surface and subsurface soil (for terrestrial receptors); and dermal contact with and ingestion of surface water and sediments (for terrestrial and aquatic receptors).

In addition to these potential pathways, the ecological risk assessment considered whether visible signs of stress to receptors at the site were present and whether exposures to endangered and threatened species might occur.

Results of the ecological risk assessment indicate that risk to ecological receptors at the site is very slight. Negative impacts to flora and fauna by contaminants are not expected. Though one endangered species (bald eagle) has been seen in areas bordering the site, more suitable habitats and foraging areas exist nearby. In addition, *no* signs of stress to the flora and fauna were observed at the site. Therefore, population-scale effects on ecological receptors at the site are not anticipated.

SCOPE AND ROLE OF ACTION

This Proposed Plan is for the Remedial Action for the SFL site. Remedial Action, as defined in the NCP, is "those actions ... taken instead of, or in addition to, removal action ... to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare of the environment.

As indicated in the baseline risk assessment, unacceptable risks posed by the SFL site are associated only with hypothetical future exposure to on-site groundwater. Dermal contact with the landfill is not considered an unacceptable risk, given current site use (because it is not likely to occur and because concentrations of constituents of concern in soil are limited). However, to be conservative, minimizing contact with both on-site groundwater and the landfill contents are goals of the remedial action for the SFL aimed at protecting human health and the environment. Because the site is a large landfill, the alternatives considered rely on containment of the landfill contents and monitoring of the groundwater for protecting human health and the environment.

While the RI and FS were being completed, Fort Riley initiated a Non-Time Critical Removal Action (NTCRA), in accordance with NCP 300.415, to address the physical condition of the landfill surface and to stabilize the Kansas River bank. The NTCRA process includes an Engineering Evaluation/Cost Analysis (EE/CA) report which characterizes the site, evaluates removal alternatives, and proposes a Removal Action. The EE/CA report was added to the Administrative Record and made available in August 1993 for a 30-calendar day public comment period. Based on the results of the EE/CA report, a Removal Action was implemented.

This Removal Action includes both stabilization of the adjacent Kansas River bank and repairs to the existing soil cover over the SFL. The construction of the bank stabilization portion was accomplished in the Spring 1994 and consisted of the installation of rock revetment to minimize erosion of the bank and exposure of the landfill contents. Repairs to the existing soil cover, which will help prevent ponding and erosion of the cover, and thus minimize infiltration into the landfill, are to begin soon. Establishment of a good native grass cover which is important for minimizing infiltration is included in the repairs. This project involves the use of a borrow area adjacent to the Kansas River. Development of this borrow area and other construction activities will damage established wildlife habitat, including that of the bald eagle which winters in this area. To mitigate the loss of habitat, the borrow area is being developed as a wetlands and replacement trees will be planted along the River.

These improvements to the landfill surface conditions and the Kansas River bank are an integral part of the preferred remedial action. Additional actions potentially needed to comprise the Remedial Action were developed and evaluated and are discussed in the following sections.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. Where appropriate, they specify the contaminant(s) of concern, the exposure route(s), receptor(s), and acceptable contaminant levels(s) for each exposure route. These objectives are based on available information and standards such as ARARs and risk-based levels established in the baseline risk assessment.

The following remedial action objectives were established for the SFL:

- Minimize human and ecological direct contact with landfill contents.
- Reduce the potential for leachate generation by reducing stormwater ponding and infiltration (i.e., facilitating evapotranspiration) as practical.
- Stabilize the Kansas River bank slope adjacent to the SFL to prevent movement of the channel into the landfill and to prevent exposure and erosion of the landfill contents.
- Prevent ingestion, inhalation and dermal contact with groundwater with organic concentrations exceeding the remediation goals (RGs). See Table 1.

CERCLA remedial response actions must address the requirements of the environmental laws which are determined to be "applicable" or "relevant and appropriate." ARARs are identified on a site-specific basis. Factors such as the types of hazardous substances present (chemical-specific), the types of remedial actions considered (action-specific), and the physical nature of the site (location-specific), are compared to the statutory or regulatory requirements of the relevant environmental laws. Because potential future use of site groundwater (although unlikely) is seen as the principal threat at this site, the ARAR of principal interest is the maximum contaminant level (MCL), which applies to drinking water from a public water system. Subtitle D Criteria for Municipal Solid Waste Landfills (40 CFR 258) is also an ARAR which would apply to cover alternatives.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment and comply with ARARs. Additionally, CERCLA requires that the selected site remedy be cost effective, comply with other statutory laws, and, to the maximum extent practicable, utilize permanent solutions, alternative treatment technologies and resource recovery alternatives. In addition, the statute includes a preference for the use of treatment as a principal element for reducing toxicity, mobility, or volume of the hazardous substances.

The FS report evaluates six remedial alternatives for addressing the contamination associated with the SFL site. Seven remedial alternatives were originally screened in the FS, with one alternative (Alternative 5) being eliminated due to its potential ineffectiveness.

Alternative 1 ***- No Action:*** The CERCLA program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. As the name implies, this alternative does not involve any remedial action. This alternative does not account for the bank stabilization and cover improvement actions already being implemented. The alternative includes the same potential threats to human health and the environment as those identified in the baseline risk assessment. This alternative does not address potential future groundwater exposure. This alternative addresses the MCL ARAR considering current site use, but it fails this criterion considering potential future groundwater use.

The "no-action" alternative involves no costs and no time to implement. Because contaminants would remain at the SFL, CERCLA requires that the site be reviewed every 5 years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 2 ***- Institutional Controls, Riverbank Stabilization, Long-term Groundwater Monitoring, and Future Action Contingency:*** Alternative 2 includes implementing institutional controls, including signage, to restrict future site uses and prohibit the future use of site groundwater. Restrictions on future site uses include restricting the construction of structures that involve excavation for the foundation, restricting the permanent occupancy of any structure, and limiting future utility easements to outside the edge of the landfill, and possibly prohibiting construction of buried utilities in the near vicinity of the landfill. The alternative also includes placing rock revetment along the Kansas Riverbank (installed in Spring 1994 as a Removal Action) and conducting semi-annual groundwater monitoring at the site. As described in the FS report, the objectives of the long-term groundwater monitoring program are to detect increases in contaminant concentrations in the vicinity of the SFL which would warrant additional actions, and to determine if constituents from the SFL are migrating under Threemile Creek (i.e., toward potential receptors). Long-term groundwater monitoring is also valuable for developing a better understanding of groundwater flow paths. The program includes groundwater sampling and analysis for VOCs, antimony, and lead, which are the constituents of concern at the site. The groundwater monitoring program may utilize existing monitoring wells installed for the RI/FS and/or additional wells installed specifically for the long-term monitoring program.

Alternative 2 does not involve treatment, and therefore provides no reduction in toxicity and volume of contamination. The riverbank stabilization effectively meets the RAO of preventing movement of the Kansas River Channel into the landfill. The restrictions on site use prevent exposure to subsurface materials and future use of groundwater at the site. This alternative complies with the MCL ARAR by including a contingency for future active remediation, if warranted, as well as by preventing use of groundwater as drinking water. However, this alternative is not an active response anticipated to improve site groundwater quality. Because contaminants would remain on site, CERCLA requires that the site be reviewed every five years. If justified by the review, additional remedial actions might be implemented. Furthermore, if long-term groundwater monitoring indicated a need for further remediation, a contingency plan including possible groundwater remediation would be implemented.

The estimated capital cost is $500,000, including the costs already incurred for river bank stabilization activities. The estimated annualized operational and maintenance (O&M) costs are $40,000. The estimated net total present worth cost for construction and 30 years of O & M is $850,000. This alternative is readily implementable. Construction of the riverbank stabilization has been completed, groundwater monitoring has been ongoing at the site, and additional wells can easily be installed. The estimated time to install any additional monitoring wells is one month, not including any time for design activities or procurement of contracts. Implementation of institutional controls is also straightforward.

The elements of this alternative are also included in Alternatives 3, 4, 6, and 7.

Alternative 3 - ***Institutional Controls, Riverbank Stabilization, Long-Term Groundwater Monitoring, Future Action Contingency, and Native Soil Cover:*** Alternative 3 includes all the elements of Alternative 2, plus construction of a 2-foot thick native soil cover over the landfill. The post-closure cover is classified as a native soil cover, but was in need of repair to restore positive drainage and minimize the ponding of storm water, to fill in cracks and eroded rills, and to enhance evapotranspiration. This alternative would involve performing these repairs to re-establish a more effective native soil cover which will minimize infiltration (by increasing evapotranspiration) and the subsequent generation of leachate. These repairs include placing local borrow soil in settled areas and placing additional fill over the existing cover. Hydrologic modeling was performed to determine the efficiency of a native soil cover versus Subtitle D cover in reducing infiltration. The results of this modeling indicated that repairs to the existing cover using the local borrow area soil would provide an equivalent reduction in infiltration to that of a Subtitle D cover. The regraded area would be revegetated to control erosion caused by storm water runoff and promote evapotranspiration of soil water that would otherwise percolate through the cover and potentially contact the landfill contents. As discussed in the Scope and Role of Action section, bank stabilization and the cover improvement portions of this alternative are currently being implemented.

Bank stabilization and cover improvements are expected to reduce mobility of constituents within the landfill. However, this alternative will not reduce mobility, toxicity, or volume of contamination through treatment. The alternative addresses the MCL ARAR considering current groundwater use, and it meets MCL ARARs in the future by restricting groundwater use and site operations, by implementing an active response (i.e, cover repair) which is anticipated to improve groundwater quality and by including a contingency for future action if warranted. This alternative meets the Subtitle D ARAR by providing a cover with equivalent reduction in infiltration to a Subtitle D cover. Alternative 3 also meets the RAOs for the SFL. Furthermore, if long-term groundwater monitoring indicated a need for further remediation, a contingency plan for groundwater remediation would be implemented. Because the alternative would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, additional remedial actions might be implemented. (The native soil cover is also included in Alternatives 6 and 7.)

The updated conceptual estimated capital cost is $2,100,000. The estimated annualized O&M costs are $50,000. The estimated net total present worth cost for construction and 30 years of O & M is $2,500,000. The construction elements of this alternative are currently being implemented as a Removal Action with standard construction methods. Local borrow soil is available near the landfill. The estimated time to construct the native soil cover, which is to be started soon, is nine months.

Alternative 4 - ***Institutional Controls, Riverbank Stabilization, Long-Term Groundwater Monitoring, Future Action Contingency, and Single Barrier Cover:*** Alternative 4 includes the elements of Alternative 2, plus a landfill cover with a hydraulic barrier made of clay or a geosynthetic to reduce infiltration of storm water. The cover would also have a lateral drainage layer and vegetative soil surface above the barrier. Compared to the native soil cover, the single barrier cover includes a hydraulic barrier made of clay or geosynthetic, a drainage system, and an optional gas collection system. Bank stabilization and cover improvements would be expected to reduce mobility of constituents within the landfill. However, this alternative would not reduce mobility, toxicity, or volume of contamination through treatment. The alternative would meet the MCL ARAR considering current groundwater use. It would also meet MCL ARARs in the future by restricting groundwater use and site operations by implementing an active response (i.e., cover) which would be anticipated to improve groundwater quality and by including a contingency for future action if warranted. This alternative would also meet the Subtitle D ARAR and the RAOs for the SFL. Because the alternative would result in contaminants remaining on-site, CERCLA would require that the site be reviewed every five years. If justified by the review, additional remedial actions might be implemented. Furthermore, if long-term groundwater monitoring indicated a need for further remediation, a contingency plan including groundwater remediation would be implemented.

The estimated capital cost is $12,700,000 and the estimated annualized O&M costs are $50,000. The estimated total net present worth cost for construction and 30 years of O & M is $13,100,000. This alternative is implementable using standard construction methods. However, a local source of clay is not available. The estimated time to construct the single barrier cover is six to eight months. This time does not include any time for design activities or procurement of contracts.

Alternative 5 - ***Institutional Controls, Riverbank Stabilization, Long-Term Groundwater Monitoring, Native Soil Cover, and Physical Containment of Groundwater:*** Alternative 5 includes the elements of Alternatives 2 and 3 and a slurry wall surrounding the landfill to provide a barrier between the alluvial aquifer beneath the landfill and the rest of the aquifer. The slurry wall is not considered effective or technically feasible without a mechanism for groundwater removal because of the hydrologic and groundwater flow conditions at the site. This alternative was eliminated from further consideration and no costs were estimated.

Alternative 6 - ***Institutional Controls, Riverbank Stabilization, Long-Term Groundwater Monitoring, Native Soil Cover, and Hydraulic Containment of Groundwater:*** Alternative 6 includes a slurry wall surrounding the landfill, as discussed in Alternative 5, plus a groundwater extraction well within the confines of the slurry wall to assure effective containment of groundwater. A soil bentonite slurry wall around the boundary of the landfill would be approximately 9,100 linear feet installed to a depth of approximately 55 feet. In order to create an effective hydraulic barrier, groundwater from within the landfill would be extracted by a recovery well installed to a depth of approximately 70 feet pumping at a rate of approximately 250 gallons per minute (gpm). The intent of this system is to pump from within the slurry wall to maintain an inward gradient toward the landfill. The volume of groundwater projected to be collected is approximately 360,000 gallons per day (gpd). Alternative 6 would also include treating the extracted groundwater on the site to reduce the levels of organics. A groundwater treatment system would consist of a filtration system for solids/metals removal, an air stripper for VOC removal, and carbon adsorption vessels for polishing prior to discharge. Treated groundwater would be discharged directly to Threemile Creek. Quality of the treated water would meet or exceed the requirements of the Clean Water Act for discharging water to the environment. This alternative would also include the elements of Alternative 2 and Alternative 3. The alternative would effectively collect the potentially contaminated groundwater from the SFL and thus reduce and control the volume of contaminated groundwater at the site. This alternative would be expected to reduce the toxicity and mobility of the groundwater. The time frame to meet remedial goals would be expected to be long, however, and complete remediation might not be feasible. This alternative would meet the MCL ARAR by restricting groundwater and site use and by potential future attainment of MCLs in site groundwater. The Subtitle D ARAR would be met with the cover improvements.

The estimated capital cost is $7,000,000. The estimated annualized O&M costs are $170,000. The estimated total net present worth cost for construction and 30 years of operation is $9,500,000. Implementation of this alternative would require an aquifer test to confirm the projected groundwater recovery rate, a geotechnical evaluation to confirm site conditions before installing a slurry wall, and treatability testing to confirm effectiveness of the proposed treatment system. Installation of a recovery well should be readily implementable. Overall, this alternative could be implemented using available equipment and construction techniques. However, during the design phase, additional field work and data collection activities would be required prior to any construction activities associated with the installation of the slurry wall and groundwater extraction and treatment systems. The estimated time to construct the slurry wall is four to six months; construction of the groundwater extraction system would require approximately three months, and construction of the groundwater treatment system would take approximately six months. These times do not include any time for design activities or procurement of contracts. (Nor does duration does include the time required for construction of the native soil cover which has been initiated and would likely be completed prior to the start of construction of these other Alternative 7 features.)

Alternative 7 - ***Institutional Controls, Riverbank Stabilization, Long-Term Groundwater Monitoring, Native Soil Cover, and Groundwater Extraction, Treatment and Discharge:*** Alternative 7 involves the extraction of contaminated groundwater from three locations (near the downgradient edge of the SFL) where the RI data indicate the presence of organic contamination exceeding the RGs. Three extraction wells would be placed in the vicinity of the existing monitoring wells where the RG exceedances were observed. The extraction wells would draw groundwater from much of the eastern edge of the landfill. The estimated pumping rate of the recovery wells is 330 gpm per well, resulting in a total rate of approximately 1,000 gpm. Each recovery well would be installed to a depth of approximately 70 feet. The intent of this system would be to form a hydraulic barrier in the SFL which would prevent contaminants in the groundwater from migrating. The volume of groundwater expected to be collected is approximately 1,440,000 gpd. Extracted groundwater would be treated for organics and discharged to Threemile Creek in a similar manner as discussed in Alternative 6. The treatment system for Alternative 7 would consist of three air strippers piped in parallel for VOC removal, a filtration system for solids removal, and carbon adsorption vessels for polishing prior to discharge. Alternative 7 also includes the elements of Alternative 2 and Alternative 3. Potentially contaminated groundwater from the SFL would be effectively collected, thus reducing and controlling the volume of contaminated groundwater at the site. This alternative would be expected to reduce the toxicity and mobility of the groundwater. The time frame to meet remedial goals would be expected to be long, however, and complete remediation might not be feasible. Alternative 7 would meet ARARs.

The estimated capital cost is $4,200,000. The estimated O&M costs are $330,000. The estimated total net present worth cost for construction and 30 years of operation is $8,500,000. As discussed in Alternative 6, implementation of this alternative would require an aquifer test to confirm the projected groundwater recovery rate and treatability testing to confirm effectiveness of the proposed treatment system. A building for the treatment system must be designed to function in a 50-year floodplain. Installation of recovery wells should be a relatively straightforward process. Overall, this alternative could be implemented using available equipment and construction techniques, but it would not be a straightforward process due to the confirmatory testing required prior to installation of the groundwater recovery and treatment system. The estimated time to install the groundwater extraction system is three months and construction of the treatment system would require approximately six months, not including time for design activities or procurement of contracts. (As for Alternative 6, this duration does not include the construction of the native soil cover.)

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against the nine evaluation criteria namely, overall protection of human health and the environment, compliance with applicable or relevant and appropriate requirements, long-term effectiveness and permanence, reduction of toxicity,mobility, or volume, short-term effectiveness, implementability, cost, and state and community acceptance.

A comparative analysis of these alternatives, based upon the evaluation criteria noted above, is as follows:

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

The existing conditions are currently protective of human health and the environment because groundwater at the site is not currently used for drinking water and there is no unacceptable human exposure to the site. Considering the reasonable maximum exposure scenario discussed in the risk assessment, the no action alternative (Alternative 1) is not protective of human health and the environment because this alternative does not address the potential exposure to landfill contents and the potential future exposure from using the groundwater as drinking water. The remaining alternatives (Alternatives 2, 3, 4, 6, 7) provide protection against the potential exposure scenarios discussed in the baseline risk assessment and therefore meet this criterion. For these alternatives, protection of human health is achieved with institutional controls that would prohibit the future use of site groundwater, with erosion control measures which protect against exposure to landfill contents, and with long-term groundwater monitoring. Alternative 2 details these institutional controls, the erosion control measures, and long-term monitoring. The elements of Alternative 2 are included in Alternatives 3, 4, 6, and 7. Alternatives 6 and 7 collect the potentially contaminated groundwater and thus reduce and control the volume of contaminated groundwater at the site. Alternatives 6 and 7 are expected to reduce the toxicity and mobility of the groundwater. However, the time frame to meet the remedial goals is expected to be long, and complete remediation may not be feasible.

- Compliance with applicable or relevant and appropriate requirements (ARARs) addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

The RI indicates that groundwater is the only environmental medium at the site that has constituent levels above their corresponding chemical-specific ARARs. All the alternatives are currently in compliance with ARARs because use of groundwater with concentrations above MCLs is not occurring. Alternative 1 (no-action) does not, however, comply with ARARs considering a potential, future groundwater use scenario as discussed in the FS report. Because the other alternatives (Alternatives 2, 3, 4, 6, 7) include institutional controls prohibiting future groundwater use and a contingency plan (Alternatives 2, 3 and 4) for future active remediation if appropriate, compliance with the MCL ARAR is achieved. However, Alternative 2 is not expected to be acceptable for the site because groundwater quality is not actively addressed. Alternative 3 is in compliance with the Subtitle D ARAR by providing infiltration reduction equivalent with a Subtitle D cover.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

As a "no-action" alternative, Alternative 1 does not address potential future groundwater exposure or potential exposure to landfill contents. Evaluation of this alternative for long-term effectiveness and permanence is not applicable.

Alternative 2 relies on institutional controls to address future groundwater use, but does not address proper drainage and erosion control on the existing cover. Alternative 2 does include erosion control measures along the riverbank to protect against exposure to landfill contents.

Alternatives 3 and 4 rely on the institutional controls detailed in Alternative 2 to address future groundwater use. Additionally, these alternatives include actions to prevent ponding and erosion on the cover along with the erosion control measures along the riverbank, thus helping to protect against exposure to landfill contents.

With Alternatives 2, 3, and 4, the long-term groundwater monitoring program would detect future changes in groundwater quality, if any. If long-term groundwater monitoring indicated a need for further remediation, a contingency plan including groundwater remediation would be implemented. Periodic inspections of the landfill cover and riverbank conditions are appropriate, and a 5-year review to assess overall site conditions would be required.

Alternatives 6 and 7 include the institutional controls and riverbank stabilization detailed in Alternative 2 and the native soil cover described in Alternative 3. The long-term effectiveness and permanence of these alternatives is described above. Additionally, Alternatives 6 and 7 involve groundwater recovery and treatment and active restoration of the aquifer. However, it is currently unknown how long the restoration of the aquifer to RGs would require, and it is questionable whether it is technically feasible to achieve contaminant levels at or below RGs in the aquifer. Several references indicate that restoration of contaminated groundwater to low concentration levels (ppb) may not be technically practicable or feasible. In addition to the periodic inspections of the landfill cover and riverbank conditions, various operation and maintenance activities would be associated with the treatment system in order to maintain its effectiveness.

- Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

Evaluation of Alternative 1 for short-term effectiveness is not applicable since this is a "no-action" alternative. Currently, no human exposure to groundwater exists and the landfill is not a threat to human health and the environment.

Alternative 2 does not involve on-site activities or disturbances of the existing landfill cover. Risks to the community and on-site workers during construction activities associated with riverbank stabilization is minimal. The potential risk of exposure to groundwater sampling personnel would be controlled with adherence to OSHA requirements.

Alternatives 3, 4, 6, and 7 involve on-site work, but there are no anticipated significant adverse impacts to on-site workers or the community during construction activities. Alternatives 6 and 7 involve intrusive activities and require additional on-site activities prior to construction to confirm design parameters.

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies a remedy may employ.

Alternatives 1, 2, 3, and 4 do not involve treatment and thus will not reduce the toxicity or volume of the waste. By reducing infiltration, Alternatives 3 and 4 may reduce the mobility of contaminants. Hydrologic modeling indicated that the native soil cover of Alternative 3 and the single barrier cover of Alternative 4 provide reduction in infiltration comparable to that of a Subtitle D cover. Alternative 4 would be anticipated to be more effective in limiting infiltration into the SFL than the soil cover of Alternative 3. However, hydrologic modeling has shown the difference to be minor. Alternatives 6 and 7 involve recovery and treatment of groundwater. The recovery well/slurry wall of Alternative 6 and the recovery well collection system of Alternative 7 would reduce the mobility and volume of groundwater contaminants. Treatment of collected groundwater for organics would reduce the toxicity and volume of contamination in the groundwater. However, since groundwater contamination is characterized as isolated, sporadic exceedances of RGs and because complete restoration of groundwater is expected to require long-term operation and may not be practical or feasible, the actual benefit of groundwater recovery and treatment may not be significant.

- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

Alternative 1 is a "no-action" alternative, so implementability is not applicable.

The institutional controls and groundwater monitoring associated with Alternative 2 may be readily implemented. Construction of the riverbank stabilization was completed in the Spring of 1994.

Alternative 3 is readily implementable with standard construction methods. Repairs to the existing landfill cover are currently under design and planned for construction. Additionally, local borrow soil is available from a nearby borrow source.

Alternative 4 is implementable using standard construction methods. However, a local source of clay is not available, thus implementing Alternative 4 would require use of a geosynthetic barrier or clay soil which would be hauled from a borrow area located a significant distance from the site.

Implementation of Alternative 6 is not a straightforward process. The installation of a slurry wall would require additional geotechnical evaluation and coordination with various regulatory agencies and contractors. Adverse site conditions may impact the construction duration and cost of the slurry wall installation. Design of the groundwater recovery system would require an aquifer test to confirm the potential effectiveness of the system as designed. Treatability testing of recovered groundwater would be required to confirm the effectiveness of the treatment system as designed. A treatment building would be required to contain the treatment system. This building and the treatment system must be designed to function in a 50-year floodplain. Equipment for the proposed treatment system is readily available from vendors.

Uncertainties exist relative to the design of the extraction and treatment system of Alternative 7. An aquifer pumping test would be required to address the pumping rate required to meet the alternative's objectives. The pumping rate might be so significantly higher that treatment would be impractical or cost prohibitive. The required flow rates might be excessively high for discharge to the receiving stream. Also, a treatability test of the groundwater to confirm the treatment design and project costs would be required. Thus, implementation of Alternative 7 is not a straightforward process.

- Cost includes estimated capital and operation and maintenance costs, and net present worth costs. Table 2 presents a summary of the estimated costs of each of the alternatives.

The estimated capital, operation and maintenance, and present worth costs for each alternative are presented in the "Summary of Remedial Alternatives" section of this Proposed Plan.

No costs are associated with Alternative 1, and limited capital, O&M, and present worth costs would be associated with Alternative 2. The costs of Alternative 3 would be higher than those of Alternative 2 but are significantly lower than Alternatives 4, 6, and 7.

Alternatives 4, 6, and 7 would be significantly greater in cost than the other alternatives, with Alternative 4 being the costliest in terms of capital and present worth costs.

- Regulatory Agency acceptance indicates whether, based on its review of the RI/FS reports and Proposed Plan, the EPA and KDHE concur, oppose, or have no comment on the preferred alternative at the present time.

EPA and KDHE have indicated their preference for Alternative 3 as evidenced by their review comments and approval of the RI/FS reports, and review comments on the Proposed Plan.

- Community acceptance of the preferred alternative will be assessed in the Record of Decision (ROD) following a review of the public comments received on the RI/FS reports and the Proposed Plan.

Table 2

SUMMARY OF ALTERNATIVES AND ASSOCIATED COSTS
Southwest Funston Landfill
Fort Riley, Kansas

Alternative		Capital Cost ($)	Operation & Maintenance (Annualized) ($)	Total Cost (Present Worth) ($)
Alt 1	No Action	0	0	0
Alt 2	Institutional Controls, River Bank Stabilization, Longterm Monitoring and Future Action Contingency	500,000	40,000	850,000
Alt 3	Alt 2 plus Native Soil Cover	2,100,000	50,000	2,500,000
Alt 4	Alt 2 plus Single Barrier Cover	12,700,000	50,000	13,100,000
Alt 5	Alt 3 plus Physical Containment of Groundwater	---	---	---
Alt 6	Alt 3 plus Physical & Hydraulic Containment of Groundwater	7,000,000	170,000	9,500,000
Alt 7	Alt 3 plus Groundwater Extraction & Treatment	4,200,000	330,000	8,500,000

Costs reflect a -30% to +50% accuracy, developed for comparison purposes only.
Values are rounded to the nearest $ 10,000 or $ 100,000.

PREFERRED ALTERNATIVE

At the present time, the frequency of occurrence of contamination in the groundwater and contaminant concentrations do not warrant treatment. Therefore, based upon an evaluation of the various alternatives, Fort Riley, EPA Region VII, and KDHE recommend Alternative 3 as the preliminary choice for the site remedy. This alternative includes institutional controls, long-term groundwater monitoring, Kansas River bank stabilization (installed in Spring 1994 as a Removal Action), repairs to the existing soil cover (currently being implemented as a Removal Action) and a contingency for future remediation of groundwater, if warranted. If the future long-term groundwater monitoring indicates that concentrations are increasing or contaminants are migrating off site, then other remedial alternatives will be re-evaluated and remediation goals will be specified during the design phase.

There are significant uncertainties surrounding the feasibility and effectiveness of Alternatives 6 and 7, which involve active remediation of groundwater. Because the RI characterizes the groundwater contamination as isolated, sporadic detections of contaminants at levels above RGs, it is reasonable and prudent to select long-term monitoring as the groundwater response measure. Long-term groundwater monitoring is important to understand the potential extent of contamination and to understand groundwater flow paths. Long-term groundwater monitoring will allow for detection of increases in contaminant concentrations in the vicinity of the SFL and will help determine if constituents from the SFL are migrating under Threemile Creek.

The native soil cover is preferred over the single barrier cover because the single barrier cover is not anticipated to provide a significant, incremental benefit to controlling contaminant migration from the landfill to groundwater when compared to the native soil cover. The single barrier cover will reduce infiltration, but the groundwater can still rise into the landfill contents and groundwater levels will not be significantly impacted by either cover. The slight benefit of reduced infiltration with the single barrier cover does not justify the significant difference in cost.

The preferred native soil cover alternative is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the extent practicable. However, since the contaminant source, the site itself, could not be effectively excavated and treated due to its large size and absence of hot spots representing major sources of contamination, none of the alternatives considered would satisfy the statutory preference for treatment as a principal element of the remedy with respect to source control.

GLOSSARY
Of Terms Used In The Proposed Plan

This glossary defines the technical terms used in this Proposed Plan. The terms and abbreviations contained in this glossary are often defined in the context of hazardous waste management, and apply specifically to work performed under the CERCLA program. Therefore, these terms may have other meanings when used in a different context.

Alluvial: An area of sand, clay, or other similar material that has been gradually deposited by moving water, such as along a river bed or the shore of a lake.

Aquifer: An underground layer of rock, sand, or gravel capable of storing water within cracks and pore spaces, or between grains. When water contained within an aquifer is of sufficient quantity and quality, it can be tapped and used for drinking or other purposes. The water contained in the aquifer is called groundwater.

Borrow area: An excavated area where soil, sand, or gravel has been dug up for use elsewhere.

Carcinogenic: Capable of causing the cells of an organism to react in such a way as to produce cancer.

Closure: The process by which a landfill stops accepting wastes and is shut down under federal or state guidelines that ensure the public and the environment is protected.

Containment: The process of enclosing or containing hazardous substances in a structure, typically in ponds and lagoons, to prevent the migration of contaminants into the environment.

Contingency Plan: A document setting out an organized, planned and coordinated course of action to be followed in the case that an event threatens human health or the environment.

Downgradient/downslope: A downward hydrologic slope that causes groundwater to move toward lower elevations. Therefore, wells downgradient of a contaminated groundwater source are prone to receiving pollutants.

Federal Facility Agreement (FFA) or Interagency Agreement (IAG): A written agreement between EPA and a federal agency that has the lead for site cleanup activities (e.g., the Department of Defense), that sets forth the roles and responsibilities of the agencies for performing and overseeing the activities. States are often parties to interagency agreements.

Evapotranspiration: The loss of water from soil both by evaporation and transpiration from plants growing in the soil.

Five Year Review: CERCLA requirement for alternatives which would result in contaminants staying on site is that the site be reviewed every 5 years.

Hydrogeology: The geology of groundwater, with particular emphasis on the chemistry and movement of water.

Infiltration or Percolation: The downward flow or filtering of water or other liquids through subsurface rock or soil layers, usually continuing downward to groundwater.

Installation Restoration Program (IRP): The specially funded program established in 1978 under which the Department of Defense has been identifying and evaluating its hazardous waste sites and controlling the migration of hazardous contaminants from those sites.

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 contaminant migration, such as fencing, deed restrictions, and groundwater monitoring.

Landfill: A disposal facility where waste is placed in or on land.

Leachate: The liquid that trickles through or drains from waste, carrying soluble components from the waste.

Leach/Leaching: The process by which soluble chemical components are dissolved and carried through soil by water or some other percolating liquid.

Long-Term Monitoring: Groundwater monitoring, typically for a period of 30 years; normally required with alternatives which leave contaminants on site.

Migration: The movement of contaminants, water, or other liquids through porous and permeable rock.

Mitigation: Actions taken to improve site conditions by limiting, reducing, or controlling toxicity and contamination sources.

National Contingency Plan (NCP): A plan which puts into effect the response powers and responsibilities created by CERCLA. The plan includes policies and procedures that the federal government follows in implementing responses to hazardous substances.

Plume: A body of contaminated groundwater flowing from a specific source. The movement of the groundwater is influenced by such factors as local groundwater, flow patterns, the character of the aquifer in which groundwater is contained, and the density of the contaminants.

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

Remedial: A course of study combined with actions to correct site contamination problems through identifying the nature and extent of cleanup strategies under the CERCLA program.

Runoff: The discharge of water over land into surface water. It can carry pollutants from the air and land into receiving waters.

Sediment: The layer of soil, and minerals at the bottom of surface waters, such as streams, lakes, and rivers that may absorb contaminants.

Slurry Wall: Barrier used to contain the flow of contaminated groundwater or subsurface liquids. Slurry walls are constructed by digging a trench around a contaminated area and filling the trench with an impermeable material that prevents water from passing through it. The groundwater or contaminated liquids trapped within the area surrounded by the slurry wall can be extracted and treated.

Stabilization: The process of changing an active substance to inert, harmless material, or physical activities at a site that act to limit the further spread of contamination without actual reduction of toxicity.

Upgradient/Upslope: Upstream; an upward slope. Demarks areas that are higher than contaminated areas and, therefore, are not prone to contamination by the movement of polluted groundwater.

Upper Confidence Limit (UCL): A statistical parameter used to estimate an upper bound on the mean value of a data set with a stated degree of confidence. Typically, the 95% UCL is used as an estimate of exposure point concentrations at CERCLA sites.

Volatile Organic Compounds (VOCs): VOCs are made as secondary petrochemicals. They include light alcohols, acetone, trichloroethylene, perchloroethylene, dichloroethylene, benzene, vinyl chloride, toluene, and methylene chloride. These potentially toxic chemicals are used as solvents, degreasers, paints, thinners, and fuels. Because of their volatile nature, they readily evaporate into the air, increasing the potential exposure to humans. Due to their low water solubility, environmental persistence, and wide-spread industrial use, they are commonly found in soil and groundwater.

COMMUNITY ROLE IN SELECTION PROCESS

Fort Riley, the Environmental Protection Agency (EPA), and the Kansas Department of Health and Environment (KDHE) rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for the Southwest Funston Landfill (SFL) site. To this end, the Remedial Investigation (RI) and Feasibility Study (FS) reports, this Proposed Plan, and supporting documentation have been made available to the public for a public comment period which begins on November 9, 1994 and concludes on December 9, 1994.

A public meeting will be held during the public comment period to present the conclusions of the RI/FS, to elaborate further on the reasons for recommending the preferred remedial alternative, and to receive public comments. This meeting is to be held on November 15, 1994 at the Fort Riley Community Club (formerly the Officer's and Leader's Club), Building 446, on Huebner Road on Main Post. A brief formal presentation will be made at 6:30 p.m. following which questions will be addressed and public comments heard. An Availability Session will begin at 5:00 p.m. and continue following the formal session until 8:00 p.m. During the Availability Session, project information will be available for viewing and project team members will be available for individual or small group discussions of the project in an informal setting.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

All written comments should be addressed to:

PUBLIC WORKS
ATTN AFZN PW V JANET WADE
1970 2ND STREET
FORT RILEY KANSAS 66442-6016

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

<u>Information Repositories</u>

Dorothy Bramlage Public Library
230 West Seventh Street
Junction City, Kansas
(913) 238-4311
Hours: Monday - Saturday 9:30 a.m. - 6 p.m.
Sunday 1 p.m. - 6 p.m.

Manhattan Public Library
Corner of Juliette & Poyntz Streets
Manhattan, Kansas 66502
(913) 776-4741
Hours: Monday - Friday 9 a.m. - 9 p.m.
Saturday 9 a.m. - 6 p.m.
Sunday 2 p.m. - 6 p.m.

Clay Center Carnegie Library
Clay Center, Kansas 67432
(913) 632-3889
Hours: Monday and Wednesday 2 p.m. - 8 p.m.
Tuesday and Thursday 10 a.m. - 8 p.m.
Friday 2 p.m. - 6 p.m.
Saturday 10 a.m. - 2 p.m.

<u>Administrative Record</u>

Public Works, Environmental
and Natural Resources Division
Building 1970, Camp Funston
Fort Riley, Kansas 66442
(913) 239-3962
Hours: Monday - Friday 8:30 a.m. - 4 p.m.

A limited number of copies of this Proposed Plan are available for distribution at above locations, at the Public Meeting, or may be requested from the Fort Riley Public Works Environmental and Natural Resources Division, telephone (913) 239-8662 or 3343, or the Fort Riley Public Affairs Office, Building 405, telephone (913) 239-3032.